Iowa Department of Transportation

MINUTES
OF
IOWA D.O.T. SPECIFICATION COMMITTEE MEETING

April 8, 2010

Members Present:	Jim Berger	Office of Materials
	Roger Bierbaum	Office of Contracts
	Donna Buchwald	Office of Local Systems
	Eric Johnsen, Secretary	Specifications Section
	Bruce Kuehl	District 6 - Construction
	Deanna Maifield	Office of Design
	Doug McDonald	District 1 - Marshalltown RCE
	Gary Novey	Office of Bridges & Structures
	Dan Redmond	District 4 - Materials
	Tom Reis, Chair	Specifications Section
	John Smythe	Office of Construction
Members Not Present:	John Adam	Statewide Operations Bureau
	Troy Jerman	Office of Traffic & Safety
Advisory Members Present:	Kevin Jones	Office of Materials
	Lisa Rold	FHWA
	Paul Wiegand	SUDAS
Others Present:	None	

Tom Reis, Specifications Engineer, opened the meeting. The following items were discussed in accordance with the agenda dated April 1, 2010:

1. Article 1108.02, K, Accelerated Work Schedule.
The Office of Contracts requested changes to clarify when an accelerated work schedule will be allowed.

2. Section 2301, Portland Cement Concrete Pavement
The Office of Construction requested changes adding method of measurement and basis of payment information for Rumble Strip Panel (PCC Surface).

3. Section 2402, Foundation Treatment Material.
The Office of Construction requested changes to clarify method of measurement and basis of payment information for Foundation Treatment Material.

4. Articles 2507.02, Materials and 4196.01, B.
The Office of Materials requested changes to add specifications for engineering fabric for under Concrete and Stone Revetment.

5. Section 2522, Tower Lighting.
The Office of Traffic and Safety requested changes to tower lighting specifications.

6. Article 2526.03, Survey.
The Office of Construction requested changes to add separate specifications for surveying a PCC Overlay.

7. Section 2529, Full Depth Finish Patches.
The Office of Construction requested changes to add method of measurement and basis of payment information for EF Joint Assemblies and Rumble Strip Panel (Full Depth Patch).

8. Section 2548, Milled Shoulder Rumble Strips.
The Office of Design requested changes to add specifications for Milled Centerline Rumble Strips.

9. DS-090XX, Developmental Specifications for PCC Pavement Non-Destructive Thickness Determination.
The Office of Materials requested approval of a DS for PCC Pavement Non-Destructive Thickness Determination.

10. SS-09004, Supplemental Specifications for Mobilization for Erosion Control.
The Office of Construction requested changes to SS for Mobilization for Erosion Control.

11. DS-09XXX, Developmental Specifications for Safety Edge.
The Specifications Section requested approval of a Developmental Specification describing the contract requirements for a Safety Edge.

12. DS-09040, Developmental Specifications for Asphalt Concrete Mixtures.
The Developmental Specifications for Asphalt Concrete Mixtures were approved at the March 11, 2010 Specification Committee meeting. In discussions since those meeting minutes were issued, the application of this specification has been revised. This specification will apply to all Interstate and Primary Road projects starting with the June 2010 letting. This specification will apply to all federally funded Local Systems projects starting in July 2010. The specification language will be incorporated into the October 2010 General Supplemental Specifications and will apply to all projects let through the Department.

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Roger Bierbaum	**Office:** Contracts	**Item 1**
Submittal Date: March 22, 2010	**Proposed Effective Date:** October 2010 GS	
Article No.: 1108.02, K **Title:** Accelerated Work Schedule	**Other:**	

Specification Committee Action: Approved as is.

Deferred:	**Not Approved:**	**Approved Date:** 4/8/2010	**Effective Date:** 10/19/2010

Specification Committee Approved Text: See Specification Section Recommended Text.

Comments: None.

Specification Section Recommended Text:

1108.02, K, Accelerated Work Schedule.

Replace Article 2 and **add** Article 3:

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

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

Comments:

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

K. Accelerated Work Schedule.

1. An accelerated work schedule may be required by a note on the proposal. When required, the Contractor shall marshal the necessary forces, including but not limited to, extra crews, subcontractors, extra work hours, or other acceptable methods to insure completion of the project, or various stages of the project, within the contract period and in compliance with the specifications.

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

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

Reason for Revision: At the joint specification meeting with the ICPA last fall, contractors noted that on occasion they are being denied the opportunity to work nights or weekends on projects with bonuses.

County or City Input Needed (X one)	**Yes**	**No** X
Comments:		

Industry Input Needed (X one)			**Yes** X	**No**	
Industry Notified:	**Yes** X	**No**	**Industry Concurrence:**	**Yes** X	**No**
Comments: Requested by industry					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: John Smythe / Kevin Merryman	**Office:** Construction	**Item 2**
Submittal Date: March 25, 2010	**Proposed Effective Date:** October 2010	
Article No.: 2301.04 **Title:** Method of Measurement (PCC Pavement) **Article No.:** 2301.05 **Title:** Basis of Payment (PCC Pavement)	**Other:**	

Specification Committee Action: Approved as is.

Deferred:	**Not Approved:**	**Approved Date:** 4/8/2010	**Effective Date:** 10/19/2010

Specification Committee Approved Text: See Specification Section Recommended Text.

Comments: The Methods Section will remove MOM/BOP from the Road Standard to coincide with the specification change.

Specification Section Recommended Text:

2301.04, METHOD OF MEASUREMENT.

Add the following Article:

J. Rumble Strip Panel (PCC Surface)

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

2301.05 BASIS OF PAYMENT.

Renumber Article J to Article K:

~~**J**~~**K. General.**

Add the following Article:

J. Rumble Strip Panel (PCC Surface)

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

Comments:

Member's Requested Change (Redline/Strikeout):

Add the following;

2301.04 METHOD OF MEASUREMENT.

J. Rumble Strip Panel (PCC Surface)

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

2301.05 BASIS OF PAYMENT.

J. Rumble Strip Panel (PCC Surface)

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

~~**J**~~**K. General.**

Reason for Revision: To include measurement and payment information in the specifications for Rumble Strip Panels placed in PCC pavement. This information is currently found on Design Typical 7132.

County or City Input Needed (X one)	**Yes**	**No** X
Comments:		

Industry Input Needed (X one)			**Yes**	**No** X	
Industry Notified:	**Yes** X	**No**	**Industry Concurrence:**	**Yes**	**No**
Comments:					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: John Smythe	**Office:** Construction	**Item 3**
Submittal Date: March 19, 2010	**Proposed Effective Date:** October 2010	
Article No.: 2402.04, F **Title:** Method of Measurement (Foundation Treatment Material) **Article No.:** 2402.05, F **Title:** Basis of Payment (Foundation Treatment Material)	**Other:**	

Specification Committee Action: Approved with changes.

Deferred:	**Not Approved:**	**Approved Date:** 4/8/2010	**Effective Date:** 10/19/2010

Specification Committee Approved Text:

2402.04, F, Foundation Treatment Material.

Replace Article 1:

1. The Engineer will compute the quantity of excavation for foundation treatment ~~material measured for payment~~ in cubic yards (cubic meters) ~~from measurements of the space to be excavated and backfill material placed, or it may be measured in the transporting vehicle or weighed~~.

The quantity of foundation treatment material will be measured for payment in tons (Mg).

Delete Article 3:

~~**3.** When weighing is accepted as the method of measurement and the material is weighed prior to delivery, the cubic yards (cubic meters) will be determined by the method outlined in Article 2312.04, A.~~

2402.05, F, Foundation Treatment Material.

Replace the Article:

Payment for foundation treatment material furnished according to Article 2402.03, C, will be at the Contractor's unit delivered invoiced cost per ~~cubic yard (cubic meter)~~ ton (Mg) plus the applicable contract unit price per cubic yard (Mg) for the class of excavation ~~treated, but not to exceed $25 per cubic yard ($33 per cubic meter) for the combined cost of excavation and treatment~~ performed.

Comments: Per a comment from the Office of Bridges and Structures, the method of measurement for excavation related to Foundation Treatment was revised to eliminate some confusion on computed versus measured quantity.

Specification Section Recommended Text:

2402.04, F, Foundation Treatment Material.

Replace Article 1:

1. The Engineer will compute the quantity of excavation for foundation treatment ~~material~~ measured for payment in cubic yards (cubic meters) ~~from measurements of the space to be excavated and backfill material placed, or it may be measured in the transporting vehicle or weighed~~.

The quantity of foundation treatment material will be measured for payment in tons (Mg).

Delete Article 3:

~~**3.** When weighing is accepted as the method of measurement and the material is weighed prior to delivery, the cubic yards (cubic meters) will be determined by the method outlined in Article 2312.04, A.~~

2402.05, F, Foundation Treatment Material.

Replace the Article:

Payment for foundation treatment material furnished according to Article 2402.03, C, will be at the Contractor's unit delivered invoiced cost per ~~cubic yard (cubic meter)~~ ton (Mg) plus the applicable contract unit price per cubic yard (Mg) for the class of excavation ~~treated, but not to exceed $25 per cubic yard ($33 per cubic meter) for the combined cost of excavation and treatment~~ performed.

Comments:

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

Replace 2402.04 F 1 with the following:

F. Foundation Treatment Material.

1. ~~The Engineer will compute the quantity of foundation treatment material measured for payment in cubic yards (cubic meters) from measurements of the space to be excavated and backfill material placed, or it may be measured in the transporting vehicle or weighed.~~ The Engineer will compute the quantity of excavation for the foundation treatment measured for payment in cubic yards (cubic meters). The quantity of foundation treatment material will be measured for payment in tons (Mg).

2. Foundation treatment material not ordered placed by the Engineer or quantities in excess of the quantity ordered placed by the Engineer will not be measured for payment.

Delete 2402.04 F 3

~~**3. When weighing is accepted as the method of measurement and the material is weighed prior to delivery, the cubic yards (cubic meters) will be determined by the method outlined in Article 2312.04, A.**~~

Replace 2402.05 F with the following:

F. Foundation Treatment Material.

Payment for foundation treatment material furnished according to Article 2402.03, C, will be at the Contractor's unit delivered invoiced cost per ~~cubic yard (cubic meter)~~ ton (Mg) plus the applicable contract unit price per cubic yard (Mg) for the class of excavation ~~treated~~ performed. ~~but not to exceed $25 per cubic yard ($33 per cubic meter) for the combined cost of excavation and treatment.~~

Reason for Revision: Current pay limits are not sufficient to fairly compensate contractors for this type of work.

County or City Input Needed (X one)	**Yes**	**No** X
Comments:		

Industry Input Needed (X one)			**Yes**	**No** X	
Industry Notified:	**Yes** X	**No**	**Industry Concurrence:**	**Yes** X	**No**
Comments: Discussed at AGC/DOT joint spec meeting.					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Jim Berger	**Office:** Materials	**Item 4**
Submittal Date: 3-8-10	**Proposed Effective Date:** October 2010	
Article No.: 2507.02, D **Title:** Engineering Fabric **Article No.:** 4196.01, B, 6 **Title:** Concrete and Stone Revetment, (Engineering Fabrics)	**Other:**	

Specification Committee Action: Approved with changes.

Deferred:	**Not Approved:**	**Approved Date:** 4/8/2010	**Effective Date:** 10/19/2010

Specification Committee Approved Text:

2507.02, Materials.

Add Article D:

D. Engineering Fabric.

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

4196.01, B

Add Article 6:

6. Concrete and Stone Revetment and Bridge Abutment Backfill Fabric.

Use engineering fabric having properties listed in Table 4196.01-6.

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

Property	Value	Test Method
Tensile Strength (at 5% Strain)	1356 lbs/ft (19.8 kN/m)	ASTM D 4595
Apparent opening size (AOS)	US Sieve #40 (0.43 mm)	ASTM D 4751
UV resistance (at 500 hours)	70% retained strength	ASTM D 4355
Flow Rate	18 gal./min./ft^2 (733 L/min./m^2)	ASTM D 4491

Comments: The Office of Materials submitted a new property table that includes flow rate.

Specification Section Recommended Text:

2507.02, Materials.

Add Article D:

D. Engineering Fabric.

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

4196.01, B

Add Article 6:

6. Concrete and Stone Revetment and Bridge Abutment Backfill Fabric.

Use engineering fabric having the properties listed in Table 4196.01-6.

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

Property	Value	Test Method
Tensile Strength (at 5% Strain)	1356 lbs/ft (19.8 kN/m)	ASTM D 4595
Apparent opening size (AOS)	US Sieve #40 (0.43mm)	ASTM D 4751
UV resistance (at 500 hours)	70% retained strength	ASTM D 4355

Comments:

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

2507.02

D. Engineering Fabric.

Meet the requirements of Section 4196.01-6 and be listed on Materials IM 496.01 Appendix G.

4196.01-6 Concrete / Stone Revetment and Bridge Abutment Backfill Fabric.

Use engineering fabric which has the properties listed in table 4196.01-6.

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

Property	**Value**	**Test Method**
Tensile Strength (at 5% Strain)	1356 lbs/ft(19.8 kN/m)	ASTM D 4595
Apparent opening size(AOS)	US Sieve#40 (0.43mm)	ASTM D 4751
UV resistance(at 500 hours)	70% retained strength	ASTM D 4355

Reason for Revision: Engineering Fabric requirements were omitted in the Standard Specs.

County or City Input Needed (X one)	**Yes**	**No** X
Comments:		

Industry Input Needed (X one)			**Yes**	**No** X	
Industry Notified:	**Yes**	**No** X	**Industry Concurrence:**	**Yes**	**No** x
Comments:					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Troy Jerman / Mike Jorgenson	**Office:** Bridges and Structures	**Item 5**
Submittal Date: 03/29/2009	**Proposed Effective Date:** October 2010	
Section No.: 2522 **Title:** Tower Lighting	**Other:**	

Specification Committee Action: Deferred until May.

Deferred: X	**Not Approved:**	**Approved Date:**	**Effective Date:**

Specification Committee Approved Text:

Comments: The Office of Traffic and Safety and Office of Bridges and Structures are still working on this revision.

Specification Section Recommended Text:

2522.01, A.

Replace the first sentence of the Article:

This specification is for design, fabrication, and construction of tower lighting systems, consisting of footings, towers, luminaires, and associated appurtenant items required by the contract documents.

2522.03, D, 1.

Replace the Article:

Weld and fabricate steel structures according to Article 2408.03, B except that gas~~,~~ metal arc~~,~~ and flux cored arc welding processes will be permitted.

2522.03, E, Lighting Tower.

Replace the first paragraph:

Ensure the structural design of the tower and its appurtenances meet the requirements of the current AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals," and interims with the following clarifications:

2522.03, E, 1, Wind Velocity.

Add the following to the end of the Article:

Fatigue requirements shall be Cat I with Vortex Shedding included.

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

Replace the Article:

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

~~**a.**~~ Furnish each anchor bolt with one leveling nut and two anchoring nuts. ~~Use a~~Anchor bolts ~~that:~~ shall meet the requirements of Materials I.M. 453.08.

- ~~Meet the requirements of ASTM F 1554, Grade 105 (724 MPa),~~
- ~~Are full-length galvanized,~~
- ~~Are high-strength low alloy steel, and~~
- ~~Unless specified otherwise, are Unified Coarse Thread Series with Class 2A tolerance.~~

~~**b.** Color code, in red, the end of each anchor bolt intended to project from the concrete to identify the grade.~~

~~**c.** Use galvanized washers that meet the requirements of ASTM F 436.~~

~~**d.** Use heavy hex, galvanized nuts that meet the requirements of ASTM A 563, DH. Nuts may be over-tapped according to the allowance requirements of ASTM A 563.~~

2522.03, E, 5, a.

Replace the second sentence of the Article:

Keep the holes cut out in the base plate for utility lines to a ~~minimum, subject to the Engineer's approval~~ maximum diameter of 12 inches (300 mm) as shown on the contract document.

2522.03, E, 7, b.

Replace the Article:

b. ~~When designated in the contract documents~~ Testing:

- Radiographically inspect 100% of the full penetration section~~s~~ of the longitudinal seam well at the base plate connection location, and
- Use the magnetic particle method to inspect a random 10% of the partial penetration section of the longitudinal seam welds.

2522.03, E, 10, a.

Replace the second sentence of the Article:

~~Ensure the handhole is reinforced to maintain the design strength of the pole.~~ Reinforce the handhole as shown in the contract document.

2522.03, E, 10, c.

Replace the first sentence of the Article:

Ensure the door ~~is hinged and~~ is fabricated from the same type of steel as the poles.

2522.03, G, 1, a.

Replace the Article:

In a three lift cable system, ~~E~~ensure the luminaire frame and head frame assembly meet the requirements of ASTM A 709 Grade 50 (345 MPa). For the purpose of Charpy V-notch toughness requirements, all steel required to be ASTM A 709 Grade 50 (345 MPa) will be considered main members. Miscellaneous appurtenant steel components may be constructed using ASTM A 709 Grade 36 (250 MPa) steel. Ensure all steel and the head frame dome are galvanized. Alternately in a two lift cable system, the luminaire frame, head frame and miscellaneous appurtenant steel components will all be fabricated from ASTM A 240 Type 201LN Stainless Steel.

2522.03, G, 1, e.

Replace the first sentence of the Article:

In a three lift cable system, ~~I~~install three or more spring loaded centering arms with rubber or nylon rollers to control lateral movement of the luminaire frame during raising or lowering operations.

2522.03, G, 1, f.

Add new Article:

f. In a two lift cable system, the luminaire frame shall be protected from contact with the pole shaft by means of two 2 7/16 inch (62 mm) diameter PVC bumpers on the inner surface of the luminaire frame.

2522.03, G, 2, Support Cables.

Replace the Article:

a. Install support cables of anti-rotational aircraft type stainless steel with a minimum diameter of 3/16 inch (4.8 mm) and having a safety factor of 5.

b. In a three lift cable system, ~~S~~space the cables 120 degrees apart where attached to the luminaire frame. Attach them to a terminating device which is located within the tower shaft and provides a means of equalizing tension of the lift cables.

~~**b.**~~ Ensure the terminator and attached components are shaped to prevent interference to the raising or lowering operation caused by irregularities on the interior surface of the tower shaft.

c. In a two lift cable system, the cables will be spaced 180° apart and no terminating device is used since the cables go directly to the winch drums.

2522.03, G, 3, b.

Replace the Article:

Install ~~a~~ stainless steel, anti-rotational aircraft type winch cable(s) with 1/4 inch (6.4 mm)

minimum diameter and a safety factor of 3 to be used to raise and lower the luminaire frame. In a three winch cable system, ~~A~~attach the cable to the terminator. Include a safety device that is capable of stopping upward motion of the terminator at any time, in case of winch cable failure. Include a torque limiting device with the winch or power unit.

2522.03, G, 3, c.

Replace the first two sentences of the Article:

If a three lift cable system is employed, ~~I~~install a top-latching system~~. Do not install non-latching systems.~~ that ~~E~~ensures the following:

2522.03, G, 3.

Renumber Article d to Article e.

2522.03, G, 3.

Add new Article d:

d. If a two lift cable system is employed ensure the following:

- Latch mechanism can be engaged or disengaged manually in less than 60 seconds working through the handhole at the pole base and can be disengaged without power to the pole
- Entire Latch mechanism must be accessible through handhole at the pole base. with no pole top components to fail.
- Latching Indicator system is visible through the handhole at the pole base
- Latching components are never exposed to ice formation so latch mechanism cannot be impaired by ice

2522.03, I, Miscellaneous.

Add new Article:

3. Provide standard industry warranty on all mechanical components of system not including finish.

Comments: Approved revisions will be included in an SP to be used until October 2010 GS is issued.

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

2522.01 DESCRIPTION.

A. This specification is for design, fabrication and construction of tower lighting systems, consisting of footings, towers, luminaires, and associated appurtenant items required by the contract documents. Apply Section 2523 to other components of this system.

B. Each individual installation consists of:

- A reinforced concrete footing,
- A tubular steel tower of circular or other approved cross-section of the length indicated in the contract documents,
- Approved luminaires of the proper number,
- An approved lowering device, and
- The electrical system described in the contract documents.

2522.02 MATERIALS.

A. Submit copies of the following to the Office of Materials for review for compliance before these materials are shipped to the project:

- A certified mill analysis for each heat of steel used in the pole and pole assembly, and
- Certified test results for support cables.

B. Refer to Article 2522.03, D for welding requirements.

C. Notify the Office of Materials of the shop fabrication schedule.

D. Verify one copy of a mill certification accompanies each shipment to the project and two copies are sent to the Office of Materials to:

- Identify materials included in each shipment, and
- Ensure that materials and fabricated materials may be used in the work promptly after delivery.

E. Final approval of all materials and fabricated materials will be based on:
- A certification that methods and materials used in fabrication comply with the contract documents,
- Satisfactory reports from random monitoring inspections performed during fabrication, and
- Verification of satisfactory compliance at the time of final inspection of the construction site.

2522.03 CONSTRUCTION.

A. Shop Drawings.

1. Submit drawings according to Article 1105.03.
- **a.** Tower lighting equipment (if applicable):
  - **1)** Tower design data.
  - **2)** Lowering device, showing wiring diagram and materials.
  - **3)** Luminaires, including photometric data.
- **b.** Additional drawings may be required on a project specific basis according to the contract documents.

2. Along with the shop drawings, include a statement that methods and materials to be used in fabrication comply with the contract documents. Note and identify all materials or methods for which specific requirements have not been previously stipulated.

3. Provide the Engineer with an appropriate certification of compliance with all design requirements. Along with the certification, include copies of all calculations necessary for proper design of the tower shaft and component features of the tower assembly.

4. Have a Professional Engineer licensed in the State of Iowa perform the structural design. The Contractor's certification is to appear on the drawings. Provide the Engineer with the base shear, base moments, and vertical loads on the bottom of the base plate.

5. Obtain the Engineer's written concurrence for the various items involved prior to fabricating or assembling parts.

B. Footings.

1. Construct footings as required in the contract documents at the specified locations. Unless specifically stated otherwise, construct footings using methods and materials complying with current specifications.

2. Place anchor bolts according to Article 2405.03, H, 3. Place conduit and all other appurtenant or optional features of the footing as shown in the contract documents.

C. Transporting Towers.

1. When transporting the towers over the highways of the State of Iowa, comply with all applicable laws, rules, and regulations governing such movements. Obtain all required permits for such movements.

2. Limit the overall length of the hauling unit and tower to 120 feet (35 m) or less.

D. Welding.

1. Weld and fabricate steel structures according to Article 2408.03, B except that gas, metal arc, and flux cored arc welding processes will be permitted.

2. A list of approved brands of electrodes may be obtained from the Office of Materials.

3. Examine all fillet welds accessible for inspection using magnetic particle inspection according to ASTM E 709, at no additional cost to the Contracting Authority.

4. Use ultrasonic inspection, according to the requirements of Article 2408.03, B, to perform a 100% examination of all transverse butt welds and all specified 100% penetration longitudinal butt welds on

the pole. Perform a 100% visual inspection of all longitudinal butt welds. Supplement the visual inspection with magnetic particle inspection on all areas of questionable visual results. If defects are found in the area tested, perform additional inspection for a minimum of 5 feet (1.5 m) on each side of the defect, at no additional cost to the Contracting Authority. The cost of these inspections is incidental to other items in the contract.

E. Lighting Tower.
Ensure the structural design of the tower and its appurtenances meet the requirements of the current AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals," and interims with the following clarifications:

1. Wind Velocity.
Use a design wind velocity (V) of 90 mph (145 km/h). Fatigue requirements shall be Cat I with Vortex Shedding included.

2. Total Wind Force.
Calculate the total wind force on luminaires on the basis of the sum of projected areas for each individual luminaire. Base the projected area of individual luminaires on manufacturer's recommendations.

3. Steel Tubular Shape.
Use a compact section.

4. Anchor Bolts, Washers, and Nuts.
Ensure galvanizing for anchor bolts, washers, and nuts meets the requirements of ASTM F2329 ~~A 153, Class C~~; or ASTM B 695, Class 50.

a. Furnish each anchor bolt with one leveling nut and two anchoring nuts and shall meet the requirements of Materials I.M. 453.08. ~~Use anchor bolts that:~~
- ~~Meet the requirements of ASTM F 1554, Grade 105 (724 MPa),~~
- ~~Are full-length galvanized,~~
- ~~Are high-strength low alloy steel, and~~
- ~~Unless specified otherwise, are Unified Coarse Thread Series with Class 2A tolerance.~~

~~**b.** Color code, in red, the end of each anchor bolt intended to project from the concrete to identify the grade.~~

~~**c.** Use galvanized washers that meet the requirements of ASTM F 436.~~

~~**d.** Use heavy hex, galvanized nuts that meet the requirements of ASTM A 563, DH. Nuts may be over-tapped according to the allowance requirements of ASTM A 563.~~

5. Pole Base.

a. Use a solid plate. Keep the holes cut out in the base plate for utility lines to a maximum diameter of 12 inches as shown on the contract document. ~~minimum, subject to the Engineer's approval.~~

b. Design the pole base and anchor bolt system to resist both tension and compression resulting from bending moments and direct loads.

6. Poles.
The poles may be furnished in single welded units or in telescoping sections.

a. Single Welded Units.

1) Fabricating the tower by welding two or more shaft sections together is permitted. If the pole sections are welded together, butt weld all transverse pole splices with full penetration welds.

2) Use a method for connecting the sections that results in a smooth joint with no projections on the exterior of the shaft.

3) Unless specifically authorized otherwise, all welded connections of shaft sections are to be made in the fabricator's shop.

4) If hauling length restrictions do not allow the tower shaft to be shop fabricated in one piece, furnish a telescoped pole.

b. Telescoping Sections.

1) If the pole sections are telescoped together, ensure the overlapped splices:
- Are equal in strength and rigidity to that of welded splices, and
- Do not exceed four sections for poles up to and including 120 feet (35 m) in length and do not exceed five sections for poles between 120 feet (35 m) and 160 feet (50 m) in length.

2) Ensure the telescoping sections overlap a length which is the larger of the following, and the

overlap has full contact between faying surfaces:

- 2 feet (0.6 m), or
- 1.5 times the nominal diameter of the shaft at the splice level.

3) Ensure pole sections to be telescoped together are factory test fit to verify straightness of the pole and accuracy of the mating surfaces. Ensure the sections are match marked for accurate field assembly. In the field, mechanically fit the telescoping sections using factory supplied equipment. Submit field assembly procedures for the Engineer's review and concurrence.

7. Longitudinal Seam Welds.

a. Minimum 60% penetration, except for the following areas where complete penetration welds are required:

1) Within 6 inches (150 mm) of circumferential welds which are complete penetration butt welds.

2) For a distance of the nominal splice length plus 6 inches (150 mm) on both sections of telescopic (slip type) field splices of high level lighting (pole type) supports.

b. Testing: ~~When designated in the contract documents~~:

- Radiographically inspect 100% of the full penetration section~~s~~ of the longitudinal seam weld, at the based plate connection location and
- Use the magnetic particle method to inspect a random 10% of the partial penetration section of the longitudinal seam welds.

8. Poles with Welded Transverse Splices.

Bevel all backing plates for transverse welds.

9. Poles with Telescoped Lab Joints.

Bevel the lower section of the joint. The beveling is required to prevent possible interference with the operation of the lowering device.

10. Hand Hole.

a. Ensure the pole provide an opening for a minimum 10 inch by 30 inch (250 mm by 750 mm) handhole to allow for servicing and maintenance of the lowering devices. Reinforce the handhole as shown in the contract document. ~~Ensure the handhole is reinforced to maintain the design strength of the pole.~~

b. Install a neoprene or rubber gasket to make the handhole weatherproof. Obtain the Engineer's acceptance for the gasket prior to installation. Foam adhesive-back rubber gaskets are unacceptable.

c. Ensure the door ~~is hinged and~~ is fabricated from the same type of steel as the poles. Ensure the securing hardware is stainless steel and provisions have been made to allow for the door to be bolted securely shut.

11. Pole Base Plate.

a. Prior to welding, ultrasonically test the pole base plate using a Straight Beam Search Unit, meeting requirements of the current AWS D1.1, Structural Welding Code, to determine the extent of laminar type discontinuities in the plate.

b. After welding the pole to the base plate, use the same ultrasonic testing described above to ensure there are no laminar tears in the base plate.

12. Shaft, Base Plate, and Integral Shaft.

a. Ensure the shaft, base plate, and integral shaft components are fabricated with steel meeting the requirements of ASTM A 709 Grade 50 (345 MPa), with a minimum yield strength of 50,000 psi (345 MPa). All steel required to be ASTM A 709 Grade 50 (345 MPa) must meet impact requirements specified for main members in Article 4152.02. If the Engineer approves, certain components of the tower assembly may be fabricated from steel meeting requirements of ASTM A 709 Grade 36 (250 MPa).

b. Ensure that after fabrication pole shafts, anchor bolts, base plate, washers, nuts, and all steel items are:

- Fully galvanized inside and outside according to ASTM A 123 or ASTM A 153 as appropriate, and
- Are of uniform color and appearance.

F. Tower Lighting Luminaire.

Meet the following provisions:

1. **Luminaire Assembly.**
   Rain tight aluminum housing and slipfitter with an internally mounted ballast designed for operation with the specified lamp.

2. **Optical System (when required).**
   Specular aluminum or prismatic glass reflector and a prismatic glass refractor or a clear lens.

3. **Luminaires with Open Bottom Optical Systems.**
   Prismatic glass reflectors and refractors.

4. **Luminaires with Horizontal Burning Lamps**
   Totally enclosed optical systems with prismatic glass refractors.

5. **Specular Aluminum Reflectors.**
   Protective coating of oxide applied by the anodic oxidation process. The manufacturer's certification that the coating is not less than 6 milligrams per square inch (0.01 mg/mm^2) and that the reflectivity of the specular surface is not less than 82% is required.

6. **The Lamp Socket.**
   Mogul multiple and porcelain enclosed. Lamp gripping device for vertical burning lamp sockets.

7. **Glassware.**
   Annealed, thermal-shock-resisting, borosilicate glass.

8. **Slipfitter.**
   Accommodate a standard two-inch (50 mm) pipe bracket and provide for leveling of the luminaire.

9. **Light Source.**
   High pressure sodium lamp of the size shown in the contract documents.

10. **Ballast.**
    Regulated high-power-factor type with starting current lower than operating current. Maintains lamp wattage within ± 10% with a line voltage regulation of ± 10%, with no less than 90% power factor.

G. Luminaire Lowering Device.
Consists of a luminaire frame and head frame, support cables, winch, and electrical cable, along with associated appurtenant devices. Ensure the lowering device properly lowers the luminaires to a position within 5 feet (1.5 m) of the ground for maintenance, and maintains their alignment when raised to the operational position.

1. **Luminaire Frame and Head Frame.**
   - **a.** In a three lift cable system, ensure the luminaire frame and head frame assembly meet the requirements of ASTM A 709 Grade 50 (345 MPa). For the purpose of Charpy V-notch toughness requirements, all steel required to be ASTM A 709 Grade 50 (345 MPa) will be considered main members. Miscellaneous appurtenant steel components may be constructed using ASTM A 709 Grade 36 (250 MPa) steel. Ensure all steel and the head frame dome are galvanized. Alternately in a two cable lift system the luminaire frame, head frame and miscellaneous appurtenant steel components will all be fabricated from ASTMA240 Type 201LN Stainless Steel
   - **b.** Attach the luminaire frame to two or three lift cables. Attach a multiple conductor electrical cable to the luminaire frame with a double weave, stainless steel, grip type, strain relief connection. Pass all cables through a head frame assembly mounted at the top of the tower shaft, as shown in the contract documents. Ensure they pass freely through the shaft during raising and lowering operations.
   - **c.** Ensure the luminaire frame is designed to accommodate the specified number of luminaires on mounts consisting of 2 inch (50 mm) slipfitters.
   - **d.** Ensure the head frame assembly is enclosed and shielded from the elements by means the Engineer approves.
   - **e.** In a three lift cable system install three or more spring loaded centering arms with rubber or nylon rollers to control lateral movement of the luminaire frame during raising or lowering operations. Ensure the centering arms interlock with each other so the tower is centered within the luminaire frame.

In two lift cable systems the luminaire frame shall be protected from contact with the pole shaft by means of two (2 7/16") diameter PVC bumpers on the inner surface of the luminaire frame.

2. **Support Cables.**
   - **a.** In a three lift cable system install support cables of anti-rotational aircraft type stainless steel with a minimum diameter of 3/16 inch (4.8 mm) and having a safety factor of 5. Space them 120 degrees apart where attached to the luminaire frame. Attach them to a terminating device which is located within the tower shaft and provides a means of equalizing tension of the lift cables.
   - **b.** In a three lift cable system ensure the terminator and attached components are shaped to prevent interference to the raising or lowering operation caused by irregularities on the interior surface of the tower shaft.
   - **c**. In a two lift cable system the cables will be spaced 180 degrees apart and no terminating device is used since the cables go directly to the winch drums.

3. **Winch.**

   - **a.** Install and securely anchor a winch assembly that:
     - Consists of a worm gear speed reducer with either one or two output shafts with cable drum attached.
     - Is capable of supporting five times the maximum lifted load.
     - Includes an integral drag brake to prevent unwinding, slipping, or free spooling of the winch cable.
     - Includes a drum provided with keepers to ensure that the cable will properly wrap onto the drum.
     - When powered by the internal power unit, raises the luminaire ring at a minimum rate of 12 feet (4 m) per minute.
   - **b.** Install stainless steel, anti-rotational aircraft type winch cable(s) with 1/4 inch (6.4 mm) minimum diameter and a safety factor of 3 to be used to raise and lower the luminaire frame. In a three winch cable system attach the cable to the terminator. Include a safety device that is capable of stopping upward motion of the terminator at any time, in case of winch cable failure. Include a torque limiting device with the winch or power unit.
   - **c.** If a three lift cable system is employed install a top-latching system that ensures the following:
     - Latch barrels are cast, high strength, copper-free aluminum or cast stainless steel.
     - Latching is accomplished by the alternate raising and lowering of the luminaire ring assembly using the winch and hoisting assembly.
     - There are no moving latch parts or springs attached to the head frame assembly.
     - The latch mechanism is not impaired by the formation of ice and does not require adjustment after the original installation.
     - Indicator flags are used to show when the luminaire supporting ring is in the latched or unlatched position.

   If a two lift cable system is employed ensure the following:
     - Latch mechanism can be engaged or disengaged manually in less than 60 seconds working through the handhole at the pole base and can be disengaged without power to the pole
     - Entire Latch mechanism must be accessible through handhole at the pole base. with no pole top components to fail.
     - Latching Indicator system is visible through the handhole at the pole base
     - Latching components are never exposed to ice formation so latch mechanism cannot be impaired by ice

   - **d.** Install pulleys that are:
   - Stainless steel type designed for the respective types and sizes of cables used, and
   - Equipped with permanently lubricated, sealed bearings or oil impregnated bronze bushings mounted on stainless steel shafts.

4. **Electrical Cable.**
   - **a.** Install a multiple conductor cable complying with the requirements for flexible cord. Ensure it is designed to meet all physical requirements for satisfactory operation of the lowering device. Ensure all provisions for electrical disconnects are accessible from ground level.
   - **b.** Attach the electrical cable to the terminator with a strain relief device as used at the luminaire frame. Ensure electrical connectors for the power and control circuits are rigidly attached to the terminator.
   - **c.** Ensure conductors for connections from the power cable to the luminaires are protected by suitable raceways or are made with weatherproof cables securely anchored to the luminaire

frame. A luminaire frame of hollow cross section may be used as a raceway. Ensure all connections are made in weather tight boxes or within the luminaire housings.

H. Erection.

1. After testing has been accomplished to the satisfaction of the Engineer, the tower may be erected on the foundation.

2. Precise aligning and erecting of all components of the tower lighting system is essential. Plumb towers during full cloud cover, prior to sunrise or after sunset, as approved by the Engineer, to prevent thermal expansion effects on the steel tower due to heat from sunshine. Verify in at least two directions, 90 degrees apart, with a transit. Plumb all towers within a tolerance of 50% of the pole top diameter. Tighten anchor bolt nuts, after the tower has been plumbed, using the following procedure:

a. Perform this work only on days with winds less than 15 mph (25 km/h). Tighten all of the nuts in the presence of the inspector. Once the tightening procedure is started, it must be completed on all of the base plate nuts without pause or delay.

b. Use properly sized wrenches or sockets, or both, designed for tightening nuts or bolts, or both, to avoid rounding or other damage to the nuts. Do not use adjustable end or pipe wrenches.

c. Ensure base plates, anchor rods, and nuts are free of all dirt or debris.

d. Apply stick wax or bees wax to the threads and bearing surfaces of the anchor bolt, nuts, and washers.

e. Tighten top nuts so they fully contact the base plate. Tighten leveling nuts to snug tight condition. Snug tight is defined as the full effort of one person on a wrench with a length equal to 14 times the bolt diameter but not less than 18 inches (460 mm). Apply full effort as close to the end of the wrench as possible. Perform tightening by leaning back and using entire body weight to pull firmly on the end of the wrench until the nut stops rotating. Perform a minimum of two separate passes of tightening. Sequence tightening in each pass so that the nut on the opposite side, to the extent possible, is subsequently tightened until all of the nuts in that pass have been tightened.

f. Tighten top nuts to snug tight as described for the leveling nuts.

g. Match-mark the top nuts and base plate using paint, crayon, or other approved means to provide a reference for determining the relative rotation of the nut and base plate during tightening. Further tighten the top nuts tightened in two passes, as listed in the Table 2522.03-1, using a striking or hydraulic wrench. Follow a sequence of tightening in each pass so that the nut on the opposite side, to the extent possible, is subsequently tightened until all nuts in that pass have been turned. Do not allow the leveling nut to rotate during the top nut tightening.

Table 2522.03-1: Bolt Tightening

Anchor Bolt Size	First Pass	Second Pass	Total Rotation
Less than or equal to 1 1/2 inch (38 mm) diameter	1/6 turn	1/6 turn	1/3 turn
Greater than 1 1/2 inch (38 mm) diameter	1/12 turn	1/12 turn	1/6 turn

h. Lubricate the jam nuts, place, and tighten to snug tight.

3. Cover the void between the base plate and top of the foundation as shown in the contract documents.

4. Construct and test all other components of this system according to Section 2523.

I. Miscellaneous.

1. Have a manufacturer's service engineer present, on site, to advise during the installation of at least one complete lowering system. Duties of the manufacturer's service engineer include directing all adjustments to the lowering system to insure positive latching and unlatching (a minimum of three complete raising and lowering cycles) and other necessary work.

2. Provide three complete raising and lowering operations for the other towers, providing the same adjustment and commissioning as demonstrated by the manufacturer's service engineer on the first tower.

3. Warranty on all mechanical components of system not including finish will be ten years.

2522.04 METHOD OF MEASUREMENT.
Measurement for the various items of work involved in tower lighting, satisfactorily completed, will be as follows:

A. Towers.
By count for the various lengths specified in the contract documents.

B. Luminaires.
By count.

C. Footings.
As outlined in the following sections:

Piling	Section 2501
Structural Concrete	Section 2403
Reinforcement	Section 2404
Excavation	Section 2402

2522.05 BASIS OF PAYMENT.

A. Payment for the various items of work involved in tower lighting will be the contract unit price as follows:

1. Towers.
Each for the various specified lengths.

2. Luminaires.
Each.

3. Footings.
As outlined in the following sections:

Piling	Section 2501
Structural Concrete	Section 2403
Reinforcement	Section 2404
Excavation	Section 2402

B. Payment for towers is full compensation for furnishing all materials, equipment, tools, and labor for construction of the towers complete, including an approved lowering device, and related equipment, anchor bolt assembly, and responsibility during the testing period.

C. Payment for other components of the tower lighting system will be as provided in Article 2523.05.

Reason for Revision: Update requested so specifications are consistent with revisions made to the Standard Road Plan RM-44 for October 2009 release.

County or City Input Needed (X one)			**Yes**	**No** X	
Comments:					
Industry Input Needed (X one)			**Yes** X	**No**	
Industry Notified:	**Yes**	**No** X	**Industry Concurrence:**	**Yes**	**No**
Comments:					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: John Smythe / Kevin Merryman	**Office:** Construction	**Item 6**
Submittal Date: March 25, 2010	**Proposed Effective Date:** October 2010	
Article No.: 2526.03 **Title:** Survey	**Other:**	

Specification Committee Action: Deferred until May.

Deferred: X	**Not Approved:**	**Approved Date:**	**Effective Date:**

Specification Committee Approved Text:

Comments: SUDAS had some concerns with how this specification would apply to overlays done with stringless paving, in regards to the staking intervals.

How to control overruns versus getting a smooth profile will need to be discussed.

Some definitions in regard to bonded versus unbonded overlays will need to be reviewed.

Since counties do a significant amount of bonded overlays, the counties and CP Tech Center will be asked for input before this revision is discussed in May.

Specification Section Recommended Text:

2526.03, A.

Rename Article 10:

10. ~~Pavement~~ HMA Overlays ~~(PCC and HMA)~~

Renumber Article 11:

~~11~~12. Structural Walls.

Add new Article 11:

11. PCC Overlays

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

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

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

1) Obtain elevations of the existing pavement at centerline and both pavement edges for bonded overlays and projects including mainline pavement scarification.

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

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

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

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

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

f. Reset Control Points after the work is complete.

Comments:

Member's Requested Change (Redline/Strikeout):

2526.03 SURVEY.

10. ~~Pavement~~ HMA Overlays ~~(PCC and HMA)~~

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

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

c. Reset Control Points after the work is complete.

11. PCC Overlays

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

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

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

1) Obtain elevations of the existing pavement at centerline and both pavement edges for bonded overlays and projects including mainline pavement scarification.

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

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

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

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

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

f. Reset Control Points after the work is complete.

~~11~~12. Structural Walls.

a. Survey requirements for structural walls includes the following work types:

1) Mechanically Stabilized Earth (MSE) Walls.

2) Cast in Place (CIP) Retaining Walls.

3) Soil Nail Walls.

4) Tie Back Walls.

5) Noise Walls.

6) Modular Block Retaining Walls.

7) Segmental Retaining Walls.

b. 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.					
Reason for Revision: Current specification language does not adequately describe survey requirements for PCC overlays. The changes more thoroughly describe staking requirements and requirements for developing a profile grade when one is not provided.					
County or City Input Needed (X one)			**Yes**	**No** X	
Comments:					
Industry Input Needed (X one)			**Yes** X	**No**	
Industry Notified:	**Yes** X	**No**	**Industry Concurrence:**	**Yes**	**No**
Comments:					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: John Smythe / Kevin Merryman	**Office:** Construction	**Item 7**
Submittal Date: March 25, 2010	**Proposed Effective Date:** October 2010	
Article No.: 2529.04 **Title:** Method of Measurement (Full Depth Finish Patches) **Article No.:** 2529.05 **Title:** Basis of Payment (Full Depth Finish Patches)	**Other:**	

Specification Committee Action: Approved as is.

Deferred:	**Not Approved:**	**Approved Date:** 4/8/2010	**Effective Date:** 10/19/2010

Specification Committee Approved Text: See Specification Section Recommended Text.

Comments: The Methods Section will remove MOM/BOP from the Road Standard to coincide with this spec. change.

Specification Section Recommended Text:

2529.04, B, CD Joint Assembly and CT Joint.

Rename and **replace** the Article:

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

2529.04, Method of Measurement.

Add new Article:

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

2529.05, B, CD Joint Assembly and CT Joint.

Rename and **replace** the Article:

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

2529.05, Method of Measurement.

Add new Article:

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

Comments:

Member's Requested Change (Redline/Strikeout):

2529.04 METHOD OF MEASUREMENT.

B. CD Joint Assembly, Joint Assembly, EF, and CT Joint.

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

F. Rumble Strip Panel (In Full Depth Patch)

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

2529.05 BASIS OF PAYMENT.

B. CD Joint Assembly, Joint Assembly, EF, and CT Joint.

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

F. Rumble Strip Panel (In Full Depth Patch)

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

Reason for Revision: To include measurement and payment information in the specifications for EF Joints in PCC patches and Rumble Strip Panels in PCC patches. This information is currently found on the applicable Road Standards.

County or City Input Needed (X one)			**Yes**	**No** X	
Comments:					
Industry Input Needed (X one)			**Yes**	**No** X	
Industry Notified:	**Yes** X	**No**	**Industry Concurrence:**	**Yes**	**No**
Comments:					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Deanna Maifield	**Office:** Design	**Item 8**
Submittal Date: 2010.03.10	**Proposed Effective Date:** 10/2010	
Section No.: 2548 **Title:** Milled Shoulder Rumble Strips	**Other:**	

Specification Committee Action: Deferred until the May meeting.

Deferred: X	**Not Approved:**	**Approved Date:**	**Effective Date:**

Specification Committee Revised Text:

2548, Milled Shoulder Rumble Strips – HMA or PCC Surface

Retitle the Section:

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

2548.01, General.

Replace the Article:

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

2548.02, B, 2.

Replace the first sentence of the Article:

Dilute the asphalt emulsion with water prior to application to the milled ~~shoulder~~ rumble strip.

2548.03, Construction.

Replace the first paragraph:

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

2548.03, A, Test Strip.

Replace the first sentence:

Demonstrate to the Engineer on an initial 500 foot (150 m) test section that the equipment and method will provide the desired milled ~~shoulder~~ rumble strip and surface inside each depression without damaging the adjacent pavement.

2548.03, B, 1.

Delete the third sentence of the Article:

~~The offset may be decreased to 6 inches (150 mm) on shoulders with a top width less than 30 inches (750 mm).~~

2548.03, B, Milling.

Renumber Article 2 to Article 3.

Add new Article 2:

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

2548.03, C, 2.

Replace the Article:

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

2548.04, A, Milled Shoulder Rumble Strips.

Replace the Article:

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

2548.04, Method of Measurement.

Renumber Article B to Article C.

Add new Article B:

B. Milled Centerline Rumble Strips.

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

2548.05, Basis of Payment.

Renumber Article B to Article C.

Add new Article B:

B. Milled Centerline Rumble Strips.

Per station (meter) for the type specified.

Comments: The Office of Bridges and Structures asked about the statement “no deduction will be made for gapped areas”. Gapped areas include gaps at bridges, sideroads, etc. Some designers have been taking the gapped areas out of the quantity. The Office of Construction would like to include these gaps in the measurement for ease of inspection and design.

The Office of Construction expressed some reservations about the effect of the centerline rumble strips on the condition of the centerline. This is especially relevant when the notched centerline joint is used. There will be very little material remaining after the rumble strips are milled.

The Office of Construction also pointed out that the emulsion will be important to maintaining the condition of the centerline. They also have concerns with the longevity of the centerline pavement markings placed on the emulsion.

The Office of Materials also has concerns about the density of the centerline and how this will affect spalling following milling of the centerline rumble strips.

The centerline rumble strips will be installed on all new and resurfaced two lane roadways with traffic volumes over 3000. Any new roadway surface placed in the last 5 years will be evaluated for placement of milled centerline rumble strips.

References to “HMA” were left in until the final language is agreed upon and the entire book can be revised at once.

Milled centerline rumble strips will require an additional application of paint. The centerline will need to be painted after the overlay and then again after the milling.

The Office of Design requested adding (For Milled Rumble Strips) to the item for Asphalt Emulsion for Fog Seal, so that a new bid item is added that will reference to this section. The dilution and application rates are different for the Asphalt Emulsion for Fog Seal than what is contained in Section 2307. The Specifications Section asked if there needs to be a difference in the dilution and application rates. It appears that with the differences in dilution and application rates that you may end up with the same

amount of material. If the dilution and application rates are the same, there will be no need to add the additional language for the item. The application and dilution rates will be investigated and this item will be reviewed again at the May Specification Committee meeting.

Specification Section Recommended Text:

2548, Milled Shoulder Rumble Strips – HMA or PCC Surface

Retitle the Section:

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

2548.01, General.

Replace the Article:

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

2548.02, B, 2.

Replace the first sentence of the Article:

Dilute the asphalt emulsion with water prior to application to the milled ~~shoulder~~ rumble strip.

2548.03, Construction.

Replace the first paragraph:

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

2548.03, A, Test Strip.

Replace the first sentence:

Demonstrate to the Engineer on an initial 500 foot (150 m) test section that the equipment and method will provide the desired milled ~~shoulder~~ rumble strip and surface inside each depression without damaging the adjacent pavement.

2548.03, B, 1.

Delete the third sentence of the Article:

~~The offset may be decreased to 6 inches (150 mm) on shoulders with a top width less than 30 inches (750 mm).~~

2548.03, B, Milling.

Renumber Article 2 to Article 3.

Add new Article 2:

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

2548.03, C, 2.

Replace the Article:

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

2548.04, A, Milled Shoulder Rumble Strips.

Replace the Article:

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

deemed unsatisfactory.

2548.04, Method of Measurement.

Renumber Article B to Article C.

Add new Article B:

B. Milled Centerline Rumble Strips.

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

2548.05, Basis of Payment.

Renumber Article B to Article C.

Add new Article B:

B. Milled Centerline Rumble Strips.

Per station (meter) for the type specified.

Comments:

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

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

2548.01 GENERAL.

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

2548.02 MATERIALS.

A. Milling.

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

B. Asphalt Emulsion Fog Seal.

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

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

2548.03 CONSTRUCTION.

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

A. Test Strip.

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

B. Milling.

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

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

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

to opening adjacent lane to traffic.

C. Asphalt Emulsion Fog Seal.

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

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

3. Place the diluted asphalt emulsion fog seal according to Article 2308.03, D, at a rate of 0.13 gallon per square yard (0.6 L/m_2).

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

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

D. Limitations.

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

2548.04 METHOD OF MEASUREMENT.

Measurement will be as follows:

A. Milled Shoulder Rumble Strips.

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

B. Milled Centerline Rumble Strips.

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

C. Asphalt Emulsion for Fog Seal.

Gallons (liters) as provided in Article 2307.04, B.

2548.05 BASIS OF PAYMENT.

Payment will be the contract unit price as follows:

A. Milled Shoulder Rumble Strips.

Per station (meter) for the type specified.

B. Milled Centerline Rumble Strips.

Per station (meter) for the type specified.

C. Asphalt Emulsion for Fog Seal.

1. Per gallon (liter) for undiluted Asphalt Emulsion for Fog Seal 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~~ paved surface, furnishing and applying diluted asphalt emulsion, mixing water, and protecting the adjacent pavement and edge lines.

Reason for Revision: Centerline rumble strips will be added to projects and there is no current spec. Also, the note in 2548.03B that allows reduction to 6" offset is out of date because we now use a 6" offset everywhere.

County or City Input Needed (X one)			**Yes**	**No** x	
Comments:					
Industry Input Needed (X one)			**Yes**	**No** x	
Industry Notified:	**Yes**	**No** x	**Industry Concurrence:**	**Yes**	**No**
Comments:					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: J. Berger	**Office:** Materials	**Item 9**
Submittal Date: March 17, 2010	**Proposed Effective Date:** July 20, 2010	
Article No.: DS-090XX **Title:** Developmental Specifications for PCC Pavement Non-Destructive Thickness Determination	**Other:**	

Specification Committee Action: Approved with changes.

Deferred:	**Not Approved:**	**Approved Date:** 4/8/2010	**Effective Date:** 6/15/2010

Specification Committee Approved Text: See attached Draft DS-090XX.

Comments: Per the Office of Materials, metric dimensions were added in Table 2301.05-2 and in Article 2301.05, A, 5, design thickness was changed to thickness value from Table 2301.05-2.

It is to be determined who will do the measurement testing, typically either the residency or district materials.

Kevin Jones will be the controller on the DS.

The Department owns two gauges, so the other will be available for assurance testing by District Materials or the Office of Materials, depending on who did the original testing.

Specification Section Recommended Text: See attached Draft DS.

Comments:

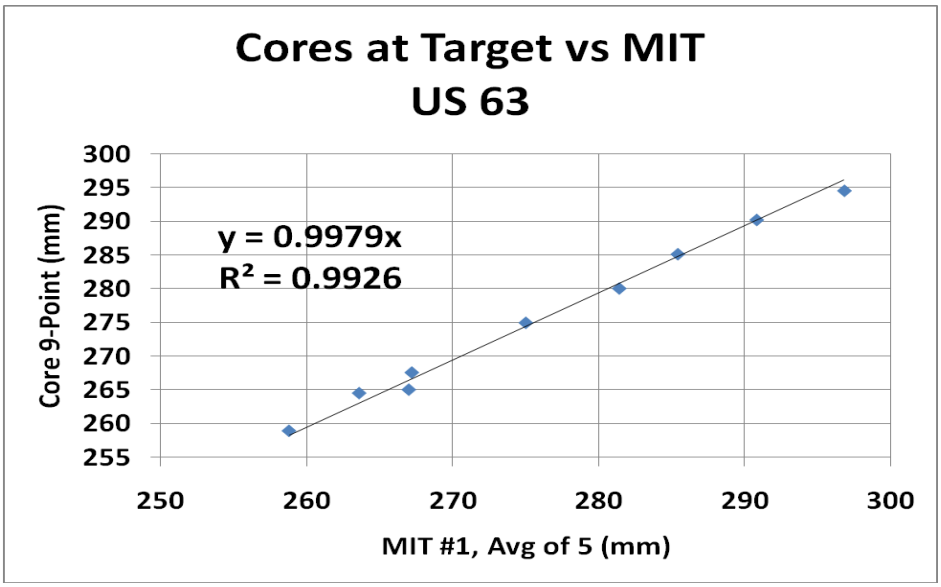
Member's Requested Change: **(Do not use 'Track Changes', or 'Mark-Up'. Use ~~Strikeout~~ and Highlight.**

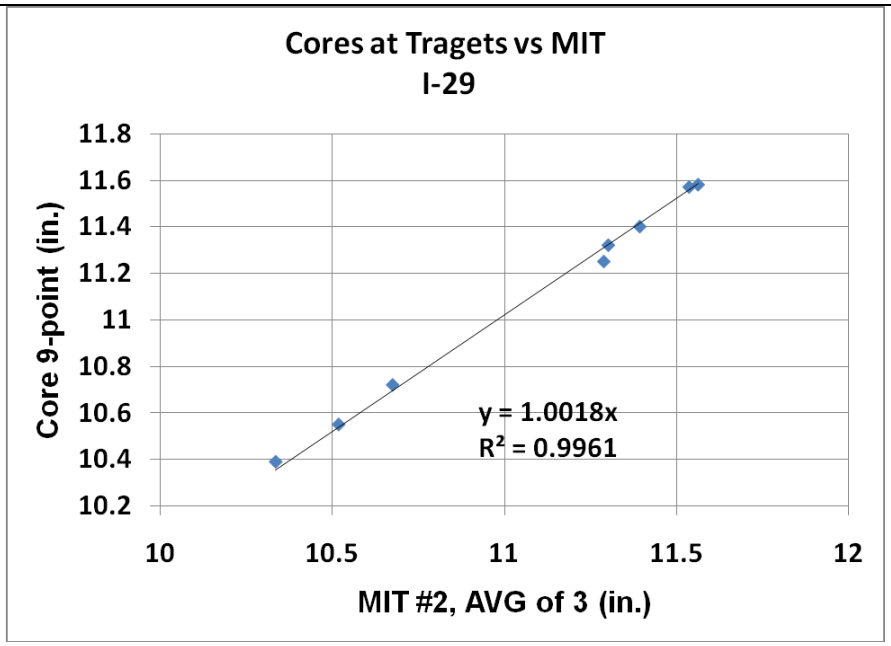
See Attached DS

Reason for Revision: There is now non-destructive PCC thickness testing equipment available that is relatively cheap and easy to operate. It has been evaluated on 3 projects and appears to be sufficiently accurate to replace coring as the method for determining PCC pavement thickness for pay. The Power Point Presentation covering the evaluation is at:

W:\Highway\Materials\LAB\Out Box

Below is some of the data:





County or City Input Needed (X one)			**Yes**	**No**	
Comments:					
Industry Input Needed (X one)			**Yes**	**No**	
Industry Notified:	**Yes**	**No**	**Industry Concurrence:**	**Yes**	**No**
Comments: The information was shared with the CQI committee at the recent meeting and was presented at the 2010 Concrete Paving Workshop.					

DRAFT DS-090XX
(New)

Iowa Department of Transportation

DEVELOPMENTAL SPECIFICATIONS
FOR
PCC PAVEMENT NON-DESTRUCTIVE THICKNESS DETERMINATION

Effective Date
July 20, 2010

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

Replace all of Articles 2301.04 and 2301.05 of the Standard Specifications with the following:

2301.04 METHOD OF MEASUREMENT.
Measurement will be as follows:

A. Portland Cement Concrete Pavement.

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

2. The ~~coring~~ measurement requirements for thickness do not apply to detour pavements, paved drives, and temporary pavements. The thickness of pavement constructed will be determined from ~~core depths~~ thickness measurements as follows:

a. The division of sections, lots, and ~~core~~ measurement locations will be according to ~~Materials I.M. 346~~ Appendix A.

b. At locations determined by the Engineer~~, cut samples from the pavement, as directed above, by drilling with a core drill that will provide samples with a 4 inch (101.6 mm) outside diameter~~ the Engineer will measure for thickness according to Appendix A. ~~Restore the surface by tamping low-slump concrete into the hole, finishing, and texturing. The Engineer will witness the core drilling, and identify and measure the cores immediately. The Engineer will measure the cores and determine the thickness index according to Materials I.M. 346. After measurement on the grade, deliver the cores to the Engineer's office or field laboratory. When cores are not measured on the grade, the Engineer will take immediate possession of the cores.~~

c. ~~Coring of pavement and other~~ Measurement work for thickness determination may be waived by mutual agreement for sections of the same design thickness less than 5000 square yards (4200 m^2).

d. Only sections which are ~~cored~~ measured for thickness will be included in the thickness index determination. Areas not ~~cored~~ measured for thickness will be paid for at the contract unit price.

B. Integral Curb.
Incidental to the other items of work. Not measured for payment.

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

D. Bridge Approach Sections.
Square yards (square meters) shown in the contract documents.

E. Excavation.

1. When the contract provides a unit price per station (meter) for earth shoulder finishing and a price per cubic yard (cubic meter) for excavation, the excavation required for preparation of natural subgrade will be measured as provided in Article 2102.04. The volume measured for payment will include only the materials actually removed above the elevation of the pavement subgrade and between vertical planes 1 foot (0.3 m) outside the edge of the finished pavement.

2. Other work connected with preparation of natural subgrade will not be measured for payment.

3. When the contract provides a unit price for earth shoulder construction (whether or not a unit price per cubic yard (cubic meter) of excavation is provided in the contract), excavation required for preparation of natural subgrade will not be measured for payment. Unless otherwise provided in the contract documents, work connected with preparation of natural subgrade will not be measured for payment.

F. Driveway Surfacing Material.
Tons (megagrams) or cubic yards (cubic meters), as provided in the contract and in Section 2315, placed at intersecting roads, drives, and turnouts. Excavation required for placement of this material will not be measured for payment.

G. Portland Cement Concrete Pavement Samples.
Not individually counted for payment when furnished according to Article 2301.04, A, or when required in the contract documents.

H. Saw Cut and Joint Sealing.

1. Saw cut for constructing joints in new pavement will not be measured for payment.

2. Saw cut for cutting old existing pavement, which is to be abutted with new pavement, will not be measured for payment.

3. Joint sealing will not be measured for payment.

I. Safety Fence for Pavement.
Not measured for payment.

2301.05 BASIS OF PAYMENT.
Payment will be as follows:

A. Portland Cement Concrete Pavement.

1. Contract unit price for Standard or Slip-Form Portland Cement Concrete Pavement of the type specified per square yard (square meter).

2. Payment for the quantities of pavement in square yards (square meters) will be at a percentage of the contract unit price according to Table 2301.05-1.

Table 2301.05-1: Payment Schedule for Quantities of Pavement

Thickness Index Range	Percent Payment	Thickness Index Range	Percent Payment
English (Metric)		English (Metric)	
0.00 or more (0.00 or more)	103	-0.56 to -0.60 (-13.98 to -15.24)	91
-0.01 to -0.05 (-0.01 to -1.27)	102	-0.61 to -0.65 (-15.25 to -16.51)	90
-0.06 to -0.10 (-1.28 to -2.54)	101	-0.66 to -0.70 (-16.52 to -17.78)	89
-0.11 to -0.15 (-2.55 to -3.81)	100	-0.71 to -0.75 (-17.79 to -19.05)	88

-0.16 to -0.20 (-3.82 to -5.08)	99	-0.76 to -0.80 (-19.06 to -20.32)	87
-0.21 to -0.25 (-5.09 to -6.35)	98	-0.81 to -0.85 (-20.33 to -21.59)	86
-0.26 to -0.30 (-6.36 to - 7.62)	97	-0.86 to -0.90 (-21.69 to -22.86)	85
-0.31 to -0.35 (-7.63 to -8.89)	96	-0.91 to -0.95 (-22.87 to -24.13)	84
-0.36 to -0.40 (-8.90 to -10.16)	95	-0.96 to -1.00 (-24.14 to -25.40)	83
-0.41 to -0.45 (-10.17 to -11.43)	94	-1.01 to -1.05 (-25.41 to -26.67)	82
-0.46 to -0.50 (-11.44 to -12.70)	93	-1.06 to -1.10 (-26.68 to - 27.94)	81
-0.51 to -0.55 (-12.71 to -13.97)	92	-1.11 or less (-27.95 or less)	80

3. Use the following formula to determine the thickness index for the section of pavement thickness:

$$TI = (\overline{X} - S) - T$$

Where:

TI = thickness index for the section.
$\overline{X}$ = mean ~~core length~~ thickness for the section.
T = ~~design thickness~~ see Table 2301.05-2.
S = ~~core length~~ measurement thickness standard deviation (of the sample) for the section.

Table 2301.05-2: Thickness Value for determining Thickness Index

Type of Base, Subbase, Subgrade just below the concrete	Value of T in Inches
Natural Subgrade or Soil Aggregate Subbase	Design Thickness
HMA Base, PCC Base, or Asphalt or Cement Treated Base	Design Thickness
Modified Subbase or Special Subbase	Design Thickness minus 0.25 inches (6 mm)
Granular Subbase	Design Thickness minus 0.35 inches (9 mm)

4. Replace pavement represented by cores deficient from design thickness by 1 inch (25 mm) or greater. The deficient areas and the replacement of the deficient cores will be determined according to ~~Materials I.M. 346~~ Appendix A.

5. At the Contractor's option, ~~cores that are~~ measurement readings that are larger than the thickness value (from Table 2301.05-2) by three standard deviations or greater ~~than design thickness~~ may be removed from analysis for thickness index determination. Do not remove more than 10% of the total ~~cores~~ measurements in a section. Do not replace ~~cores~~ measurements removed from the analysis.

6. Gaps in the pavement less than 500 feet (150 m), required by staging, will be considered irregular areas for analysis of pavement thickness determinations.

7. The percent payment for projects which have all ~~core lengths~~ measurement readings greater than ~~design thickness~~ T in Table 2301.05-2 will be at least 100%.

APPENDIX A
EVALUATING PORTLAND CEMENT
CONCRETE PAVEMENT THICKNESS

SCOPE

Thickness measurements will be taken on Portland Cement Concrete (PCC) pavement, to determine the pavement thickness and the thickness index for each section. Refer to Specification DS-090XX.

APPARATUS

1. An MIT Scan T2 gauge will be used to perform thickness measures.
2. Steel Targets will be 11.81 inches (300.0 mm) in diameter, 24 gauge, meeting ASTM A 653, commercial steel with a G90 coating (about 275 g/m^2 total both sides).

DEFINITIONS

Section: All Portland Cement Concrete in a project of the same bid item. Irregular areas, as defined herein, of the same bid item shall form a separate section.

Lot: A portion of a section normally 200 feet (50 m) in length and 2 traffic lanes wide.

Regular area pavement sections:

- All mainline pavement for normal travel lanes. Includes middle (both direction) turn lanes
- Paved shoulder – if same thickness as pavement and part of pavement bid item include with pavement. If separate bid item, treat as separate section.
- Paved median - if same thickness as pavement and part of pavement bid item, and longer than 300 feet (100 m), include with pavement.
- Auxiliary lanes of full width longer 300 feet (100 m).
- Widening greater than 6 feet (2 m).

Irregular areas:

- Widening less than 6 feet (2 m).
- Side street connections.
- Ramps, including gore areas, and collector distributor roads.
- Deceleration and acceleration lanes.
- Turn lanes, including taper sections.
- Tapers.
- Radiuses.
- Median crossovers

PROCEDURES

The District Materials Engineer will determine the location of each lot, the random location of each metal target, and the random thickness measuring scheme for each section using an Iowa DOT developed MSExcel spreadsheet.

A. Target Location for Regular Areas

1. Divide the section longitudinally into 200 foot (50 m) long lots. One target will be located in each lot based on the spreadsheet selection (The targets should be placed half way between dowel baskets). See Figure 1. A minimum of ten targets will be tested. If a target location falls on a bridge or in an approach section, it will be eliminated.

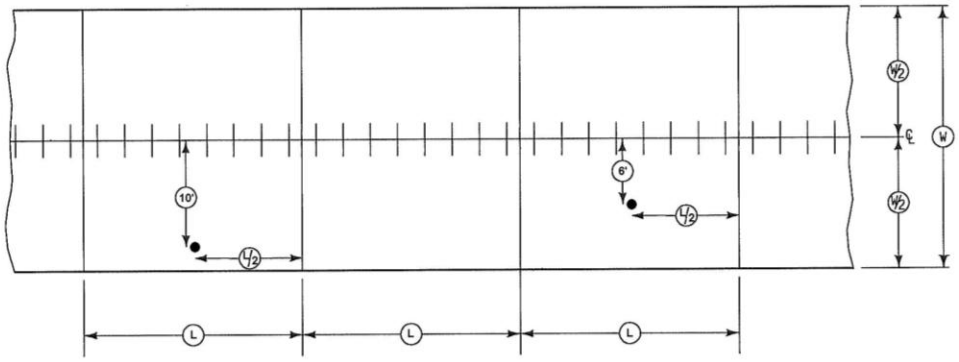
2. The transverse location of the targets will be randomly determined by the spreadsheet program. The random locations will be either 6 or 10 feet (2 or 3 m) left or right of centerline. When tie steel is present at the edge of the pavement or lane, the locations will be 5 or 9 feet (1.5 or 2.5 m).

3. The program will randomly determine which targets to measure. If a measurement location falls on a bridge or bridge approach pavement, it will be eliminated and the next closest target not in the original random selection will be used for measurement.

4. Shoulders. Divide the section into 200 foot (50 m) long lots. Place targets approximately mid-point transversely on shoulders wider than 6 feet (1.82 m). On 6 foot (1.82 m) shoulders, the targets should be 4

feet (1.2 m) from the edge of the pavement.

Figure1. Target Location



PLAN

B. Target Location for Irregular Areas

1. All irregular areas of the same design thickness will be grouped together for determining the number of lots. The Engineer may waive sections of the same design thickness that total less than 5,000 square yards (4200 sq. m).

2. Place targets randomly in all irregular areas larger than 100 square feet (10 m^2). One target will be randomly located in each selected irregular area, unless one or more of the areas are significantly larger than the others, then more than one target may be located in the large area. Targets must be placed at least 2 feet (0.6 m) away from tie steel and 4 feet (1.2 m) from dowel bars. A minimum of ten targets will be tested to represent each section of irregular areas. All targets will be measured.

C. Testing

Follow the manufacturer's instructions for operating the thickness gauge. It is important to avoid testing close to any steel including vehicles, equipment, steel toed shoes as well as tie bars, dowel bars and baskets, and manhole covers. When wearing steel toed shoes, always keep both toes at least 2 feet (0.6 m) from the gauge during the test. Three repeat readings will be taken. The readings should all be within 1 to 2 mm of each other. If the difference between any of the readings is more than 3 mm, take 2 additional readings. If the two additional readings are within 3 mm of any of the first 3 readings, the measurement is valid for that location. If not, note that the location is not valid and select the next target location not originally selected for testing.

The US made targets produce a slight bias on the T2 unit (approximately 3 mm less than the actual thickness). The correction factor is programmed into the reporting spreadsheet. The correlation factor is:

Corrected Thickness Reading = -0.00003723X(T2 reading)^2 + 1.01629229X(T2 reading) + 1.44772852

D. Section Evaluation

1. Use the following formula to determine the mean thickness for the section:

$$\overline{X} = \frac{\sum X}{n}$$

Where: $\overline{X}$ = mean length for the section

$\sum X$ = sum of core lengths for the section

n = number of cores taken within the section

Round the mean thickness to two decimal places.

2. Use the following formula to determine the sample standard deviation of the thickness of the section:

$$S = \sqrt{\frac{\sum \left(X - \overline{X}\right)^2}{n-1}}$$

Where:

S = thickness standard deviation for the section.
$\overline{X}$ = mean thickness for the section
X = individual thickness values for the section.
n = number of tests representing the section.

$\sum$ = sign indicating the sum of all values of $(X - \overline{X})^2$

Round the sample standard deviation to two decimal places.

NOTE: Calculations of the standard deviation are best made with an electronic calculator with standard deviation capability that uses the formula containing the quantity (n-1).

3. Use the following formula to determine the thickness index for the section of pavement thickness.

$$TI = (\overline{X} - S) - T$$

Where:

TI = thickness index for the section
$\overline{X}$ = mean thickness length for the section
T = from Table 090XX.05-2
S = measurement thickness standard deviation (of the sample) for the section

Round the thickness index to two decimal places.

NOTE: If the mean thickness minus the standard deviation is less than T of the section, the thickness index will be a negative number.

4. Basis of Payment. Payment for the quantities of pavement in square yards (square meters) in each section will be as shown in Article 09XXX.05 and based on the thickness index as determined in accordance with these instructions.

E. Deficient Areas

1. If any measurement is deficient from T by 1 inch (25.4 mm) or more, the measurement should be rechecked to confirm the reading and the equipment. If the repeat measurement is also 1 inch (25.4 mm) or more below T, mark the location directly over the target. The Contractor shall drill a 4.0 inch (101.6 mm) diameter core at that location. If the core length confirms the measurement, continue to drill cores as described below.

2. Deficient areas, represented by cores deficient in length by 1 inch (25.4 mm) or more from design thickness, are to be replaced. These areas will be determined by drilling a core 60 feet (18 m) in each direction longitudinally at the same transverse location from the deficient core. Drilling will be continued at 60 feet (18 m) intervals until a core is obtained which is not deficient by 1 inch (25.4 mm) or more from design thickness. Interpolate between this core and the adjacent core to determine the limits of the deficient area. This is the area to be removed and replaced at contractor's expense. These additional cores are to be used to define the deficient area and will not be used in the thickness index calculation. When an obstruction, such as a bridge, intersection, previous work, etc., prevents drilling a core at the required 60 feet (18 m) interval in either direction longitudinally, continue the balance of the distance on the other side of the obstruction.

3. Any readings taken in the area for removal will be eliminated from the analysis for the entire section. After replacement, the contractor will take cores as directed by the engineer to verify the thickness.

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: John Smythe / Melissa Serio	**Office:** Construction	**Item 10**
Submittal Date: March 19, 2010	**Proposed Effective Date:** July, 2010	
Article No.: **Title:**	**Other:** SS-09004, SUPPLEMENTAL SPECIFICATIONS FOR MOBILIZATION FOR EROSION CONTROL	

Specification Committee Action: Approved as is.

Deferred:	**Not Approved:**	**Approved Date:** 4/8/2010	**Effective Date:** 10/19/2010

Specification Committee Approved Text: See attached Draft DS.

Comments: None.

Specification Section Recommended Text: See attached Draft DS.

Comments:

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

09004.01 MOBILIZATIONS, EROSION CONTROL.

A. Prior to the Preconstruction Conference, submit for approval an Erosion Control Implementation Plan (ECIP) for accomplishing all aspects of the erosion control work. In the ECIP include a description of additions or modifications to the ~~project~~ contract. Do not implement deviations from the approved ECIP without the Engineer's written permission. During the course of the ~~project~~ contract, review the ECIP with the Engineer and modify as needed.

B. In the ECIP, include stages for erosion control work to address the Contractor's timetable and sequence for major activities on the ~~project~~ contract, including the number of Mobilizations, Erosion Control, anticipated for the ~~project~~ contract. In the consideration of the number of mobilizations consider, as a minimum:

- Clearing and grubbing activities,
- The number of earthwork balances for the ~~project~~ contract,
- Sensitive areas requiring special consideration,
- Anticipated suspension of work,
- Compliance with the Pollution Prevention Plan (PPP), and
- Separate mobilizations needed for different crews performing work such as silt fence, seeding, or ditch checks (however, multiple mobilizations will not be paid for a single crew performing different items of work that require the same equipment to be mobilized).

Reason for Revision: Clarification required due to situations where multiple projects are combined into a single contract.

County or City Input Needed (X one)	**Yes**	**No** X
Comments: None		

Industry Input Needed (X one)			**Yes**	**No** X	
Industry Notified:	**Yes**	**No** X	**Industry Concurrence:**	**Yes**	**No**
Comments: For clarification only.					

DRAFT SS-090XX
(Replaces SS-09004)

Iowa Department of Transportation

SUPPLEMENTAL SPECIFICATIONS
FOR
MOBILIZATION FOR EROSION CONTROL

Effective Date
July 20, 2010

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

090XX.01 MOBILIZATIONS, EROSION CONTROL.

A. Prior to the Preconstruction Conference, submit for approval an Erosion Control Implementation Plan (ECIP) for accomplishing all aspects of the erosion control work. In the ECIP include a description of additions or modifications to the ~~project~~ contract. Do not implement deviations from the approved ECIP without the Engineer's written permission. During the course of the ~~project~~ contract, review the ECIP with the Engineer and modify as needed.

B. In the ECIP, include stages for erosion control work to address the Contractor's timetable and sequence for major activities on the ~~project~~ contract, including the number of Mobilizations, Erosion Control, anticipated for the ~~project~~ contract. In the consideration of the number of mobilizations consider, as a minimum:

- Clearing and grubbing activities,
- The number of earthwork balances for the ~~project~~ contract,
- Sensitive areas requiring special consideration,
- Anticipated suspension of work,
- Compliance with the Pollution Prevention Plan (PPP), and
- Separate mobilizations needed for different crews performing work such as silt fence, seeding, or ditch checks (however, multiple mobilizations will not be paid for a single crew performing different items of work that require the same equipment to be mobilized).

C. Only one mobilization will be paid for each stage of work described in the ECIP. Within the scope of work defined for each single mobilization described in the ECIP, additional movement due to weather delays or at the option of the Contractor will not be counted as a mobilization.

D. Additional mobilizations not outlined in the ECIP must be approved by the Engineer. Only one mobilization will be paid for each stage of additional work approved by the Engineer.

E. Mobilize with sufficient labor, equipment, and materials to perform the erosion control included in the ECIP. If the Contractor fails to mobilize when erosion control work is needed to comply with the ECIP and the PPP, the Engineer will, by written order, direct the Contractor to mobilize within 72 hours of a written order.

F. If the Contractor fails to mobilize within such time period, a deduction of $750.00 per calendar day will be made from money due under the contract, except when the Engineer extends such time period.

G. Mobilizations, Erosion Control is not to include work provided under the item of Mobilizations, Emergency Erosion Control.

090XX.02 MOBILIZATIONS, EMERGENCY EROSION CONTROL.
An emergency will be considered to be a sudden occurrence of a serious and urgent nature which requires work not included in the contract or is beyond normal maintenance of erosion control items and the mobilizations included in the erosion control implementation plan. Emergency work requires immediate mobilization and movement of necessary labor, equipment, and materials to the emergency site, followed by the immediate installation of temporary erosion control measures.

A. Mobilize with sufficient labor, equipment, and materials on the job site within eight hours of the Engineer's written order to install temporary erosion control items on an emergency basis. The Engineer's written order will include a description of the required work. Only one mobilization will be paid for the work described in the written order.

B. If the Contractor fails to mobilize within eight hours of the written order, a deduction of $1500.00 per calendar day will be made from money due under the contract, except when the Engineer extends such time period.

090XX.03 METHOD OF MEASUREMENT.

A. Mobilizations, Erosion Control: units. The quantity measured for payment will be the number of such mobilizations in the approved ECIP and acceptably performed, as well as all additional mobilizations approved by the Engineer and acceptably performed.

B. Mobilizations, Emergency Erosion Control: units. The quantity measured for payment will be the number of such mobilizations directed in writing by the Engineer and acceptably performed.

090XX.04 BASIS OF PAYMENT.
Payment for Mobilizations, Erosion Control, and Mobilizations, Emergency Erosion Control will be according to Article 1109.03, B, 1, of the Standard Specifications, at the unit prices stipulated in this specification. Mobilization for Erosion Control costs are not included as part of the contract item for "Mobilization" described in Section 2533 of the Standard Specification.

A. Mobilizations, Erosion Control.

1. The quantity will be paid for at the unit price of $500.00 each for Mobilizations, Erosion Control, which price is full compensation for the staged movement of labor, equipment, and materials; and for all labor, tools, equipment, and incidentals necessary to complete the movement.

2. Individual erosion control items provided for in the contract, and acceptably furnished and placed under the item of Mobilizations, Erosion Control, will be paid for separately at the contract unit price for the items.

B. Mobilizations, Emergency Erosion Control.

1. The quantity will be paid for at the unit price of $1000 each for Mobilizations, Emergency Erosion Control, which price is full compensation for movement of labor, equipment and materials; and for all labor, tools, equipment, and incidentals necessary to complete the movement.

2. Individual temporary erosion control items provided for in the contract, and acceptably furnished and placed under the item of Mobilizations, Emergency Erosion Control, will be paid for separately at the contract unit price for the items.

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Tom Reis	**Office:** Specifications	**Item 11**
Submittal Date: March 26, 2010	**Proposed Effective Date:** October 2010	
Article No.: **Title:**	**Other:** DS-09XXX, Developmental Specifications for Safety Edge	

Specification Committee Action: Deferred until May.

Deferred: X	**Not Approved:**	**Approved Date:**	**Effective Date:**

Specification Committee Approved Text:

Comments: This specification will apply to mainline pavement (when shoulders are unpaved) or shoulders (when they are less than 4 feet in width). We will not require the safety edge on detour pavement or crossovers, but it will be required on patches when the adjacent pavement has it.

There was much discussion on how to handle design or top width versus pay or bottom width. Typically asphalt has been measured to the top width, making the 1:1 area incidental. We will pay to the bottom width. The detail will be revised to show design width and pay width. For asphalt, the safety edge will be shown as a nominal 1 foot.

If the Contractor elects to put safety edge in where it is not required, will the additional quantity be paid for or incidental?

It was decided this specification will not be issued as a DS, but will go into the October GS. The wording and detail will be finalized so Safety Edge can be added by contract modification prior to the October letting.

The draft Standard Road Plan is attached.

Specification Section Recommended Text: See attached Draft DS.

Comments:

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

See attached Developmental Specification

Reason for Revision: Added specification language to implement a Safety Edge on selected projects.

County or City Input Needed (X one)			**Yes**	**No** X	
Comments:					
Industry Input Needed (X one)			**Yes**	**No** X	
Industry Notified:	**Yes**	**No** X	**Industry Concurrence:**	**Yes**	**No**
Comments:					

DRAFT DS-09XXX
(New)

Iowa Department of Transportation

DEVELOPMENTAL SPECIFICATIONS
FOR
SAFETY EDGE

Effective Date
October 19, 2010

THE STANDARD SPECIFICATIONS, SERIES 2009, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE DEVELOPMENTAL SPECIFICATIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

09XXX.01 DESCRIPTION.
Incorporate a Safety Edge to the dimensions shown and at locations designated on the contract documents.

09XXX.02 MATERIALS.
Safety Edge material shall match the adjoining pavement or shoulder material.

09XXX.03 CONSTRUCTION.

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

Use one of the following approved devices or an approved equal providing the same end-result cross-section as designated on the plans:

TransTech Systems, Inc.
1594 State Street
Schenectady, NY 12304

Telephone: 800.724.6306
Website: www.transtechsys.com

Advant-Edge Paving Equipment, LLC
P.O. Box 9163
Niskayuna, NY 12309-0163

Telephone: 518.280.6090
Website: www.advantedgepaving.com
Contact: Gary D. Antonelli
Cellular Telephone: 518.368.5699
Email: garya@nycap.rr.com

The Engineer may require proof that the device has been used on previous projects with acceptable results or may require a test section constructed prior to the beginning of work and demonstrate wedge compaction to the satisfaction of the Engineer. The Engineer may allow short sections of handwork when necessary for transitions at driveways, intersections, interchanges, and bridges.

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

installed.

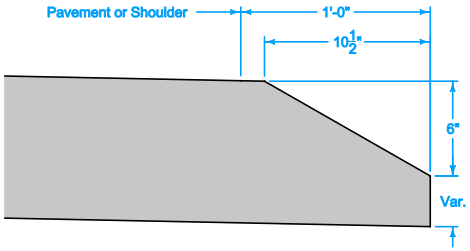
B. PCC Pavement.
Modify paver screed to ensure the Safety Edge meets the final cross-section as detailed on the plans.

09XXX.04 METHOD OF MEASUREMENT.
Safety Edge will not be measured.

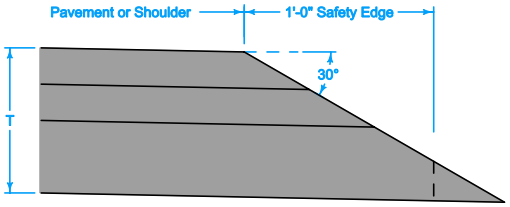
09XXX.05 BASIS OF PAYMENT.
Safety Edge will not be paid for separately and shall be included in the contract unit price for the item for which it is required.

Quantities for Safety Edge are included in the estimated quantity of the pavement or shoulder. For HMA quantities calculated by area, the Safety Edge is measured as one foot of width regardless of thickness.

See paving typicals for placement within roadway.



PCC



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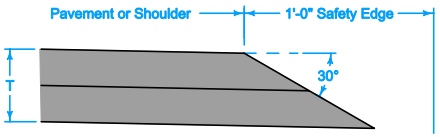

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HMA

Iowa Department of Transportation

STANDARD ROAD PLAN

REVISION	
New	10-19-10

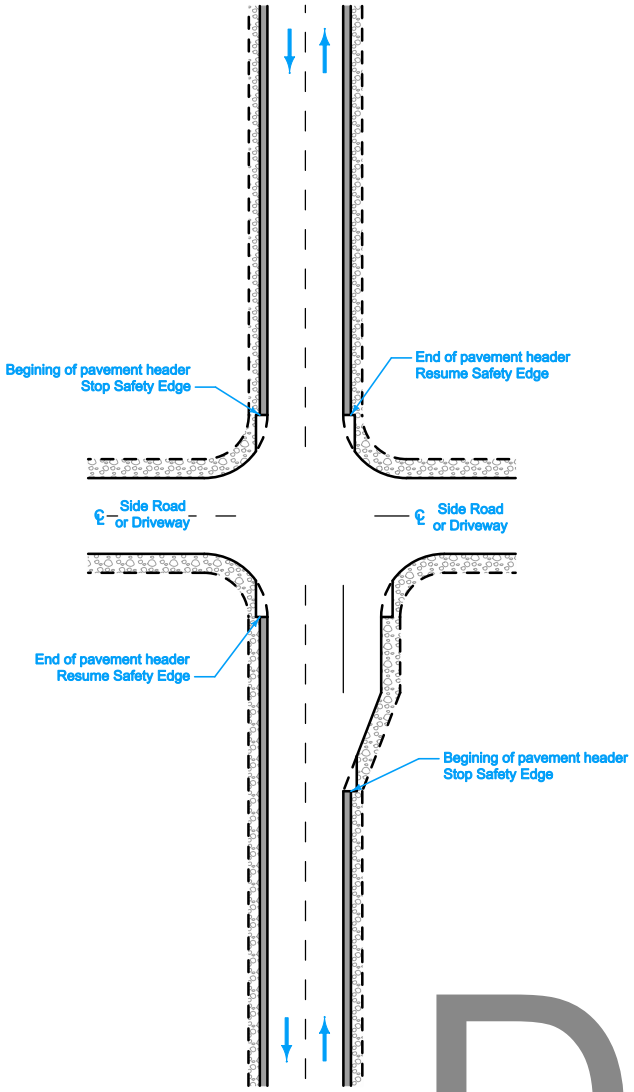
PV-3

SHEET 1 of 2

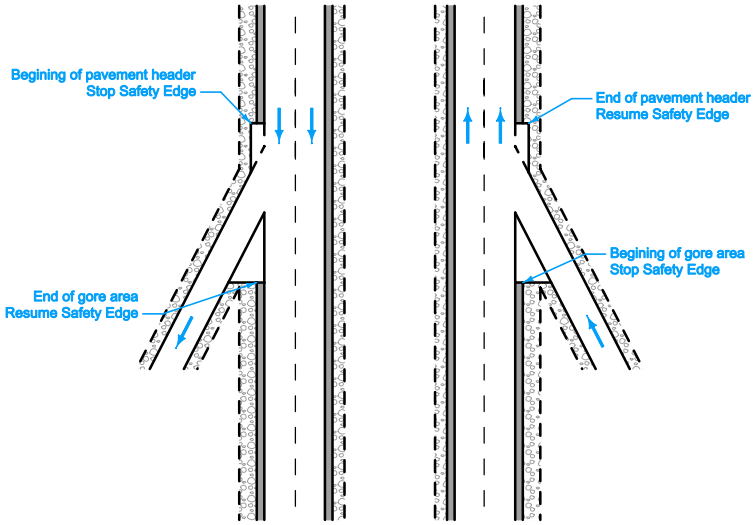
REVISIONS: New.

Deanna Maifield
APPROVED BY DESIGN METHODS ENGINEER

SAFETY EDGE



AUXILIARY LANES AND INTERSECTIONS



RAMPS AND LOOPS

Iowa Department of Transportation

STANDARD ROAD PLAN

REVISION	
New	10-19-10

PV-3

SHEET 2 of 2

REVISIONS: New.

Deanna Maifield
APPROVED BY DESIGN METHODS ENGINEER

SAFETY EDGE