Iowa Department of Transportation

MINUTES
OF
IOWA DOT SPECIFICATION COMMITTEE MEETING

May 8, 2014

Members Present:	Darwin Bishop	District 3 - Construction
	Eric Johnsen, Secretary	Specifications Section
	Greg Mulder	Office of Construction & Materials
	Wes Musgrove	Office of Contracts
	Gary Novey	Office of Bridges & Structures
	Dan Redmond	District 4 - Materials
	Tom Reis, Chair	Specifications Section
	Brian Smith	Office of Design
	Willy Sorensen	Office of Traffic & Safety
Members Not Present:	Mark Brandl	District 6 - Davenport RCE
	Donna Buchwald	Office of Local Systems
	Mitch Dillavou	Project Delivery Bureau
Advisory Members Present:	Lisa McDaniel	FHWA
	Paul Wiegand	SUDAS
Others Present:	Brenda Boell	Office of Local Systems
	Roger Boulet	District 6 - Materials
	Kevin Jones	Office of Construction & Materials
	Mahbub Khoda	Office of Construction & Materials
	Melissa Serio	Office of Construction & Materials

Tom Reis, Specifications Engineer, opened the meeting. The following items were discussed in accordance with the revised agenda dated May 7, 2014:

1. Article 1107.02, B, 7, Insurance When Working In Railroad Right-of-Way.

The Office of Contracts requested to clarify payment for meeting railroad insurance requirements.

2. Article 1107.07, E, Safety, Health, Pollution, and Sanitation.

The Specifications Section requested to increase the rate paid for water for dust control on Primary projects.

3. Article 2102.05, A, 4, b, Basis of Payment (Special Backfill Material).

The Office of Construction and Materials requested to clarify the Basis of Payment for Special Backfill Material.

4. Article 2111.04, Method of Measurement (Granular Subbase).

The Office of Construction and Materials requested to make Granular Subbase a plan quantity item.

5. Article 2405.03, H, 1, General (Anchor Bolts for Bridge Bearings and Foundations).

The District 4 Materials Office requested to move specification language from Materials I.M. 453.08.

6. **Article 2408.03, S, 5, c, Inspection (Bolting)**.

The Office of Construction and Materials requested to standardize the frequency of both the torque wrench and the Skidmore-Wilhelm check at 12 months.

7. **Article 2408.03, S, Bolting (Steel Structures).**

The District 4 Materials Office requested to move specification language from Materials I.M. 453.07.

8. **Article 2408.03, Y, Sheer Connector Studs (Steel Structures).**

The Office of Construction and Materials requested to move specification language from Materials I.M. 453.10.

9. **Article 2419.02, C, Reinforcing Steel and Wire Fabric (Materials).**

The Office of Construction and Materials requested to move specification language from Materials I.M. 451, Appendix H.

10. **Article 2419.01, E, Precast concrete Units.**

Section 4149, Sanitary and Storm Sewer Pipe and Structure Materials .

The Office of Construction and Materials requested to apply the requirements of Section 2419 to precast concrete storm and sanitary sewer pipe and structures.

11. **Article 2505.03, A, 1, Steel Beam Guardrail (Guardrail Construction and Removal).**

The Office of Construction and Materials requested to move specification language from Materials I.M. 455.02.

12. **Article 2511.02, D, Detectable Warnings (Removal and Construction of Sidewalks and Recreational Trails).**

The Office of Construction and Materials requested to move specification language from the Materials I.M.s and update the detectable warning specifications.

13. **Section 2528, Traffic Control.**

Section 4188, Traffic Control Devices .

The Offices of Traffic & Safety and Local Systems and Specifications Section requested to incorporate the portable dynamic message sign specifications (DS-12053) into the Standard Specifications.

14. **Article 2529.03, H, 2, Placing Full Depth Portland Cement Concrete Finish Patches.**

The Office of Construction and Materials requested to clarify that air temperature restrictions do not apply to PCC patches.

15. **Section 4141, Corrugated Steel Culvert Pipe.**

The Office of Construction and Materials requested to move specification language from Materials I.M. 441.

16. **Article 4149.04, H, 1, Manhole or Intake Adjustment Rings (Grade Rings).**

The Office of Construction and Materials requested to move specification language from Materials I.M. 449.05.

17. Article 4151.02, B, Pavement Dowel Bars.

The Office of Construction and Materials requested to move specification language from Materials I.M. 451.03B, Appendix C.

18. Article 4151.03, Reinforcement for Structures.

The Office of Construction and Materials requested to move specification language from Materials I.M.s 451.01, 451.02, and 451.03B and add stainless steel reinforcement to the Standard Specifications.

19. Article 4151.04, Wire Mesh Reinforcement .

The Office of Construction and Materials requested to move specification language from Materials I.M. 451, Appendix C.

20. Section 4151, Steel Reinforcement .

The Office of Construction and Materials requested to move specification language from Materials I.M.s 451 and 451, Appendix E.

21. Section 4152, Structural Steel.

The Office of Construction and Materials requested to move specification language from Materials I.M. 453.10.

22. Article 4153.06 , Bolts, Nuts, Washers and Fasteners.

The District 4 Materials Office requested to move specification language from Materials I.M.s 453.06B and 453.07.

23. Section 4154, Fence Materials.

The Office of Construction and Materials requested to update the fence materials specifications.

24. Article 4187.01, C, Fasteners for Aluminum Alloy and Galvanized Steel Superstructures and Anchor Bolts.

The Office of Construction and Materials requested to move specification language from Materials I.M.s 453.07 and 453.08.

25. Discuss MAPLE / Approved Products List database and how it affects the Standard Specifications.

The implementation of MAPLE will not require revisions to the Standard Specifications. Hyperlinks within ERL will change, as hyperlinks to approved products lists in the appendices of the Materials I.M.s will now go directly to MAPLE.

26. Developmental Specifications for Modular Expansion Joints.

The Office of Bridges and Structures requested approval of Developmental Specifications for Modular Expansion Joints.

27. Section 1102, Proposal Requirements and Conditions.

The Office of Contracts requested to require electronic bidding for all contracts let by the Department.

28. Discuss posting of Specification Committee agendas for review by industry, cities, and counties.

The Specifications Section suggested posting Specification Committee agendas prior to the meeting for industry, cities, and counties review. This will require moving up the submittal date for each Specification Committee meeting. It is proposed that the submittal date for Specification revisions will go from the Friday, 13 days before the meeting, to the Monday, 17 days before the meeting. This will give one week to create the agenda, so that it can be posted on the Monday, 10 days before the meeting. We will allow one week for comments and then have 3 to 4 days to review the comments before the meeting. All comments will be automatically emailed to all members of the Specification Committee. Comments will be included on the specification revision form when the meeting minutes are issued. It is planned that this process will be implemented for the June 2014 Specification Committee meeting.

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Wes Musgrove / Ed Kasper	**Office:** Contracts	**Item 1**
Submittal Date: March 14, 2014	**Proposed Effective Date:** October 2014	
Article No.: 1107.02, B, 7 **Title:** Insurance When Working In Railroad Right-of-Way	**Other:**	

Specification Committee Action: Approved with changes.

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

Specification Committee Approved Text:

1107.02, B, 7, Payment.

Replace the Article:

Payment to the Contractor for insurance required ~~in the contract documents~~ by Article 1107.02, B, shall be ~~considered as incidental to other items in the contract~~ per the contract documents.

Comments: Since there should be a Developmental Specification, Supplemental Specification, or Special Provision for projects involving each railroad, there was not a need for MOM and BOP in the Standard Specifications.

The Rail Section will add the appropriate specification in PSS. The Office of Contracts will add the appropriate railroad insurance bid item to the proposal. The Office of Contracts will also review the Contractor's railroad insurance policy before signing the contract (except on projects where the railroad company has requested to review the policy before the contract is signed).

Specification Section Recommended Text:

1107.02, B, 7, Payment.

Replace the title and Article:

Method of Measurement and Basis of Payment.

~~Payment to the Contractor for insurance required in the contract documents shall be considered as incidental to other items in the contract.~~

The lump sum price bid for Insurance Provisions, of the company specified, will be full compensation for fulfilling the requirements of Article 1107.02.

Full payment will be made upon submittal of the required evidence of coverage and, where necessary, approval of such coverage by the railroad company.

Comments: The Office of Contracts requested to defer this revision to address some issues with the implementation of the revision. The Office of Design will set up a meeting with affected offices to discuss.

The Office of Design requested clarification on how they will be notified of the need for a railroad insurance provision bid item. The Rail Section is reviewing all projects and flagging in the Project Scheduling System (PSS) when a railroad is involved. This would indicate the need for a bid item.

The Office of Local Systems requested a report on the cost bid for the existing railroad insurance provisions bid items. The Office of Contracts will produce a report prior to the meeting.

The District 6 Office asked about verifying the adequacy of the Contractor's insurance policy. They requested the policies be submitted to the Rail Section for review, similar to the specifications for shop drawings in Article 1105.03. The Office of Contracts indicated that they believe the Office of Finance keeps track of what railroad policies have been submitted, but does not verify the policies meet specifications. The BNSF Railroad requires submission of railroad policies on some projects for approval prior to the Office of Contracts signing the contract. The Office of Contracts indicated that they review other policies prior to signing the contract. The District 6 Office asked how they know to pay the bid price for the railroad insurance bid item. The Office of Contracts indicated that the Construction

Office could pay as soon as they receive the contract, as the Office of Contracts has already reviewed the policy. The Construction Offices would like to receive copies of the policies for administration of the contract.

The District 6 Office indicated that they have had some maintenance projects that included a bid item for railroad insurance, but the Contractor had not yet obtained a policy or the Office of Contracts checked for a policy. Maintenance projects have had some issues due to the timing of when they are added to PSS.

The District 6 Office asked if the Contractor could submit the railroad policy after the contract is signed, so as not to delay the contract. The Office of Contracts indicated that they believed Iowa Code required the Department to verify the Contractor's bond and insurance prior to signing the contract.

The District 6 Office asked about working in DOT right-of-way that is less than 25 feet from the tracks. The Specifications Section indicated that a railroad insurance policy would not be required, if the Contractor is not working in railroad right-of-way, but railroad flaggers would be required.

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

7. Method of Measurement and Basis of Payment.

~~Payment to the Contractor for insurance required in the contract documents shall be considered as incidental to other items in the contract.~~

The lump sum price bid for this item will be full compensation for fulfilling the requirements of 1107.02, B.

Full payment will be made upon submittal of the required evidence of coverage and, where necessary, approval of such coverage by the railroad company.

Reason for Revision:

To establish simplicity and uniformity so that rail requirements can be accurately addressed in the contract documents. Currently rail insurance is a bid item in some instances and incidental in others. Also, in some situations only a portion of the rail insurance cost is to be applied to the bid item, and in other situations the entire cost is applied. This has resulted in errors and inconsistencies in contract documents and re-work or addendums to make corrections.

A new bid item will be established for each railroad company. The bid item will be used anytime railroad protective insurance is required, either by Article 1107.02, B; DS; SS; or SP.

It is intended to enhance the Project Scheduling System so that the Office of Rail Transportation may communicate to designers and others the projects that have rail impacts, what rail companies are impacted and what specifications are required.

Federal aid participation is limited to Railroad Protective liability insurance coverage limits of $2 million per occurrence and $6 million aggregate. When specifications require coverage limits greater than that, the bid item must be in a non-participating category. For simplicity on projects where the DOT is contracting authority the item may be made non-participating routinely. This does not prohibit local agencies from designating federal aid participation on a case by case basis.

County or City Input Needed (X one)	**Yes** x	**No**
Comments: Local agencies are represented on the Specification Committee. There has been no previous related correspondence.		

Industry Input Needed (X one)			**Yes**	**No**	
Industry Notified:	**Yes**	**No** x	**Industry Concurrence:**	**Yes**	**No**
Comments: It is anticipated that industry will support this change because it helps draw attention to those projects requiring rail protective insurance and provides uniformity to the process.					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Tom Reis / Eric Johnsen	**Office:** Specifications	**Item 2**
Submittal Date: 4/22/2014	**Proposed Effective Date:** October 2014	
Article No.: 1107.07, E **Title:** Safety, Health, Pollution, and Sanitation	**Other:**	

Specification Committee Action: Approved as recommended.

Deferred:	**Not Approved:**	**Approved Date:** 5/8/2014	**Effective Date:** 10/21/2014

Specification Committee Approved Text: See Specification Section Recommended Text.

Comments: None.

Specification Section Recommended Text:

1107.07, E

Replace the second sentence:

On Primary Roads and Primary Road extensions, on temporary Primary Road haul roads, and when designated in the contract documents construction areas adjacent to Primary Roads on which traffic is maintained, the Contractor will be paid for watering ordered by the Engineer at the rate of $~~15~~ 60 per thousand gallons ($~~4~~ 16 per kL).

Comments:

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

Reason for Revision: To match the rate paid for watering for erosion control as requested by AGCI.

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

Comments: Does not apply to secondary routes unless specifically designated.

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

Comments: An AGCI member submitted data showing an approximate average cost of $50 per thousand gallons paid in 2013 for obtaining water from a municipal source.

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Greg Mulder / Melissa Serio	**Office:** Construction & Materials	**Item 3**
Submittal Date: 2014.04.22	**Proposed Effective Date:** October 21, 2014	
Article No.: 2102.05, A, 4, b **Title:** Basis of Payment (Special Backfill Material)	**Other:**	

Specification Committee Action: Approved as recommended.

Deferred:	**Not Approved:**	**Approved Date:** 5/8/2014	**Effective Date:** 10/21/2014

Specification Committee Approved Text: See Specification Section Recommended Text.

Comments: None.

Specification Section Recommended Text:

2102.05, A, 4, b.

Delete the second bullet:

~~Excavating material,~~

Comments:

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

4. **Special Backfill Material.**
   - **a.** Per ton (megagram) or cubic yard (cubic meter) including water naturally present in the material.
   - **b.** Except for water added, payment is full compensation for all work involved in:
     - Furnishing material,
     - ~~Excavating material,~~
     - Processing material, when the source is designated in the contract documents,
     - Hauling this material, and
     - Incorporating material into the roadway.

Reason for Revision: As written, there could be different interpretations on what material excavation is covered – whether it's special backfill material or existing material. Excavation of existing material is covered by Cl. 10 or 13 bid items. Excavation of special backfill material would be covered by furnishing of material.

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: None

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Greg Mulder / Melissa Serio	**Office:** Construction & Materials	**Item 4**
Submittal Date: April 23, 2014	**Proposed Effective Date:** October 21, 2014	
Article No.: 2111.04 **Title:** Method of Measurement (Granular Subbase)	**Other:**	

Specification Committee Action: Approved as recommended.

Deferred:	**Not Approved:**	**Approved Date:** 5/8/2014	**Effective Date:** 10/21/2014

Specification Committee Approved Text: See Specification Section Recommended Text.

Comments: None.

Specification Section Recommended Text:

2111.04, Method of Measurement.

Replace the Article:

~~**A.**~~ Measurement for Granular Subbase ~~material furnished and placed in accepted portions of work will be in square yards (square meters) for the specified design thickness~~ will be the quantity shown in the contract documents. ~~The measured area will be based on plan dimensions for the finished surface but will exclude fillets~~.

~~**B.** The design thickness of the placed material will be verified by spot checks of the grade.~~

Comments:

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

2111.04 METHOD OF MEASUREMENT.

~~**A.**~~ Measurement for Granular Subbase ~~material furnished and placed in accepted portions of work will be in square yards (square meters) for the specified design thickness. The measured area will be based on plan dimensions for the finished surface but will exclude fillets~~ will be the quantity shown in the contract documents.

~~**B.** The design thickness of the placed material will be verified by spot checks of the grade.~~

Reason for Revision: Clarification that granular subbase is paid based on contract quantity.

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: None					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Dan Redmond	**Office:** District 4 Materials	**Item 5**
Submittal Date: April 22, 2014	**Proposed Effective Date:** October 2014	
Article No.: 2405.03, H, 1 **Title:** General (Anchor Bolts for Bridge Bearings and Foundations)	**Other:**	

Specification Committee Action: Approved as recommended.

Deferred:	**Not Approved:**	**Approved Date:** 5/8/2014	**Effective Date:** 10/21/2014

Specification Committee Approved Text: See Specification Section Recommended Text.

Comments: None.

Specification Section Recommended Text:

2405.03, H, 1, General.

Replace the Article:

a. Use bolts, nuts, and washers; galvanized according to ASTM F 2329 with zinc bath temperature not to exceed 850ºF (455ºC) or ASTM B 695, Class 55, Type I.

b. Use full-length galvanized anchor bolts that:

- Meet the requirements of ASTM F 1554, Grade 36.
- Are Unified Coarse Thread Series, and
- Have Class 2A tolerance.

c. Color code in blue the end of each anchor bolt intended to project from the concrete in order to identify the grade. Use galvanized washers that meet the requirements of ASTM F 436, Type 1. Use heavy hex, galvanized nuts that meet the requirements of ASTM A 563, DH, Class 2B. Threads are to comply with Unified Coarse Thread Series, and have Class 2B tolerance. Nuts may be over-tapped in accordance with the allowance requirements of ASTM A 563.

Comments:

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

Section 2405. Foundations and Substructures

2405.03 CONSTRUCTION.

H. Anchor Bolts for Bridge Bearings and Foundations.

1. General

a. Use bolts, nuts and washers, galvanized according to ASTM F 2329 with zinc bath temperature not to exceed 850ºF (455ºC) or ASTM B 695, Class 55, Type I.

c. Use galvanized washers that meet the requirements of ASTM F 436, Type 1. Use heavy hex, galvanized nuts that meet the requirements of ASTM A 563, DH, Class 2B. Threads are to comply with Unified Coarse Thread Series, and have Class 2B tolerance.

Reason for Revision: This is language removed from Materials I.M. 453.08 better suited for the specifications.

County or City Input Needed (X one)	**Yes**	**No**
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: Greg Mulder	**Office:** Construction and Materials	**Item 6**
Submittal Date: 2014.04.22	**Proposed Effective Date:** October, 2014	
Article No.: 2408.03, S, 5 , c **Title:** Inspection (Bolting) [Steel Structures]	**Other:**	

Specification Committee Action: Approved as recommended.

Deferred:	**Not Approved:**	**Approved Date:** 5/8/2014	**Effective Date:** 10/21/2014

Specification Committee Approved Text: See Specification Section Recommended Text.

Comments: None.

Specification Section Recommended Text:

2408.03, S, 5, c, 4.

Replace the Article:

Establish the job inspecting torque value(s) at least once prior to each day's inspection. Have an approved testing agency verify ~~calibrate~~ calibration of the tension measuring device at least every ~~6~~ 12 months and if found to be out of tolerance, have it calibrated.

Comments:

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

4) Establish the job inspecting torque value(s) at least once prior to each day's inspection. Have an approved testing agency verify the calibration~~e~~ of the tension measuring device at least every ~~6~~ 12 months and if found to be out of tolerance, have it calibrated.

Reason for Revision: Standardizing the frequency of both the torque wrench and the skidmore-Wilhelm check at 12 months is consistent with the industry standard and the manufacturer's recommendations.

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

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

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Dan Redmond	**Office:** District 4 Materials	**Item 7**
Submittal Date: 2014.04.22	**Proposed Effective Date:** October, 2014	
Article No.: 2408.03, S **Title:** Bolting (Steel Structures)	**Other:**	

Specification Committee Action: Approved as recommended.

Deferred:	**Not Approved:**	**Approved Date:** 5/8/2014	**Effective Date:** 10/21/2014

Specification Committee Approved Text: See Specification Section Recommended Text.

Comments: None.

Specification Section Recommended Text:

2408.03, S, Bolting.

Add the Article:

6. Installing Stainless Steel Fasteners.

Install stainless steel fasteners using the following:

a. Install stainless steel fasteners to a snug tight condition. Snug tight is defined as the tightness attained with a few impacts (3-5) of an impact wrench or full effort with an ordinary spud wrench.

b. Tightening of bolts shall be performed in a manner that brings faying surfaces up evenly.

c. Do not use compressible materials such as gaskets, insulation, or metal shims between any bolted connections or flanges.

d. Visually ensure that plies of connected elements have been brought into firm contact.

e. Verify torque values as noted in Table 2408.03-4.

f. When in storage, protect bolts, nuts, and washers from the elements.

Table 2408.03-4: Minimum Bolt Torque

Bolt Dia. inches (mm)	Min. Bolt Torque, Type 304 ft-lb (N-m)	Min. Bolt Torque, Type 316 ft-lb (N-m)
1/4 (6.4)	6.0 (8.1)	7.0 (9.5)
5/16 (7.9)	11.0 (14.9)	12.0 (16.3)
3/8 (9.5)	20.0 (27.1)	21.0 (28.5)
7/16 (11.1)	31.0 (42.0)	33.0 (44.7)
1/2 (12.7)	43.0 (58.3)	45.0 (61.0)
9/16 (14.3)	57.0 (77.3)	59.0 (80.0)
5/8 (15.9)	93.0 (126.1)	97.0 (131.5)
3/4 (19.0)	128.0 (173.5)	132.0 (179.0)
7/8 (22.2)	194.0 (263.0)	203.0 (275.2)
1 (25.4)	287.0 (389.1)	333.0 (451.5)
1 1/8 (28.6)	413.0 (560.0)	432.0 (585.7)
1 1/4 (31.8)	480.0 (650.8)	504.0 (683.3)
1 1/2 (38.1)	703.0 (953.1)	732.0 (992.5)

Comments:

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

6. Installing Stainless Steel Fasteners.

Install stainless steel fasteners using the following:

a. Install stainless steel fasteners to a snug tight condition. Snug tight is defined as the tightness attained with a few impacts (3-5) of an impact wrench or full effort with an ordinary spud wrench.

b. Tightening of the bolts shall be performed in a manner that brings the faying

surfaces up evenly.

c. Do not use compressible materials such as gaskets, insulation, metal shims between any bolted connections or between any flanges.

d. Visually ensure that the plies of the connected elements have been brought into firm contact.

e. Verify torque values as noted in Table 2408.03-4.

f. When in storage, protect bolts, nuts, and washers from the elements.

Table 2408.03-4: Minimum Bolt Torque

Bolt Dia. inches (mm)	Min. Bolt Torque, Type 304 ft-lb (N-m)	Min. Bolt Torque, Type 316 (ft-lb) (N-m)
1/4 (6.4)	6.0 (8.1)	7.0 (9.5)
5/16 (7.9)	11.0 (14.9)	12.0 (16.3)
3/8 (9.5)	20.0 (27.1)	21.0 (28.5)
7/16 (11.1)	31.0 (42.0)	33.0 (44.7)
1/2 (12.7)	43.0 (58.3)	45.0 (61.0)
9/16 (14.3)	57.0 (77.3)	59.0 (80.0)
5/8 (15.9)	93.0 (126.1)	97.0 (131.5)
3/4 (19.0)	128.0 (173.5)	132.0 (179.0)
7/8 (22.2)	194.0 (263.0)	203.0 (275.2)
1 (25.4)	287.0 (389.1)	333.0 (451.5)
1 1/8 (28.6)	413.0 (560.0)	432.0 (585.7)
1 1/4 (31.8)	480.0 (650.8)	504.0 (683.3)
1 1/2 (38.1)	703.0 (953.1)	732.0 (992.5)

Reason for Revision: This is language removed from Materials I.M. 453.07 that is better suited for the specifications.

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

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Greg Mulder	**Office:** Construction and Materials	**Item 8**
Submittal Date: 2014.04.18	**Proposed Effective Date:** October, 2014	
Article No.: 2408.03, Y **Title:** Sheer Connector Studs (Steel Structures)	**Other:**	

Specification Committee Action: Approved as recommended.

Deferred:	**Not Approved:**	**Approved Date:** 5/8/2014	**Effective Date:** 10/21/2014

Specification Committee Approved Text: See Specification Section Recommended Text.

Comments: None.

Specification Section Recommended Text:
2408.03, Construction.

Add the Article:

Y. Shear Connector Studs.

1. When required by the contract documents, provide shear connector studs according to Article 4152.03. Achieve uniform quality and condition of completed studs, free of injurious laps, fins, seams, cracks, twists, bends, or other discontinuities. Replace studs that have radial cracks or bursts in the head of a stud. Use automatically timed stud welding equipment. Welding shall not be performed when base metal temperature is below 0ºF (-20ºC) or when surface is wet or exposed to falling rain or snow. Set-up shall include stud gun, power source, total welding lead length, and stud diameter.

2. Test completed studs in accordance with Materials I.M. 558 and Section 7 of the latest ANSI/AWS Welding Code D1.5/D1.5M.

Comments:

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

2408.03

Y. Shear Connector Studs.

1. When required by the contract documents, provide shear connector studs according to Article 4152.03. Achieve uniform quality and condition of completed studs, free of injurious laps, fins, seams, cracks, twists, bends or other discontinuities. Replace any studs that have radial cracks or bursts in the head of a stud. Use only automatically timed stud welding equipment. Welding shall not be performed when base metal temperature is below 0º F (-20º C) or when the surface is wet or exposed to falling rain or snow. Set-up shall include stud gun, power source, total welding lead length and stud diameter.

2. Test completed studs in accordance with Materials I.M. 558 and Section 7 of the latest Welding Code D1.5/D1.5M.

Reason for Revision: This is language removed from Materials I.M. 453.10 that is better suited for the specifications.

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

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

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Greg Mulder	**Office:** Construction and Materials	**Item 9**
Submittal Date: 2014.04.18	**Proposed Effective Date:** October, 2014	
Article No.: 2419.02, C **Title:** Reinforcing Steel and Wire Fabric (Materials)	**Other:**	

Specification Committee Action: Approved with changes.

Deferred:	**Not Approved:**	**Approved Date:** 5/8/2014	**Effective Date:** 10/21/2014

Specification Committee Approved Text:

2415.02, B, Precast.

Replace the Article:

1. Apply Section 2419.

2. Culvert Connectors.
Apply Article 2416.02, B.

2416.02, Materials.

Replace the Article:

A. Apply Section 2419.

B. Culvert Connectors.

a. Use either grade 40 or grade 60.

b. Unless otherwise specified, provide coarse thread series in accordance with the requirements of ASME B 1, Class 1A or 2A tolerance.

c. Galvanize and or metalize after fabrication by one of the following:

- ASTM A 153,
- ASTM F 2329, or
- ASTM B 633, Class Fe/Zn 25 or Fe/Zn 12.

Comments: The Committee decided to use “connectors” throughout the specifications for consistency. This matches the Standard Road Plans, but is different than Standard Bridge Plans. The Office of Bridges and Structures will revise accordingly. The Office of Construction and Materials will revise the Materials I.M.s accordingly also.

Specification Section Recommended Text:

2415.02, B, Precast.

Replace the Article:

1. Apply Section 2419.

2. Culvert Ties.
Apply Article 2416.02, B.

2416.02, Materials.

Replace the Article:

A. Apply Section 2419.

B. Culvert Ties.

d. Use either grade 40 or grade 60.

e. Unless otherwise specified, provide coarse thread series in accordance with the requirements of ASME B 1, Class 1A or 2A tolerance.

f. Galvanize and or metalize after fabrication by one of the following:

- ASTM A 153,
- ASTM F 2329, or
- ASTM B 633, Class Fe/Zn 25 or Fe/Zn 12.

Comments: Section 2419 is not the correct section for this revision. The culvert ties have nothing to do with the precast concrete units, as they are a field installed item. Section 2419 covers constructing the precast units.

We need to use consistent language for "culvert ties". Materials I.M. 451, Appendix H uses "tie rods" and Standard Road Plan RF-14 uses "connectors".

Do we need to add this language to Section 2422, Unclassified Culverts?

What about construction specifications? Do we need to add culvert ties to the MOM and BOP?

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

2419.02 **MATERIALS**.

C. Reinforcing Steel, ~~and~~ Wire Fabric, and Culvert Ties.
Comply with requirements of Section 4151 and ensure materials are from an approved source identified in Materials I.M. 451. Precast fabricator shall accept reinforcing steel with certified mill test reports for each heat delivered.

1. Culvert Ties.
   - **a.** Use either grade 40 or grade 60
   - **b.** Unless otherwise specified, provide coarse thread series in accordance with the requirements of ASME B 1, Class 1A or 2A tolerance.
   - **c.** Galvanize and or metalize after fabrication by one of the following:
     - ASTM A153
     - ASTM F2329
     - ASTM B633, Class Fe/Zn 25 or Fe/Zn 12

Reason for Revision: This is language removed from Materials I.M. 451Appendix H that is better suited for the specifications.

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

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Greg Mulder / Mahbub Khoda	**Office:** Construction and Materials	**Item 10**
Submittal Date: 2014.04.07	**Proposed Effective Date:** 2014.10.21	
Article No.: 2419.01, E **Title:** Precast concrete Units **Section No.:** 4149 **Title:** Sanitary and Storm Sewer Pipe and Structure Materials	**Other:**	

Specification Committee Action: Approved as recommended.

Deferred:	**Not Approved:**	**Approved Date:** 5/8/2014	**Effective Date:** 10/21/2014

Specification Committee Approved Text: See Specification Section Recommended Text.

Comments: None.

Specification Section Recommended Text:

2419.01, E.

Add to the end of the Article:

Section 2435: Sanitary and Storm Sewer Structures
Section 2503: Storm Sewers
Section 2504: Sanitary Sewers
Section 4149: Sanitary and Storm Sewer Pipe and Structures Materials

4149.02, A, 6, a, 1.

Replace the Article:

Comply with Section 2419 and ASTM C 76/C 76M (AASHTO M 170/M 170M).

4149.03, A, 1.

Replace the Article:

Comply with Section 2419 and ASTM C 76/C 76M.

4149.03, B, 1.

Replace the Article:

Comply with Section 2419 and ASTM C 506/C 506M.

4149.04, A, 1.

Replace the Article:

Precast: Comply with Section 2419 and ASTM C 478/C 478M.

Comments: Articles 2435.02, 2503.02, and 2504.02, A, do not need to reference Section 2419, as they reference Section 4149 for materials, which references Section 2419.

Member's Requested Change (Redline/Strikeout):

2419.01.E

Section 2435, Section 2503, Section 2504, Section 4149

2435.02 Materials.

Apply Article 2419, Precast Concrete Units.

2503.02: Materials.

Apply Article 2419, Precast Concrete Units.

2504.02 A: Materials.

Apply Article 2419, Precast Concrete Units.

4149.01 Description

C. Apply Article 2419, Precast Concrete Units.

Reason for Revision: Apply requirements of Article 2419 to Precast Concrete Storm and Sanitary Sewer Pipe and Structures.

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:					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Greg Mulder	**Office:** Construction and Materials	**Item 11**
Submittal Date: 2014.04.18	**Proposed Effective Date:** October, 2014	
Article No.: 2505.03, A, 1 **Title:** Steel Beam Guardrail (Guardrail Construction and Removal)	**Other:**	

Specification Committee Action: Approved as recommended.

Deferred:	**Not Approved:**	**Approved Date:** 5/8/2014	**Effective Date:** 10/21/2014

Specification Committee Approved Text: See Specification Section Recommended Text.

Comments: None.

Specification Section Recommended Text:

2505.03, A, 1, Steel Beam Guardrail.

Add the Articles:

h. Tighten bolts by a method approved by the Engineer to obtain specified torque requirements for each bolt size. If no torque requirements are specified by the manufacturer, use the following guidelines:

Bolt Size	Torque
1/2”	100 ft.-lbs. (135 Nm)
5/8”	180 ft.-lbs. (245 Nm)
3/4"	320 ft.-lbs. (435 Nm)
7/8”	470 ft.-lbs. (635 Nm)

i. Plate cuts may be saw cuts or flame cuts with prior approval of the Engineer. Grind cut edges smooth. Leave no metal projection beyond the plane of the plate face.

Comments:

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

2505.03 CONSTRUCTION AND REMOVAL OF GUARDRAIL.

Furnish and install posts, beams or cables, end anchors, and special connections and fittings required in the contract documents. Install to the specified line and mounting height. Changes in the installed length require the Engineer’s approval.

A. Steel Beam Guardrail and Low Tension Cable Guardrail.

1. Steel Beam Guardrail.

a. Install w-beam or thrie-beam as designated in the contract documents. When not designated, install w-beam.

b. Use steel beam guardrail ready for assembly when delivered to the project. Do not punch, drill, cut, or weld beam in the field.

c. Steel beam guardrail elements may be furnished in either 25 foot (7.62 m) or 12.5 foot (3.81 m) nominal length sections.

d. Straight rail sections may be used to construct radii of 150 feet (45 m) or greater. Shop curve rail sections for radii less than 150 feet (45 m).

e. Install posts for steel beam guardrail at spacing identified in the contract documents. If not defined, use 6.25 foot (1.91 m) spacing.

f. Where necessary, adjust horizontal and vertical alignment of the guardrail to account for road curvature. Use minor adjustments with no abrupt changes.

g. Fully connect beam to all posts as shown in the contract documents. For W-beam guardrail installations with wood blockouts, nail the blockout to the post to prevent blockout rotation. Other methods of preventing rotation may be approved by the Engineer.

h. Tighten all bolts by a method approved by the engineer to obtain the specified torque requirements for each bolt size. If no torque requirements are specified by the manufacturer, use the following torque guidelines:

Bolt Size	Torque
1/2”	100 ft.-lbs. (135 Nm)
5/8”	180 ft.-lbs. (245 Nm)
3/4"	320 ft.-lbs. (435 Nm)
7/8”	470 ft.-lbs. (635 Nm)

i. Plate cuts may be saw cuts or flame cuts with prior approval of the engineer. Grind all cut edges smooth. Leave no metal projection beyond the plane of the plate face.

Reason for Revision: This is language removed from Materials I.M. 455.02 that is better suited for the specifications.

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

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Greg Mulder / Mahbub Khoda	**Office:** Construction and Materials	**Item 12**
Submittal Date: April 23, 2014	**Proposed Effective Date:** October, 2014	
Article No.: 2511.02, D **Title:** Detectable Warnings (Removal and Construction of Sidewalks and Recreational Trails)	**Other:**	

Specification Committee Action: Approved with changes.

Deferred:	**Not Approved:**	**Approved Date:** 5/8/2014	**Effective Date:** 10/21/2014

Specification Committee Approved Text:

2511.02, D, Detectable Warnings.

Replace the Article:

~~Furnish detectable warning that contrast visibly with adjoining surfaces, either light-on-dark or dark-on-light.~~ Comply with ~~Materials I.M. 411~~ Section 4171.

4171, Detectable Warnings.

Add the Section:

4171.01 DESCRIPTION.

Detectable warning panels shall be modular and/or prefabricated composite polymer, cast iron, or steel.

4171.02 GENERAL.

A. Detectable warning panels shall meet the requirements of American with Disabilities Act Accessibility Guidelines (ADAAG).

B. Anchors used in detectable warning panels shall meet the minimum dome size requirements when anchors are located where they replace a dome.

C. Surface applied detectable warning panels shall have an adhesive and mechanical attachment to the hard surface.

D. Detectable warnings shall contrast visibly with adjoining surfaces, either light on dark or dark on light. Acceptable colors for panels shall be Federal Yellow #33538 and Federal Brick Red #22144 (or approved equals). Detectable warning panels shall have a uniform color. Surface applied coating shall be applied to panel at time of manufacture and shall be powder type and baked on the surface per manufacturer's recommendations. Field-applied surface coatings and/or paint will not be acceptable.

E. Variations from dimensions shown in contract documents shall be no more than 1/8 inch (3 mm).

4171.03. POLYMER DETECTABLE WARNING PANELS.

Detectable warning panels with truncated dome inserts in prefabricated panels of vitrified polymer shall include integral embedment flanges for securing the panels to the concrete. Embedment flange cells shall include vent holes for a cast in place installation. Panels shall meet the following specifications:

- Warpage of Edge - 0.5% maximum.
- Water Absorption - ASTM D 570-98 less than 0.05%.

- Slip Resistance - ASTM C 1028-96 greater than 0.80.
- Compressive Strength - ASTM D 695-02a greater than 28,000 psi (193 MPa).
- Tensile Strength - ASTM D 638-03 greater than 19,000 psi (131 MPa).
- Flexural Strength - ASTM D 790-03 greater than 25,000 psi (172 MPa).
- Chemical Stain Resistance - ASTM D 543-95 no discoloration or staining.
- Abrasive Wear - ASTM D 2486-00 less than 0.060 after 1000 cycles.
- Wear Resistance - ASTM C 501-84 greater than 500.
- Fire Resistance - ASTM E 84-05 flame spread less than 15.
- Impact Resistance - ASTM D 5420-04 greater than 550 inch-pounds per inch (24.5 J/cm).
- Accelerated Weathering - ASTM G 155-05a for 3000 hours $\Delta E<4.5$ tile color 33538, no fading or chalking.
- Freeze Thaw - ASTM D 1037-99 no cracking, delamination, or other defects.
- Salt Spray - ASTM B 117-03 for 200 hours or deterioration.

4171.04. CAST IRON DETECTABLE WARNING PANELS.

Detectable warning panels with truncated dome inserts in cast iron panels shall meet the following requirements:

- Slip resistance - ASTM C 1028 greater than 0.8.
- Tensile strength of gray cast iron conforming to ASTM A 48.
- Wear resistance - ASTM A 532 greater than 500.
- Impact resistance - ASTM A 327 greater than 550 inch-pounds per inch (24.5 J/cm).
- Warpage of edge 0.5% maximum.
- Meet Article 4153.04.

4171.05. STEEL DETECTABLE WARNING PANELS.

Detectable warning panels with truncated dome inserts in steel panels shall meet the following requirements:

- Slip resistance - ASTM C 1028 greater than 0.8.
- Wear resistance - ASTM A 532 greater than 500.
- Impact resistance - ASTM A 327 greater than 550 inch-pounds per inch (24.5 J/cm).
- Warpage of edge 0.5% maximum.
- Meet Article 4153.03.

Comments: The District 6 Office commented that much of the proposed language is materials language and should be in Division 41. A new Section 4171 was created.

The Committee decided to eliminate precast concrete detectable warning panels on the recommendation of SUDAS and the Office of Design. These panels have shown poor performance and are difficult to replace. Precast concrete approved sources will be removed from the approved products list.

The District 6 Office asked if we should specify “stainless” steel or just steel. The only approved steel product is stainless steel. The Committee decided to leave it as steel since that is the way it has been.

Specification Section Recommended Text:

2511.02, D, Detectable Warnings.

Replace the Article:

~~Furnish detectable warning that contrast visibly with adjoining surfaces, either light-on-dark or dark-on-light. Comply with Materials I.M. 411.~~

1. General.

a. Detectable warning panels shall meet the requirements of American with Disabilities Act Accessibility Guidelines (ADAAG).

b. Types of acceptable detectable warning panels shall be modular, precast and/or prefabricated polymer concrete, composite polymer, cast iron, or steel.

c. Anchors used in detectable warning panels shall meet the minimum dome size requirements when anchors are located where they replace a dome.

d. Surface applied detectable warning panels shall have an adhesive and mechanical attachment to the hard surface.

e. Detectable warnings shall contrast visibly with adjoining surfaces, either light on dark or dark on light. Acceptable colors for panels shall be Federal Yellow #33538 and/or Brick Red Federal Color #22144 (or approved equals). Detectable warning panels shall have a uniform color. Surface-applied coating shall be applied to panel at time of manufacture and shall be powder type and baked on the surface per manufacturer's recommendations. Field-applied surface coatings and/or paint will not be acceptable.

f. Variations from dimensions shown in contract documents shall be no more than 1/8 inch (3 mm).

2. Detectable warning panels with truncated dome inserts in precast panels of concrete shall meet the following requirements:

a. Concrete strength shall be a minimum of 5000 psi (34.5 MPa).

b. Freeze-thaw shall meet the requirements of ASTM C 1262 using 3% NaCl solution. Panel units shall meet the minimum of the following:

1) Weight loss of each of five test specimens at the conclusion of 40 cycles shall not exceed 1% of its initial weight, or

2) Weight loss of four out of five test specimens at the conclusion of 50 cycles shall not exceed 1.5% of its initial weight with maximum allowable weight loss for the fifth specimen to not exceed 10%.

c. Absorption shall not exceed 5%.

d. No surface degradation voids, or fading will be allowed on the surface.

e. Curing compounds that discolor the concrete shall not be used.

f. Warpage of Edge - 0.5% maximum.

3. Detectable warning panels with truncated dome inserts in prefabricated panels of vitrified polymer shall include integral embedment flanges for securing the panels to the concrete. Embedment flange cells shall include vent holes for a cast in place installation. Panels shall meet the following specifications:

a. Warpage of Edge - 0.5% maximum.

b. Water Absorption - ASTM D 570-98 less than 0.05%.

c. Slip Resistance - ASTM C 1028-96 greater than 0.80.

d. Compressive Strength - ASTM D 695-02a greater than 28,000 psi (193 MPa).

e. Tensile Strength - ASTM D 638-03 greater than 19,000 psi (131 MPa).

f. Flexural Strength - ASTM D 790-03 greater than 25,000 psi (172 MPa).

g. Chemical Stain Resistance - ASTM D 543-95 no discoloration or staining.

h. Abrasive Wear - ASTM D 2486-00 less than 0.060 after 1000 cycles.

i. Wear Resistance - ASTM C 501-84 greater than 500.

j. Fire Resistance - ASTM E 84-05 flame spread less than 15.

k. Impact Resistance - ASTM D 5420-04 greater than 550 inch-pounds per inch (24.5 J/cm).

l. Accelerated Weathering - ASTM G 155-05a for 3000 hours $\Delta E<4.5$ tile color 33538, no fading or chalking.

m. Freeze Thaw - ASTM D 1037-99 no cracking, delamination, or other defects.

n. Salt Spray - ASTM B 117-03 for 200 hours or deterioration.

4. Detectable warning panels with truncated dome inserts in cast iron panels shall meet the following requirements:

a. Slip resistance - ASTM C 1028 greater than 0.8.

b. Tensile strength of gray cast iron conforming to ASTM A48, Class 20A, greater than 20,000 psi (138 MPa) .

c. Wear resistance - ASTM A 532 greater than 500.

d. Impact resistance - ASTM A 327 greater than 550 inch-pounds per inch (24.5 J/cm).

e. Warpage of edge 0.5% maximum.

f. Meet Article 4153.04.

5. Detectable warning panels with truncated dome inserts in steel panels shall meet the following requirements:

- **a.** Slip resistance - ASTM C 1028 greater than 0.8.
- **b.** Wear resistance - ASTM A 532 greater than 500.
- **c.** Impact resistance - ASTM A 327 greater than 550 inch-pounds per inch (24.5 J/cm).
- **d.** Warpage of edge 0.5% maximum.
- **e.** Meet Article 4153.03.

Comments: We need to include metric ASTM standards.

Member's Requested Change (Redline/Strikeout):

2511.01 Description.

Detectable warning panels are the standard for detectable warnings to determine the boundary between the sidewalk and street by people with visual disabilities. All detectable warning panels shall meet the requirements of American with Disabilities Act Accessibility Guidelines (ADAAG). Types of acceptable detectable warning panels shall be modular, precast and/or prefabricated polymer concrete, composite polymer, or cast iron. Anchors used in detectable warning panels shall meet the minimum dome size requirements when the anchors are located where they replace a dome. Surface applied detectable warning panels shall have an adhesive and mechanical attachment to the hard surface.

2511.02.D Detectable Warnings.

~~Furnish detectable warning that contrast visibly with adjoining surfaces, either light-on-dark or dark-on-light. Comply with Materials I.M. 411~~.

A. All detectable warning panels shall be installed according to the manufacturer's recommendations. The installation recommendations shall include details regarding product-specific construction requirements.

B. Furnish detectable warnings that contrast visibly with adjoining surfaces either light-on-dark or dark on light. Acceptable colors for the panels shall be Federal Yellow #33538 and/or Brick Red Federal Color #22144 (or approved equals). Detectable warning panels shall have a uniform color. Surface-applied coating shall be applied to the panel at the time of the manufacture and shall be powder type and baked on the surface per manufacturer's recommendations. Field-applied surface coatings and/or paint shall not be acceptable.

C. Detectable warning panels with truncated dome inserts in precast panels of concrete shall meet the following requirements:

1. Concrete strength shall be a minimum of 5000 psi.

2. Freeze-thaw shall meet the requirements of ASTM C1262 using 3% NaCl solution. The panel units shall meet the minimum of the following:

a. The weight loss of each of five test specimens at the conclusion of 40 cycles shall not exceed 1% of its initial weight

OR

b. The weight loss of four out of five test specimens at the conclusion of 50 cycles shall not exceed 1.5% of its initial weight with the maximum allowable weight loss for the fifth specimen to not exceed 10%.

3. Absorption shall not exceed 5%.

4. No surface degradation voids, or fading shall be allowed on the surface.

5. Any change in mix design of product formulation without DOT approval shall result in product being removed from the approved list.

6. Curing compounds that discolor the concrete shall not be used

7. Warpage of Edge maximum 0.5%

D. Detectable warning panels those have truncated dome inserts in prefabricated panels of vitrified polymer shall include integral embedment flanges for securing the panels to the concrete. The embedment flange cells shall include vent holes for a cast in place installation. The panels shall meet the following specifications:

1. Warp age of Edge - 0.5% Max.
2. Water Absorption - ASTM d 570-98 less than 0.05%.
3. Slip Resistance - ASTM C 1028-96 greater than 0.80.
4. Compressive Strength - ASTM D 695-02a greater than 28,000 psi.
5. Tensile Strength - ASTM D 638-03 greater than 19,000 psi.
6. Flexural Strength - ASTM D 790-03 greater than 25,000 psi.
7. Chemical Stain Resistance - ASTM D 543-95 no discoloration or staining.
8. Abrasive Wear - ASTM D 2486-00 less than 0.060 after 1000 cycles.
9. Wear Resistance - ASTM C 501-84 greater than 500.
10. Fire Resistance - ASTM E 84-05 flame spread less than 15.
11. Impact Resistance - ASTM D 5420-04 greater than 550 in. lbf/in.
12. Accelerated Weathering - ASTM G 155-05a for 3000 hrs. $\Delta E < 4.5$ tile color 33538, no fading or chalking.
13. Freeze Thaw - ASTM D 1037-99 no cracking, delamination, or other defects.
14. Salt Spray - ASTM B 117-03 for 200 hours or deterioration

E. Detectable warning panels with truncated dome inserts in cast iron panels shall meet the following requirements:

1. Slip resistance ASTM C1028 greater than 0.8
2. Tensile strength of gray cast iron conforming to ASTM A48, Class 20A, greater than 20,000 psi
3. Wear resistance ASTM A532 greater than 500
4. Impact resistance ASTM A327 greater than 550 in. lbf/in
5. Warpage of edge 0.5% maximum
6. Meet Iowa DOT specification requirements 4153.04

F. Detectable warning panels with truncated dome inserts in steel panels shall meet the following requirements:

1. Slip resistance ASTM C1028 greater than 0.8
2. Wear resistance ASTM A532 greater than 500
3. Impact resistance ASTM A327 greater than 550 in. lbf/in
4. Warpage of edge 0.5% maximum
5. Meet Iowa DOT specification requirements 4153.03

G. Tolerances.

Variations from dimensions shown in contract documents shall be no more than 1/8 inch (3 mm).					
Reason for Revision: Removing spec language from the IM to the specification and adding new spec requirements.					
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: Tom Reis / Eric Johnsen, Willy Sorenson, & Donna Buchwald	**Office:** Specifications, Traffic & Safety, & Local Systems	**Item 13**
Submittal Date: 4/24/2014	**Proposed Effective Date:** Oct. 2014	
Section No.: 2528 **Title:** Traffic Control **Section No.:** 4188 **Title:** Traffic Control Devices	**Other:**	

Specification Committee Action: Approved with changes.

Deferred:	**Not Approved:**	**Approved Date:** 5/8/2014	**Effective Date:** 10/21/2014

Specification Committee Approved Text:

2528.01, B, 3, b, Operation.

Replace Articles 3 and 4:

3) ~~The Engineer may request to operate project related Portable Changeable Message Signs (PCMS) according to Article 2528.03, B, for advance traffic notification and warning. Authority to operate PCMS units will be under the direction of the Engineer according to the contract documents. Only the Engineer may add or modify any preprogrammed messages. The Contractor may only operate the CMS to display one of the preprogrammed messages.~~

~~4)~~ During anticipated peak traffic times, the Engineer may direct Contractor to provide additional monitoring personnel ~~for PCMS operation and other traffic monitoring functions~~.

2528.03, B, Portable Changeable Message Signs.

Replace the Article and title:

Portable ~~Changeable~~ Dynamic Message Signs

Furnish, place, operate (when specified), and maintain ~~PCMS~~ Portable Dynamic Message Sign (PDMS) meeting requirements of Article 4188.06 at ~~the~~ locations shown on the plans. Contractor maintains possession of ~~the PCMS~~ PDMS upon completion of the project.

~~**1. Sign Design.**~~

~~**a.** Trailer mounted signs. Message panel mounted at a height of at least 7 feet (2.2 m), measured from the bottom of the sign to the near edge of the pavement. Sign presents a level appearance. Sign is capable of displaying three lines of up to eight characters at one time. Character height is 18 inches (450 mm) and configured using a 7 pixel tall by 5 pixel wide font.~~

~~**b.** Message panel visible from 1/2 mile (800 m) under both day and night conditions. Letters legible from 750 ft (225 m). Message sign shall include automatic dimming for nighttime operation and a power supply capable of providing continuous 7 days (24 hours per day) service.~~

~~**c.** Message panel consisting of a line matrix or full matrix design controlled by an onboard computer capable of:~~

- ~~Storing a minimum of 99 programmed messages for instant recall.~~
- ~~Being programmed to accept messages created by the operator via an alpha-numeric keyboard.~~
- ~~Being programmed by remote.~~

~~**d.** Physical access to the onboard computer protected by a padlock (using a key). Electronic access to the onboard computer protected by a username and password.~~

1. Testing and Configuration.

a. Physical and electronic access to PDMS shall be granted to the Engineer.

b. On Interstate and Primary projects:
  1) At least one week before PDMS is deployed to a project, a testing and configuration meeting with the Engineer shall be held.
  2) The Engineer, in conjunction with the Contractor, will perform necessary configuration adjustments to the PDMS and cellular modem to allow remote control by the Contracting Authority's NTCIP software.

2. Remote Operation.
a. On Interstate and Primary projects, the Department will remotely operate signs through use of a modem and NTCIP software.
b. Contracting Authority will use their own NTCIP compliant software to activate messages, check sign's status, and perform diagnostic tests.
c. Anytime during the project, the Engineer may remotely activate a message on the PDMS. Any message placed on the PDMS shall not be removed or replaced by the Contractor unless requested by the Engineer.

~~2~~ 3. Direct Operation ~~of Signs~~.
a. ~~Provide preventive maintenance efforts necessary to achieve uninterrupted service. If service is interrupted and not restored within 24 hours, the Engineer will cause such work to be performed as may be necessary to provide this service, at no additional cost to the Contracting Authority.~~ On Secondary road projects, PDMS will be operated directly by either the Contractor or the Engineer.
b. Engineer may request Contractor to operate ~~PCMS~~ PDMS for advance traffic notification and warning. Authority to operate ~~PCMS~~ PDMS will be under the direction of the Engineer. Contractor may only operate ~~PCMS~~ PDMS to display messages authorized by the Engineer.
c. Promptly program and/or reprogram the computer to provide the messages as directed by the Engineer.
~~**d.** Provide the Engineer with the username and password and two keys.~~

~~**3. Internet Operation for Long Term Duration.**~~
~~**a.** This section describes Internet operations for use of PCMS for long term duration. PCMS hardware and software that are required for Internet operation under this article will be considered extra work according to Article 1109.03, B.~~
~~**b.** Communication equipment at the sign, a web server at a central communications hub, and communications from the sign to the Internet are required.~~
~~**c.** Make an Internet web page available as the method for the Engineer to control the sign from the office. Choose software to control the signs that is not required to be installed on the Engineer's computer. Ensure the Internet web page performs the following functions:~~
- ~~Displays the name of the sign.~~
- ~~Shows the current display on the message board.~~
- ~~Puts up a message using free text.~~
- ~~Puts up a message by calling the onboard library of stored messages.~~
- ~~Removes the current message.~~
- ~~Displays the current voltage of the sign's batteries (if solar).~~

4. Maintenance.
a. Provide preventive maintenance necessary to achieve uninterrupted service.
b. On Interstate and Primary projects, Engineer will perform remote diagnostic tests of sign's operational status each morning and notify Contractor when a problem is detected.
c. On Secondary road projects, verify operational status each morning and notify Engineer when a problem is detected.
d. Provide unscheduled maintenance or total replacement of sign when sign is unable to

display a message adequately within 24 hours of notification. Action shall be taken to resolve the following problems if they have been visually observed or confirmed by self diagnostics by the PDMS for three continuous days or seven intermittent days over a two week period.

1) An entire pixel board is showing failure.

2) Five or more pixel failures over entire message panel anytime while sign is deployed for use (blank or displaying a message).

3) Two or more pixel failures in any character when displaying a message.

e. If service is not restored within 24 hours, Engineer will cause such work to be performed as may be necessary to provide this service. The cost for this restoration shall be borne by the Contractor.

2528.04, B, Portable Changeable Message Signs.

Replace the Article and title:

Portable ~~Changeable~~ Dynamic Message Signs.

The Engineer will count the number of days each ~~PCMS~~ Portable Dynamic Message Sign is required to be in ~~a location to display potential~~ place along a road and capable of displaying messages to the traveling public. Days when PDMS is blank and is in good working condition, will be measured. Days when PDMS is unable to display a message due to cellular (when specified) or mechanical problems will not be measured. Days when PDMS is on the roadway and not approved by the Engineer will not be measured.

2528.05, B, Portable Changeable Message Signs.

Replace the Article and title:

Portable ~~Changeable~~ Dynamic Message Signs.

1. Payment will be at the contract unit price per calendar day for each ~~PCMS~~ Portable Dynamic Message Sign ~~that is required to be in a location to display potential messages to the traveling public~~ measured as provided in Article 2528.04, B.

2. Payment is full compensation for furnishing, placing, operation (when specified), and maintenance of ~~PCMS~~ PDMS. Payment includes the cost of preventative and unscheduled maintenance, cellular communication (when specified), on-board software, hardware, and power supply.

4188, Traffic Control Devices.

Add the Article:

4188.06 PORTABLE DYNAMIC MESSAGE SIGN.

A. Sign Design.

1. A PDMS is defined as all components working together to accomplish the requirements of the specifications. These components include, but are not limited to, LED pixel boards, on-board computer, cellular modem (when specified), trailer, mounting equipment, solar panels, batteries, charge controller, etc.

2. The message panel shall be trailer mounted. Message panel shall be mounted at a height of at least 7 feet (2.2 m), measured from bottom of sign to ground directly below. Sign presents a level appearance. Sign is capable of displaying three lines of up to eight characters at one time. Character height is 18 inches (450 mm) and configured using a 7 pixel tall by 5 pixel wide font. Message panel may be configured as character matrix, line matrix, or full matrix.

3. Message panel visible from 1/2 mile (800 m) under both day and night conditions.

Letters legible from 750 feet (225 m). Message sign shall include automatic dimming for nighttime operation and a power supply capable of providing service for 7 continuous days without recharging.

4. Message panel controlled by an onboard computer capable of:
- Storing a minimum of 99 programmed messages for instant recall,
- Being programmed to accept messages created by the operator via an alpha-numeric keyboard, and
- Being programmed remotely by National Transportation Communication for Intelligent Transportation Systems Protocols (NTCIP) DMS software (when specified).

5. Physical access to the onboard computer protected by a padlock or other locking handle mechanism. Electronic access to the onboard computer protected by a username and password.

B. Cellular Communications.

On Interstate and Primary projects, PDMS shall be equipped with a cellular modem for remote communications.

1. Cellular service provider shall have data coverage within project limits. Contractor shall be responsible for integrating cellular modem with the PDMS.

2. Upon confirmation that remote communication has been successfully setup, the IP address, communications port, software, and username/password for web interface shall be supplied to Engineer for integration into the statewide ITS control software.

3. Cellular modem shall be capable of obtaining its location by GPS. Current location from GPS coordinates shall be stored in cellular modem's memory for retrieval by ITS control software. Modem shall have firewall security protections that limit who and what can communicate to it.

4. Typical monthly data usage by Contracting Authority is 5 Mb when PDMS is in good working condition. Additional data usage is possible if PDMS requires remote troubleshooting or maintenance.

C. NTCIP Compliance.

On Interstate and Primary projects, PDMS onboard computer and operating firmware shall be compliant with at least NTCIP 1203 v1.15 supplemented with NTCIP 1203 Amendment 1 v07, (dated July 3, 2001) for the following commands:
- Read configuration data from sign,
- Send configuration data to sign,
- Poll sign (retrieve sign status) both manual and automated with software,
- Activate a message,
- Blank or remove a message,
- Upload fonts, and
- Reset controller/onboard computer.

Comments: The Office of Traffic and Safety wanted a more direct reference to the Contractor supplying the modem on Interstate and Primary projects. This language was added to Articles 4188.06, B and C.

Specification Section Recommended Text:

2528.01, B, 3, b, Operation.

Replace Articles 3 and 4:

3) ~~The Engineer may request to operate project related Portable Changeable Message Signs (PCMS) according to Article 2528.03, B, for advance traffic notification and warning. Authority to operate PCMS units will be under the direction of the Engineer according to the contract documents. Only the Engineer may add or modify any preprogrammed messages. The Contractor may only operate the CMS to display one of the preprogrammed messages.~~

~~4)~~ During anticipated peak traffic times, the Engineer may direct the Contractor to provide additional monitoring personnel ~~for PCMS operation and other traffic monitoring functions~~.

2528.03, B, Portable Changeable Message Signs.

Replace the Article and title:

Portable ~~Changeable~~ Dynamic Message Signs

Furnish, place, operate (when specified), and maintain ~~PCMS~~ Portable Dynamic Message Sign (PDMS) meeting the requirements of Article 4188.06 at ~~the~~ locations shown on the plans. The Contractor maintains possession of ~~the PCMS~~ PDMS upon completion of the project.

~~**1. Sign Design.**~~

~~**a.** Trailer mounted signs. Message panel mounted at a height of at least 7 feet (2.2 m), measured from the bottom of the sign to the near edge of the pavement. Sign presents a level appearance. Sign is capable of displaying three lines of up to eight characters at one time. Character height is 18 inches (450 mm) and configured using a 7 pixel tall by 5 pixel wide font.~~

~~**b.** Message panel visible from 1/2 mile (800 m) under both day and night conditions. Letters legible from 750 ft (225 m). Message sign shall include automatic dimming for nighttime operation and a power supply capable of providing continuous 7 days (24 hours per day) service.~~

~~**c.** Message panel consisting of a line matrix or full matrix design controlled by an onboard computer capable of:~~

- ~~Storing a minimum of 99 programmed messages for instant recall.~~
- ~~Being programmed to accept messages created by the operator via an alpha-numeric keyboard.~~
- ~~Being programmed by remote.~~

~~**d.** Physical access to the onboard computer protected by a padlock (using a key). Electronic access to the onboard computer protected by a username and password.~~

3. Testing and Configuration.

c. Physical and electronic access to PDMS shall be granted to the Engineer.

d. On Interstate and Primary projects:

3) At least one week before the PDMS is deployed to a project, a testing and configuration meeting with the Engineer shall be held. Coordination of this meeting will be with the Department's ITS Engineer.

4) The Engineer, in conjunction with the Contractor, will perform necessary configuration adjustments to the PDMS and cellular modem to allow remote control by the Contracting Authority's NTCIP software.

4. Remote Operation.

d. On Interstate and Primary projects, the Department will operate signs remotely.

e. Contracting Authority will use their own NTCIP compliant software to activate messages, check sign's status, and perform diagnostic tests.

f. Anytime during the project, the Engineer may remotely activate a message on the PDMS. Any message placed on the PDMS shall not be removed or replaced by the Contractor unless requested by the Engineer.

~~2~~ 3. Direct Operation ~~of Signs~~.

a. ~~Provide preventive maintenance efforts necessary to achieve uninterrupted service. If service is interrupted and not restored within 24 hours, the Engineer will cause such work to be performed as may be necessary to provide this service, at no additional cost to the Contracting Authority.~~ On Secondary road projects, PDMS will be operated directly by either the Contractor or the Engineer.

b. Engineer may request the Contractor to operate ~~PCMS~~ PDMS for advance traffic notification and warning. Authority to operate ~~PCMS~~ PDMS will be under the direction of the Engineer. The Contractor may only operate the ~~PCMS~~ PDMS to display messages authorized by the Engineer.

c. Promptly program and/or reprogram the computer to provide the messages as directed by the Engineer.

~~**d.** Provide the Engineer with the username and password and two keys.~~

~~**3. Internet Operation for Long Term Duration.**~~

~~**a.** This section describes Internet operations for use of PCMS for long term duration. PCMS hardware and software that are required for Internet operation under this article will be considered extra work according to Article 1109.03, B.~~

~~**b.** Communication equipment at the sign, a web server at a central communications hub, and communications from the sign to the Internet are required.~~

~~**c.** Make an Internet web page available as the method for the Engineer to control the sign from the office. Choose software to control the signs that is not required to be installed on the Engineer's computer. Ensure the Internet web page performs the following functions:~~

- ~~Displays the name of the sign.~~
- ~~Shows the current display on the message board.~~
- ~~Puts up a message using free text.~~
- ~~Puts up a message by calling the onboard library of stored messages.~~
- ~~Removes the current message.~~
- ~~Displays the current voltage of the sign's batteries (if solar).~~

4. Maintenance.

f. Provide preventive maintenance necessary to achieve uninterrupted service.

g. On Interstate and Primary projects, Engineer will perform remote diagnostic tests of sign's operational status each morning and notify Contractor when a problem is detected.

h. On Secondary road projects, verify operational status each morning and notify Engineer when a problem is detected.

i. Provide unscheduled maintenance or total replacement of sign when sign is unable to display a message adequately within 24 hours of notification. Action shall be taken to resolve the following problems if they have been visually observed or confirmed by self diagnostics by the PDMS for 3 continuous days or 7 intermittent days over a 2 week period.

4) An entire pixel board is showing failure.

5) Five or more pixel failures over entire message panel anytime while sign is deployed for use (blank or displaying a message).

6) Two or more pixel failures in any character when displaying a message.

j. If service is not restored within 24 hours, Engineer will cause such work to be performed as may be necessary to provide this service. The cost for this restoration shall be borne by the Contractor.

2528.04, B, Portable Changeable Message Signs.

Replace the Article and title:

Portable ~~Changeable~~ Dynamic Message Signs.

The Engineer will count the number of days each ~~PCMS~~ Portable Dynamic Message Sign is required to be in ~~a location to display potential~~ place along a road and capable of displaying messages to the traveling public. Days when the PDMS is blank and is in good working condition, will be measured. Days when the PDMS is unable to display a message due to cellular (when specified) or mechanical problems will not be measured. Days when the PDMS is on the roadway and not approved by the Engineer will not be measured.

2528.05, B, Portable Changeable Message Signs.

Replace the Article and title:

Portable ~~Changeable~~ Dynamic Message Signs.

1. Payment will be at the contract unit price per calendar day for each ~~PCMS~~ Portable Dynamic Message Sign ~~that is required to be in a location to display potential messages to the traveling public~~ measured as provided in Article 2528.04, B.

2. Payment is full compensation for furnishing, placing, operation (when specified), and maintenance of ~~PCMS~~ PDMS. Payment includes the cost of preventative and unscheduled maintenance, cellular communication (when specified), on-board software, hardware, and power supply.

4188, Traffic Control Devices.

Add the Article:

4188.06 PORTABLE DYNAMIC MESSAGE SIGN.

D. Sign Design.

6. A PDMS is defined as all components working together to accomplish the requirements of the specifications. These components include, but are not limited to, LED pixel boards, on-board computer, cellular modem (when specified), trailer, mounting equipment, solar panels, batteries, charge controller, etc.

7. The message panel shall be trailer mounted. Message panel shall be mounted at a height of at least 7 feet (2.2 m), measured from bottom of sign to ground directly below. Sign presents a level appearance. Sign is capable of displaying three lines of up to eight characters at one time. Character height is 18 inches (450 mm) and configured using a 7 pixel tall by 5 pixel wide font. Message panel may be configured as character matrix, line matrix, or full matrix.

8. Message panel visible from 1/2 mile (800 m) under both day and night conditions. Letters legible from 750 feet (225 m). Message sign shall include automatic dimming for nighttime operation and a power supply capable of providing service for 7 continuous days without recharging.

9. Message panel controlled by an onboard computer capable of:

- Storing a minimum of 99 programmed messages for instant recall,
- Being programmed to accept messages created by the operator via an alpha-numeric keyboard, and
- Being programmed remotely by National Transportation Communication for Intelligent Transportation Systems Protocols (NTCIP) DMS software (when specified).

10. Physical access to the onboard computer protected by a padlock or other locking handle mechanism. Electronic access to the onboard computer protected by a

username and password.

E. Cellular Communications.
When specified, PDMS equipped with a cellular modem for remote communications.

5. Cellular service provider shall have data coverage within project limits. Contractor is responsible for integrating cellular modem with the PDMS.

6. Upon confirmation that remote communication has been successfully setup, the IP address, communications port, software, and username/password for web interface shall be supplied to Engineer for integration into the statewide ITS control software.

7. Cellular modem shall be capable of obtaining its location by GPS. Current location from GPS coordinates shall be stored in cellular modem's memory for retrieval by ITS control software. Modem shall have firewall security protections that limit who and what can communicate to it.

8. Typical monthly data usage by Contracting Authority is 5 Mb when PDMS is in good working condition. Additional data usage is possible if PDMS requires remote troubleshooting or maintenance.

F. NTCIP Compliance.
When specified, PDMS onboard computer and operating firmware shall be compliant with at least NTCIP 1203 v1.15 supplemented with NTCIP 1203 Amendment 1 v07, (dated July 3, 2001) for the following commands:

- Read configuration data from sign,
- Send configuration data to sign,
- Poll sign (retrieve sign status) both manual and automated with software,
- Activate a message,
- Blank or remove a message,
- Upload fonts, and
- Reset controller/onboard computer.

Comments: We will eliminate the old bid item for Changeable Message Signs, Portable (2528-9290004) and bid everything using the existing bid item for Portable Dynamic Message Sign (PDMS) (2528-9290050).

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

Reason for Revision: To incorporate the approved Developmental Specifications for PDMS (Engineer control) into the Standard Specifications while still allowing Cities and Counties to operate under the old specifications for PCMS (Contractor control).

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

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Greg Mulder / Kevin Merryman	**Office:** Construction and Materials	**Item 14**
Submittal Date: 2014.04.02	**Proposed Effective Date:** October 2014	
Article No.: 2529.03, H, 2 **Title:** Placing Full Depth Portland Cement Concrete Finish Patches	**Other:**	

Specification Committee Action: Approved as recommended.

Deferred:	**Not Approved:**	**Approved Date:** 5/8/2014	**Effective Date:** 10/21/2014

Specification Committee Approved Text: See Specification Section Recommended Text.

Comments: None.

Specification Section Recommended Text:

2529.03, H, 2.

Add the Article:

i. Temperature restrictions in Article 2301.03, S, will not apply.

Comments:

Member's Requested Change (Redline/Strikeout):

H. Placing Full Depth Portland Cement Concrete Finish Patches.

2. Place, consolidate, finish, and cure concrete as provided in Section 2301, except as follows:

a. Moisten the subbase or subgrade or cover with a single layer of plastic film meeting requirements of Section 4107.

b. Except for preplanned joints, place the patch in a continuous manner until placement is completed. When a delay of 45 minutes cannot be avoided, construct an appropriate DW joint.

c. Dump or convey the concrete into the patch areas to avoid segregation. Spread it into place and vibrate with a mechanical vibrator. Smooth the concrete and finish it to the elevation of the adjacent pavement surface. Avoid excessive vibrating.

d. Finish full lane width patches over 25 feet (10 m) long flush with the adjacent pavement. Use a finishing machine that has at least one vibrating screed. To ensure a smooth riding surface, straight edge all patches finished flush with adjacent pavement. Texture patches by finishing with a burlap, carpet drag, or rake, to approximately match the texture of the adjacent surface.

e. Check the patches with a 10 foot (3 m) straightedge before the concrete has set. Correct spots that are 1/8 inch (3 mm) high or low, as shown by the straightedge. The existing pavement crown shall be maintained.

f. Finish all edges and ends of patches with an edging tool.

g. Construct lane edges and the ends of patches to a depth of approximately 1 1/8 inches (30 mm), leaving an opening of at least 3/8 inch (10 mm) to provide a reservoir for joint sealer. The reservoir may be constructed by hand methods or may be sawed. When white pigmented curing compound is used, protect the reservoir with tape or other suitable material.

h. On patches finished flush with the pavement surface, stamp two numerals indicating the year of placement 2 feet (0.6 m) from the outside edge, facing outward to be read from the near shoulder.

i. The temperature restrictions in Article 2301.03, S will not apply.

Reason for Revision: Patches are placed with a minimum mix temperature requirement and are cured by covering with blanket and fiber board so they are much less susceptible to cold ambient temperatures. Additionally the temperature restrictions in 2301.03, S were written with daytime paving in mind. They really don't fit night patching when temperatures are falling before work begins.

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: Greg Mulder	**Office:** Construction & Materials	**Item 15**
Submittal Date: 2014.04.18	**Proposed Effective Date:** OCTOBER 2014	
Section No.: 4141 **Title:** Corrugated Steel Culvert Pipe	**Other:**	

Specification Committee Action: Approved with changes.

Deferred:	**Not Approved:**	**Approved Date:** 5/8/2014	**Effective Date:** 10/21/2014

Specification Committee Approved Text:
4141, Corrugated Steel Culvert Pipe.

Replace the title and Section:

Section 4141. Corrugated ~~Steel~~ Metal Culvert Pipe

4141.01 GENERAL REQUIREMENTS.

A. Corrugated Steel Pipe.

1. Unless specified otherwise, meet the requirements of AASHTO M 36/M 36M for the following:

- Circular corrugated steel culvert pipe, Type I.
- Pipe arch shapes, Type II.
- Coupling bands, special fittings, and associated hardware.

2. Meet requirements of AASHTO M 218 Steel Sheet Zinc Coated (Galvanized) for corrugated Steel Pipe or AASHTO M 274 Steel Sheet Aluminum Coated (Type 2) for corrugated Steel Pipe.

3. Metallic coated sheets or coils used for corrugated pipe shall meet requirements of, and be marked in accordance with ASTM A 929.

B. Corrugated Aluminum Pipe.

Unless specified otherwise, meet requirements of AASHTO M 196/M 196M for the following:

- Circular corrugated steel culvert pipe, Type I.
- Pipe arch shapes, Type II.
- Coupling bands, special fittings, and associated hardware.

~~B~~ C. The minimum sheet thickness will be shown in the contract documents and zinc coating shall be 610 g/m^2 (min) total amount on both sides of the sheet.

~~C~~ D. When the diameter of round pipe is elongated, increase one diameter by approximately 5%. Permanently mark each piece at least once inside and once outside to indicate the top.

~~D~~ E. Types of approved coupling devices are described in Materials I.M. 441.01. Joint types are standard and positive, and the type may be designated in the contract documents. When not designated, either type may be used.

4141.02 COATED CORRUGATED PIPE.

A. Use pipe coated by either of the following methods:

1. Meet the requirements of Article 4141.01 and AASHTO M 245/M 245M, Type I. The polymeric coating is to have a minimum thickness of 0.010 inch (254 µm) on inside surfaces and 0.003 inch (76 µm) on outside surfaces.

2. Aluminized pipe meeting requirements of Article 4141.01 may be furnished.

B. Repair, to the Engineer's satisfaction, breaks or damage to the coating that occur during handling or installation.

4141.03 METAL PIPE APRONS AND BEVELED END SECTIONS.

A. Materials for pipe aprons and beveled end sections shall meet requirements of AASHTO M 218/M 218M.

B. Galvanized sheet metal of aprons and end sections shall be comparable to pipe sections in type, grade, sheet thickness, corrugations, dimensions, and coatings.

C. Aprons and end sections shall meet requirements of Standard Road Plans RF-5 and RF-44.

Comments: The reference in Article 4141.01, E was revised to Materials I.M. 441.01.

Specification Section Recommended Text:

4141, Corrugated Steel Culvert Pipe.

Replace the title and Section:

Section 4141. Corrugated ~~Steel~~ Metal Culvert Pipe

4141.01 GENERAL REQUIREMENTS.

A. Corrugated Steel Pipe.

1. Unless specified otherwise, meet the requirements of AASHTO M 36/M 36M for the following:

- Circular corrugated steel culvert pipe, Type I.
- Pipe arch shapes, Type II.
- Coupling bands, special fittings, and associated hardware.

2. Meet requirements of AASHTO M 218 Steel Sheet Zinc Coated (Galvanized) for corrugated Steel Pipe or AASHTO M 274 Steel Sheet Aluminum Coated (Type 2) for corrugated Steel Pipe.

3. Metallic coated sheets or coils used for corrugated pipe shall meet requirements of, and be marked in accordance with ASTM A 929.

B. Corrugated Aluminum Pipe.

Unless specified otherwise, meet requirements of AASHTO M 196/M 196M for the following:

- Circular corrugated steel culvert pipe, Type I.
- Pipe arch shapes, Type II.
- Coupling bands, special fittings, and associated hardware.

~~B~~ **C**. The minimum sheet thickness will be shown in the contract documents and zinc coating shall be 610 g/m^2 (min) total amount on both sides of the sheet.

~~C~~ **D.** When the diameter of round pipe is elongated, increase one diameter by approximately 5%. Permanently mark each piece at least once inside and once outside to indicate the top.

~~D~~ **E.** Types of approved coupling devices are described in Materials I.M. 441. Joint types are standard and positive, and the type may be designated in the contract documents. When not designated, either type may be used.

4141.02 COATED CORRUGATED PIPE.

A. Use pipe coated by either of the following methods:

1. Meet the requirements of Article 4141.01 and AASHTO M 245/M 245M, Type I. The polymeric coating is to have a minimum thickness of 0.010 inch (254 µm) on inside surfaces and 0.003 inch (76 µm) on outside surfaces.

2. Aluminized pipe meeting requirements of Article 4141.01 may be furnished.

B. Repair, to the Engineer's satisfaction, breaks or damage to the coating that occur during handling or installation.

4141.03 METAL PIPE APRONS AND BEVELED END SECTIONS.

A. Materials for pipe aprons and beveled end sections shall meet requirements of AASHTO M 218/M 218M.

B. Galvanized sheet metal of aprons and end sections shall be comparable to pipe sections in type, grade, sheet thickness, corrugations, dimensions, and coatings.

C. Aprons and end sections shall meet requirements of Standard Road Plans RF-5 and RF-44.

Comments:

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

Section 4141. Corrugated ~~Steel~~ Metal Culvert Pipe

4141.01 GENERAL REQUIREMENTS.

A. Corrugated Steel Pipe.

Unless specified otherwise, meet the requirements of AASHTO M 36/M 36M for the following:

- Circular corrugated steel culvert pipe, Type I.
- Pipe arch shapes, Type II.
- Coupling bands, special fittings, and associated hardware.

Meet the requirements of AASHTO M 218 Steel Sheet Zinc Coated (Galvanized) for corrugated Steel Pipe. OR AASHTO M 274- Steel sheet Aluminum Coated (Type2) for corrugated Steel Pipe

The metallic coated sheets or coils used for corrugated pipe shall meet the requirements of, and be marked in accordance with ASTM A-929.

B. Corrugated Aluminum Pipe.

Unless specified otherwise, meet the requirements of AASHTO M 196/M 196M for the following:

- Circular corrugated steel culvert pipe, Type I.
- Pipe arch shapes, Type II.
- Coupling bands, special fittings, and associated hardware.

~~**B.**~~ **C**. The minimum sheet thickness will be shown in the contract documents and zinc coating shall be 610 g/m2 (min) total amount on both sides of the sheet

~~**C.**~~ **D.** When the diameter of round pipe is elongated, increase one diameter by approximately 5%. Permanently mark each piece at least once inside and once outside to indicate the top.

~~**D.**~~ **E.** Types of approved coupling devices are described in Materials I.M. 441. Joint types are standard and positive, and the type may be designated in the contract documents. When not designated, either type may be used.

4141.02 COATED CORRUGATED PIPE.

A. Use pipe coated by either of the following methods:

1. Meet the requirements of Article 4141.01 and AASHTO M 245/M 245M, Type I. The polymeric coating is to have a minimum thickness of 0.010 inch (254 µm) on inside surfaces and 0.003 inch (76 µm) on outside surfaces.

2. Aluminized pipe meeting requirements of Article 4141.01 may be furnished.

B. Repair, to the Engineer's satisfaction, breaks or damage to the coating that occur during handling or installation.

4141.03 METAL PIPE APRONS AND BEVELED END SECTIONS

Materials for the pipe aprons and beveled end sections shall meet the requirements of AASHTO M218.

The Galvanized sheet metal of the aprons and end sections shall be comparable to the pipe sections in type, grade, sheet thickness, corrugations, dimensions and coatings.

Aprons and end sections shall meet the requirements of Iowa DOT current standard road plans RF5 and RF44

Reason for Revision: Moved out of IM 441.					
County or City Input Needed (X one)			**Yes**	**No**	
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: Greg Mulder	**Office:** Construction and Materials	**Item 16**
Submittal Date: 2014.04.18	**Proposed Effective Date:** October, 2014	
Article No.: 4149.04, H, 1 **Title:** Manhole or Intake Adjustment Rings (Grade Rings) [Sanitary and Storm Sewer Pipe and Structures Materials]	**Other:**	

Specification Committee Action: Approved with changes.

Deferred:	**Not Approved:**	**Approved Date:** 5/8/2014	**Effective Date:** 10/21/2014

Specification Committee Approved Text:

4149.04, I, 1, Gray Cast Iron.

Replace the title and Article:

1. ~~**Gray Cast Iron**~~ **Casting Materials.**
   - **a. Gray Cast Iron.**
     Comply with AASHTO M 306.
   - **b. Carbon Steel.**
     Comply with ASTM A 36.

Comments: SUDAS requested to use the term “extension ring” instead of adjustment ring, as these are different than adjustment rings (grade rings).

It was discovered that manhole casting adjustment rings are covered in Article 4149.04, I, 3, c. The revisions were moved to Article 4149.04, I, 1 which references gray cast iron for castings.

The Office of Construction and Materials preferred to go with the existing reference to AASHTO M 306 over ASTM A 48, which are equivalent.

Specification Section Recommended Text:

4149.04, H, 1.

Add the Articles:

- **c. Carbon Steel Adjustment Rings.**
  Comply with ASTM A 36.
- **d. Cast Iron Adjustment Rings.**
  Comply with ASTM A 48, Class 35 B.

Comments:

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

c. Carbon Steel Adjustment Rings.
Comply with ASTM A36.

d. Cast Iron Adjustment Rings.
Comply with ASTM A48 Class 35 B.

Reason for Revision: This is language removed from Materials I.M. 449.05 that is better suited for the specifications.

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

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

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Greg Mulder	**Office:** Construction and Materials	**Item 17**
Submittal Date: 2014.04.18	**Proposed Effective Date:** October, 2014	
Article No.: 4151.02, B **Title:** Pavement Dowel Bars	**Other:**	

Specification Committee Action: Approved as recommended.

Deferred:	**Not Approved:**	**Approved Date:** 5/8/2014	**Effective Date:** 10/21/2014

Specification Committee Approved Text: See Specification Section Recommended Text.

Comments: None.

Specification Section Recommended Text:

4151.02, B, Pavement Dowel Bars.

Replace Article 3:

3. Furnish dowels, with the exceptions of end of run and header joints, in approved assemblies~~, suitable for skewed or perpendicular joints~~ as shown in the contract documents. Ensure all dowels, including end of run and header dowels, have an epoxy coating. Ensure the coating is applied by the electrostatic spray method complying with the requirements of AASHTO M 254, Type B, with a minimum coating thickness of 6 mils (150 µm) after cure. Epoxy powders approved for use are listed in Materials I.M. 451.03B, Appendix B. Perform welding and tack welding on reinforcement according to Article 4151.06

Add the Article:

6. Protect epoxy coated dowels in dowel assemblies stored outdoors, longer than 2 months either at fabricator or project site, from weather exposure and salt spray. Cover coated dowels in dowel assembly with a non-transparent or other suitable opaque protective material. Provide adequate ventilation to minimize condensation. Record on an identification tag the date coated dowels assemblies were placed outdoors. Do not use weathered, discolored, or faded dowel bars. Store dowel assemblies off the ground on pavement or wood supports. When stacking is necessary, place wood supports between assemblies or other method to ensure a stable stack.

Comments:

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

B. Pavement Dowel Bars.

2. Approved manufacturers and suppliers of load transfer dowels and dowel assemblies are listed in Materials I.M. 451.03B, Appendix C.

3. Furnish dowels, with the exceptions of end of run and header joints, in approved assemblies~~,~~ ~~suitable for skewed or perpendicular joints~~ as shown in the contract documents. Ensure all dowels, including end of run and header dowels, have an epoxy coating. Ensure the coating is applied by the electrostatic spray method complying with the requirements of AASHTO M 254, Type B, with a minimum coating thickness of 6 mils (150 µm) after cure. Epoxy powders approved for use are listed in Materials I.M. 451.03B, Appendix B. Perform welding and tack welding on the reinforcement according to Article 4151.06

4. The ends of dowels may be saw cut or sheared. The sawed and sheared ends need not be coated. If the dowel bars are saw cut, ensure they are free of burrs and projections. Also ensure the deformation of the bars from true round shape does not exceed 0.04 inches (1 mm)

in diameter or in thickness.

5. Prior to delivery to the work site, the assemblies are to be dipped in a bond breaker meeting the requirements of Section 4137, 4138, or 4140. The bond breaker may be bituminous or paraffin.

6. Protect epoxy coated dowels in dowel assemblies stored outdoors longer than two months either at the fabricator or at the project site from weather exposure and salt spray. Cover coated dowels in the dowel assembly with a non-transparent or other suitable opaque protective material. Provide adequate ventilation to minimize condensation. Record on an identification tag the date the coated dowels assemblies were placed outdoors. Do not use weathered, discolored, or faded dowel bars. Store dowel assemblies off the ground on pavement or wood supports. When stacking is necessary, place wood supports between assemblies or other method to ensure a stable stack of baskets.

Reason for Revision: This is language removed from Materials I.M. 451.03B Appendix C that is better suited for the specifications.

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

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Greg Mulder	**Office:** Construction and Materials	**Item 18**
Submittal Date: 2014.04.18	**Proposed Effective Date:** October, 2014	
Article No.: 4151.03 **Title:** Reinforcement for Structures	**Other:**	

Specification Committee Action: Approved as recommended.

Deferred:	**Not Approved:**	**Approved Date:** 5/8/2014	**Effective Date:** 10/21/2014

Specification Committee Approved Text: See Specification Section Recommended Text.

Comments: None.

Specification Section Recommended Text:
4151.03, Reinforcement for Structures.

Replace the Article:

A. General.

1. Unless otherwise specified, use deformed bars meeting the requirements of ASTM A 615/A 615M, ASTM A 706/A 706M or ASTM A 996/A996M. Use bars fabricated according to Article 2404.03, B.

2. Spirals of No. 5 (15) bars or smaller and any bars No. 3 (10) or smaller for stirrups or hoops of a specified shape may, at the Contractor's option, be:

- Material meeting requirements of ASTM A ~~82~~ 1064 reinforcement specified above, or
- Steel meeting physical and chemical requirements of ASTM A 615/A 615M, Grade 40 (300).

3. For spirals in precast and prestressed concrete piling and all wire ties, use steel wire with a minimum tensile strength of 40,000 psi (300 MPa), with other properties such as to permit bending as shown in the contract documents.

4. When required by the contract documents, coat steel wire supports with:

- PVC according to ASTM A 933, or
- Epoxy according to ASTM A 884.

B. Galvanized Reinforcement.

1. ~~Perform~~ Comply with ASTM A 767, Class I coating with cutting and bending done prior to galvanizing and according to the requirements of Section 2404. ~~After cutting and bending, galvanize all reinforcement required to be galvanized according to the requirements of ASTM A 123. Take precautionary measures to prevent loss in the height of the deformation pattern.~~

~~**2.** Apply a chromate conversion coating immediately after galvanizing. This may be accomplished by either: 1) quenching the bars, immediately after galvanizing, in a solution containing at least 0.2% (by weight (mass)) of sodium dichromate in water; or 2) quench chromating in a minimum 0.2% chromic acid solution. The quench water should be at least 90°F (32°C). Proprietary chromate solutions of equivalent effectiveness may be substituted for the above procedure. If the reinforcing material is allowed to cool before chromate treating as specified above, 0.5% to 1.0% concentration of sulfuric acid should be added as an activator to the chromate solution.~~

~~**3**~~ **2.** Galvanize tie wires and wire or pressed steel chairs to be used with galvanized

reinforcing steel. Either turn up or coat the ends of chairs which may be exposed in the finished concrete. Stainless steel chairs, plastic coated carbon steel chairs, or other types of chairs may be approved by the Engineer. Galvanizing of hangers is optional (required only when to remain exposed), according Article 2412.03, A.

4 3. Handle bars according to ASTM A 767 in a manner to prevent damage to the galvanized coating. When coating damage is 2% or less of the surface area, repair it according to Materials I.M. 410. Replace bars with more than 2% of the surface area damaged.

C. Epoxy Coated Reinforcement.

1. Ensure reinforcement (deformed and plain) required to be epoxy-coated has a protective coating of epoxy applied by electrostatic spray method according to the requirements of ASTM A 775/A 775M.

2. Acceptance and handling of epoxy-coated reinforcing steel reinforcement bars at the project site are to be according to the requirements of these specifications and the requirements of Materials I.M. 451.03B.

D. Stainless Steel Reinforcement.

1. Unless otherwise specified in the contract documents, stainless steel reinforcement bars shall be deformed and meet requirements of ASTM A 955 and be the grade, UNS designations, and types listed in Materials I.M. 452.

2. Bar sizes shall be specified in the contract documents.

3. Bars shall be heat treated using one of the three methods listed in ASTM A 955.

4. If welding and/or tack welding is employed in the placement of stainless steel reinforcement, the following requirements shall be met prior to welding:
- **a.** Welding shall not be performed without prior approval of Engineer.
- **b.** Welding procedure suitable for the chemical composition and intended use shall be submitted for approval prior to welding.
- **c.** Welding shall be performed by a state certified welder.
- **d.** Welding and/or tack welding shall be performed in accordance with the requirements of the contract documents, and latest edition of the American Welding Society, AWS D1.6, including requirements for minimum preheat and interpass temperature.

~~D~~ E. Surface Preparation.

1. Thoroughly blast (near-white) clean reinforcing steel surfaces to be coated. Remove mill scale, rust, and foreign matter. Ensure the blast media produces a suitable anchor pattern profile (a depth of 2.0 to 4.0 mils (50 µm to 100 µm)). Apply the coating within 0.5 hour after cleaning.

2. Ensure blast media meets the requirements of ~~Materials I.M. 451.03B~~ ASTM A 775. A maximum of 10% steel shot may be added to blast media.

~~E~~ F. Repair to Damage Incurred During Fabrication.
Ensure coating damage due to fabrication or handling at the fabricator facility is repaired using patching material meeting the requirements of Section 3.1 of ASTM D 3963/D 3963M. The fabricator is responsible for the repair.

~~F~~ G. Repair of Damage Incurred during Shipment and Handling at the Job Site.
Comply with the following:

1. Repair visible damage incurred during shipment, storage, and /or placement of epoxy-coated bars at the job site.

2. Use coating patch materials of organic composition consisting of a two-component liquid properly mixed that hardens to a solid form upon curing. Approved repair/patch compounds are listed in Materials I.M. 451.03B.

3. Repair damage to the coating caused by shipment, storage, and/or placement at the job site.

4. Ensure sheared ends/saw-cut ends of the coated bars have adequate coating, have no signs of surface rust or damage, and are repaired and/or coated with the same patching material that is used for repairing damaged coating.

5. The maximum amount of repaired, damaged areas is not to exceed 2% of the total surface area in each 1.0 linear foot (0.3 m) of the bar. Should the amount of damage exceed the 2% in 1.0 linear foot (0.3 m), then remove that bar and replace with an acceptable bar. Coating the cut ends will not be included in the repair percentage.

6. Apply a minimum coating thickness of 7 mils (175 µm) to areas to be repaired.

7. Allow patches to cure (dry to the touch) before placing concrete over the coated bars.

8. Prepare the surface, repair it, and apply patches according to the resin manufacturer's recommendations.

~~G~~ H. Storage, Handling, and Placement at the Job Site.

1. Comply with the following:
   - **a.** Store coated bars or bundles above ground on wooden or padded supports with padded timbers placed between bundles when stacking is necessary. Place supports to prevent sags in the bundles.
   - **b.** Ensure systems for handling (loading, unloading, storing) the coated bars at the job site have padded contact areas. Do not drop or drag coated bars or bundles.
   - **c.** Store coated and uncoated steel reinforcing bars separately.
   - **d.** Minimize handling and re-handling of the coated bars.
   - **e.** Tie coated bars using tie wire coated with epoxy, plastic, Nylon, or other non-conductive Materials that will not damage or cut the coating.
   - **f.** Use a non-conductive Material compatible with concrete to coat or fabricate bar supports or spacers.

2. Use a non-transparent material to cover coated bars if they will be exposed for 2 months or more. Ensure adequate ventilation is provided to minimize condensation under the cover.

Comments:

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

4151.03 REINFORCEMENT FOR STRUCTURES.

A. General.

1. Unless otherwise specified, use deformed bars meeting the requirements of ASTM A 615/A

615M, ASTM A 706/A 706M or ASTM A 996/A996M. Use bars fabricated according to Article 2404.03, B.

2. Spirals of No. 5 (15) bars or smaller and any bars No. 3 (10) or smaller for stirrups or hoops of a specified shape may, at the Contractor's option, be:
   - Material meeting requirements of ASTM A ~~82~~ 1064 reinforcement specified above, or
   - Steel meeting physical and chemical requirements of ASTM A 615/A 615M, Grade 40 (300).

3. For spirals in precast and prestressed concrete piling and all wire ties, use steel wire with a minimum tensile strength of 40,000 psi (300 MPa), with other properties such as to permit bending as shown in the contract documents.

4. When required by the contract documents, coat steel wire supports:
   - with PVC according to ASTM A-933, or
   - with epoxy according to ASTM A-884

B. Galvanized Reinforcement.

1. Comply with ASTM A767, Class I coating with ~~Perform~~ cutting and bending done prior to galvanizing and according to the requirements of Section 2404. ~~After cutting and bending, galvanize all reinforcement required to be galvanized according to the requirements of ASTM A 123. Take precautionary measures to prevent loss in the height of the deformation pattern.~~

2. ~~Apply a chromate conversion coating immediately after galvanizing. This may be accomplished by either: 1) quenching the bars, immediately after galvanizing, in a solution containing at least 0.2% (by weight (mass)) of sodium dichromate in water; or 2) quench chromating in a minimum 0.2% chromic acid solution. The quench water should be at least 90°F (32°C). Proprietary chromate solutions of equivalent effectiveness may be substituted for the above procedure. If the reinforcing material is allowed to cool before chromate treating as specified above, 0.5% to 1.0% concentration of sulfuric acid should be added as an activator to the chromate solution.~~

3. Galvanize tie wires and wire or pressed steel chairs to be used with galvanized reinforcing steel. Either turn up or coat the ends of chairs which may be exposed in the finished concrete. Stainless steel chairs, plastic coated carbon steel chairs, or other types of chairs may be approved by the Engineer. Galvanizing of hangers is optional (required only when to remain exposed), according Article 2412.03, A.

4. Handle bars according to ASTM A767 in a manner to prevent damage to the galvanized coating. When coating damage is 2% or less of the surface area, Repair it according to IM 410. Replace bars with damage over more than 2% of the surface area.

D. Stainless Steel Reinforcement.

1. Unless otherwise specified in the contract documents, stainless steel reinforcement bars shall be deformed and meet the requirements of ASTM A955 and be the grade, UNS designations, and types listed in Materials I.M. 452.

2. Bar sizes shall be specified in the contract documents.

3. Bars shall be heat treated using one of the three methods listed in ASTM A955.

4. If welding and/or tack welding is employed in the placement of the stainless steel reinforcement, the following requirements shall be met prior to any welding:

a. Welding cannot be performed without prior approval of the engineer.

b. A welding procedure suitable for the chemical composition and the intended use shall be submitted for approval prior to any welding.

c. Welding shall be performed by a state certified welder.

d. Welding and/or tack welding shall be performed in accordance with the requirements of the contract documents, IM, and the latest edition of the American Welding Society, AWS D1.6, including all of the requirements for the minimum preheat and interpass temperature.

~~**D.**~~ **E. Surface Preparation.**

~~**E.**~~ **F. Repair to Damage Incurred During Fabrication.**

~~**F.**~~ **G. Repair of Damage Incurred during Shipment and Handling at the Job Site.**

~~**G.**~~ **H. Storage, Handling, and Placement at the Job Site.**

D. Surface Preparation.

1. Thoroughly blast (near-white) clean reinforcing steel surfaces to be coated. Remove mill scale, rust, and foreign matter. Ensure the blast media produces a suitable anchor pattern profile (a depth of 2.0 to 4.0 mils (50 µm to 100 µm)). Apply the coating within 0.5 hour after cleaning.

2. Ensure blast media meets the requirements of ~~Materials I.M. 451.03B~~. ASTM A775. A maximum of 10% steel shot may be added to the blast media.

Reason for Revision: This is language removed from Materials I.M. 451.01 that is better suited for the specifications. ASTM A82 was withdrawn in 2013.

This is language removed from Materials I.M. 451.02 that is better suited for the specifications.

Update to the steel reinforcement specifications to include stainless steel.

This is language removed from Materials I.M. 451.03B that is better suited for the specifications.

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

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Greg Mulder	**Office:** Construction and Materials	**Item 19**
Submittal Date: 2014.04.18	**Proposed Effective Date:** October, 2014	
Article No.: 4151.04 **Title:** Wire Mesh Reinforcement	**Other:**	

Specification Committee Action: Approved as recommended.

Deferred:	**Not Approved:**	**Approved Date:** 5/8/2014	**Effective Date:** 10/21/2014

Specification Committee Approved Text: See Specification Section Recommended Text.

Comments: None.

Specification Section Recommended Text:

4154.04, Wire Mesh Reinforcement.

Replace the Article:

Comply with size and spacing and one of the following classifications, as required by the contract documents:

A. Uncoated Wire Mesh.
~~Use the size and spacing shown in the contract documents. Ensure it m~~Meet~~s~~ ~~the~~ requirements of ASTM A ~~185~~ 1064.

B. Vinyl Coated Wire Mesh.
Meet requirements of ASTM A 933.

C. Epoxy Coated Wire Mesh.
Meet requirements of ASTM A 884, Class A coating for concrete applications and ASTM A 884, Class B coating for mechanically stabilized earth applications.

Comments:

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

4151.04 WIRE MESH REINFORCEMENT.

Comply with the size and spacing and one of the following classifications, as required by the contract documents:

A. Uncoated Wire Mesh.
~~Use the size and spacing shown in the contract documents. Ensure it~~ Mmeet~~s~~ the requirements of ASTM A ~~185~~ 1064.

B. Vinyl Coated Wire Mesh.
Meet the requirements of ASTM A933.

C. Epoxy Coated Wire Mesh.
Meet the requirements of ASTM A884, Class A coating for concrete applications and ASTM A884, Class B coating for mechanically stabilized earth Applications.

Reason for Revision: This is language removed from Materials I.M. 451 appendix C that is better suited for the specifications. ASTM A185 was withdrawn in 2013.

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

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

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Greg Mulder	**Office:** Construction and Materials	**Item 20**
Submittal Date: 2014.04.18	**Proposed Effective Date:** October, 2014	
Section No.: 4151 **Title:** Steel Reinforcement	**Other:**	

Specification Committee Action: Approved with changes.

Deferred:	**Not Approved:**	**Approved Date:** 5/8/2014	**Effective Date:** 10/21/2014

Specification Committee Approved Text:

4151, Steel Reinforcement.

Add the Articles:

4151.06 WELDING REINFORCEMENT.

Unless specified elsewhere in the contract documents, comply with the following for welding and tack welding steel reinforcement or wire mesh:

A. Weld and/or tack weld according to Materials I.M. 558 and latest edition of the AWS D1.4 including table 5.2 for minimum preheat and interpass temperatures.

B. Engineer will review weld procedures. Do not start welding process until Engineer has approved weld procedures. Request a new review of weld procedures if any one variable of the essential procedure has been changed**.**

C. Use qualified/certified welders and tack welders.

D. Calculate carbon equivalent of reinforcing steel bars or wire fabric. Do not weld reinforcement with a carbon equivalent exceeding 0.55%.

E. Weld with Shielded Metal Arc Welding (SMAW), Gas Metal Arc Welding (GMAW), or Flux Core Arc Welding (FCAW).

F. Use other welding processes if approved by Engineer.

4151.07 Reinforcement Couplers.

Mechanical reinforcement couplers may be used when allowed by the contract documents or with the Engineer's approval. Use couplers that meet requirements of Materials I.M. 451 and the following:

A. Strength Requirements.

1. Withstand 80,000 cycles of fatigue tensile loading from 5000 psi (35 MPa) to 30,000 psi (210 MPa) at a maximum frequency of 5 cycles per second.

2. Develop in tension at least 125% of the specified yield strength of the bars being spliced both before and after fatigue loading.

3. Maximum slip of coupler after being loaded to 30,000 psi (210 MPa) tension and unloaded to 3000 psi (21 MPa) tension:
- For bar size up to No. 14 (45) - 0.01 inches (0.25mm)
- For No. 18 (60) Bars - 0.03 inches (0.75mm)

B. Couplers shall be made of steel conforming to one of the following:
- ASTM A 108, Level one or Level two,

- ASTM A 519 Grade 1025, or
- ASTM A 576.

C. Epoxy coated couplers shall be coated according to ASTM A 934. Other couplers shall have similar steel properties and same coating properties as reinforcement being spliced.

D. Install couplers following manufacturer's requirements.

Comments: The District 4 Materials Office had some additional changes to Article 4151.07 that were incorporated.

The Office of Bridges and Structures asked if welding should be in Division 41. This welding will be done in a fabrication shop and not the field.

Specification Section Recommended Text:

4151, Steel Reinforcement.

Add the Articles:

4151.06 WELDING REINFORCEMENT.

Unless specified elsewhere in the contract documents, comply with the following for welding and tack welding steel reinforcement or wire mesh:

A. Weld and/or tack weld according to Materials I.M. 558 and latest edition of the AWS D1.4 including table 5.2 for minimum preheat and interpass temperatures.

B. Engineer will review weld procedures. Do not start welding process until Engineer has approved weld procedures. Request a new review of weld procedures if any one variable of the essential procedure has been changed**.**

C. Use qualified/certified welders and tack welders.

D. Calculate carbon equivalent of reinforcing steel bars or wire fabric. Do not weld reinforcement with a carbon equivalent exceeding 0.55%.

E. Weld with Shielded Metal Arc Welding (SMAW), Gas Metal Arc Welding (GMAW), or Flux Core Arc Welding (FCAW).

F. Use other welding processes if approved by Engineer.

4151.07 Reinforcement Couplers.

Mechanical reinforcement couplers may be used when allowed by the contract documents or with Engineer's approval. Use couplers that meet requirements of Materials I.M. 451 and the following:

A. Strength Requirements.

4. Withstand 80,000 cycles of fatigue tensile loading from 5000 psi (35 MPa) to 30,000 psi (210 MPa) at a maximum frequency of 5 cycles per second.

5. Develop in tension at least 125% of the specified yield strength of the bars being spliced both before and after fatigue loading.

6. Maximum slip of coupler after being loaded to 30,000 psi (210 MPa) tension and unloaded to 3000 psi (210 MPa) tension:
- For bar size up to No. 14 - 0.01 inches (0.25mm)
- For No. 18 Bars - 0.03 inches (0.75mm)

B. Use couplers with similar steel properties and same coating properties as the reinforcement being sliced.

C. Install couplers following the manufacturer's requirements.

Comments:

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

4151.06 Title: WELDING REINFORCEMENT.

Unless specified elsewhere in the contract documents, comply with the following for welding and tack welding steel reinforcement or wire mesh:

G. Weld and or tack weld according to Materials I.M. 558 and the latest edition of the AWS D1.4 including table 5.2 for minimum preheat and interpass temperatures.

H. The engineer will review the weld procedures. Do not start the welding process until the engineer has approved the weld procedures. Request a new review of the weld procedures if any one variable of the essential procedure has been changed.

I. Use qualified/certified welders and tack welders.

J. Calculate the carbon equivalent of reinforcing steel bars or wire fabric. Do not weld reinforcement with a carbon equivalent exceeding 0.55%.

K. Weld with Shielded Metal Arc Welding (SMAW), Gas Metal Arc Welding (GMAW) or Flux Core Arc Welding (FCAW).

L. Use other welding processes if approved by the Engineer.

4151.07 Reinforcement Couplers.

Mechanical reinforcement couplers may be used when allowed by the contract documents or with the engineer's approval. Use couplers that meet the requirements of Materials I.M. 451 and the following:

D. Strength Requirements

7. Withstand 80,000 cycles of fatigue tensile loading from 5000 psi (35 MPa) to 30,000 psi (210 MPa) at a maximum frequency of 5 cycles per second.

8. Develop in tension at least 125% of the specified yield strength of the bars being spliced both before and after fatigue loading.

3. Maximum slip of coupler after being loaded to 30,000 psi (210 MPa) tension and unloaded to 3000 psi (210 MPa) tension:
   - For bar size up to No. 14 0.01 inches (0.25mm)
   - For No. 18 Bars 0.03 inches (0.75mm)

B. Use couplers with similar steel properties and the same coating properties as the reinforcement being sliced.

C. Install couplers following the manufacturer's requirements.

Reason for Revision: This is language removed from Materials I.M. 451 that is better suited for the specifications.
This is language removed from Materials I.M. 451 appendix E that is better suited for the specifications.

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

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Greg Mulder	**Office:** Construction and Materials	**Item 21**
Submittal Date: 2014.04.18	**Proposed Effective Date:** October, 2014	
Section No.: 4152 **Title:** Structural Steel	**Other:**	

Specification Committee Action: Approved with changes.

Deferred:	**Not Approved:**	**Approved Date:** 5/8/2014	**Effective Date:** 10/21/2014

Specification Committee Approved Text:

4152, Structural Steel.

Add the Article:

4152.03 Shear Connector Studs

A. Comply with ASTM A 108 for steel bars, carbon cold-finished, standard quality, Grades 1010 through 1020 inclusive either semi-killed or killed deoxidation. Inspection and acceptance of shear connector studs will be according to Materials I.M. 453.10.

B. Provide an arc shield (ferrule) of heat-resistant ceramic or other suitable material when approved by the Engineer. Ferrules shall be kept dry and protected from moisture or oven dried at 250°F (120°C) for 2 hours.

Comments: "Shear Connector Studs" header for Article 4152.03, A was removed, as it repeated the header for Article 4152.03.

Specification Section Recommended Text:

4152, Structural Steel.

Add the Article:

4152.03 Shear Connector Studs.

A. Shear Connector Studs.
Comply with ASTM A 108 for steel bars, carbon cold-finished, standard quality, Grades 1010 through 1020 inclusive either semi-killed or killed deoxidation. Inspection and acceptance of shear connector studs will be according to Materials I.M. 453.10.

B. Provide an arc shield (ferrule) of heat-resistant ceramic or other suitable material when approved by the Engineer. Ferrules shall be kept dry and protected from moisture or oven dried at 250°F (120°C) for 2 hours.

Comments:

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

4152.03 Shear Connector Studs

A. Shear Connector Studs.
Comply with ASTM A108 for steel bars, carbon cold-finished, standard quality, Grades 1010 through 1020 inclusive either semi-killed or killed deoxidation. Inspection and acceptance of shear connector studs will be according to Materials I.M. 453.10.

B. Provide an arc shield (ferrule) of heat-resistant ceramic or other suitable material when approved by the engineer. Ferrules shall be kept dry and protected from moisture or oven-dried at 250°F for two hours.

Reason for Revision: This is language removed from Materials I.M. 453.10 that is better suited for the specifications.					
County or City Input Needed (X one)			**Yes**	**No** X	
Comments:					
Industry Input Needed (X one)			**Yes**	**No** X	
Industry Notified:	**Yes**	**No**	**Industry Concurrence:**	**Yes**	**No** X
Comments:					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Dan Redmond	**Office:** District 4 Materials	**Item 22**
Submittal Date: April 22, 2014	**Proposed Effective Date:** October 2014	
Article No.: 4153.06 **Title:** Bolts, Nuts, Washers and Fasteners	**Other:**	

Specification Committee Action: Approved with changes.

Deferred:	**Not Approved:**	**Approved Date:** 5/8/2014	**Effective Date:** 10/21/2014

Specification Committee Approved Text:

4153.06, A, Non-High Strength Bolts and Nuts.

Replace the Article:

1. Bolts and nuts meet the requirements of ASTM A 307, ~~Class~~ Grade A or Grade B, with full diameter body. Hexagonal bolt heads and nuts.

2. Threads meet the requirements of ANSI B1.1, Unified Coarse Thread Series, Class 1A and Class 1B fit.

3. Where galvanized fasteners are specified, zinc is applied by hot dipped galvanizing to meet the requirements of ASTM F 2329 with a zinc bath temperature not exceeding 850°F (455°C). Fasteners may be mechanically galvanized to meet the requirements of ASTM B 695, Class 55 Type 1.

4. Where stainless steel fasteners are specified, use stainless steel fasteners meeting requirements of Article 4187.01, C, 1. Use lock type washers or jam nuts with stainless steel fasteners.

4153.06, B, 1.

Replace the Article:

Ensure the following:

a. High strength bolts, nuts, and washers meet the requirements of the appropriate ASTM Specifications as follows:

bolts	A 325
nuts	A 563 Grade DH3
washers	F 436

b. For galvanized high strength fasteners, the fasteners meet the requirements of ASTM B 695, Class 55 Type I or ASTM F 2329 with a zinc bath temperature not exceeding 850°F (455°C).

c. For weathering steel, bolts are ASTM A 325 Type III, nuts are ASTM A 563 Grade DH3, and washers are ASTM F 436 Type III.

d. For quenched and tempered steel bolts and studs with diameters greater than 1 1/2 inch, but with similar mechanical properties as ASTM A 325, refer to ASTM A 449.

1107.06, B.

Add the title and **Replace** the Article:

Buy America.

On all contracts, all products of iron, steel, or a coating of steel which are incorporated into the work shall be of domestic origin and shall be melted and manufactured in the United States. The Engineer may allow minimal amounts of these materials from foreign sources, provided the cost does not exceed 0.1% of the contract sum or $2,500, whichever is greater. This amount shall include transportation, assembly, and testing as delivered cost of foreign products to the project. Per Materials I.M. 107, miscellaneous steel or iron components, subcomponents, and hardware, as defined by FHWA, will not be subject to Buy America requirements.

Comments: The Office of Bridges and Structures requested that Article 4153.06, A, 4 read similar to the previous article so there is no confusion as to when to use stainless steel.

The Office of Traffic and Safety asked where it is specified that non-high strength bolts and nuts do not need to meet Buy America requirements. The new Materials I.M. 107 will define what products are exempt from Buy America. It was requested to add language to Article 1107.06, B, that references Materials I.M. 107.

Specification Section Recommended Text:

4153.06, A, Non-High Strength Bolts and Nuts.

Replace the Article:

1. Bolts and nuts meet the requirements of ASTM A 307, ~~Class~~ Grade A or Grade B, with full diameter body. Hexagonal bolt heads and nuts.

2. Threads meet the requirements of ANSI B1.1, Unified Coarse Thread Series, Class 1A and Class 1B fit.

3. Where galvanized fasteners are specified, zinc is applied by hot dipped galvanizing to meet the requirements of ASTM F 2329 with a zinc bath temperature not exceeding 850°F (455°C). Fasteners may be mechanically galvanized to meet the requirements of ASTM B 695, Class 55 Type 1.

4. Use stainless steel fasteners meeting requirements of Article 4187.01, C, 1, unless specified elsewhere in the contract documents. Use lock type washers or jam nuts with stainless steel fasteners.

4153.06, B, 1.

Replace the Article:

Ensure the following:

a. High strength bolts, nuts, and washers meet the requirements of the appropriate ASTM Specifications as follows:

bolts	A 325
nuts	A 563 Grade DH3
washers	F 436

b. For galvanized high strength fasteners, the fasteners meet the requirements of ASTM B 695, Class 55 Type I or ASTM F 2329 with a zinc bath temperature not exceeding 850°F (455°C).

c. For weathering steel, bolts are ASTM A 325 Type III, nuts are ASTM A 563 Grade DH3, and washers are ASTM F 436 Type III.

d. For quenched and tempered steel bolts and studs with diameters greater than 1 1/2 inch, but with similar mechanical properties as ASTM A 325, refer to ASTM A 449.

Comments:

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

Section 4153. Miscellaneous Iron and Steel

4153.06 BOLTS, NUTS, WASHERS AND FASTENERS.

A. Non-High Strength Bolts and Nuts.

1. Bolts and nuts meet the requirements of ASTM A 307, Grade A or Grade B, with full diameter body.

2. Where galvanized fasteners are specified, zinc is applied by hot dipped galvanizing to meet the requirements in ASTM F 2329 with a zinc bath temperature not exceeding 850°F (455°C).

4. Use stainless steel fasteners meeting the requirements of Article 4187.01,C,1. unless specified elsewhere in the contract documents.
   a. Use lock type washers or jam nuts with all stainless steel fasteners. Lock washers reduce loosening due to structure vibration and load fluctuation.

B. High Strength Fasteners.

1. Ensure the following:

   b. For galvanized high strength fasteners, the fasteners meet the requirements of ASTM B 695, Class 55 Type I or ASTM F 2329 with a zinc bath temperature not exceeding 850°F (455°C).

   d. For quenched and tempered steel bolts and studs with diameters greater than 1 1/2 inch but with similar mechanical properties as A 325, refer to ASTM A 449.

Reason for Revision: This is language removed from Materials I.M.s 453.06B and 453.07 better suited for the specifications.

County or City Input Needed (X one)			**Yes**	**No**	
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: Greg Mulder	**Office:** Construction & Materials	**Item 23**
Submittal Date: 2014.04.18	**Proposed Effective Date:** October 2014	
Section No.: 4154 **Title:** Fence Materials	**Other:**	

Specification Committee Action: Approved with changes.

Deferred:	**Not Approved:**	**Approved Date:** 5/8/2014	**Effective Date:** 10/21/2014

Specification Committee Approved Text:

4154, Fence Materials.

Replace the Section:

4154.01 DESCRIPTION.

A. Materials covered by this section include woven wire farm field fabric, chain link fabric, barbed wire, steel fence posts, wood fence posts, tie and brace wire, gates, and special fittings.

B. Use material of the size and type designated in the contract documents. Use new material meeting the requirements of the following provisions.

C. Inspection and acceptance of fence materials will be according to Materials I.M. 454.10.

D. Ensure similar parts with different shapes or protective coatings are not intermingled within the project limits.

4154.02 FIELD FENCE AND DEER FENCE.

A. ~~**Field Fence.**~~ Field fence shall conform to AASHTO M 279 and ASTM A 116 and shall be, unless otherwise specified:

1. ~~Use fabric meeting the requirements of ASTM A 116, Class 3 coating.~~ Type Z, Class 3.
- ~~For Type 47 fence, the fabric design is ASTM Design Number 1047-6-11 grade 60 wire or 1047-6-12 1/2 grade 125 wire.~~
- ~~For Type 39 fence, the fabric design is ASTM Design Number 939-6-11 grade 60 wire or 939-6-12 1/2 grade 125 wire.~~

2. ~~When the type is not designated, furnish one of the above 1047 fabrics.~~ Design numbers 1047-6-11 or 939-6-11 for grade 60 wire or design numbers 1047-6-12 1/2 or 939-6-12 1/2 for grade 125 wire.

~~**3.** Fabric may be furnished in lengths greater than 20 rods (100 m).~~

4 3. Use galvanized (as determined by visual inspection) steel rod for splicing fence material.

B. ~~**Deer Fence**~~ Deer fence shall be woven wire that meets the following requirements:
- ~~Use woven wire fence fabric that:~~
- ~~Meets the requirements (excluding wire spacing and fence height) for 12.5 gage wire according to ASTM A 116, and~~
- ~~Has wires spaced horizontally and vertically as shown in the contract documents or closer.~~

1. 12.5 gauge wire according to ASTM A 116 (excluding wire spacing and fence height).

2. Wires are spaced horizontally and vertically as shown in the contract documents or closer.

4154.03 CHAIN LINK FABRIC.

A. When chain link fence is specified in the contract documents, ~~use either~~ chain link fabric shall conform to one of the following:

~~• Zinc coated fabric meeting the requirements of ASTM A 392, Class 2 coating, or~~
~~• Aluminum coated fabric meeting the requirements of ASTM A 491.~~
~~•~~

1. Zinc coated fabric meeting requirements of ASTM A 392, Class 2 (2.0 ounces per square foot (610 g/m^2)) or AASHTO M 181 Type I, Class D.

2. Aluminum coated fabric meeting the requirements of ASTM A 491 or AASHTO M 181, Type II.

3. PVC coated fabric meeting requirements of ASTM F 668, Class 2b or AASHTO M 181, Type IV, Class B Fused.

B. ~~Knuckle the salvage top and bottom, except as indicated. Use material 72 inches (1.8 m) high (unless specified otherwise) and fabricated from No. 9 (3.76 mm diameter) wires.~~ Unless otherwise specified in contract documents, use:

1. 9 gauge coated wire with a breaking strength of 1290 pounds (5.740 kN).

2. Height of fabric of 72 inches (1.8 m).

3. Selvage knuckled at both the top and bottom.

4. Mesh size 2 1/8 inches (50.8 3.18 mm).

4154.04 BARBED WIRE.

~~Use barbed wire meeting the requirements of ASTM A 121 for 950 pounds (4.23 kN) force minimum strand breaking strength and 4 barbs at nominal 5 inch (125 mm) centers. Ensure the zinc coating is at least 0.80 ounce per square foot (244 g/m^2).~~ Unless otherwise specified in contract documents, use barbed wire conforming to AASHTO M 280, Design Number 12-4-5-14R, Type Z Class 3.

4154.05 BRACE WIRE, TENSION WIRE, AND TIE WIRE.

A. ~~Use galvanized wire meeting requirements of ASTM A 116, Class 3 coating, or an aluminum coated steel wire with a coating of not less than 0.25 ounce per square foot (76 g/m^2). Use tension wire at the bottom of chain link fence that meets the requirements of ASTM A 641/641 M, hard grade, with a Class 3 zinc coating or an aluminum coating of no less than 0.25 ounce per square foot (76 g/m^2).~~ Tension wire shall meet requirements of AASHTO M 181 or one of the following:

1. ASTM A 817, Type II, Class 3.

2. ASTM A 121, Type Z, Class 3 zinc coated or aluminum coated.

3. ASTM A 817, Type I.

4. ASTM F 1664, PVC (Vinyl) Coated, Class 2b.

B. Brace and tie wire shall meet the requirements of ASTM F 626 zinc coated or aluminum coated.

1. Where specified, round metallic-coated tie wires, clips, and hog rings shall be polymer coated to match the color of the chain-link fabric as selected from ASTM F 934

2. The coating process and metallic-coated core wire materials shall be in accordance with ASTM F 668.

~~**B**~~ **C.** Unless designated otherwise, use wire sizes no smaller than the following diameters:

Table 4154.05-1: Wire Sizes

Use	Wire Size
Tension wire Brace wire Tie wires or clips for fastening field fence to steel posts	No. 7 (4.49 mm) No. 9 (3.76 mm) No. 12 (2.68 mm)
Use tie wires for chain link fence ~~that are the size and type the manufacturer recommends, but~~ no smaller than No. 9 (3.76 mm) diameter for post ties or No. 12 (2.68 mm) diameter for rail and brace ties. Equivalent steel clips or aluminum wires or clips may be used if the Engineer approves.	

4154.06 STAPLES.

~~Use plain, class 3 zinc coated, No. 9 (3.76 mm), 1 3/4 inch (45 mm) long wire staples, unless specified otherwise in the contract documents. Obtain Engineer's approval for the staples to be used.~~

A. Unless otherwise specified in the contract documents, use fence staples conforming to ASTM F 1667 - 13, Table 57: F 1667 ST FN - 06 Z.

B. Obtain Engineer's approval for the staples to be used.

4154.07 WOOD POSTS.

A. Use pine posts of the size and length designated in the contract documents that~~:~~
- ~~M~~meet the requirements of Section 4164 with pressure preservative treatment meeting the requirements of Section 4161.
- ~~Are of the size and length designated in the contract documents.~~

B. Unless specified otherwise, use round stock posts of the following sizes and lengths:

Table 4154.07-1: Post Sizes and Lengths

Use	Length, feet (meters)
Line posts, 4 inch (100 mm) top End, corner, gate, pull, angle, and brace posts, 6 inch (150 mm) top	7 (2.1 m) 8 (2.4 m)

C. If contemplating driving the line posts, the tip of the post may have a blunt point made before treatment and located near the center line of the post.

4154.08 BRACES FOR FIELD FENCE.

A. ~~Use steel angle (or other approved bracing systems) weighing (with a mass of) no less than 1.94 pounds per foot (2.9 kg/m).~~ Unless otherwise specified in the contract documents, use either of the following between wood pull posts:

1. 2 3/8 inch (60.3 mm) SS-40 steel pipe.

2. 5 inch (127 mm) diameter wood posts.

B. ~~Use angles no less than 2 inches by 1 1/2 inches by 3/16 inches (50 mm by 40 mm by 5 mm). Use braces shown in the contract documents.~~ Use diagonal trussing with a double-wrapped 9 gauge, Class 3 steel brace wire.

C. Ensure ends are flattened to fit squarely against the posts with brace approximately horizontal.

~~**D.** For steel line posts, use coated braces as required.~~

4154.09 STEEL LINE POSTS FOR FIELD FENCE AND DEER FENCE.

A. Use T-section ~~(or other approved sections)~~ steel posts, of the length specified, as line posts with wood posts, as shown in the contract documents. Do not use T-section steel posts for corner, brace, pull, end, or gate posts.

B. Only one type of steel post may be used in any installation 1~~,~~000 feet (300 m) or less in length.

C. Equip posts with lugs or other approved means to prevent the fence fabric from moving vertically.

D. ~~Use posts that weigh (have a mass of) no less than 1.3 pounds per foot (1.9 kg/m), exclusive of anchor plate.~~ Use nominal 1.33 pounds per foot (1.98 kg/m) T-section post meeting requirements of ASTM A 702 and hot dip galvanizing requirements of ASTM A 123.

E. ~~Provide each post with a steel anchor plate of adequate size, firmly attached. After the anchor plate is attached, c~~Completely paint the finished post with a prime coat ~~and an enamel finish coat,~~ with no limitation on color or tip identification except as provided for 1~~,~~000 foot (300 m) installations. Ensure the paint is thoroughly dry before posts are bundled for shipment. ~~Unless specified otherwise, use steel line posts that are 7 feet (2.1 m) in length.~~

4154.10 STEEL POSTS, BRACES, AND RAILS FOR CHAIN LINK FENCE.

A. ~~Use galvanized standard weight (schedule 40) pipe meeting the requirements of ASTM F 1083 of the lengths designated in the contract documents. Posts, braces, and rails of alternate cross sectional shape, material, or protective coating may be used if approved according to Materials I.M. 454.10. Ensure similar parts with different shapes or protective coatings are not intermingled within the project limits.~~ Steel pipe length shall be designated in the contract documents and conform to AASHTO M 181 (ASTM) requirements:

1. Grade 1 (ASTM F 1083); minimum average zinc coating weight of 1.8 ounces per square foot (549 g/m^2).

2. Grade 2 (ASTM F 1043, Group I-C); external zinc coating minimum of 0.9 ounces per square foot (275 g/m^2) and internal zinc coating minimum 0.9 ounces per square foot (275 g/m^2).

B. ~~Ensure protective coatings for steel posts, braces, and rails of alternate shapes or alloys comply with one of the following methods. Other protective coatings, including polymeric, metallic, or combinations of the two, that provide protection equivalent to a zinc coating meeting ASTM A 123, may be approved.~~ When specified, PVC thermoplastic coating shall be fused and adhered to zinc-coated posts with a minimum coating thickness of 0.010 inch (0.254 mm) conforming to ASTM F 934 & ASTM F 1043 Sections 7 and 8.

~~**1.** Zinc coatings meeting the requirements of ASTM A 123.~~

~~**2.** Hot dipped pure aluminum coating with a minimum coating of 0.75 ounce per square foot (228 g/m^2) of surface, triple spot test, 0.70 ounce per square foot (213 g/m^2) of surface, single spot test, as measured according to ASTM A 428. Both outer and inner surfaces of pipe or tubing coated with a chromate chemical treatment and a thin resin film for protection during storage~~

~~or handling.~~

~~**C.** With the posts, provide approved caps that, for 3 inch and 4 inch (75 mm and 100 mm) posts, either:~~

- ~~Make a driving fit over the upper 1/2 inch (13 mm) of the post, or~~
- ~~Have other approved means for holding the cap securely in place.~~

4154.11 ~~SPECIAL~~ FITTINGS FOR CHAIN LINK FENCE.

A. Comply with the following:

1. Attach braces to posts using fittings which will hold both the post and brace rigidly.

2. Use diagonal ~~tension~~ truss rods of 3/8 inch (9.5 mm) diameter, round steel rods with an appropriate commercial means for tightening.

3. Furnish a locknut or other device to hold the tightening device in place.

~~**4.** Use wire ties meeting requirements of Article 4154.05.~~

~~**5**~~ **4.** Furnish a suitable sleeve or coupling device, recommended by the manufacturer, to connect sections of top rail and to provide for expansion and contraction.

~~**6**~~ **5.** Use stretcher bars no less than 3/8 inch (9.5 mm) diameter, or equivalent cross section area, with suitable clamps for attaching fabric to corner, end, or gate posts.

B. Ensure ~~all special~~ fittings~~, except aluminum fittings, have a galvanized coating of no less than 0.8 ounce per square foot (244 g/m^2) applied by the hot dip process~~ also conform to AASHTO M 181.

4154.12 GATES.

A. Field Fence and Chain Link Fence.

1. Ensure gates provide the width of opening shown in the contract documents. Install a vertical stay in gates more than 6 feet (1.8 m) wide. Where the width of opening specified is:
- 16 feet (5 m) or less, provide a single gate frame.
- More than 16 feet (5 m), provide two gate frames using a drop bar locking device allowing operation as a double gate.

2. Ensure each gate is furnished complete with necessary hinges, latch, and other special fittings recommended for the type of gate and gate post being installed.

3. For chain link fence gates, use the pipe size shown in the contract documents or approved by the Engineer. When size is not shown in the contract documents, use:
- 1 1/2 inch (40 mm) nominal diameter pipe for gates 6 feet (1.8 m) wide or more, and
- 1 1/4 inch (30 mm) nominal diameter pipe for gates less than 6 feet (1.8 m) wide.

4. Use gate fabric similar to that used for the fence. Attach using stretcher bars.

5. Use adjustable rods to cross truss gates 6 feet (1.8 m) wide or more.

6. Ensure materials are galvanized with no less than 0.8 ounce per square foot (244 g/m^2) of surface. Gates for field fence may be painted with a prime coat and an enamel finish coat.

B. Deer Fence.
Furnish the following, galvanized according to Article 4154.10:

1. Tines molded in one piece of steel with no welds.

2. Structural steel tubes with wall thickness of 0.1875 inches (4.75 mm) and unit weight of 4.32 pounds per foot (6.43 kg/m).

3. Support plates, hinges, and top braces.

Comments: Tension wire language was removed as Article 2519.03, B, 1 references placing the tension wire.

The title of Article 4154.11 was revised to remove "special" so that it applies to all chain link fence fittings.

The Office of Traffic and Safety asked what specifications apply to steel posts for deer fence. Deer fence was added to Article 4154.09. The length was removed from this Article, as the Standard Road Plans define the length for field fence and deer fence. The Office of Construction and Materials asked if deer fence requires a heavier post than field fence since it is taller. The Specifications Section could not find any details that indicated a heavier post is required.

The Specifications Section asked if there is a reason to go to 1.33 pounds per foot steel line posts, as the current weight is 1.3 pounds per foot. The ASTM standard includes "nominal" and a range of +/- 5% for the weight of the post. "Nominal" was added.

Specification Section Recommended Text:
4154, Fence Materials.
Replace the Section:

4154.01 DESCRIPTION.

E. Materials covered by this section include woven wire farm field fabric, chain link fabric, barbed wire, steel fence posts, wood fence posts, tie and brace wire, gates, and special fittings.

F. Use material of the size and type designated in the contract documents. Use new material meeting the requirements of the following provisions.

G. Inspection and acceptance of fence materials will be according to Materials I.M. 454.10.

H. Ensure similar parts with different shapes or protective coatings are not intermingled within the project limits.

4154.02 FIELD FENCE AND DEER FENCE.

A. ~~**Field Fence.**~~ Field fence shall conform to AASHTO M 279 and ASTM A 116 and shall be, unless otherwise specified:

1. ~~Use fabric meeting the requirements of ASTM A 116, Class 3 coating.~~ Type Z, Class 3.
- ~~For Type 47 fence, the fabric design is ASTM Design Number 1047-6-11 grade 60 wire or 1047-6-12 1/2 grade 125 wire.~~
- ~~For Type 39 fence, the fabric design is ASTM Design Number 939-6-11 grade 60 wire or 939-6-12 1/2 grade 125 wire.~~

2. ~~When the type is not designated, furnish one of the above 1047 fabrics.~~ Design numbers 1047-6-11 or 939-6-11 for grade 60 wire or design numbers 1047-6-12 1/2 or 939-6-12 1/2 for grade 125 wire.

~~**3.** Fabric may be furnished in lengths greater than 20 rods (100 m).~~

4 3. Use galvanized (as determined by visual inspection) steel rod for splicing fence material.

B. ~~**Deer Fence**~~ Deer fence shall be woven wire that meets the following requirements:

- ~~Use woven wire fence fabric that:~~
- ~~Meets the requirements (excluding wire spacing and fence height) for 12.5 gage wire according to ASTM A 116, and~~
- ~~Has wires spaced horizontally and vertically as shown in the contract documents or closer.~~

3. 12.5 gauge wire according to ASTM A 116 (excluding wire spacing and fence height).

4. Wires are spaced horizontally and vertically as shown in the contract documents or closer.

4154.03 CHAIN LINK FABRIC.

A. When chain link fence is specified in the contract documents, ~~use either~~ chain link fabric shall conform to one of the following:

- ~~Zinc coated fabric meeting the requirements of ASTM A 392, Class 2 coating, or~~
- ~~Aluminum coated fabric meeting the requirements of ASTM A 491.~~
- ~~~~

4. Zinc coated fabric meeting requirements of ASTM A 392, Class 2 (2.0 ounces per square foot (610 g/m^2)) or AASHTO M 181 Type I, Class D.

5. Aluminum coated fabric meeting the requirements of ASTM A 491 or AASHTO M 181, Type II.

6. PVC coated fabric meeting requirements of ASTM F 668, Class 2b or AASHTO M 181, Type IV, Class B Fused.

B. ~~Knuckle the salvage top and bottom, except as indicated. Use material 72 inches (1.8 m) high (unless specified otherwise) and fabricated from No. 9 (3.76 mm diameter) wires.~~ Unless otherwise specified in contract documents, use:

5. 9 gauge coated wire with a breaking strength of 1290 pounds (5.740 kN).

6. Height of fabric of 72 inches (1.8 m).

7. Selvage knuckled at both the top and bottom.

8. Mesh size 2 1/8 inches (50.8 3.18 mm).

4154.04 BARBED WIRE.

~~Use barbed wire meeting the requirements of ASTM A 121 for 950 pounds (4.23 kN) force minimum strand breaking strength and 4 barbs at nominal 5 inch (125 mm) centers. Ensure the zinc coating is at least 0.80 ounce per square foot (244 g/m^2).~~ Unless otherwise specified in contract documents, use barbed wire conforming to AASHTO M 280, Design Number 12-4-5-14R, Type Z Class 3.

4154.05 BRACE WIRE, TENSION WIRE, AND TIE WIRE.

A. ~~Use galvanized wire meeting requirements of ASTM A 116, Class 3 coating, or an aluminum coated steel wire with a coating of not less than 0.25 ounce per square foot (76 g/m^2). Use tension wire at the bottom of chain link fence that meets the requirements of ASTM A 641/641 M, hard grade, with a Class 3 zinc coating or an aluminum coating of no less than 0.25 ounce per square foot (76 g/m^2).~~ Tension wire shall ~~be placed at the bottom of the chain link fence fabric and~~ meet requirements of AASHTO M 181 or one of the following:

5. ASTM A 817, Type II, Class 3.

6. ASTM A 121, Type Z, Class 3 zinc coated or aluminum coated.

7. ASTM A 817, Type I.

8. ASTM F 1664, PVC (Vinyl) Coated, Class 2b.

B. Brace and tie wire shall meet the requirements of ASTM F 626 zinc coated or aluminum coated.

3. Where specified, round metallic-coated tie wires, clips, and hog rings shall be polymer coated to match the color of the chain-link fabric as selected from ASTM F 934

4. The coating process and metallic-coated core wire materials shall be in accordance with ASTM F 668.

~~B~~ **C.** Unless designated otherwise, use wire sizes no smaller than the following diameters:

Table 4154.05-1: Wire Sizes

Use	Wire Size
Tension wire Brace wire Tie wires or clips for fastening field fence to steel posts	No. 7 (4.49 mm) No. 9 (3.76 mm) No. 12 (2.68 mm)
Use tie wires for chain link fence ~~that are the size and type the manufacturer recommends, but~~ no smaller than No. 9 (3.76 mm) diameter for post ties or No. 12 (2.68 mm) diameter for rail and brace ties. Equivalent steel clips or aluminum wires or clips may be used if the Engineer approves.	

4154.06 STAPLES.

~~Use plain, class 3 zinc coated, No. 9 (3.76 mm), 1 3/4 inch (45 mm) long wire staples, unless specified otherwise in the contract documents. Obtain Engineer's approval for the staples to be used.~~

C. Unless otherwise specified in the contract documents, use fence staples conforming to ASTM F 1667 - 13, Table 57: F 1667 ST FN - 06 Z.

D. Obtain Engineer's approval for the staples to be used.

4154.07 WOOD POSTS.

A. Use pine posts of the size and length designated in the contract documents that~~:~~
- ~~M~~meet the requirements of Section 4164 with pressure preservative treatment meeting the requirements of Section 4161.
- ~~Are of the size and length designated in the contract documents.~~

B. Unless specified otherwise, use round stock posts of the following sizes and lengths:

Table 4154.07-1: Post Sizes and Lengths

Use	Length, feet (meters)
Line posts, 4 inch (100 mm) top End, corner, gate, pull, angle, and brace posts, 6 inch (150 mm) top	7 (2.1 m) 8 (2.4 m)

C. If contemplating driving the line posts, the tip of the post may have a blunt point made before treatment and located near the center line of the post.

4154.08 BRACES FOR FIELD FENCE.

A. ~~Use steel angle (or other approved bracing systems) weighing (with a mass of) no less than 1.94 pounds per foot (2.9 kg/m).~~ Unless otherwise specified in the contract documents, use either of the following between wood pull posts:

3. 2 3/8 inch (60.3 mm) SS-40 steel pipe.

4. 5 inch (127 mm) diameter wood posts.

B. ~~Use angles no less than 2 inches by 1 1/2 inches by 3/16 inches (50 mm by 40 mm by 5 mm). Use braces shown in the contract documents.~~ Use diagonal trussing with a double-wrapped 9 gauge, Class 3 steel brace wire.

C. Ensure ends are flattened to fit squarely against the posts with brace approximately horizontal.

~~**D.** For steel line posts, use coated braces as required.~~

4154.09 STEEL LINE POSTS FOR FIELD FENCE.

A. Use 7 foot (2.1 m) T-section ~~(or other approved sections)~~ steel posts as line posts with wood posts, as shown in the contract documents. Do not use T-section steel posts for corner, brace, pull, end, or gate posts.

B. Only one type of steel post may be used in any installation 1~~,~~000 feet (300 m) or less in length.

C. Equip posts with lugs or other approved means to prevent the fence fabric from moving vertically.

D. ~~Use posts that weigh (have a mass of) no less than 1.3 pounds per foot (1.9 kg/m), exclusive of anchor plate.~~ Use 1.33 pounds per foot (1.98 kg/m) T-section post meeting requirements of ASTM A 702 and hot dip galvanizing requirements of ASTM A 123.

E. ~~Provide each post with a steel anchor plate of adequate size, firmly attached. After the anchor plate is attached, c~~Completely paint the finished post with a prime coat ~~and an enamel finish coat,~~ with no limitation on color or tip identification except as provided for 1~~,~~000 foot (300 m) installations. Ensure the paint is thoroughly dry before posts are bundled for shipment. ~~Unless specified otherwise, use steel line posts that are 7 feet (2.1 m) in length.~~

4154.10 STEEL POSTS, BRACES, AND RAILS FOR CHAIN LINK FENCE.

A. ~~Use galvanized standard weight (schedule 40) pipe meeting the requirements of ASTM F 1083 of the lengths designated in the contract documents. Posts, braces, and rails of alternate cross sectional shape, material, or protective coating may be used if approved according to Materials I.M. 454.10. Ensure similar parts with different shapes or protective coatings are not intermingled within the project limits.~~ Steel pipe length shall be designated in the contract documents and conform to AASHTO M 181 (ASTM) requirements:

3. Grade 1 (ASTM F 1083); minimum average zinc coating weight of 1.8 ounces per square foot (549 g/m^2).

4. Grade 2 (ASTM F 1043, Group I-C); external zinc coating minimum of 0.9 ounces per square foot (275 g/m^2) and internal zinc coating minimum 0.9 ounces per square foot (275 g/m^2).

B. ~~Ensure protective coatings for steel posts, braces, and rails of alternate shapes or alloys comply with one of the following methods. Other protective coatings, including polymeric, metallic, or combinations of the two, that provide protection equivalent to a zinc coating meeting ASTM A 123, may be approved.~~ When specified, PVC thermoplastic coating shall be fused and adhered to zinc-

coated posts with a minimum coating thickness of 0.010 inch (0.254 mm) conforming to ASTM F 934 & ASTM F 1043 Sections 7 and 8.

~~**1.** Zinc coatings meeting the requirements of ASTM A 123.~~

~~**2.** Hot dipped pure aluminum coating with a minimum coating of 0.75 ounce per square foot (228 g/m^2) of surface, triple spot test, 0.70 ounce per square foot (213 g/m^2) of surface, single spot test, as measured according to ASTM A 428. Both outer and inner surfaces of pipe or tubing coated with a chromate chemical treatment and a thin resin film for protection during storage or handling.~~

C. ~~With the posts, provide approved caps that, for 3 inch and 4 inch (75 mm and 100 mm) posts, either:~~ Chain link fence fittings shall conform to AASHTO M 181.

- ~~Make a driving fit over the upper 1/2 inch (13 mm) of the post, or~~
- ~~Have other approved means for holding the cap securely in place.~~

4154.11 SPECIAL FITTINGS FOR CHAIN LINK FENCE.

A. Comply with the following:

1. Attach braces to posts using fittings which will hold both the post and brace rigidly.

2. Use diagonal ~~tension~~ truss rods of 3/8 inch (9.5 mm) diameter, round steel rods with an appropriate commercial means for tightening.

3. Furnish a locknut or other device to hold the tightening device in place.

~~**4.** Use wire ties meeting requirements of Article 4154.05.~~

~~**5**~~ **4.** Furnish a suitable sleeve or coupling device, recommended by the manufacturer, to connect sections of top rail and to provide for expansion and contraction.

~~**6**~~ **5.** Use stretcher bars no less than 3/8 inch (9.5 mm) diameter, or equivalent cross section area, with suitable clamps for attaching fabric to corner, end, or gate posts.

B. Ensure ~~all~~ special fittings~~, except aluminum fittings, have a galvanized coating of no less than 0.8 ounce per square foot (244 g/m^2) applied by the hot dip process~~ also conform to AASHTO M 181.

4154.12 GATES.

A. Field Fence and Chain Link Fence.

1. Ensure gates provide the width of opening shown in the contract documents. Install a vertical stay in gates more than 6 feet (1.8 m) wide. Where the width of opening specified is:
- 16 feet (5 m) or less, provide a single gate frame.
- More than 16 feet (5 m), provide two gate frames using a drop bar locking device allowing operation as a double gate.

2. Ensure each gate is furnished complete with necessary hinges, latch, and other special fittings recommended for the type of gate and gate post being installed.

3. For chain link fence gates, use the pipe size shown in the contract documents or approved by the Engineer. When size is not shown in the contract documents, use:
- 1 1/2 inch (40 mm) nominal diameter pipe for gates 6 feet (1.8 m) wide or more, and

- 1 1/4 inch (30 mm) nominal diameter pipe for gates less than 6 feet (1.8 m) wide.

4. Use gate fabric similar to that used for the fence. Attach using stretcher bars.

5. Use adjustable rods to cross truss gates 6 feet (1.8 m) wide or more.

6. Ensure materials are galvanized with no less than 0.8 ounce per square foot (244 g/m^2) of surface. Gates for field fence may be painted with a prime coat and an enamel finish coat.

B. Deer Fence.
Furnish the following, galvanized according to Article 4154.10:

1. Tines molded in one piece of steel with no welds.

2. Structural steel tubes with wall thickness of 0.1875 inches (4.75 mm) and unit weight of 4.32 pounds per foot (6.43 kg/m).

3. Support plates, hinges, and top braces.

Comments: Highlighted language is Construction language and not Materials language.

What is the difference between chain link fence fittings and special fittings for chain link fence.

Member's Requested Change (Redline/Strikeout):

4154.01 DESCRIPTION.

A. Materials covered by this section include woven wire farm field fabric, chain link fabric, barbed wire, steel fence posts, wood fence posts, tie and brace wire, gates, and special fittings.

B. Use materials of the size and type designated in the contract documents. Use new material meeting the requirements of the following provisions.

C. Inspection and acceptance of fence materials will be according to Materials I.M. 454.10.

D. Ensure similar parts with different shapes or protective coatings are not intermingled within the project limits.

4154.02 FIELD FENCE AND DEER FENCE.

A. Field fence shall conform to AASHTO M 279 and ASTM 116 and shall be, unless otherwise specified:

1. ~~Use fabric meeting the requirements of ASTM A 116, Class 3 coating.~~
   - ~~For Type 47 fence, the fabric design is ASTM Design Number 1047-6-11 grade 60 wire or 1047-6-12 1/2 grade 125 wire.~~
   - ~~For Type 39 fence, the fabric design is ASTM Design Number 939-6-11 grade 60 wire or 939-6-12 1/2 grade 125 wire.~~

   Type Z, Class 3.

2. ~~When the type is not designated, furnish one of the above 1047 fabrics.~~ Design numbers 1047-6-11 or 939-6-11 for grade 60 wire or design numbers 1047-6-12 ½ or 939-6-12 ½ for grade 125 wire.

3. ~~Fabric may be furnished in lengths greater than 20 rods (100 m).~~ Use

galvanized (as determined by visual inspection) steel rod for splicing fence material.

B. Deer fence shall be woven wire that meets the following requirements:
~~Use woven wire fence fabric that:~~
- ~~Meets the requirements (excluding wire spacing and fence height) for 12.5 gauge wire according to ASTM A 166, and~~
- ~~Has wires spaced horizontally and vertically as shown in the contract documents or closer.~~

1. 12.5 gauge wire according to ASTM A 116 (excluding wire spacing and fence height).

2. Wires are spaced horizontally and vertically as shown in the contract documents or closer.

4154.03 CHAIN LINK FABRIC.

A. When chain link fence is specified in the contract documents, chain link fabric shall conform to ASTM or AASHTO standards using either:
- ~~Zinc coated fabric meeting the requirements of ASTM A 392, Class 2 coating, or~~
- ~~Aluminum coated fabric meeting the requirements of ASTM A 491.~~

1. Zinc coated fabric meeting the requirements of ASTM A 392, Class 2 (2.0 oz/ft^2, 610 g/m^2) or AASHTO M 181 Type I, Class D.

2. Aluminum coated fabric meeting the requirements of ASTM A 491 or AASHTO M 181, Type II.

3. Polyvinyl Chloride (PVC) coated fabric meeting the requirements of ASTM F 668, Class 2b or AASHTO M 181, Type IV, Class B Fused.

B. ~~Knuckle the salvage top and bottom, except as indicated. Use material 72 inches (1.8 m) high (unless specified otherwise) and fabricated from No. 9 (3.76 mm diameter) wires.~~ Unless otherwise specified in contract documents, use:

1. 9 gauge coated wire with a breaking strength of 1,290 lbf (5.740 kN).

2. Height of fabric of 72 inches (1.8 m).

3. Selvage knuckled at both the top and bottom.

4. Mesh size 2 1/8 inches (50.8 3.18 mm).

4154.04 BARBED WIRED.
~~Use barbed wire meeting the requirements of ASTM A 121 for 950 pounds (4.23 kN) force minimum strand breaking strength and 4 barbs at nominal 5 inch (125 mm) centers. Ensure the zinc coating is at least 0.80 ounce per square foot (244 g/m^2).~~

A. Unless otherwise specified in contract documents, use barbed wire conforming to AASHTO M 280, Design Number 12-4-5-14R, Type Z Class 3.

4154.05 BRACE WIRE, TENSION WIRE, AND TIE WIRE.

A. ~~Use galvanized wire meeting requirements of ASTM A 116, Class 3 coating, or an~~

~~aluminum coated steel wire with a coating of not less than 0.25 ounce per square foot (76 g/m^2). Use tension wire at the bottom of chain link fence that meets the requirements of ASTM A 641/641 M, hard grade, with a Class 3 zinc coating or an aluminum coating of no less than 0.25 ounce per square foot (76 g/m^2).~~ Tension wire shall be placed at the bottom of the chain link fence fabric and meet the requirements of AASHTO M 181 or one of the following:

1. ASTM A 817, Type II, Class 3.

2. ASTM A 121, Type Z, Class 3 zinc coated or aluminum coated.

3. ASTM A 817, Type I.

4. ASTM F 1664, PVC (Vinyl) Coated, Class 2b.

B. Brace and tie wire shall meet the requirements of ASTM F 626 zinc coated or aluminum coated.

1. Where specified, round metallic-coated tie wires, clips, and hog rings shall be polymer coated to match the color of the chain-link fabric as selected from ASTM F 934

2. The coating process and metallic-coated core wire materials shall be in accordance with ASTM F 668.

C. Unless designated otherwise, use wire sizes no smaller than the following diameters:

Table 4154.05-1: Wire Sizes

Use	Wire Size
Tension wire Brace wire Tie wires or clips for fastening field fence to steel posts	No. 7 (4.49 mm) No. 9 (3.76 mm) No. 12 (2.68 mm)
Use tie wires for chain link fence ~~that are the size and type the manufacturer recommends, but~~ no smaller than No. 9 (3.76 mm) diameter for post ties or No. 12 (2.68 mm) diameter for rail and brace ties. Equivalent steel clips or aluminum wire or clips may be used if the engineer approves.	

4154.06 STAPLES.

~~Use plain, class 3 zinc coated, No. 9 (3.76 mm), 1 3/4 inch (45 mm) long wire staples, unless specified otherwise in the contact documents. Obtain Engineer's approval for the staples to be used.~~

A. Unless otherwise specified in the contract documents, use fence staples conforming to ASTM F 1667 – 13, Table 57: F1667 ST FN – 06 Z.

B. Obtain engineer's approval for the staples to be used.

4154.07 WOOD POSTS.

A. ~~Use pine posts that:~~

- ~~Meet the requirements of Section 4164 with pressure preservative treatment meeting the requirements of Section 4161.~~
- ~~Are of the size and length designated in the contract documents.~~

Use pine posts of the size and length designated in the contract documents that meet the requirements of Section 4164 with pressure preservative treatment meeting the requirements of Section 4161.

B. Unless specified otherwise, use round stock posts of the following sizes and lengths:

Table 4154.07-1: Post Sizes and Lengths

Use	Length, ft (meters)
Line posts, 4 inch (100 mm) top End, corner, gate, pull, angle, and brace posts, 6 inch (150 mm) top	7 (2.1 m) 8 (2.4 m)

C. If contemplating driving the line posts, the tip of the post may have a blunt point made before treatment and located near the center line of the post.

4154.08 BRACES FOR FIELD FENCE.

A. ~~Use steel angle (or other approved bracing systems) weighing (with a mass of) no less than 1.94 pounds per foot (2.9 kg/m).~~ Unless otherwise specified in the contract documents, use either of the following between the wood pull posts:

1. 2 3/8 inch (60.3 mm) SS-40 steel pipe.

2. 5 inch (127 mm) diameter wood posts.

B. ~~Use angles no less than 2 inches by 1 1/2 inches by 3/16 inches (50 mm by 40 mm by 5 mm). Use braces shown in the contract documents.~~ Use diagonal trussing with a double-wrapped 9 gauge, Class 3 steel brace wire.

C. Ensure ends are flattened to fit squarely against the posts with brace approximately horizontal.

D. ~~For steel line posts, use coated braces as required.~~

4154.09 STEEL LINE POSTS FOR FIELD FENCE.

A. Use T-section ~~(or other approved sections)~~ steel posts as line posts with wood posts, as shown in the contract documents. Do not use them for corner, brace, pull, end, or gate posts.

B. Only one type of steel post may be used in any installation of 1,000 feet (300 m) or less in length.

C. Equip posts with lugs or other approved means to prevent the fence fabric from moving vertically.

D. ~~Use posts that weigh (have a mass of) no less than 1.3 pounds per foot (1.9 kg/m), exclusive of anchor plate.~~ Use 1.33 lb/ft (1.98 kg/m) T-section post meeting the requirements of ASTM A 702 and hot dip galvanizing requirements of ASTM A 123, 7 feet (2.13 m) in length.

E. ~~Provide each post with a steel anchor plate of adequate size, firmly attached. After the anchor plate is attached, completely paint the finished post with a prime coat and an enamel finish coat, with no limitation on color or tip identification except as provided for 1,000 foot (300 m) installations. Ensure the paint is thoroughly dry before posts are~~

~~bundled for shipment. Unless specified otherwise, use steel line posts that are 7 feet (2.1 m) in length.~~ Completely paint the finished post with a prime coat with no limitation on color or tip identification except as provided for 1,000 foot (300 m) installations. Ensure the paint is thoroughly dry before pasts are bundled for shipment.

4154.10 STEEL POSTS, BRACES, AND RAILS FOR CHAIN LINK FENCE.

A. ~~Use galvanized standard weight (schedule 40) pipe meeting the requirements of ASTM F 1083 of the lengths designated in the contract documents. Posts, braces, and rails of alternative cross sectional shape, material, or protective coating may be used if approved according to Materials I.M. 454.10. Ensure similar parts with different shapes or protective coatings are not intermingled within project limits.~~ Steel pipe length shall be designated in the contract documents and conform to the AASHTO M 181 (ASTM) requirements:

1. Grade 1 (ASTM F 1083); minimum average zinc coating weight of 1.8 oz/ft^2 (549 g/m^2).

2. Grade 2 (ASTM F 1043, Group I-C); external zinc coating minimum of 0.9 oz/ft^2 (275 g/m^2) and internal zinc coating minimum 0.9 oz/ft^2 (275 g/m^2).

B. ~~Ensure protective coatings for steel posts, braces, and rails of alternate shapes or alloys comply with one of the following methods. Other protective coatings, including polymeric, metallic, or combinations of the two, that provide protection equivalent to a zinc coating meeting ASTM A 123, may be approved.~~ When specified, PVC thermoplastic coating shall be fused and adhered to zinc-coated posts with a minimum coating thickness of 0.010 inch (0.254 mm) conforming to ASTM F 934 & ASTM F 1043 Sections 7 and 8.

~~**1.** Zinc coatings meeting the requirements of ASTM A 123.~~

~~**2.** Hot dipped pure aluminum coating with a minimum coating of 0.75 ounce per square foot (228 g/m2) of surface, triple spot test, 0.70 ounce per square foot (213 g/m2) of surface, single spot test, as measured according to ASTM A 428. Both outer and inner surfaces of pipe or tubing coating with a chromate chemical treatment and a thin resin film for protection during storage or handling.~~

C. ~~With the posts, provide approved caps that, for 3 inch and 4 inch (75 mm and 100 mm) posts, either:~~

~~• Make a driving fit over the upper 1/2 inch (13 mm) of the post, or~~

~~• Have other approved means for holding the cap securely in place.~~

Chain link fence fittings shall conform to AASHTO M 181.

4154.11 SPECIAL FITTINGS FOR CHAIN LINK FENCE.

A. Comply with the following:

1. Attach braces to posts using fittings which will hold both the post and brace rigidly.

2. Use diagonal truss ~~tension~~ rods of 3/8 inch (9.5 mm) diameter, round steel rods with an appropriate commercial means for tightening.

3. Furnish a locknut or other device to hold the tightening device in place.

~~**4.** Use wire ties meeting requirements of Article 4154.05.~~

5. Furnish a suitable sleeve or coupling device, recommended by the manufacturer, to connect sections of top rail and to provide for expansion and contraction.

6. Use stretcher bars of no less than 3/8 inch (9.5 mm) diameter, or equivalent cross section area, with suitable clamps for attaching fabric to corner, end, or gate posts.

B. All specials fittings shall also conform to AASHTO M 181.

4154.12 GATES.

A. Field Fence and Chain Link Fence.

1. Ensure gates provide width of opening shown in the contract documents. Install a vertical stay in gates more than 6 feet (1.8 m) wide. Where the width of opening specified is:
   - 16 feet (5 m) or less, provide a single gate frame.
   - More than 16 feet (5 m), provide two gate frames using a drop bar locking device operation as a double gate.

2. Ensure each gate is furnished complete with necessary hinges, latches, and other special fittings recommended for the type of gate and gate post being installed.

3. For chain link fence gate, use the pipe shown in the contract documents or by the engineer. When size is not shown in the contract documents, use:
   - 1 1/2 inch (40 mm) nominal diameter pipe for gates 6 feet (1.8 m) wide or more, and
   - 1 1/4 inch (30 mm) nominal diameter pipe for gates less than 6 feet (1.8 m) wide.

4. Use gate fabric similar to that used for the fence. Attach using stretcher bars.

5. Use adjustable rods to cross truss gates 6 feet wide or more.

6. Ensure materials are galvanized according to the standards specified. Gates for field fence may be painted with a prime coat.

B. Deer Fence.

Furnish the following, galvanized according to Article 4154.10:

1. Tines molded in one piece of steel with no welds.

2. Structural steel tubes with wall thickness of 0.1875 inches (4.75 mm) and unit weight of 4.32 pounds per foot (6.43 kg/m).

3. Support plates, hinges, and top braces

Reason for Revision: Update to the latest fence material specifications.

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:					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Dan Redmond	**Office:** District 4 Materials	**Item 24**
Submittal Date: April 22, 2014	**Proposed Effective Date:** October 2014	
Article No.: 4187.01, C **Title:** Fasteners for Aluminum Alloy and Galvanized Steel Superstructures and Anchor Bolts (Materials for Support Structures)	**Other:**	

Specification Committee Action: Approved as recommended.

Deferred:	**Not Approved:**	**Approved Date:** 5/8/2014	**Effective Date:** 10/21/2014

Specification Committee Approved Text: See Specification Section Recommended Text.

Comments: None.

Specification Section Recommended Text:

4187.01, C, 3, a, 2.

Replace the second sentence:

Comply with ASTM F 1554, Grade 36, Grade 55, S1 or Grade 105, S5 as specified.

Comments: All other requested revisions are already in GS-12004.

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

4187.01 GENERAL REQUIREMENTS.

C. Fasteners for Aluminum Alloy and Galvanized Steel Superstructures and Anchor Bolts

1. Material for Superstructure.

a. Stainless Steel Bolts and Studs.

1) Meet the requirements of ASTM A 320/A 320M ~~Type 304~~ or ASTM F 593 Alloy Group 1, 2, or 3 Condition A.

d. Stainless Steel U-Bolts.

2) Meet the requirements of ASTM A 320/A 320M ~~Type 304~~ or ASTM F 593 Alloy Group 1, 2, or 3 Condition A.

2. Anchor Bolts, Nut and Washers

b. Anchor Bolts

2) Comply with ASTM F 1554, Grade 36 (248 MPa), 55 S1 (380 MPa) or Grade 105 S5 (724 MPa).

c. Nuts.

4) Use Unified Coarse Thread Series.

5) Use Class 2B tolerance.

d. Washers.

Comply with ASTM F 436, Type 1.

Reason for Revision: This is language removed from Materials I.M.s 453.07 and 453.08 better suited for the specifications.

County or City Input Needed (X one)			**Yes**	**No**	
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: Gary Novey	**Office:** Bridges and Structures	**Item 26**
Submittal Date: April 25, 2014	**Proposed Effective Date:** August 2014	
Article No.: **Title:**	**Other:** Developmental Specifications for Modular Expansion Joints	

Specification Committee Action: Approved with changes.			
Deferred:	**Not Approved:**	**Approved Date:** 5/8/2014	**Effective Date:** 8/19/2014

Specification Committee Approved Text: See attached Draft Developmental Specifications for Modular Expansion Joints.

Comments: The District 4 Materials Office asked if we need to be more specific in our reference to Materials I.M. 557 in Article 12XXX.01, A, 1. The Office of Bridges and Structures indicated that they would like to reference Appendix G.

Specification Section Recommended Text: See attached Draft Developmental Specifications for Modular Expansion Joints.

Comments:

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

See attachment.

Reason for Revision: The special provision has been used a number of times. Changing it to a Development Specification is a logical next step.

New Bid Item Required (X one)			**Yes X**	**No**	
Bid Item Modification Required (X one)			**Yes**	**No** X	
Bid Item Obsoletion Required (X one)			**Yes**	**No** X	
Comments: When using the SP the bid item used the 2599 item code. Two bid items are required as noted in the Basis of Payment.					
County or City Input Needed (X one)			**Yes**	**No** X	
Comments:					
Industry Input Needed (X one)			**Yes**	**No** X	
Industry Notified:	**Yes**	**No**	**Industry Concurrence:**	**Yes**	**No**
Comments:					

DS- 12XXX
(New)

Iowa Department of Transportation

SPECIAL PROVISIONS
FOR
MODULAR EXPANSION JOINT ASSEMBLY

Effective Date
August 19, 2014

THE STANDARD SPECIFICATIONS, SERIES 2012, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE DEVELOPMENTAL SPECIFICATIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

12XXX.01 DESCRIPTION.

This work shall consist of furnishing materials, services, labor, tools, equipment and incidentals necessary to design, fabricate, inspect, test, certify and install the Modular Expansion Joint Assembly (MEJA) as specified herein. Additionally, this work will consist of the design, detailing and submittal of calculations and drawings for reinforcing steel required in the modular joint blockout in the bridge slab and if applicable in the bridge abutment backwalls. Minimum reinforcing requirements are provided in the design plans. The contractor's engineer shall design and detail reinforcing meeting or exceeding these minimum requirements. The fabrication and installation of the galvanized barrier rail cover plates is also included herein. Contractor shall submit details of the barrier rail conduit expansion fitting in conjunction with the modular joint and barrier rail cover plate details for simultaneous review.

A. General Requirements.

1. Contractor shall provide a MEJA to accommodate the design movements. Contractor shall provide a MEJA that is either a single support bar system with sliding yokes or a welded multiple support bar system furnished by one of the approved manufacturers listed in Materials I.M. 557, Appendix G.

2. Contractor shall provide a MEJA with a single layer preformed elastomeric seal mechanically held in place by steel edge beams and center beams. Support the center beams on individual support bars for a welded multiple support bar system or on common support bars for a single support bar system. Allow for a maximum of 3 inches (75 mm) of movement in each elastomeric seal. Suspend the support bars over the joint opening using support boxes with internal sliding elastomeric bearings. For a welded multiple support bar system, a large support box to enclose the multiple support bars will be permitted. Control the joint opening with equidistant mechanisms that develop their maximum compressive force at the widest joint opening. In addition to any support of the joint from above prior to concreting, support the MEJA in the blockout from below with a positive support system at each support box designed to level the joint to the proper grade and slope.

B. Design and Testing Requirements.

1. The MEJA shall be designed in accordance with the AASHTO LRFD Bridge Design Specifications, 6th edition, series of 2012 plus current interims, including the modifications and exceptions noted herein.

2. Fabrication and construction shall be in accordance with the AASHTO LRFD Bridge Construction Specifications, 3rd edition, including the modifications and exceptions noted herein.

3. Prior to fabrication, submit complete details of the MEJA together with an installation and water tightness plan to the Engineer for approval. The following information shall be included in the submittal:

- **a.** Complete reinforcing bar layout for the expansion joint blockouts based on the reinforcing layout and limitations provided in the plans. Integrate this layout with bars extending from the deck slab and if applicable the abutment backwall. The minimum reinforcing steel in the top of the blockout shall be No. 5 (No. 15) bars at 12 inches (300 mm) on center, in both directions. Provide complete details of the blockout reinforcing on design and shop drawings.
- **b.** Plan and section views of the MEJA showing dimensions and tolerances. Provide a minimum of 3/8 inch (10 mm) material thickness for all structural steel elements.
- **c.** Provide support boxes with a minimum steel thickness for 3/8 inch (10 mm). For support boxes wider than 16 inches (400 mm), provide a width to thickness ratio not to exceed 45.
- **d.** Design and detail support bar bearing locations to provide adequate bearing stress resistance and avoid excessive edge loading of the blockout concrete. Provide calculations detailing satisfaction of this requirement.
- **e.** In addition to the design requirements of AASHTO LRFD 14.5.6.9.4, design the support boxes to transfer stresses from wheel loads applied to the top surface of the box in the blockout areas and transferred through the box to the supporting concrete. Use the AASHTO LRFD tandem axle loads for the Strength Limit State design. Fatigue loading is in accordance with AASHTO 14.5.6.9.4. For the distribution of wheel loads to the support boxes, perform design calculations using a contact area measuring 20 inches (500 mm) wide and 10 inches (250 mm) long in accordance with AASHTO LRFD 3.6.1.2.5. Do not assume any benefit to load distribution from the concrete cover. Apply impact as required for the Strength and Fatigue Limit States.
- **f.** Design the joint at the Strength Limit State for effects of snowplow loading in accordance with the requirements of AASHTO LRFD 14.5.1.2.
- **g.** Detail all welded and bolted center beam or support bar joints and all shop or field splices.
- **h.** When support bars are welded to center beams, use complete penetration groove welds and ultrasonically test 100% of the welds.
- **i.** Provide complete details of all components and assemblies incorporated into the MEJA.
- **j.** Provide all ASTM, AASHTO or other material designations.
- **k.** Provide details of shipping, lifting, support and alignment details.
- **l.** Provide temperature adjustment data in accordance with values shown in the plan drawings.
- **m.** Provide a certificate of compliance with the AISC Quality Certification Program for Simple Steel Bridges for vendor-fabricated joints. Provide a certificate of compliance with the AISC Quality Certification Program for Major Steel Bridges for joints fabricated using third-party fabricators.
- **n.** Provide certification that welding inspectors have current certification under AWS QC1, Standard for Qualification and Certification of Welding Inspectors.
- **o.** Document that nondestructive test technicians are certified by ASNT.
- **p.** Provide Manufacturer's certificate of compliance for PTFE sheet / fabric.
- **q.** Provide sealed engineering drawings and calculations prepared by a Professional Engineer licensed in the State of Iowa for the proposed MEJA including designs for both the Fatigue and Strength Limit States as described by AASHTO LRFD Bridge Design

Specifications, 6th Edition, Section 14.5.6.9 and referenced articles therein. At a minimum, all AASHTO requirements will be followed.

r. Provide test data and reports indicating the joint type, including all structural details, has been tested for compliance with NCHRP 402 – "Fatigue Design of Modular Bridge Expansion Joints." Provide certification that the design to be furnished has passed the requirements of the Opening Movement and Vibration Test (OMV), the Seal Push Out Test (SPO) and the Fatigue testing requirements of AASHTO LRFD Bridge Construction Specifications, 3rd Edition, Chapter 19, Appendix A, as verified by an independent testing agency.

s. Provide a manufacturer's recommended maintenance and repair plan for the MEJA for review and approval of the Engineer. The plan should include a detailed description of recommended and required maintenance activities including maintenance inspection requirements, wear tolerances, methods for determining wear or deterioration, and procedures for replacing worn parts.

t. Detail any temporary bridging that may be required to allow construction traffic to cross the joint prior to complete installation. If construction traffic will not be permitted to cross the joint, include this in the installation plan as a restriction on operations.

u. Provide final accepted versions of all of the above documents to the Contracting Authority on a CD-ROM in Adobe Acrobat PDF format at the completion of the project.

4. In addition to a required longitudinal movement range as specified in the plan drawings for each location, provide a joint having the additional movement capabilities:

- Transverse movement, 1.0 inch (25 mm).
- Vertical movement, 1.0 inch (25 mm).
- Rotation about longitudinal axis, 1 degree.
- Rotation about transverse axis, 1 degree.
- Rotation about vertical axis, 1/2 degree.

12XXX.02 MATERIALS.

Furnish materials new and without defects. Remove defective materials from the jobsite at no additional cost. Materials for MEJA shall consist of the following:

A. Blockout Concrete, High Performance Structural Concrete, or as specified.

B. Reinforcing Steel, Epoxy Coated, Section 4151 of the Standard Specifications.

C. Preformed Neoprene Strip Seal and Lubricant Adhesive, Section 4136 of the Standard Specifications and AASHTO M 220.

D. Structural Steel, Section 4152 of the Standard Specifications, hot dip galvanized per Materials I.M. 557, Appendix G.

E. Stainless Steel, ASTM A 240 Type 304, with 2B finish.

F. Stainless Steel Mating Surfaces, ASTM A 240/A 240M Type 304. Minimum No. 8 mirror finish for mating surface. Minimum 16 gauge thickness for the stainless steel plate.

G. PTFE, 100% virgin Teflon, woven PTFE fabric or dimpled PTFE, AASHTO Section 18.8, Division II.

H. Bolts, Nuts, Washers and other hardware shall conform to the requirements of Materials I.M. 557, Appendix G including galvanizing.

I. Urethane Foam, ASTM D 3574.

J. Springs, bearings, and equidistant devices to be the same material composition and formulation, Manufacturer, fabrication procedure, and configuration as those used in the prequalification tests.

12XXX.03 CONSTRUCTION.

A. Fabricate the modular expansion joint assembly at facilities owned and operated by the manufacturer that is responsible for the design of the joint assembly. The facility must have a current AISC Simple Steel Bridge Certification. Alternately, provide a joint fabricated by an AISC Major Steel Bridge Certified fabricator with experience in fabricating MEJA's. Provide written certification of the fabricators experience. Provide welding conforming to ANSI/AASHTO/AWS Bridge Welding Code D1.5-2008.

B. Fabricator shall thoroughly clean and remove excess galvanizing material from interior portions of steel extrusions prior to installing elastomeric seals.

C. Remove all debris from the concrete blockout prior to placing the concrete. Protect the joint blockout and MEJA from damage during all phases of construction. Use bridging to span the joint blockout during construction. Submit details of the bridging to the Engineer for approval.

D. Damage to the joint system during shipping, handling or installation shall be cause for rejection of the system.

E. Repair damage to the corrosion protection system to the satisfaction of the Engineer.

F. Design the MEJA, fabricate and deliver to the job site as a continuous unit. Field welding of the MEJA is not permitted.

G. Provide single piece seals. Seals will be installed in the shop, except when indicated otherwise. No splices are permitted. Joint seals are not permitted to extend above the joint. Design and detail the joint to allow for seal removal and replacement with a minimum of 1.25 inch (33 mm) space between adjacent center beams.

H. Provide edge beams and center beams machined or extruded to form the required profile. Multiple pieces welded to form the profile or bent / crimped to form the required profile are not permitted.

I. Coordinate upturns at the exterior gutter lines with the barrier rail cover plate and conduit expansion and fitting details.

J. Provide a minimum of 3 inches (75 mm) of concrete cover above the top of the joint support boxes. As a minimum, install rebar in the blockout as directed on the plans. Provide a minimum of 2 inches (50 mm) of concrete under the support boxes. Provide a minimum of 2 inch (50 mm) clear cover to support boxes and anchor studs to the vertical face of the blockouts. Coordinate these requirements with the design and detailing of the blockouts and girder end copes. Blockout dimensions shall be reduced or enlarged as necessary to accommodate a particular joint design. Modify girder and if applicable the abutment backwall design accordingly if blockout dimensions and support slab details are to be changed. Submit calculations and drawings documenting all proposed changes from the as-designed drawings. Calculations and drawings shall be sealed by a Professional Engineer licensed in the State of Iowa.

K. Furnish a joint such that the bearings and slide assemblies are removable and replaceable.

L. Install the joint system in strict accordance to the Manufacturers recommendations. A minimum of two weeks proceeding installation of the first joint, furnish to the Representative, three copies of a detailed installation plan and instructions.

M. Arrange for an employee of the joint manufacturer to be present during installation of the joint to assist with any technical or construction issues. Adhere to all recommendations made by the manufacturer representative made both on site and off site. Arrange for the Manufacturer's representative to certify to the Contracting Authority in writing that the installation adheres to the Manufacturers recommended installation procedures.

N. Furnish a system to expand or compress the joint system evenly to the desired joint opening for given installation temperatures. Temperatures correspond to structure temperature, not air temperature. Final adjustment of the joint opening shall be based on the Manufacturer's recommendation immediately prior to placing the blockout concrete. Use a temperature sensing device to measure the slab temperature on the lower surface of the slab at both ends of the blockout. Use an average of these readings to determine the structure temperature at time of installation. Adjust the joint based on these structure temperature readings.

O. Align the joint to the roadway grade and cross-section. Install the joint flush with the top of deck.

P. Provide a level top of joint allowing no more than 1/8 inch (3 mm) differential elevation between any center beams and the edge beams measured using a straight edge between the two edge beams.

Q. Provide uniform gaps for all joint seals. The allowable difference in gaps at either end of a joint seal is 1/2 inch (12 mm) maximum.

R. To reduce corrosion potential, electrically isolate the MEJA by not connecting the bridge deck reinforcement to the MEJA.

S. Place concrete to completely fill the blockout. Thoroughly consolidate the concrete under the support boxes to completely fill the area. Do not use vibrators to move concrete. Prevent concrete from entering inside the support boxes or otherwise interfering with the proper operation of the joint system. Prior to placing the blockout concrete, coat all existing concrete with an approved bonding compound.

T. Do not allow construction vehicles to apply live load to the joint for a period of 72 hours. Use bridging to allow for passage of construction vehicles.

U. Leak Testing.

1. After installation of all neoprene glands at one modular expansion joint, the contractor shall perform watertight integrity tests at the deck level to detect any leakage. The tests are to check for leakage at the upturned ends of the expansion device and for leakage along the expansion device across the deck. The contractor may conduct a single test of the entire device including upturned ends or may conduct separate tests of upturned ends and one or more tests of overlapping lengths between the upturned ends.

2. At each upturned end of the expansion device, the contractor shall block out on the deck at least 3 feet (0.9 m) of the expansion device leading to the upturned end and flood the area. A minimum water depth of 3 inches (75 mm) shall be maintained at the gutter line for at least 30 minutes. During the test, the inspector shall observe for any overflow at the upturned end. At the conclusion of the test the inspector will examine the underside of the joint for leakage. The expansion device is considered watertight if the inspector observes no overflow during the test and if no dripping water or water droplets are visible in the underdeck areas near the upturned end.

3. The contractor shall test the expansion device between upturned ends by blocking out and covering the device with ponded or flowing water to a depth of at least 1 inch (25 mm) at all points, for at least 30 minutes. Vertical curb surfaces may be tested with an unnozzled hose

delivering approximately one gallon per minute directed to flow over the entire curb height for 30 minutes. At the conclusion of the test, the inspector will examine the underside of the joint for leakage. The expansion device is considered watertight if no dripping water or water droplets are visible in the underdeck areas along the full length of the expansion joint. Damp concrete that does not show dripping water or water droplets is not considered a sign of leakage.

4. If the expansion device leaks at an upturned end or along its length, the contractor shall locate the leak(s) and take repair measures to stop the leakage. The repair measure's shall be as recommended by the manufacturer and approved by the engineer prior to beginning corrective work.

5. If measures to eliminate leakage are taken, the contractor shall perform subsequent watertight integrity tests subject to the same conditions as the original test.

12XXX.01 METHOD OF MEASUREMENT.

A. Modular Expansion Joint Assembly will be paid for in linear feet at the quantity shown in the contract documents.

B. Modular Expansion Joint Assembly Leak Testing will be paid for by count at the quantity shown in the contract documents.

12XXX.01 BASIS OF PAYMENT.

A. The contract unit price for the Modular Expansion Joint Assembly will be full and complete payment for all materials, labor, tools, equipment, inspection, services, and incidentals necessary to furnish and install the modular expansion joint assemblies as specified and at the locations shown in the plans. Also included are the design, detailing and construction of the MEJA blockout including required submissions to the Engineer as well as fabrication and installation of the galvanized barrier rail cover plates.

B. The contract unit price for Modular Expansion Joint Leak Testing will be full and complete payment for all labor, tools, equipment, services, and incidentals necessary to test each modular expansion joint, perform repairs if needed, retest following any repairs, and performing an additional leak test immediately preceding the final inspection of the bridge.

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Wes Musgrove	**Office:** Contracts	**Item 27**
Submittal Date:	**Proposed Effective Date:** October 2014 GS	
Article No.: 1102.09 **Title:** Preparation of Proposals **Article No.:** 1102.11 **Title:** Proposal Guaranty **Article No.:** 1102.12 **Title:** Filing of Proposal	**Other:**	

Specification Committee Action: Approved with changes.

Deferred:	**Not Approved:**	**Approved Date:** 5/8/2014	**Effective Date:** 10/21/2014

Specification Committee Approved Text:

1102.09, A.

Replace the Article:

Only contractors who have been authorized to bid a proposal may submit a bid for a contract.

Unless otherwise specified, bidder shall submit an electronic ~~bid~~ proposal with digital signature using bidding software furnished by the Department and electronic bid submittal procedures of the Department. ~~When prequalification is waived per Article 1102.01, H, or elsewhere in the contract documents, bidder may submit the schedule of prices from the estimating proposal and the signed original bidding document on the forms furnished by the Department, in lieu of submitting an electronic bid.~~ Proposals received after the bid deadline will not be read.

1102.11, A.

Add to the Article:

The proposal guaranty shall be filed at the place designated in the notice to bidders, prior to the time advertised for opening of bids.

1102.12, Filing of Proposal.

Replace the title and Article:

~~**Filing of**~~ **Optionally Combined Proposal.**

~~**A.** The proposal, proposal guaranty, and other supporting documents for each proposal shall be filed in an envelope, which is marked to indicate its contents. All proposals shall be filed with the Contracting Authority at the place designated in the notice to bidders, prior to the time advertised for opening of bids. Proposals received after the time of opening bids will be returned to the bidder.~~

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

~~**1**~~ **A.** The sum of the lowest ~~responsible~~ responsive bid on each of the individual proposals.

~~**2**~~ **B.** The lowest ~~responsible~~ responsive bid on the Optionally Combined Proposal.

Comments: The Office of Contracts requested to correct the references in Article 1102.12 from "responsible bid" to "responsive bid".

Article 1102.11, A was revised to indicate that an envelope is not required for the proposal guaranty, as some projects are now all electronic, including the bid bond and many contractors have annual bid

bonds.

This revision will be effective with the July letting as a proposal note for all projects.

Specification Section Recommended Text:

1102.09, A.

Replace the Article:

Only contractors who have been authorized to bid a proposal may submit a bid for a contract.

Unless otherwise specified, bidder shall submit an electronic ~~bid~~ proposal with digital signature using bidding software furnished by the Department and electronic bid submittal procedures of the Department. ~~When prequalification is waived per Article 1102.01, H, or elsewhere in the contract documents, bidder may submit the schedule of prices from the estimating proposal and the signed original bidding document on the forms furnished by the Department, in lieu of submitting an electronic bid.~~ Proposals received after the bid deadline will not be read.

1102.11, A.

Add to the Article:

The proposal guaranty shall be filed in an envelope which is marked to indicate its contents. Each shall be filed at the place designated in the notice to bidders, prior to the time advertised for opening of bids.

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~~**1**~~ **A.** The sum of the lowest responsible bid on each of the individual proposals.

~~**2**~~ **B.** The lowest responsible bid on the Optionally Combined Proposal.

Comments:

Member's Requested Change:

1102.09 PREPARATION OF PROPOSALS.

A. Only contractors who have been authorized to bid a proposal may submit a bid for a contract.

Unless otherwise specified, bidder shall submit an electronic proposal ~~bid~~ with digital signature using bidding software furnished by the Department and electronic bid submittal procedures of the Department. Proposals received after the bid deadline will not be read. ~~When prequalification is waived per Article 1102.01, H, or elsewhere in the contract documents, bidder may submit the schedule of prices from the estimating proposal and the signed original bidding document on the forms furnished by the Department, in lieu of submitting an electronic bid.~~

1102.11 PROPOSAL GUARANTY.

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

proposal. Bids not so supported will not be read.

The proposal guaranty shall be filed in an envelope which is marked to indicate its contents. Each shall be filed at the place designated in the notice to bidders, prior to the time advertised for opening of bids.

1102.12 FILING OF PROPOSAL.

~~A. The proposal, proposal guaranty, and other supporting documents for each proposal shall be filed in an envelope, which is marked to indicate its contents. All proposals shall be filed with the Contracting Authority at the place designated in the notice to bidders, prior to the time advertised for opening of bids. Proposals received after the time of opening bids will be returned to the bidder.~~

Re-letter paragraphs B and C accordingly.

Reason for Revision: The Department will only be accepting internet bids (proposals). Submitting the proposal is addressed in 1102.09, submitting the proposal guaranty is addressed in 1102.11.

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