Iowa Department of Transportation

MINUTES
OF
IOWA DOT SPECIFICATION COMMITTEE MEETING

April 12, 2007

Members Present:	John Adam	Statewide Operations Bureau
	Tom Reis, Chair	Specifications Section
	Daniel Harness, Secretary	Specifications Section
	Gary Novey	Office of Bridges & Structures
	John Smythe	Office of Construction
	Jim Berger	Office of Materials
	Bruce Kuehl	District 6-District Construction
	Roger Bierbaum	Office of Contracts
	Doug McDonald	District 1-Marshalltown RCE
Members Not Present:	Keith Norris	District 2-District Materials
	Mike Kennerly	Office of Design
	Troy Jerman	Office of Traffic & Safety
	Larry Jesse	Office of Local Systems
Advisory Members Present:	Lisa Rold	FHWA
Others Present:	Deanna Maifield	Office of Design
	Kevin Jones	Office of Contracts
	Wayne Sunday	Office of Construction
	Kurtis Younkin	Office of Traffic & Safety
	LeRoy Bergman	Office of Local Systems

Tom Reis, Specifications Engineer, opened the meeting. The following items were discussed in accordance with the agenda dated April 5, 2007:

1. Article 1105.03, Working Drawings.

The Office of Construction requested changes to add a table to identify the requirements for submittal, review, and approval of working and shop drawings.

2. Article 1105.14, Placement of Fill Material in Streams and Water Bodies.

The Office of Construction requested changes to specify compliance with the Clean Water Act and Section 404 permits, and to clarify contractors' options.

3. Article 2310.03, C, 1, c, Joints.

The Office of Construction requested changes to the depth of cut for longitudinal joints to be T/2.

4. Section 2316, Pavement Smoothness.

The Office of Materials requested changes that will line this section up with the proposed pavement smoothness supplemental specification for Interstate and Primary pavements.

5. Article 2403.17, F, Falsework Plans.

The Specifications Section requested a change to add a reference to Article 1105.03.

6. Article 2405.02, Construction of Cofferdams.
Article 2405.12, Reconstruction of Substructures.

The Specifications Section requested changes to add references to Article 1105.03.

7. Article 2408.02, Working Drawings, Shop Drawings, Changes, and Substitutions.
Article 2408.33, Falsework.

The Specifications Section requested changes to add references to Article 1105.03.

8. Section 2413, Surfacing and Repair and Overlay of Bridge Floors.

The Offices of Materials and Construction requested changes to remove the latex modified option and replace it with high performance concrete (HPC) overlay from DS-01069.

9. Article 2423.02, General Requirements.

The Specifications Section requested a change to add a reference to Article 1105.03.

10. Article 2425.03, Design.

The Specifications Section requested a change to add a reference to Article 1105.03.

11. Article 2507.04, Method of Measurement.

The Office of Construction requested to change the method of measurement for engineering fabric from plan quantity to a measured quantity.

12. Article 2522.02, Shop Drawings.

The Specifications Section requested a change to add a reference to Article 1105.03.

13. Article 2523.02, Materials.

The Specifications Section requested a change to add a reference to Article 1105.03.

14. Section 2524, Highway Signing.

The Office of Traffic and Safety requested changes to allow Type A signs to use breakaway steel posts and the Specifications Section requested a change to reference Article 1105.03.

15. Article 2525.01, B, Equipment and Materials.

The Specifications Section requested a change to reference Article 1105.03.

16. **Article 2528.12, A, 6, a, Pilot Cars.**
Article 2528.12, A, 6, b, Pilot Cars.
Article 2528.12, A, 7, a, Flaggers.
Article 2528.12, A, 7, b, Flaggers.

The Office of Contracts requested changes to modify how flatter and pilot car days are computed for contractors when working 24 hour operations.

17. **Article 2532.03, B, Bridge Deck.**

The Office of Construction requested changes to reference Article 2412.06, A, for grinding and longitudinal grooving.

18. **Article 4186.10, B, Steel Breakaway Posts for Type B Signs.**

The Office of Traffic and Safety requested a change to allow Type A signs to use breakaway steel posts.

19. **DS-01026, Removal of Concrete Box Girder Bridges.**

The Specifications Section requested a change to add a reference to Article 1105.03.

20. **DS-01043, Sanitary Sewer (SUDAS).**
DS-01044, Storm Sewer (SUDAS).
DS-01046, Water Main (SUDAS).

The Specifications Section requested revisions to the SUDAS Developmental Specifications to bring them in line with the current SUDAS Standard Specifications.

21. **DS-01068, Mechanical Stabilized Earth (MSE) Retaining Wall.**

The Specifications Section requested a change to add a reference to Article 1105.03.

22. **DS-01093, Pavement Smoothness.**

The Office of Materials requested changes to incorporate the 0 inch blanking band and to convert this Developmental Specification into a Supplemental Specification.

23. **SS-01020, Pre-Engineered Steel Truss Recreational Trail Bridge.**

The Specifications Section requested a change to add a reference to Article 1105.03.

24. **SS-01027, Modular Block Retaining Wall.**

The Specifications Section requested a change to add a reference to Article 1105.03.

25. **SS-01028, Segmental Retaining Wall.**

The Specifications Section requested a change to add a reference to Article 1105.03.

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: John Smythe / Wayne Sunday	**Office:** Construction	**Item 1**
Submittal Date: March 22, 2007	**Proposed Effective Date:** October 16, 2007	
Article No.: 1105.03 **Title:** Working Drawings	**Other:**	

Specification Committee Action: Approved with changes as noted.

Deferred:	**Not Approved:**	**Approved Date:** 4/12/07	**Effective Date:** 10/16/07

Specification Committee Approved Text:

1105.03, Working Drawings.

Add as the second, third, fourth, and fifth paragraphs:

For non-Primary projects, working drawings shall be submitted to the Engineer unless noted otherwise in the contract documents.

For Primary and Interstate projects, all submittals shall be processed by the Contractor and sent to the Review Office identified in the table below with a copy of the cover letter sent to the Resident Construction Engineer and District Materials Engineer. The cover letter shall include the following information:

- Date of submittal or resubmittal
- Project number
- Description of submittal
- Contractor's name, address, and telephone number
- Number of submittal copies
- Fabricator's name, address, and telephone number (if applicable).

Unless otherwise specified in the contract documents, Contractor submittal time shall be subject to the specified review time and the Contractor's need based on their schedule for the work.

When the contract documents specify submittals to be sent to the Design Consultant, copies of the cover letter shall be sent to the specified Review Office, Resident Construction Engineer, and District Materials Engineer.

DESCRIPTION	REVIEW OFFICE	NUMBER OF COPIES	REVIEW TIME (calendar days)
Falsework for slab bridges	Bridges and Structures	2	30
Cofferdam design (when required)	Bridges and Structures	2	30
Reconstruction of substructure (detailed plans for supporting the superstructure)	Bridges and Structures	2	30
Steel Structures	Bridges and Structures	7	30
Detail plans for falsework or centering support of steel structures (i.e. erection plans)	Bridges and Structures	2	30
Steel and aluminum pedestrian hand rails	Bridges and Structures	2	30
Highway sign support structures (i.e. trusses, cantilevers, & bridge mounts)	Bridges and Structures	2	30

Precast concrete (i.e. deck panels, RCB culverts, noise wall panels, arch sections, etc.)	Bridges and Structures	2	30
Tower lighting	Bridges and Structures	2	30
Highway lighting	Traffic & Safety	2	30
Highway signing steel breakaway posts	Traffic and Safety	2	30
Traffic signalization*	Traffic and Safety	2	30
Highway signing - Type A & B signs	Traffic and Safety	2	30
Bridge components	Bridges and Structures	2	30
Pre-engineered steel truss recreational trail bridge	Bridges and Structures	2	30
MSE, segmental, & modular block retaining walls	Design (Soils Design Section)	Preliminary submittal: 3 design calculations, 3 shop drawings, & 3 field construction drawings Final submittal: 3 design calculations, 3 shop drawings, & 3 field construction drawings	30 14
Soil nail & tie-back retaining walls	Design (Soils Design Section)	6 final design plans	60
Intermediate foundation improvement (IFI) (i.e. stone columns, geopiers, etc.)	Design (Soils Design Section)	4 design calculations & 8 field construction drawings	30
Removal of box girder bridges	Bridges and Structures	2	30
Structural erection manual	Bridges and Structures	2	30
Temporary shoring	Bridges and Structures	2	30
Temporary sheet pile retaining wall	Bridges and Structures	2	30
Safety grates for RCB culverts	Bridges and Structures	2	30
* Submittal time shall be within 45 calendar days from the date of award of contract.			

Comments: The Office of Local Systems suggested adding a footnote that for non-Primary projects, the reviewer shall be the County, City, or designee as indicated in the contract documents. The Specifications Section suggested they be sent to the Engineer unless indicated otherwise in the contract documents. The Engineer is defined in the Standard Specifications. The Office of Contracts asked what would be the determining factor to consider a project as a local systems project, Contracting Authority or the road system the project is on? They noted many city projects are let locally. They wanted to know if locals would send working drawings to the Contracting Authority or the whose in charge of the road system. The Office of Construction commented it would be based on the road system. They noted it could be stated the table applies only to projects on Primary and Interstate systems.

The Office of Contracts noted that Note 2 in the table applies to all submittals except Traffic Signalization. They suggested making Note 2 the default and Note 1 the exception. The Specifications Section commented they will reformat.

The Office of Contracts agreed with the proposed changes, but wondered if the changes should wait until the new book is released. The Office of Construction noted that many sections that require working drawing submittals don't address the specifics of who the Engineer is, how far in advance the drawings must be submitted, etc.

The Office of Construction noted that "3 design calculations" and "3 field construction drawings" need to be added to the preliminary submittal for MSE walls. The Specifications Section will take care of that.

The Office of Construction explained they have spreadsheets that contain more information for contractors. They want to put it on the internet to make it available for contractors. The Specifications

Section noted it could be put on the Office of Construction's site and the Specification's site can link to it.

The Office of Contracts noted there is reference to the Resident Construction Engineer (RCE). They wanted to know if the RCE needs to be defined. The Office of Construction noted it is defined in the contract documents. Contractors will understand.

Specification Section Recommended Text:

1105.03, Working Drawings.

Add as the second and third paragraphs:

All submittals shall be processed by the Contractor and sent to the Review Office identified in the table below with a copy of the cover letter sent to the Resident Construction Engineer and District Materials Engineer. The cover letter shall include the following information:

- Date of submittal or resubmittal
- Project number
- Description of submittal
- Contractor's name, address, and telephone number
- Number of submittal copies
- Fabricator's name, address, and telephone number (if applicable).

When the contract documents specify submittals to be sent to the Design Consultant, copies of the cover letter shall be sent to the specified Review Office, Resident Construction Engineer, and District Materials Engineer.

DESCRIPTION	REVIEW OFFICE	NUMBER OF COPIES	SUBMITTAL TIME	REVIEW TIME (calendar days)
Falsework for slab bridges	Bridges and Structures	2	Note 2	30
Cofferdam design (when required)	Bridges and Structures	2	Note 2	30
Reconstruction of substructure (detailed plans for supporting the superstructure)	Bridges and Structures	2	Note 2	30
Steel Structures	Bridges and Structures	7	Note 2	30
Detail plans for falsework or centering support of steel structures (i.e. erection plans)	Bridges and Structures	2	Note 2	30
Steel and aluminum pedestrian hand rails	Bridges and Structures	2	Note 2	30
Highway sign support structures (i.e. trusses, cantilevers, & bridge mounts)	Bridges and Structures	2	Note 2	30
Precast concrete (i.e. deck panels, RCB culverts, noise wall panels, arch sections, etc.)	Bridges and Structures	2	Note 2	30
Tower lighting	Bridges and Structures	2	Note 2	30
Highway lighting	Traffic & Safety	2	Note 2	30
Highway signing steel breakaway posts	Traffic and Safety	2	Note 2	30
Traffic signalization	Traffic and Safety	2	Note 1	30
Highway signing - Type A & B signs	Traffic and Safety	2	Note 2	30
Bridge components	Bridges and Structures	2	Note 2	30

	Pre-engineered steel truss recreational trail bridge	Bridges and Structures	2	Note 2	30
	MSE, segmental, & modular block retaining walls	Design (Soils Design Section)	Preliminary submittal: 3 field construction drawings Final submittal: 3 design calculations, 3 shop drawings, & 3 field construction drawings	Note 2	30 14
	Soil nail & tie-back retaining walls	Design (Soils Design Section)	6 final design plans	Note 2	60
	Intermediate foundation improvement (IFI) (i.e. stone columns, geopiers, etc.)	Design (Soils Design Section)	4 design calculations & 8 field construction drawings	Note 2	30
	Removal of box girder bridges	Bridges and Structures	2	Note 2	30
	Structural erection manual	Bridges and Structures	2	Note 2	30
	Temporary shoring	Bridges and Structures	2	Note 2	30
	Temporary sheet pile retaining wall	Bridges and Structures	2	Note 2	30
	Safety grates for RCB culverts	Bridges and Structures	2	Note 2	30
	Note 1: Within 45 calendar days from the date of award of contract.				
	Note 2: Unless otherwise specified in the contract documents, Contractor submittal time is subject to the specified review time and the Contractor's need based on their schedule for the work.				

Comments: What process needs to be used for Local Systems projects?

Member's Requested Change: (DO NOT USE "Track Changes," or "Mark-Up". Use ~~Strikeout~~/Highlight)

1105.03, Working Drawings.

Add as the second paragraph:

All submittals and resubmittals shall be processed by the Contractor and sent to the Review Office identified in the table below with a copy of the cover letter sent to the Resident Construction Engineer and District Materials Engineer. The submittal (resubmittal) cover letter shall include the following information:

Date of submittal (resubmittal).
Project number.
Description of submittal (resubmittal).
Contractor's name, address, and telephone number.
Number of submittal (resubmittal) copies.
Fabricator's name, address, and telephone number (if applicable).

When the contract documents specify submittals to be sent to the Design Consultant, copies of the submittal (resubmittal) cover letter shall be sent to the specified Review Office, Resident Construction Engineer, and District Materials Engineer.

DESCRIPTION	REVIEW OFFICE	NUMBER OF COPIES	SUBMITTAL TIME	REVIEW TIME (calendar days)
Falsework for slab bridges	Bridges and Structures	2	Note 2	30
Cofferdam design (when required)	Bridges and Structures	2	Note 2	30
Reconstruction of substructure (detailed plans for supporting the superstructure)	Bridges and Structures	2	Note 2	30

Steel Structures	Bridges and Structures	7	Note 2	30
Detail plans for falsework or centering support of steel structures (i.e. erection plans)	Bridges and Structures	2	Note 2	30
Steel and aluminum pedestrian hand rails	Bridges and Structures	2	Note 2	30
Highway sign support structures (i.e. trusses, cantilevers, & bridge mounts)	Bridges and Structures	2	Note 2	30
Precast concrete (i.e. deck panels, RCB culverts, noise wall panels, arch sections, etc.)	Bridges and Structures	2	Note 2	30
Tower lighting	Bridges and Structures	2	Note 2	30
Highway lighting	Traffic & Safety	2	Note 2	30
Highway signing steel breakaway posts	Traffic and Safety	2	Note 2	30
Traffic signalization	Traffic and Safety	2	Note 1	30
Highway signing - Type A & B signs	Traffic and Safety	2	Note 2	30
Bridge components	Bridges and Structures	2	Note 2	30
Pre-engineered steel truss recreational trail bridge	Bridges and Structures	2	Note 2	30
MSE, segmental, & modular block retaining walls	Design (Soils Design Section)	Preliminary submittal: 3 field construction drawings Final submittal: 3 design calculations, 3 shop drawings, & 3 field construction drawings	Note 2	30 14
Soil nail & tie-back retaining walls	Design (Soils Design Section)	6 final design plans	Note 2	60
Intermediate foundation improvement (IFI) (i.e. stone columns, geopiers, etc.)	Design (Soils Design Section)	4 design calculations & 8 field construction drawings	Note 2	30
Removal of box girder bridges	Bridges and Structures	2	Note 2	30
Structural erection manual	Bridges and Structures	2	Note 2	30
Temporary shoring	Bridges and Structures	2	Note 2	30
Temporary sheet pile retaining wall	Bridges and Structures	2	Note 2	30
Safety grates for RCB culverts	Bridges and Structures	2	Note 2	30
Note 1: Within 45 days from the date of award of contract.				
Note 2: Unless otherwise specified in the contract documents, Contractor submittal time is subject to the specified review time and the Contractor's need based on their schedule for the work.				

Reason for Revision: There is a need for a Specification revision to clearly and consistently identify the requirements for submittal, review, and approval of shop and working drawings for all of the associated areas of construction. A spreadsheet table (attached) was developed to be added to Article 1105.03 of the Specifications to provide clear contract requirements regarding shop and working drawing submittal, review, and approval.

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

Industry Notified:	**Yes**	**No**	**Industry Concurrence:**	**Yes**	**No**
Comments:					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: John M. Smythe	**Office:** Construction	**Item 2**
Submittal Date: April 3, 2007	**Proposed Effective Date:** October, 2007	
Article No.: 1105.14 **Title:** Placement of Fill Material in Streams and Water Bodies	**Other:**	

Specification Committee Action: Deferred to the May meeting.

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

Specification Committee Approved Text:

Comments: The Offices of Construction and Contracts decided to create a bid item for temporary stream crossings. Since the cost of a stream crossing can be high, they didn't think it was appropriate to make it incidental to mobilization. The Office of Contracts is submitting for the May meeting. The Office of Construction suggested deferring this item until May so the Office of Contracts can write up a bid item.

The Office of Design asked if there will be changes to the RL-16. The Office of Construction explained that the Office of Location and Environment wants to see silt curtains on the downstream side of causeways and stream crossings. The Office of Contracts asked if these would be incidental. The Office of Design responded they would not be.

The Statewide Operations Bureau asked who decides suitability of river for dredging. The Office of Construction explained it would be part of the field exam. If the team decides there is potential, samples will be taken to characterize the sand. The Office of Location and Environment would determine the presence of endangered species. If the river is suitable for dredging, a request will be included in the proposal to Army Corps of Engineers. The process for characterizing the material is not being formalized. It will be up to Contracting Authority to determine that process.

The Committee decided to defer this item to the May meeting.

Specification Section Recommended Text:

1105.14, Placement of Fill Material in Streams and Water Bodies.

Replace the title and entire article:

1105.14 ~~Placement of Fill Material in Streams and Water Bodies~~ Protection of Water Quality and Wetlands.

~~The placement of fill material in streams is regulated by Federal and State law. The intent of this specification is to require the Contractor's operations in streams and other water bodies and adjacent swamps, marshes, bogs, or similar areas to be in compliance with Federal and State regulations.~~

~~Fill material means any material used for the primary purpose of replacing an aquatic area with dry land or of changing the bottom elevation of a water body.~~

~~Fill material shall consist of clean, suitable, naturally occurring material, which is free from unacceptable levels of toxic pollutants.~~

The Contractor shall comply with the requirements of the Clean Water Act (33 U.S.C. 1344 and 33 CFR 323) and Executive Order 11990. When it becomes necessary for the Contractor to work

in waters of the United States, the Contractor shall be aware that a Section 404 permit may be required. Waters of the United States are defined as follows: all waters, impoundments of waters, or tributaries of waters, including but not limited to lakes, rivers, streams, mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, or natural ponds.

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

~~At the Contractor's option, stream crossings and causeways may be constructed, unless otherwise indicated in the Clean Water Act Section 404 Permit cover letter included in the proposal form. On Interstate and Primary projects, temporary stream crossings and causeways shall be constructed in accordance with the Standard Road Plan RL-16.~~ The Contracting Authority will obtain approval for a temporary stream crossing in the Section 404 permit, unless indicated otherwise in the contract documents. When allowed, the temporary stream crossing may be used at the Contractor's option, and shall be constructed in accordance with Standard Road Plan RL-16, unless specified otherwise in the contract documents. Fill material used to construct the temporary stream crossing shall be furnished by the Contractor, and shall not be dredged/excavated from the river unless specifically allowed elsewhere in the contract documents. Temporary stream crossings or causeways shall not restrict expected high flows or disrupt the movement of aquatic life native to the stream or water body. They shall not extend over 100 feet (30 m) into any swamp, bog, marsh, or similar area that is adjacent to the stream or water body. Expected high flows are those flows which the Contractor expects to experience during the period of time that the crossing is in place. They shall maintain pre-construction downstream flow conditions. Contractors are encouraged to construct these during low flows. They shall be maintained to prevent unnecessary erosion and other non-point sources of pollution. ~~When~~ Within 30 calendar days of no longer being needed, they shall be completely removed to an upland area, and all disturbed areas shall be reshaped and stabilized. The cost for constructing temporary stream crossings or causeways will not be paid for separately and shall be considered incidental to the contract price for Mobilization.

Comments:

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

1105.14 ~~PLACEMENT OF FILL MATERIAL IN STREAMS AND WATER BODIES.~~ PROTECTION OF WATER QUALITY AND WETLANDS

~~The placement of fill material in streams is regulated by Federal and State law. The intent of this specification is to require the Contractor's operations in streams and other water bodies and adjacent swamps, marshes, bogs, or similar areas to be in compliance with Federal and State regulations.~~

The Contractor shall comply with the requirements of the Clean Water Act (33 U.S.C. 1344 and 33 CFR 323) and Executive Order 11990. When it becomes necessary for the Contractor to work in waters of the United States, the Contractor shall be aware that a Section 404 permit may be required. Waters of the United States are all waters, impoundments of waters, or tributaries of waters, including but not limited to lakes, rivers, streams, mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, or natural ponds.

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

~~Fill material means any material used for the primary purpose of replacing an aquatic area with dry land or of changing the bottom elevation of a water body.~~
~~Fill material shall consist of clean, suitable, naturally occurring material, which is free from unacceptable levels of toxic pollutants.~~

~~At the Contractor's option, stream crossings and causeways may be constructed, unless otherwise indicated in the Clean Water Act Section 404 Permit cover letter included in the proposal form. On Interstate and Primary projects, temporary stream crossings and causeways shall be constructed in accordance with the Standard Road Plan RL-16.~~

The Contracting Authority will obtain approval for a temporary stream crossing in the Section 404 permit, unless indicated otherwise in the contract documents. When allowed, the temporary stream crossing may be used at the Contractor's option, and shall be constructed in accordance with Standard Road Plan RL-16, unless specified otherwise in the contract documents. Fill material used to construct the temporary stream crossing shall be furnished by the Contractor, and shall not be dredged/excavated from the river unless specifically allowed elsewhere in the contract documents.

Temporary stream crossings or causeways shall not restrict expected high flows or disrupt the movement of aquatic life native to the stream or water body. They shall not extend over 100 feet (30 m) into any swamp, bog, marsh, or similar area that is adjacent to the stream or water body. Expected high flows are those flows which the Contractor expects to experience during the period of time that the crossing is in place. They shall maintain pre-construction downstream flow conditions. Contractors are encouraged to construct these during low flows. They shall be maintained to prevent unnecessary erosion and other non-point sources of pollution. Within 30 days of ~~When~~ no longer being needed, they shall be completely removed to an upland area, and all disturbed areas shall be reshaped and stabilized. The cost for constructing temporary stream crossings or causeways will not be paid for separately and shall be considered incidental to the contract price for Mobilization.

Reason for Revision: Specify compliance with the Clean Water Act, Section 404 permits, and clarify contractor's options.

County or City Input Needed (X one)	**Yes**	**No** X
Comments: This clarification is consistent with currently established procedures.		

Industry Input Needed (X one)			**Yes**	**No** X	
Industry Notified:	**Yes**	**No**	**Industry Concurrence:**	**Yes**	**No**
Comments: This change clarifies existing requirements.					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: John Smythe / Kevin Merryman	**Office:** Construction	**Item 3**
Submittal Date: March 28, 2007	**Proposed Effective Date:** October 2007	
Article No.: 2310.03, C, 1, c **Title:** Joints	**Other:**	

Specification Committee Action: Approved as is.

Deferred:	**Not Approved:**	**Approved Date:** 4/12/07	**Effective Date:** 10/16/07

Specification Committee Approved Text: See Specification Section Recommended Text.

Comments: The Office of Contracts explained that in a meeting with the Iowa Concrete Paving Association (ICPA), ICPA described problems they have seen with joints in bonded overlays. They suggested cutting to T/2 for early saw cuts. The Office of Local Systems asked if joints need to be sealed. The Office of Contracts noted that transverse joints are sealed, but not longitudinal. District 6 Construction noted jointing is covered in the joint standards. The Office of Local Systems expressed concern if uncoated tie bars are used. They wanted to know if the joints would need to be sealed. The Office of Construction explained they haven't seen problems associated with uncoated bars in unsealed joints.

Specification Section Recommended Text:

2310.03, C, 1, c, Joints.

Replace the fourth sentence of the second paragraph:

Joints shall ~~not~~ be sawed directly over existing longitudinal joints to a depth of one-half the overlay thickness, with a maximum depth of 3 inches (75 mm).

Comments:

Member's Requested Change (Redline/Strikeout):

c. Joints.
The exact location of each contraction and expansion joint in the existing pavement and the joint to be sawed at each full depth patch shall be identified on both sides by a reliable method.

Joints shall be sawed in the resurfacing directly over existing transverse joints. Transverse joints shall be sawed to the full depth of new resurfacing concrete, including depressions created in the existing surface, and as specified in the widening areas. Transverse joints shall be sawed as soon as possible without causing excessive raveling. Joints shall ~~not~~ be sawed directly over existing longitudinal joints to a depth of one-half the overlay thickness, with a maximum depth of 3 inches (75 mm).

Reason for Revision: Update the longitudinal joint to a sawed joint of T/2. There had been problems with spalling on the longitudinal joint when it has not been sawed.

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** X	**No**
Comments: This was discussed with industry at the March 27 joint spec. meeting with ICPA.					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Jim Berger	**Office:** Materials	**Item 4**
Submittal Date: March, 2007	**Proposed Effective Date:** October, 2007	
Article No.: Section 2316 **Title:** Pavement Smoothness	**Other:**	

Specification Committee Action: Approved with changes as noted.

Deferred:	**Not Approved:**	**Approved Date:** 4/12/07	**Effective Date:** 10/16/07

Specification Committee Approved Text: See Members Member's Requested Change.

Comments: The Office of Materials noted the changes being proposed are intended to change Section 2316 so it will apply to non-Primary roads and to certain Primary roads. The proposed draft Supplemental Specification included as Item 22 will apply to Interstate and Primary roads. They noted that in the sixth paragraph of Article 2316.08, the $900 price adjustment for bumps also applies to Schedule A.

Specification Section Recommended Text: See Member's Requested Change.

Comments: Since several changes are being proposed, the entire Section is being replaced

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

Section 2316, Pavement Smoothness.

Replace the entire section:

Section 2316.

2316.01 GENERAL.

Pavement smoothness shall be evaluated for ~~all Interstate and Primary~~ main line pavement surfaces.~~, and all other road surfaces included on Primary projects, except when specifically excluded by the contract documents.~~ Pavement smoothness shall not be evaluated for ~~all other roads~~ non-Primary roadways unless specified in the contract documents. Main line pavement is defined as all permanent pavement for traffic lanes, including tapers to parallel lanes or through lanes at intersections, tapers to climbing lanes, and tapers to ramps and loops. Pavement smoothness shall also be evaluated for all interchange ramps and loops.

If this specification is required by contract documents on non-Primary projects let by the Department, it will be added in its entirety. Selected portions of the specification will not be deleted.

Bridge approach sections which are a part of the paving contract will be tested ~~for smoothness~~ according to Section 2317.

A. Smoothness Requirements.

The following shall apply to all ~~Interstate and Primary projects, and to non-Primary~~ projects when specified. Smoothness requirements in inches per mile (millimeters per kilometer) are listed in Schedules A and B. On lanes over 8.5 feet (2.6 m) in width, for through traffic which requires matching the surface of the new pavement to the surface of an existing old pavement, an Average Base Index (ABI) will be calculated as shown below; this will be the smoothness base in inches per mile (millimeters per kilometer) for payment for the new pavement unless otherwise specified. The requirements are shown in Schedule C.

Schedule for Identification of Pavements
~~And Bridge Approach Sections~~

Pavement	Schedule By Posted Speed (mph) (Existing or Proposed)	
	45 or less	**Over 45**
Mainline, curbed (one or both sides of roadway)	B	A
Mainline, not curbed	A	A
Ramps and Collector Distributor Roads	A(3)	A(3)
Loops	B	B
Side Roads	B	A
Grade Separations (1)	B	A
Pavement adjacent to existing pavement (added lane)	C(2)	C(2)

(1) Including municipal and Secondary Roads therein.
(2) ABI = $\frac{PI + X}{2}$
Where,
PI = the profile index of the edge line of the abutting lane. If the computed ABI is less than X, use an ABI equal to X.
X = 7 inches/mile (110 mm/km) if Schedule A, or 22 inches/mile (~~350~~ 345 mm/km) if Schedule B.
(3) When a ramp or collector distributor road terminates at an intersection with a traffic signal or stop sign, the 700 feet (215 m) nearest the intersection will be evaluated under Schedule B.

B. Exclusions.
Areas excluded from smoothness testing are detour pavement, crossovers, shoulders, and sections less than 50 feet (15 m) long.

All excluded areas will be checked with a surface checker by the Engineer and shall not exceed 1/8 inch in 10 feet (3 mm in 3 m).

2316.02 MEASUREMENT.
The Contractor shall provide and operate an Ames or California type profilograph to ~~determine the pavement profile~~ produce a profilogram (profile trace) of the surface tested in accordance with Materials I.M. 341. Other types of profilographs or profilers that produce compatible results and meet the requirements of Materials I.M. 341 may be used.

When a pavement, for which smoothness is to be tested is adjacent to an existing old pavement, smoothness must also be tested on the old pavement 3 feet (1 m) from the adjacent edge for ABI calculation. Should the surface of the old pavement be specified for correction, smoothness testing for ABI calculation shall be done after correction.

All objects and foreign material on the pavement surface, including protective covers, if used, shall be removed by the Contractor prior to testing, and if appropriate, protective covers shall be properly replaced by the Contractor after testing.

A profilogram shall be made for each segment of 50 feet (15 m) or more. The profilogram shall include the 16 feet (5 m) beyond the ends of the section.

A. Pavements.
The pavement surface will be divided into sections that represent continuous placement. A section will terminate at a day's work joint (header), a bridge, similar interruption, or when continuous placement crosses to a section with a different smoothness designation. Sections longer than 778 feet or 0.147 miles (240 m) placed without interruption will be separated into segments of 0.1 mile (160 m). The terminating segment may be shorter than 0.1 mile (160 m) and greater than 250 feet (80 m) and is still considered a segment. A segment is to be in only one traffic lane. Each traffic lane will be tested and evaluated separately. Gaps in otherwise continuous sections, for temporary crossings, or similar construction sequencing, will be tested, when placed, and included in the adjacent section evaluation.

B. Bridge Approach Sections.
Bridge approach sections shall ~~be tested with the profilograph. Each lane of each approach shall be an individual segment and shall~~ not be considered a part of a pavement segment, section, or project. ~~Testing shall be at the center of each traffic lane of travel.~~

2316.03 PROFILOGRAPH TESTING.
The Contractor shall perform testing and furnish the profilogram results to the Engineer. The testing and evaluation shall be done by a trained and certified person, and the evaluation shall be certified in accordance with Materials I.M. 341.

~~**A. Pavements.**~~
Each segment shall be tested and evaluated. The profile trace and index for each segment of paving shall be furnished to the Engineer by noon of the next day worked following the placement until there has been 3 consecutive days of paving where the index for all segments would result in 100% payment or better. After 3 consecutive days of paving that qualify for at least 100% payment, the profile trace and index must be furnished to the Engineer within 48 hours after each day's run. Should any following day be evaluated to receive less than 100% payment, a trace and index shall be furnished to the Engineer by noon the following day worked for each day until there has been 3 consecutive days of 100% payment or better.

For each day's run, an evaluation shall be submitted to the Engineer within 5 working days. This evaluation submittal shall include identification of segments that may qualify for less than 100% payment, segments that may qualify for incentive payment, segments to be corrected, and the section weighted average in inches per mile (millimeter per kilometer) certified smoothness testing.

The Engineer will perform verification testing to validate the contractor’s certified quality control testing. If the Engineer’s verification test results validate the Contractor’s test results, the Contractor's results will be used for acceptance. Disputes between the Contractor's and Engineer's test results will be resolved in accordance with Materials I.M. 341. The Engineer may test the entire project length if it is determined that the Contractor certified test results are inaccurate, and the Contractor will be charged for this work at a rate of $400.00 per mile ($250.00 per kilometer), per profile track, with a minimum charge of $800.00. Furnishing inaccurate tests may result in decertification of the Contractor's certified operator.

~~The Engineer may also subject the surface to monitor testing. Any portion of the project may be tested if the Engineer determines that the Contractor certified test results are inaccurate. If they are inaccurate, the Contractor will be charged for this work at a rate of $250 per lane per mile ($150 per lane per kilometer), with a minimum charge of $500. In addition, furnishing inaccurate test results could result in decertification.~~

~~**B. Bridge Approach Sections.**~~
~~Bridge approach sections shall be tested and evaluated.~~

2316.04 PROFILE INDEX.

~~**A. Pavement.**~~
A profile index shall be calculated for each segment from the profilogram in accordance with Materials I.M. 341 except for:

1. Side road connections less than 600 feet (180 m) in length.
2. Single lift pavement overlays 2 inches (50 mm) or less in thickness unless the existing surface has been corrected by milling or scarification.
3. Storage lanes and turn lanes.
4. Pavement less than 8.5 feet (2.6 m) in width.
5. The 16 feet (5 m) at the ends of the section when the Contractor is not responsible for the adjoining surface.
6. Runout tapers on HMS overlays at existing pavement, bridges, or bridge approach sections when the thickness is less than the design thickness.

If there is a segment of 250 feet or 0.047 mile (80 m) or less in length at the end of a section, the profilograph measurements for that segment shall be added to and included in the evaluation of the adjacent segment in that section.

Bumps and dips shall be separately identified on all profilograms. These appear as high or low points on the profilogram and correspond to high points (bumps) or low points (dips) on the pavement surface. They are identified by locating vertical deviations exceeding 0.5 inches for a 25 foot (~~13~~ 12.7 mm for a 7.6 m) span for both bumps and dips as indicated on the profilogram.

~~**B. Bridge Approach Sections.**~~
~~A profile index shall be calculated for each bridge approach section in accordance with Materials I.M. 341 except for plan lengths less than 50 feet (15 m) which will be checked for bumps and dips only.~~

2316.05 SURFACE CORRECTION.
Surface correction for pavement smoothness may be required which includes bumps or dips. The correction shall be completed before the determination of pavement thickness.

Bump, dip, and smoothness correction work shall be for the full lane width of the paved surface.

All correction work shall be subject to the approval by the Engineer. After all required correction work is completed, the final profile index shall be determined.

~~**A. Pavements.**~~

~~**1**~~ **A. Portland Cement Concrete Pavement.**
PCC pavement surface correction shall be accomplished by grinding the pavement using a diamond grinder, by PCC resurfacing, or by replacement. Grinding and texturing equipment shall meet the requirements of Section 2532, except the cutting head shall have a minimum width of 24 inches (600 mm). Surface correction shall be performed parallel to lane lines or edge lines as directed by the Engineer and each pass shall be parallel to the previous passes. The ground surface shall be of uniform texture.

Adjacent passes shall not overlap more than 1 inch (25 mm) and they shall not have a vertical difference of more than 1/8 inch (3 mm) as measured from bottom of groove to bottom of groove. Smoothness correction shall begin and end at lines normal to the pavement lane lines or edge lines within any one corrected area. The grinding shall proceed from the center line or lane line toward the pavement edge to maintain pavement cross slope.

~~2~~ B. Hot Mix Asphalt Pavements.
For asphalt pavements, the surface correction shall be accomplished by diamond grinding, by overlaying the area, by replacing the area, or by inlaying the area.

If the surface is corrected by diamond grinding, the work and equipment shall be the same as specified for PCC pavement except that the ground surface shall be covered with a seal coat as described in Article 2303.03, B, 2, for a runout.

If the surface is corrected by overlay, replacement or inlay, the surface correction shall begin and end with a transverse saw cut normal to the pavement lane lines or edge lines within any one area. Profile of surface must be smooth with no bumps or dips at beginning or end of correction. Overlay correction must be for the entire pavement width. Pavement cross slope must be maintained through the corrected areas.

~~**B. Bridge Approach Sections.**~~
~~Surface correction of bridge approach sections shall be accomplished by grinding or other approved methods. This work shall be as identified in Section 2532.~~

~~The area requiring correction shall be ground full lane width.~~

2316.06 BUMPS AND DIPS.
Bumps and dips, including those at headers, on all pavements for which pavement smoothness is designated shall be evaluated. Correction work will be required in accordance with the following criteria and in areas excluded from profilograph testing, for deviations exceeding 1/8 inch in 10 feet (3 mm in 3 m).

A. Bumps.
For all pavements evaluated ~~under Schedule A~~, all bumps exceeding 0.5 inch (~~13~~ 12.7 mm) within a 25 foot (7.6 m) span, as indicated on the profilogram, shall be assessed a price adjustment or be corrected at the discretion of the Engineer except as stated in Article 2316.06, C. ~~On all pavements evaluated under Schedule B the bumps shall be corrected except when otherwise allowed by the Engineer and as stated in Article 2316.06, C.~~

Corrected bumps will be considered satisfactory when measurement by the profilograph shows that the bumps are 0.3 inch (8 mm) or less in a 25 foot (7.6 m) span. ~~For all bumps under Schedule B not corrected, the Contractor will be assessed a price adjustment for each bump over 0.5 inch (13 mm) except as stated in Article 2316.06, C.~~

When a lane over 8.5 feet (2.6 m) in width, for through traffic, is constructed adjacent to an existing old pavement, bump correction or price adjustment to the Contractor for a bump will not apply if a bump exists at that location in the adjacent existing old pavement.

B. Dips.
On all pavements, dips of 0.5 inch to 1.0 inch (~~13~~ 12.7 mm to 25 mm) in a 25 foot (7.6 m) span, as indicated on the profilogram, shall be assessed a price adjustment or be corrected at the discretion of the Engineer except as stated in Article 2316.06, C. ~~corrected when required by the Engineer. The Contractor will be assessed a price adjustment for dips of 0.5 inch to 1.0 inch (12.73 mm to 25 mm) that are not corrected except as stated in Article 2316.06, C.~~ The Contractor will be required to replace the pavement in areas with dips over 1.0 inch (25 mm). Corrected dips will be considered satisfactory when the profilogram shows the dips are less than 0.3 inch (8 mm) in a 25 foot (7.6 m) span.

When a lane over 8.5 feet (2.6 m) in width is constructed adjacent to an existing old pavement, correction of a dip or price adjustment to the Contractor for a dip will not be required if a dip exists at that location in the adjacent existing old pavement.

C. Exceptions.
When the Contractor is not responsible for the adjoining pavement, bumps and dips exceeding 0.5 inches (~~13~~ 12.7 mm) located within 16 feet (5 m) either side of the end of a section will be evaluated by the Engineer. The Contractor will not be price adjusted for bumps and dips in this area. When instructed by the Engineer to repair these bumps and dips, the Contractor will be paid in accordance with Article 1109.03, B.

2316.07 SMOOTHNESS.
The smoothness of pavements will be compensated by the addition (incentive) or the subtraction (price reduction) of a determined amount for each segment of pavement to the price bid for pavement. These amounts are identified in the appropriate schedule of Article 2316.08.

A. Pavement Where Schedule A Smoothness is Required.
For the appropriate categories of highway, as shown in Schedule A, incentives for pavement smoothness will be paid for each segment of pavement with an initial index per mile (kilometer) per segment of 3.0 inches (48 mm) or less.

~~A second incentive will also be paid for each segment in a section if all segments in the section qualify for 100% payment with no grinding.~~

~~If all segments in a project qualify for 100% payment with no grinding, a third incentive will be added to the amount paid per segment.~~

For segments with an initial index of 7.1 to 10.0 inches per mile (~~110.1~~ 111 mm/km to 160 mm/km), the Contractor shall ~~may grind the surface to a final index of 7.0 inches per mile (110 mm/km) per segment or~~ receive a price reduction.

For segments with an index of 10.1 inches per mile (~~160.1~~ 161 mm/km) and greater, the Contractor shall grind the surface to a final index of 7.0 inches per mile (110 mm/km) or less.

B. Pavement Where Schedule B Smoothness is Required.
For all highways, incentives for pavement smoothness will be paid for each segment of pavement with an initial index of 12 inches per mile (190 mm/km) per segment or less.

For all segments with an initial index of 22.1 to 30.0 inches per mile (~~350~~ 346 mm/km to ~~470~~ 475 mm/km), the Contractor shall ~~may grind the surface to a final index of 22.0 inches per mile (350 mm/km) per segment or~~ receive a price reduction.

For segments with an index of 30.1 inches per mile (~~470.1~~ 476 mm/km) and greater, the Contractor shall grind the surface to a final index of 22.0 inches per mile (~~350~~ 345 mm/km) or less.

C. Pavement Adjacent to Existing Pavement.
For each segment of new pavement 8.5 feet (2.6 m) or more in width, and over 600 feet (180 m) in length, which is to be matched to the surface of an existing pavement, smoothness will be evaluated by the Average Base Index (ABI) as defined in Article 2316.01, A or B.

Surface correction is required for smoothness exceeding ABI + 12 (190) when Schedule A is required and exceeding ABI + 30 (~~470~~ 475) when Schedule B is required. Payment will be based on results after correction in accordance with Schedule C.

Areas not included in the profilograph test shall be checked longitudinally with a 10 feet (3 m) straight edge and the surface shall not deviate from a straight line by more than 1/8 inch in 10 feet (3 mm in 3 m). If correction is necessary, it shall meet requirements of Article 2316.05.

D. Bridge Approach Sections.
~~Where Schedule A or Schedule B smoothness is required, bridge approach sections shall be constructed to an index of not greater than 22.0 inches per mile (350 mm/km). If the original surface does not meet this criteria, the surface shall be ground to an index of 22.0 inches per mile (350 mm/km) or better.~~

Smoothness of bridge approach sections will not be used in the calculations for incentive or price reduction of pavement segments, sections, or the project.

2316.08 SCHEDULE OF PAYMENT.
For each traffic lane of main line pavement and each traffic lane of interchange ramps and loops evaluated for smoothness, as defined in Article 2316.01, the Engineer will determine the length of each segment in miles (kilometers).

For roadways, the Contractor may receive an incentive payment or be assessed a price reduction based on the number of qualifying segments and the initial profile index.

Pavement segments excluding repair work that are subject to profilograph testing, as defined in Article 2316.04, will be considered for additional payment as a smoothness incentive or price reduction. For a segment to be qualified for incentive, there must be no grinding within that segment.

Surface correction (grinding) of bridge approach sections, and as stated in Article 2316.06, C, will not count as surface correction on adjacent pavement segments and will not detract from possible incentive payments on those segments.

Single lift pavement resurfacing 2 inches (50 mm) or more in thickness that have milling or scarification of the original pavement, shall be rated using the multi-lift schedules.

A $900 price adjustment shall be assessed for each dip not corrected in each pavement lane under Schedule A and B except as stated in Article 2316.06, C. In addition, a $900 price adjustment will be assessed for each bump not corrected under Schedule A and B except as stated in Article 2316.06, C. Bumps and dips not corrected will also be included in the evaluation for the segment smoothness.

The cost of certified smoothness and associated traffic control shall be incidental to the cost of the pavement.

These payments or assessments will be based on the following schedules:

A. Schedule A Smoothness Requirements.
Pavement segments which are designated for Schedule A smoothness will be evaluated for incentive or price reduction assessments as follows:

INCENTIVES FOR PAVEMENT SMOOTHNESS

INITIAL PROFILE INDEX	**SINGLE LIFT PAVEMENTS** ~~(5)~~			**MULTI-LIFT PAVEMENTS** ~~(8)~~		
Inches Per Mile (mm/km) Per Segment (1)	~~Interstate & Multi-Lane Divided Primary (2)~~	~~All Other~~ Primary ~~(3)~~	Non-Primary ~~(4)~~	~~Interstate & Multi-Lane Divided Primary (6)~~	~~All Other~~ Primary ~~(6)~~	Non-Primary ~~(7)~~
	~~Dollars Per Segment~~	Dollars Per Segment	Dollars Per Segment	~~Dollars Per Segment~~	Dollars Per Segment	Dollars Per Segment

0-1.0 1.1-2.0 2.1-3.0 3.1-7.0	650 550 450 Unit Price	550700 450600 350450 Unit Price	200300 150250 100200 Unit Price	300 250 200 Unit Price	200250 150200 100150 Unit Price	75125 50100 2550 Unit Price
(0-16) (176.1-32)) (332.1-48) (498.1-110)	650 550 450 Unit Price	550700 450600 350450 Unit Price	200300 150250 100200 Unit Price	300 250 200 Unit Price	200250 150200 100150 Unit Price	75125 50100 2550 Unit Price

1) For each segment of pavement that has an initial index, within the limits listed, with no grinding, the Contractor will receive an incentive payment as shown in the tabulation for the appropriate category.

(2) If all segments in a section of pavement in this category qualify for 100% payment with no grinding, the qualifying incentive payment will be increased by $100 per segment for each.

(3) If all segments in a section of pavement in this category qualify for 100% payment with no grinding, the qualifying incentive payment will be increased by $75 per segment for each segment in the section.

(4) If all segments in a section of pavement in this category qualify for 100% payment with no grinding, the qualifying incentive payment will be increased by $50 per segment for each segment in the section.

(5) If all segments in a project qualify for 100% payment with no grinding, the qualifying incentive payment as indicated in notes (2), (3), and (4) will be increased by $50 per segment for each segment in the project.

(6) If all segments in a section of pavement in this category qualify for 100% payment with no grinding, the qualifying incentive payment will be increased by $25 per segment for each segment in the section.

(7) If all segments in a section of pavement in this category qualify for 100% payment with no grinding, the qualifying incentive payment will be increased by $10 per segment for each segment in the section.

(8) If all segments in a project qualify for 100% payment with no grinding, the qualifying incentive payment as indicated in notes (6) and (7) will be increased by $25 per segment for each segment in the project.

PRICE REDUCTION FOR PAVEMENT SMOOTHNESS

Initial Profile Index	**Single Lift Pavements**			**Multi-Lift Pavements**		
Inches Per Mile (mm/km) Per Segment	Interstate & Multi-Lane Divided DollarsPer Segment	All Other Primary Dollars Per Segment	Non-Primary Dollars Per Segment	Interstate & Multi-Lane Divided Dollars Per Segment	All Other Primary Dollars Per Segment	Non-Primary Dollars Per Segment
3.1-7.0 7.1-10.0 (1) 10.1 & over (2)	Unit Price Grind or 300 Grind Only	Unit Price Grind or 200 Grind Only	Unit Price Grind or 100 Grind Only	Unit Price Grind or 150 Grind Only	Unit Price Grind or 100 Grind Only	Unit Price Grind or 50 Grind Only
(48.1-110) (1110-160)(1) (1600.1 & over)(2)	Unit Price Grind or 300 Grind Only	Unit Price Grind or 200 Grind Only	Unit Price Grind or 100 Grind Only	Unit Price Grind or 150 Grind Only	Unit Price Grind or 100 Grind Only	Unit Price Grind or 50 Grind Only

(1) For segments with an initial index of 7.1 to 10.0 (110.1 to 160), the Contractor may grind the surface to a final index of 7.0 (110) or better or accept a price reduction for each segment of pavement in non-compliance equal to the amount shown for the appropriate category.

(2) For segments with an initial index of 10.1 (160.1 161) and over, the Contractor shall grind the surface to a final index of 7.0 (110) or better. In lieu of grinding the surface to a final index of 7.0 (110) or better, the Contractor may elect to replace part or all of the segment.

B. Schedule B Smoothness Requirements.
Pavement segments for which Schedule B smoothness is designated and which is indexed in segments greater than 50 feet (15 m), will be evaluated for incentive or price reduction as follows.

For individual segments shorter than 50 feet (15 m), properly corrected if required, no price reduction assessment will be made.

INCENTIVES FOR PAVEMENT SMOOTHNESS

Initial Profile Index	New Pavements	Resurfaced Pavements
Inches Per Mile (mm/km) Per Segment (1)	Dollars Per Segment	Dollars Per Segment
0 - 4.0 (0 - 650) 4.1 - 8.0 (665.1 - 130) 8.1 - 12.0 (130.1 - 190) 12.1 - 22.0 (190.1– 3450)	600 500 400 Unit Price	300 250 200 Unit Price

(1) For each segment of pavement that has an initial index, within the limits listed, with no grinding, the Contractor will receive an incentive payment as shown in the tabulation for the appropriate category.

PRICE REDUCTION FOR PAVEMENT SMOOTHNESS

Per Segment Index	New Pavements	Resurfaced Pavements
Inches Per Mile (mm/km) Per Segment	Dollars Per Segment	Dollars Per Segment
12.1 - 22.0 (190.1 - 3450) 22.1 - 30.0 (1) (3465~~0.1~~ -475~~0~~) 30.1 & over (2)(476~~0.1~~ & over)	Unit Price ~~Grind or~~ 500 Grind Only	Unit Price ~~Grind or~~ 250 Grind Only

(1) ~~For segments with an initial index of 22.1 to 30.0 (350.1 to 470), the Contractor may grind the surface to a final index of 22.0 (350) or better or accept a price reduction for each segment of pavement in non-compliance equal to the amount shown for the appropriate category.~~

(2) For segments with an initial index of 30.1 (~~470.1~~ 476) and over, the Contractor shall grind the surface to a finish index of 22.0 (~~350~~ 345) or better. In lieu of accepting a price reduction and grinding the surface to a final index of 22.0 (~~350~~ 345) or better the Contractor may elect to replace part or all of the segment.

C. Pavement Adjacent To Existing Pavement.
For new pavement which has been matched to an existing old pavement for which an Average Base Index (ABI) was calculated, the pavement will be evaluated for a price reduction for each segment based on Schedule A or Schedule B payment.

SCHEDULE C
INITIAL PROFILE INDEX
or
PROFILE INDEX AFTER CORRECTION

(Schedule A) Inches Per Mile (mm/km) Per Segment	(Schedule B) Inches Per Mile (mm/km) Per Segment	Dollars Per Segment

0 to ABI ABI + 0.1 (~~0.~~1) to ABI +4 (65) incl. ABI + 4.1 (6~~5.1~~) to ABI+8.0 (130) incl. ABI + 8.1 (13~~0.~~1) to ABI +12 (190) incl. Greater than ABI +12 (190)	0 to ABI ABI + 0.1 (0.1) to ABI + 10 (160) incl. ABI + 10.1 (16~~0.~~1) to ABI+20 (315)incl. ABI + 20.1 (31~~6~~5.1) to ABI+30(47~~5~~0) incl. Greater than ABI +30 (470)	0 300 500 800 Grind Only

D. Bridge Approach Sections.
Bridge approach sections shall be corrected for smoothness as specified in ~~Article 2316.07, in lieu of a price reduction~~ Section 2317.

Reason for Revision: To complement new SS

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

Comments:
Thank you for the opportunity to review the Smoothness Specification on behalf of the County Engineers. I have presented this matter to all members of the Specification committee and received little feedback. Some of the comments and question include the following;

1. In regard to ½ inch bumps, some County Engineers would like the ability to penalize the contract for a reasonable dollar amount rather than force them to grind a brand new pavement. I received this comment in regard to both PCC and HMA projects alike.
2. I received acknowledgement to the difference in segment bonuses between PCC and HMA pavements. It appears as though the industry is okay with this standard, so the County Engineers do not voice objection either.
3. The zero blanking band will be new, but something the industry has probably already adjusted to.
4. I like the fact that non-primary road projects let threw the IDOT may not write out part of the specification. I was surprised to here that some counties were doing that. I think you need to adhere to the entire specification if you want smoothness on the project.

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

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Tom Reis / Daniel Harness	**Office:** Specifications Section	**Item 5**
Submittal Date: 4/2/07	**Proposed Effective Date:** 10/16/07	
Article No.: 2403.17, F **Title:** Falsework Plans	**Other:**	

Specification Committee Action: Approved as is.			
Deferred:	**Not Approved:**	**Approved Date:** 4/12/07	**Effective Date:** 10/16/07
Specification Committee Approved Text: See Member's Requested Change.			
Comments: None.			
Specification Section Recommended Text: See Member's Requested Change.			
Comments:			

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

2403.17, F, Falsework Plans.

Replace the entire article:

The Contractor shall submit ~~6 copies of~~ plans for falsework and centering on all concrete slab and cast-in-place concrete girder bridges in accordance with Article 1105.03 ~~to the Engineer for checking and review~~. Submittal of forming details for bridge decks on concrete beam and steel beam bridges is not required unless specified in the contract documents. ~~The Engineer will be allowed 30 calendar days in which to review falsework plans.~~ In addition, calculations or evidence of adequacy may be required by the Engineer. Revised plans may be required by the Engineer later because of unforeseen site conditions, unusual construction procedures, or deviation from original falsework plans. ~~Article 1105.03 shall apply.~~

Reason for Revision: Add reference to working drawings in Article 1105.03. Language has been added to 1105.03 regarding submitting working drawings.

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: Tom Reis / Daniel Harness	**Office:** Specifications Section	**Item 6**
Submittal Date: 4/2/07	**Proposed Effective Date:** 10/16/07	
Article No.: 2405.02 **Title:** Construction of Cofferdams **Article No.:** 2405.12 **Title:** Reconstruction of Substructures	**Other:**	

Specification Committee Action: Approved as is.

Deferred:	**Not Approved:**	**Approved Date:** 4/12/17	**Effective Date:** 10/16/07

Specification Committee Approved Text: See Member's Requested Change.

Comments: None.

Specification Section Recommended Text: See Member's Requested Change.

Comments:

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

2405.02, Construction of Cofferdams.

Replace the second sentence of the second paragraph:

The cofferdam plans, including the computations and drawings, shall be submitted in accordance with Article 1105.03 ~~in advance of the time the Contractor intends to start work in order to afford the Engineer 30 calendar days of review time~~.

2405.12, Reconstruction of Substructures.

Replace the first paragraph:

When the work involves reconstruction of an existing substructure, the Contractor shall submit detailed plans for supporting the superstructure in accordance with Article 1105.03 ~~to the Engineer, to allow 30 calendar days of review time prior to starting the work~~.

Reason for Revision: Add reference to working drawings in Article 1105.03. Language has been added to 1105.03 regarding submitting working drawings.

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: Tom Reis / Daniel Harness	**Office:** Specifications Section	**Item 7**
Submittal Date: 4/2/07	**Proposed Effective Date:** 10/16/07	
Article No.: 2408.02 **Title:** Working Drawings, Shop Drawings, Changes, and Substitutions **Article No.:** 2408.33 **Title:** Falsework	**Other:**	

Specification Committee Action: Approved as is.

Deferred:	**Not Approved:**	**Approved Date:** 4/12/07	**Effective Date:** 10/16/07

Specification Committee Approved Text: See Member's Requested Change.

Comments: None.

Specification Section Recommended Text: See Member's Requested Change.

Comments:

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

2408.02, Working Drawings, Shop Drawings, Changes, and Substitutions.

Replace the first sentence of the first paragraph:

The Contractor shall submit ~~six copies of~~ detailed shop drawings in accordance with Article 1105.03 ~~to the Engineer for review~~.

Delete Article 2408.02, B:

~~**B.** Article 1105.03 shall apply.~~

Renumber Articles 2408.02, C, D, and E:

~~**C**~~**B.** Shop drawings shall identify each piece that is to be made of steel required to be other than ASTM A 709/A 709M Grade 36 (Grade 250) steel. Pieces made of different grades of steel shall not be given the same assembling or erecting mark, even though they are of identical dimensions and detail.

~~**D**~~**C.** Sections other than those shown on shop drawings reviewed by the Engineer may be used under the following provisions:

1. That the substitute section is equal in strength and stiffness to the section originally shown.

2. That the substitution is approved by the Engineer.

3. That the substitution is made at no additional cost to the Contracting Authority.

~~E~~**D.** Shop drawings for steel structures shall show accumulated dimensions for each line of beams or girders in laydown. The accumulated dimensions shall be shown at the locations of the following details: bearings, welded or bolted splices, stiffeners, gusset plates and drain connecting holes.

2408.33, Falsework.

Replace the first sentence of the first paragraph:

Detailed plans for falsework or centering shall be supplied ~~to the Engineer~~ in accordance with Article 1105.03.

Reason for Revision: Add reference to working drawings in Article 1105.03. Language has been added to 1105.03 regarding submitting working drawings.

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: Jim Berger / John Smythe	**Office:** Materials / Construction	**Item 8**
Submittal Date: 02-19-2007	**Proposed Effective Date:** October 2007	
Section No.: 2413 **Title:** Surfacing and Repair and Overlay of Bridge Floors.	**Other:** Additional changes to Article 2413.07, A were submitted for the April. These are included.	

Specification Committee Action: Deferred to May.

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

Specification Committee Approved Text:

Comments: District 6 Construction asked if there were changes since this item had been sent out with the March minutes. The Specifications Section commented they had missed some changes Materials had requested with the March submittal. They have been included.

The Office of Contracts noted inconsistency with reference to PCC, Class O, and HPC. They prefer all PCC to be referred to Class O. The Office of Construction noted that HPC should actually be HPC-O, since an overlay mix is being called for. The Specifications Section will change all PCC to Class O mix and all HPC to HPC-O.

The Office of Construction commented that a contractor will provide a field demonstration for mixing grout. The Office of Materials has specified 3 gallons of water per bag. Contractors feel it should be approximately 7 gallons per bag. Construction will report the findings of the demonstration.

The Office of Bridges and Structures noted that Class A repairs and Class B repairs are being specified as both Class O and HPC. They questioned if this is correct. The Specifications Section asked if it should be one item for Class A and one item for Class B. The Office of Construction verified this. Class O and HPC-O will be bid as alternates.

District 6 Construction noted several corrections:

- In Article 2413.03, B: Paragraph 2 is being eliminated, so “1.” can be eliminated from the first paragraph.
- Grouting is discussed in several places. It could be consolidated into one discussion.
- In the third paragraph of Article 2413.06, water reducer is used for both mixes. The Office of Materials suggested changing the wording to indicate this.
- The second indented paragraph of Article 2413.07, B, should not be indented. It should line up with first paragraph under B.
- The fifth, sixth, and seventh paragraphs of Article 2413.10 should not be indented.

The Office of Construction noted that AGCI does not want evaporation specifications to apply to overlays. It can create scheduling difficulties. They asked if a contractor is applying burlap within 10 minutes, could they be excluded from applying the evaporation specifications. It was noted that other conditions such as rain need to be accounted for. Contactors should also be able to adjust for evaporation. Another suggestion was to require fogging. The Office of Construction noted their preference is applying evaporation specifications. The Committee decided to continue applying the evaporation specification. The Office of Materials suggested keeping track of how often evaporation specifications affect scheduling. They also suggested observing how well contractors are doing at applying burlap within the specified time.

The Office of Construction noted in the first sentence of Article 2413.08, the time for applying burlap should be changed back to 10 minutes.

The Office of Contracts noted in Article 2413.03, C, the last paragraph should be moved to Article 2413.03, C, 1, since it will now only apply to Class O mix. The Office of Construction agreed. The Office of Contracts also noted the title of the Section is Surfacing and Repair and Overlay. Repair and overlay seem to be used interchangeably until Article 2413.11, where they are specified as two different items. They commented there should be consistency the in use of these terms.

The Committee decided to defer this item until May. The Specifications Section will set up a meeting with the Offices of Materials, Bridges and Structures, and Construction to discuss issues.

Specification Section Recommended Text:

2413.01, Description.
Surfacing bridge floors shall consist of placing a wearing course on a prepared surface, and other necessary work shown in the contract documents or specified herein.

Repair and overlay of bridge floors shall consist of removing concrete from the existing surface, replacing and overlaying with new concrete, and other necessary work shown in the contract documents or as specified. When structural repairs are included in the project, Class C or Class D concrete, as specified, may be mixed using equipment meeting requirements of Article 2413.03, B. The concrete mixture used for the overlay may be used for the repair; the water and consistency shall be as specified in Article 2403.03, A. Unless otherwise provided in the contract documents, overlay shall accomplish a raise of the existing roadway surface and shall cover the entire concrete floor surface, including those areas to be repaired. Bridge floor repair and overlay shall be classified as follows:

A. Class A Bridge Floor Repair.
Class A bridge floor repair shall consist of removing floor concrete below the level described for Bridge Floor Overlay, but less than full depth, transporting the existing concrete removed from the project, and replacing the excavated volume with concrete to a level bounding the Bridge Floor Overlay classification. Lower limit for Class A Bridge Floor Repair shall be to suitable existing concrete, as determined by the Engineer, but to at least the level of the top of the top reinforcing steel.

B. Class B Bridge Floor Repair.
Class B bridge floor repair shall consist of removing floor concrete below the level described for Bridge Floor Overlay for the full depth of the floor, transporting the existing concrete removed from the project, and replacing the excavated volume with concrete to a level bounding the Bridge Floor Overlay classification.

C. Bridge Floor Overlay.
Bridge floor overlay shall consist of removing floor concrete to a depth 1/4 inch (5 mm) below the existing, finished surface, except at drains and elsewhere as noted in the contract documents, transporting the existing concrete removed from the project, and overlaying with a concrete course of a depth designated. Thickness of the concrete overlay shall be measured from a level 1/4 inch (5 mm) below the original surface to a final raised surface as shown. Where removal to a level lower than 1/4 inch (5 mm) below the original surface is necessary because of surface fixtures, the minimum thickness of abutting overlay shall be 3/4 inch (20 mm) and shall be tapered to the full designated thickness.

~~Unless otherwise specified, the work shall be done using either Portland cement concrete or latex modified concrete, at the Contractor's option.~~

2413.02, Materials.
All materials shall meet requirements for the respective items in Division 41.

Only one brand of cement shall be used during an individual placement. Class O concrete mixtures shall

not contain fly ash~~, Type IP cement, or Type I(PM) cement~~.

Sections 4110, and 4115 shall apply to the aggregates. Only those coarse aggregates specifically allowed by Article 4115.05 for this work shall be used.

Mix shall be either of the following:

A. Portland Cement Concrete.
Class O PCC ~~is required and it~~ shall meet the requirements of Materials I.M. 529 and the following requirements:

The slump, measured in accordance with Materials I.M. 317 shall be 3/4 inch (20 mm) with a maximum of 1 inch (25 mm) and no minimum requirement. Testing for slump of concrete from a continuous mixer shall commence within 2 to 4 minutes after the concrete is discharged.

The intended air entrainment of the finished concrete is 6%, but the air content of fresh, unvibrated concrete at the time of placement, as determined by Materials I.M. 318 shall be 6.5%, with a maximum variation of ~~± 1.0%~~ plus 2.0% and minus 1.0%.

~~Grout for bonding new concrete to previously placed concrete shall consist of equal parts by weight (mass) of Portland cement and fine aggregate for concrete mixed with sufficient water to form a stiff slurry. The consistency shall be so that the slurry can be applied with a stiff brush or broom to the previously placed concrete in a thin, even coating that will not run or puddle in low spots. An equivalent grout of Portland cement and water, to be applied by pressure spray may be substituted with approval of the Engineer. For sealing vertical joints between adjacent lanes and at the curbs, this grout shall be thinned to paint consistency.~~

B. ~~Latex Modified~~ High Performance Concrete (HPC).
~~The latex modified concrete shall be a workable mixture having the following properties or limits:~~

~~**PROPERTIES OF LATEX MODIFIED CONCRETE**~~

~~Material or Property~~	~~Type 2 Concrete~~
~~Cement (parts by weight (mass))~~	~~1.0 (1.0)~~
~~Fine Aggr. (parts by weight (mass))~~	~~2.5 (2.5)~~
~~Coarse Aggr. (parts by weight (mass))~~	~~2.0 (2.0)~~
~~Latex Emulsion Admixture (gal/bag (L/kg) cement)~~	~~3.5 (0.3)~~
~~Air Content of Plastic Mix, % (Note 1)~~	~~3-6~~
~~Slump, inches (mm), maximum (Notes 1 and 2)~~	~~5 (125)~~

~~Note 1. Following sampling of the discharged, normally mixed material: the commencement of the tests shall be delayed from 4 to 4.5 minutes.~~
~~Note 2. Water may be added to obtain slump within the prescribed limits. Concrete with a slump less than 3 inches (75 mm) may be rejected if it is not placed satisfactorily and with a closed tight surface.~~

~~The formulated latex admixture shall be a nontoxic, film forming, polymeric emulsion in water to which all stabilizers have been added at the point of manufacture and shall be homogeneous and uniform in composition.~~

~~The physical properties of the latex modifier shall conform to the following requirements:~~

~~**PHYSICAL PROPERTIES OF LATEX MODIFIER**~~

~~Polymer type~~	~~Styrene butadiene~~
~~Stabilizers~~	
~~(a) Latex*~~	~~Nonionic surfactants~~
~~(b) Portland cement composition~~	~~Poly dimethyl siloxane~~
~~Percent solids~~	~~46.0 – 49.0~~
~~Weight per gallon (lb at 25°C)~~	~~8.4~~
~~(Mass per liter (kg at 25°C)~~	~~(1.0)~~
~~Color~~	~~White~~
~~*Chloride content of the latex must be less than 0.5%.~~	

~~Latex admixture to be stored shall be kept in suitable enclosures which will protect it from freezing and from prolonged exposure to temperatures in excess of 85°F (30°C). Containers of latex admixture may be stored at the bridge site for a period not to exceed 10 calendar days. Such stored containers shall be covered completely with suitable insulating blanket material to avoid excessive temperatures.~~

Class HPC-O PCC shall meet the requirements of Materials I.M. 529 and the following requirements:

The slump, measured in accordance with Materials I.M. 317 shall be 1 inch (25 mm) to 3 inches (75 mm) with a maximum of 4 inches (100 mm). Testing for slump of concrete from a continuous mixer shall commence within 2 to 4 minutes after the concrete is discharged. Testing for slump of concrete from ready mix shall be done prior to placement.

A mid-range water reducing admixture meeting the requirements of Materials I.M. 403, Appendix C, shall be used. Other admixtures may be approved by the Engineer.

Air content shall be the same as required for Class O concrete.

Type IS or Type IP cement shall be used. If Type I/II is used, 25% replacement with ground granulated blast furnace slag shall be required.

Fly ash substitution rate shall not exceed 15% replacement by weight.

Grout for bonding new concrete to previously placed concrete shall consist of about 3 gallons of water to each 94 pound bag (0.27 L/kg) of cement. The consistency shall be so that the slurry can be applied with a stiff brush or broom to the previously placed concrete in a thin, even coating that will not run or puddle in low spots. An equivalent grout of Portland cement and water, applied by pressure spray may be substituted with approval of the Engineer. For sealing vertical joints between adjacent lanes and at the curbs, this grout shall be thinned to paint consistency.

2413.03, Equipment.
Equipment used shall be subject to approval of the Engineer and shall comply with the following:

A. Preparation Equipment.
Preparation equipment shall be of the following types:

1. Sawing Equipment.
Sawing equipment shall be capable of sawing concrete to the specified depth.

2. Sandblasting or Shot Blasting Equipment.
Sandblasting or shot blasting equipment shall be capable of removing rust, oil, and concrete laitance from the existing surface of the bridge floor.

3. Power Driven Hand Tools.
Power driven hand tools will be permitted with the following restrictions:

a. Jack Hammers heavier than nominal 30 pound class (with a mass greater than 14 kg) shall

not be used.

b. Jack Hammers or mechanical chipping tools shall not be operated at an angle in excess of 45 degrees measured from the surface of the slab.

c. Chipping Hammers heavier than a nominal 15 pound (with a mass greater than 7 kg) class shall not be used.

4. Hand Tools.
Hand tools such as hammers and chisels shall be provided for removal of final particles of unsound concrete or to achieve the required depth.

5. High Pressure Water Blasting Equipment.
High pressure water blasting equipment shall be capable of removing rust, oil, concrete laitance, and unsound concrete from the existing surface of the bridge floor.

B. Proportioning and Mixing Equipment.

1. Proportioning and mixing equipment for Portland cement concrete shall meet requirements of Article 2001.20, D, and Article 2001.21, C. In addition, the device for proportioning water shall be accurate within 1.0%, and the mixer shall be a construction or stationary concrete mixer of the rotating paddle type. A continuous mixer used in conjunction with volumetric proportioning, described above, may be used.

Sufficient mixing capacity or mixers shall be provided for either type of mixture to permit the intended quantity to be placed without interruption.

The cement, fly ash, and GGBFS for HPC shall be pre-blended by the producer using equipment capable of thoroughly mixing the materials to the tolerances in ASTM C 685 when the concrete is produced using a volumetric mixer. The cement, fly ash, and GGBFS for ready mixed concrete are not required to be pre-blended.

~~**2.** Proportioning and mixing equipment for latex modified concrete shall be of a self contained, mobile continuous mixing type subject to the following:~~

~~**a.** The mixer shall have storage for sufficient bulk cement, fine and coarse aggregate, latex modifier, and water to produce, on the site, not less than 6 cubic yards (4 m3) of concrete. The mixer shall be capable of metering materials and producing uniform concrete.~~

~~**b.** The mixer shall be capable of positive measurement of cement being introduced into the mix. A cement meter register, visible at all times, shall indicate this quantity.~~

~~**c.** The mixer shall provide positive control of the flow of water and latex emulsion into the mixing chamber. Water use shall be indicated by a recording water meter. The flow shall be readily adjustable to provide for minor variations in aggregate moisture.~~

~~**d.** The mixer shall be capable of being calibrated to automatically proportion and blend all components of indicated composition on a continuous or intermittent basis, as required by the finishing operation, and shall discharge mixed material through a conventional chute directly in front of the finishing machine.~~

C. Placing and Finishing Equipment.
Placing and finishing equipment shall include adequate hand tools for placement of the mixture and for working it down to approximately the correct level for striking off with the screed. A self propelled finishing machine will be required for all surfacing and overlays~~, and the front screed shall be~~

~~designed to consolidate the mixture to be placed to 100% of the rodded density~~. The machine shall operate on supporting rails which are adequately secured to the previously placed surface and are adjustable to the correct profile without shimming, which do not deflect under the load of the machine, and which may be removed without damage to the edge of the new surface that is to remain in place. When placing the mixture in a lane abutting a previously completed lane, that side of the finishing machine adjacent to the completed lane shall be suitably equipped to travel on the completed lane. The finishing machine shall be inspected and approved before work is started on each project.

The finishing machine shall meet the following additional requirements for the type of mixture to be placed:

1. Portland Cement Concrete.
The finishing machine shall meet requirements of Article 2412.06 and shall have a mechanical strike off to provide a uniform thickness of mixture in front of the screed designed to consolidate the mixture by vibration, as specified. The front screed shall be designed to consolidate the mixture to be placed to 100% of the rodded density. The bottom face of this screed shall be at least 5 inches (125 mm) wide with a turned up or rounded leading edge to minimize tearing of the surface of the plastic concrete. Each screed shall have an effective weight (mass) of at least 75 pounds for each square foot (365 kg/m^2) of bottom face area. Each screed shall be provided with positive control of the vertical position, the angle of tilt, and the shape of the crown. Design of the finishing machine together with appurtenant equipment shall be such that positive machine screeding of the plastic concrete will be obtained within 1 inch (25 mm) of the face of the existing curbs. The length of the screed shall be sufficient to extend at least 6 inches (150 mm) beyond the line where a saw cut is intended to form the edge of a subsequent placement section, and shall overlap the sawed edge of a previously placed course at least 6 inches (150 mm). The finishing machine shall be capable of forward and reverse motion under positive control. Provision shall be made for raising the screeds to clear the screeded surface for traveling in reverse.

2. ~~Latex Modified~~ High Performance Concrete (HPC).
~~The finishing machine shall be self propelled and shall be capable of forward and reverse movement under positive control. Provision shall be made for raising all screeds to clear the screeded surface for traveling in reverse.~~ The finishing machine shall meet the requirements of Article 2412.06 and be capable of finishing the surface to within 1 foot (0.3 m) of the edges of the area being placed.

The screeds shall be provided with positive control of the vertical position.

Internal vibration equipment will be required for consolidation at the edges of the placement for Class O concrete.

D. General.
The overall combination of labor and equipment for proportioning, mixing, placing, and finishing the new surface shall be of such minimum capability as to meet the following requirements except when noted otherwise in the contract documents.

MINIMUM CAPACITY AND LABOR REQUIREMENTS	
Total Surface Area per Bridge, sq. yd. (m^2)	**Minimum Requirement, cu. yd. per hour (m^3 per hour)**
0-328 (0-274)	1.0 (0.8)
329-492 (274.1-410)	1.5 (1.2)
493-656 (410.1-550)	2.0 (1.6)
over 656 (over 550.1)	2.5 (2.0)

The finishing machine shall be designed so that when the mixture is being mixed and placed at the specified minimum rate, under normal operating conditions, the elapsed time between depositing the

mixture on the floor and final screeding shall not exceed 10 minutes.

2413.04, Preparation of Surface for Surfacing.
Material for test ~~holes~~ wells (for PCC Class O concrete density testing) and all loose, disintegrated, or unsound concrete shall be removed from the bridge floor, as designated by the Engineer. Test wells for nuclear density checks shall have nominal dimensions of 1 1/2 inches x 10 inches x 10 inches (40 mm x 250 mm x 250 mm). Class A bridge floor repair removal areas may be used as test wells provided they meet the nominal dimensions and are located in the testing frequency areas. Nuclear density testing of Portland Cement Concrete Class O mix shall be in accordance with Materials I.M. 358.

The thickness of all new concrete above the prepared surface shall be as specified in the contract documents. The clearance shall be checked in the following manner before concrete is placed.

A filler block having a thickness 1/4 inch (5 mm) less than the designated thickness shall be attached to the bottom of the screed; with screed guides in place, the screed shall be passed over the area to be concreted. As an alternate to passage of the finishing machine, an approved template, supported by the screed guides, may be passed over the area to be concreted. If the filler block does not clear the area to be concreted, the profile of the new surface shall be adjusted as approved by the Engineer.

In preparation for placement of new concrete, the surface shall be sandblasted or shot blasted, followed by an air blast. This cleaning shall remove all dirt, oil, and other foreign material, as well as any unsound concrete, laitance, or loose material from the surface and edges against which the surface mixture is to be placed. It is desired that the surface be roughened by the cleaning to provide satisfactory bond with the surfacing mixture. Metal floor drains and areas of the curb or railing above the proposed surface shall be protected from the cleaning.

~~For the PCC mixture, i~~It is not intended or desired that existing concrete, prepared for surfacing, be presaturated before grout and new concrete is placed. The prepared surface shall be dry to allow some absorption of the grout.

~~For the latex modified concrete, the surface of existing concrete shall be saturated but free of standing water.~~

2413.05, Preparation of Surface for Repair and Overlay.
Concrete shall be removed from each area, designated in the contract documents or by the Engineer, to a depth and in a manner consistent with the classification for that area. Areas as shown in the contract documents are based on the best information available; actual areas will be determined by the Engineer.

A. Class A Bridge Floor Repair.
Concrete may be removed by chipping, shot blasting, hydro blasting, or by a combination of these, except that final clean up, in any case, shall be by use of hand tools. Class A repair removal shall be considered to start 1/4 inch (5 mm) below the existing surface, but this shall not preclude removal coincidental with preparation for overlay. Removal for Class A repair shall extend at least to the level of the top reinforcing bars, and the removal shall extend deeper, as necessary, to remove unsound concrete.

All reinforcing bars and newly exposed concrete shall be thoroughly cleaned by sandblasting or shot blasting. Where bond between existing concrete and reinforcing steel has been destroyed, the concrete adjacent to the bar shall be removed to a depth that will permit new concrete to bond to the entire periphery of the exposed bar. A minimum of 3/4 inch (20 mm) clearance shall be required around the bar. Care shall be exercised to prevent cutting, stretching, or damaging any exposed reinforcing steel. The Engineer may require enlarging a designated area should inspection indicate deterioration of concrete or corrosion of reinforcing beyond the limits previously designated.

For Class A repair and in preparation for bridge deck overlay, the surface may also be prepared or

partially prepared using a high pressure water system, at the Contractor's option. Procedures shall be as recommended by the equipment manufacturer, subject to approval of the Engineer and within such limitations as may be imposed.

Additional removal may be required to provide for test holes.

B. Class B Bridge Floor Repair.
Within all areas designated for Class B repair, and any designated areas of Class A repair in which the depth of the remaining sound concrete is less than 50% of the original depth of the bridge floor, all concrete shall be removed. Designated Class A repair areas shall be measured as Class B Bridge Floor Repair when full depth removal is required. At the direction of the Engineer, limited areas of removal greater than 50% of the floor thickness, such as beneath reinforcing, may be allowed; these limited areas of excess depth will be measured as Class A Bridge Floor Repair. Concrete shall be removed by jack hammer, chipping hammer, or by a combination of scarifying and chipping hammer, except that the final removal at the periphery of Class B repair areas shall be accomplished by 15 pound (7 kg) jack hammer, chipping hammer, or hand tools. Class B repair removal shall be considered to start 1/4 inch (5 mm) below the existing surface, but this shall not preclude removal coincidental with preparation for overlay. All exposed reinforcing bars and newly exposed concrete shall be thoroughly cleaned by sandblasting or shot blasting. Care shall be exercised to prevent cutting, stretching, or damaging exposed reinforcing.

Forms shall be provided to enable placement of new concrete in the full depth opening. The forms shall preferably be suspended from existing reinforcing bars by wire ties. Forms may, in the case of large area openings, be supported by blocking from the beam flanges. Forms will in all cases be supported by elements of the existing superstructure unless specifically noted or shown otherwise in the contract documents.

C. Bridge Floor Overlay.
The entire existing concrete floor area shall be uniformly scarified or prepared to a depth of 1/4 inch (5 mm), except over areas of Class A and Class B repair where the 1/4 inch (5 mm) removal may be coincidental with operations for repair removal. Removal to a greater depth will be required at drains and elsewhere, as noted in the contract documents.

D. General.
The thickness of concrete above the prepared surface or reinforcing steel shall be at least 3/4 inch (20 mm) and shall be greater if specified in the contract documents. The clearance shall be checked in the following manner before concrete is placed:

> A filler block having a thickness 1/8 inch (3 mm) less than the overlay thickness shall be attached to the bottom of the screed; with screed guides in place, the screed shall be passed over the area to be concreted. As an alternate to passage of the finishing machine, an approved template, supported by the screed guides, may be passed over the overlay area. Where the intended clearance does not allow use of this method, a string line or other means shall be used, subject to approval of the Engineer. All old concrete which does not have sufficient clearance shall be removed. All reinforcing steel which does not have sufficient clearance shall be depressed and fastened down. It may be necessary to remove concrete beneath some reinforcement to permit depressing the reinforcement adequately. The minimum clear distance around these bars for placement of new concrete shall be 3/4 inch (20 mm).

Areas from which concrete has been removed shall be kept free of slurry produced by wet sawing of concrete joints. All of this slurry shall be removed from prepared areas before new concrete is placed.

Hand tools shall be used to remove final particles of concrete or to achieve the required depth. The entire surface, including curbs and exposed reinforcement, against which new concrete is to be placed shall be sandblasted or shot blasted. The cleaning shall be of an extent to remove all dirt, oil, and other foreign material, as well as any unsound concrete. Immediately before applying grout in

preparation for placement of new concrete, the surface shall be cleaned with air blast. ~~For the Portland cement concrete, i~~It is not intended or desired that existing concrete, prepared for repair or overlay be presaturated with water before grout and new concrete is placed. The prepared surface shall be dry to allow some absorption of the grout.

At the time of placement of either PCC or ~~latex modified concrete~~ HPC, the area shall be clean and the reinforcement free of rust; rust forming because of dew on clean reinforcement overnight will not be considered objectionable, but reinforcement with a greater amount of rust shall be subject to recleaning before the concrete is placed. The area shall be cleaned by air blast before the concrete is placed.

~~For latex modified concrete, the surface shall be flushed with water and kept wet for at least 1 hour before concrete placement. Puddles of free water shall be removed before covering with concrete.~~

2413.06, Proportioning and Mixing.
For PCC, ~~T~~the mixture shall be proportioned and mixed at the project site. Ready mixed concrete will not be approved.

For HPC, ready mixed concrete equipment meeting the requirements of Articles 2001.20 and 2001.21 will be allowed.

The water reducing admixture for improved workability of ~~Portland cement concrete~~ HPC shall be incorporated and mixed into the concrete in accordance with the manufacturer's recommendations and the Engineer's instructions.

A. Stationary Mixer.
When a construction or stationary mixer is used, proportioning and mixing shall be in accordance with applicable provisions of Article 2403.06.

B. Continuous Mixing Equipment.
When continuous mixing equipment is used, the following shall apply:

1. Mobile continuous mixers shall accurately proportion all materials for the specified mixture.

2. The proportioning equipment for each material shall be calibrated in the presence of the inspector, or the Engineer may accept a previous calibration and require satisfactory verification checks only, at the settings indicated by the previous calibration.

3. The proportioning equipment shall be operated at the speed recommended by the manufacturer during calibration, checks, or normal operation.

4. Continuous mixers shall be recharged at the site.

5. The Contractor may make yield checks or other checks and the inspector will cooperate in such checking.

6. The materials shall be mixed in an approved mixer within 1 mile (2 km) of the site of placement. They shall be mixed in accordance with the specified requirements for the equipment used. The mixture, as discharged from the mixer, shall be uniform in composition and consistency.

~~**7.** For latex modified concrete, mixing capability shall be such that finishing operations can proceed at a steady pace with final finishing completed before the formation of the plastic surface film.~~

2413.07, Placing and Finishing:
An approved finishing machine will be required as specified in Article 2413.03, C. Supporting rails upon

which the finishing machine travels shall be placed outside the area to be surfaced. Provisions for anchorage of supporting rails shall provide for horizontal and vertical stability; positive anchorage may be required by the Engineer. A hold down device shot into concrete will not be permitted unless the concrete is to be subsequently surfaced. Hold down devices of other types leaving holes in exposed areas will be approved provided the holes remaining are grouted full. Plans for anchoring support rails and the mixture placing procedure shall be submitted to the Engineer for approval.

~~For latex modified concrete, transverse bulkheads, equal in depth to the thickness of the surface, shall be installed to the required grade and profile prior to placing the concrete.~~

The locations of longitudinal joints may be shown in the contract documents. If not shown, the locations shall be subject to approval of the Engineer, and the approval will be based on avoiding joints in the wheel paths as much as practical.

In order to insure a junction with properly consolidated concrete, the surface course previously placed shall be sawed to a straight and vertical edge at longitudinal and transverse joints and removed before adjacent concrete is placed. The Engineer will determine the extent of such removal.

The Contractor shall take every reasonable precaution to secure a smooth riding bridge deck. Prior to placement operations, the Contractor shall review the equipment, procedures, personnel, and previous results with the Engineer, and the inspection procedures will be reviewed to assure coordination. Precautions shall include the following:

Assurance that concrete can be produced and placed within the specified limits, continuously and with uniformity.

After finishing, the Contractor shall check the surface with a 10 foot (3 m) straightedge; causes for irregularities exceeding 1/8 inch (3 mm) should be eliminated, and corrections should be made, if practical.

Each placement will be checked in accordance with Section 2317 the day following placement or before another section is placed.

After the surface has been cleaned and immediately before placing Portland cement concrete or HPC, a thin coating of bonding grout shall be scrubbed into the dry, prepared surface. At the Contractor's option, the grout may be sprayed onto the surface in a manner subject to approval of the Engineer. Care shall be exercised to insure that all parts receive a thorough, even coating and that no excess grout is permitted to collect in pockets. The rate of progress in applying grout shall be limited so that the grout does not become dry before it is covered with new concrete. If the grout becomes dry, it shall be removed by sandblasting and new grout applied.

Concrete shall be placed in a continuous operation. The new concrete shall be manipulated and mechanically struck off slightly above final grade. It shall then be mechanically consolidated to 100% of the rodded density, with a minus tolerance of 2%, and screeded to final grade. The rodded density will be determined in accordance with Materials I.M. 358.

The rodded density measurement is not required for HPC.

For PCC Class O mix overlay, ~~A~~an internal vibrator shall be used for consolidation at the curb side, and along the longitudinal construction joint adjacent to a previously constructed lane.

The following applies to repair and overlay work:

Although repair classes are considered to begin 1/4 inch (5 mm) below the original concrete surface, repair concrete shall be placed monolithically with the overlay course, except as described for larger areas of Class B repair. Fresh concrete, 3 inches (75 mm) or more in thickness, shall be vibrated

internally in addition to the surface screed vibration.

Areas of Class B repair 2 square yards (2 m^2) or greater shall have floor forms supported by beams or stringers. These larger areas of Class B repair shall have individual concrete replacement to the lower boundary for the superimposed overlay. Floor repair concrete, described in Article 2413.02, or Class D structural concrete, meeting requirements of Sections 2403 and 2412, may be used for the partial placements. Surfaces of these individual placements are to be left rough, and all placements for each construction stage shall be complete before the overlay course is started. If a full depth repair is staged, a beveled keyway not less than 1 1/2 inch by 3 inches (35 mm by 75 mm) shall be provided at the vertical joint. Concrete placement and reinforcing support shall comply with applicable portions of these specifications except as modified by the contract documents. The partial placement shall have a 72 hour cure as described for the overlay surface. After the cure, partial placements are to be surface dried, sandblasted or shot blasted, and cleaned prior to the application of the overlay course or grout.

The concrete temperature and theoretical evaporation rate shall be in accordance with Article 2412.05.

Section 2317 shall apply to smoothness of the completed deck overlay for Primary projects and when specifically required for other projects.

A. Interstate and Primary Projects.
Transverse grooving or tining in plastic concrete of bridge deck overlay (and bridge approach overlay when included in a bridge deck overlay project) will not be allowed. Longitudinal grooving shall be in accordance with Article 2412.06, A. ~~grooves shall be cut into the hardened concrete surfaces using a mechanical cutting device. Longitudinal grooving shall be done after surface correction grinding.~~

~~Longitudinal grooves shall be 1/8 inch +/- 1/64 inch (3 mm +/- 0.4 mm) in width, 1/8 inch +1/32 inch or -1/16 inch (3 mm +0.8 mm or -1.6 mm) in depth, and the grooves shall be uniformly spaced at 3/4 inch (19 mm) intervals measured from center to center of groove.~~

~~Longitudinal grooving on bridge deck overlay and double reinforced bridge approach overlay sections shall not be within the area approximately 2 feet (0.6 m) adjacent to the curbs and shall terminate approximately 6 inches (150 mm) from bridge joints. Longitudinal grooving of single reinforced and non-reinforced bridge approach sections shall not be applied within 6 inches (150 mm) of the edge of the outside lane lines.~~

~~For staged bridge deck overlay and bridge approach overlay construction the Contractor may cut longitudinal grooves in the hardened concrete at the end of each construction stage or wait until all stages have been completed. If the Contractor elects to delay cutting of the longitudinal grooves until completion of all stages, the concrete deck overlay and bridge approach overlay for any stage opened to traffic shall receive an interim coarse broom finish during placement. Within 30 calendar days following completion of the last stage of the project the Contractor shall establish temporary lane closures to accomplish longitudinal grooving for all stages. The interim coarse broom finish will not be allowed as a surface texture when opened to traffic over a winter season. If the interim coarse broom texture is present and the Contractor is not in a position to finish all stages of the project, longitudinal grooving shall be cut into the hardened concrete in order to establish an acceptable driving surface texture for the winter season.~~

B. Other Projects.
When a tight, uniform surface has been achieved, the surface shall be given a suitable grooving, by hand methods, similar to that described in Article 2301.16, A, with the following exceptions:

- Grooving shall be transverse to the centerline of roadway.
- Transverse grooving shall be randomly spaced from 3/4 inch to 1 5/8 inches (20 mm by 40 mm) with no more than 50% of the spacings exceeding 1 1/4 inches (30 mm) with a minimum

of four different spacings in a 2 foot (0.6 m) width.

This operation shall be done at a time and manner that the desired texture will be achieved while minimizing displacement of the larger aggregate particles. The texture should not extend into the areas within approximately 2 feet (0.5 m) of curbs. As soon as finishing has been completed, all vertical joints with adjacent concrete shall be sealed by painting with thinned grout.

~~Screed rails and/or construction dams shall be separated from newly placed latex modified concrete by passing a pointing trowel along their inside face. Care shall be exercised to assure that this trowel cut is made for the entire depth and length of rails or dams after the mixture has stiffened sufficiently and that it does not flow back.~~

~~Section 2317 shall apply to smoothness of the completed deck overlay for Primary projects and when specifically required for other projects.~~

2413.08, Curing.

The first layer of prewetted burlap shall be placed on the concrete within ~~10~~ 15 minutes after finishing. Burlap shall be prewetted with sufficient water, prior to placement, to prevent absorption of moisture from the concrete surface. The concrete shall be cured as provided in the following paragraphs:

For Portland cement concrete or HPC, the surface shall be cured for at least 72 hours. For the first 24 hours, the burlap shall be kept continuously wet by means of an automatic sprinkling or wetting system. After 24 hours, the Contractor may cover the wet burlap with a layer of 4 mil (100 µm) polyethylene film for a minimum of 48 hours in lieu of using the sprinkling or wetting system. If ~~the~~ Class O mix concrete is revibrated because of failure to meet density requirements with initial vibration, the time for placement of prewetted burlap will be extended 15 minutes. Failure to apply wet burlap within the required time shall be cause for rejecting the work so affected. Surface concrete in the rejected area shall be removed and replaced at no additional cost to the Contracting Authority.

~~For latex modified concrete, the surface shall be cured by wet burlap for at least 24 hours and be air cured for an additional 48 hours. Within 1 hour of covering with wet burlap, a layer of 4 mil (100 µm) polyethylene film shall be placed on the wet layer for the required 24 hour period for curing. The curing material shall then be removed for an additional 48 hour air cure. Burlap polyethylene sheets may be substituted for the polyethylene film with the approval of the Engineer. It is the nature of the latex modifier to form a plastic film at the surface upon drying, usually within 25 minutes in hot, dry weather. It is the intent of this specification that this film be protected from drying and cracking by prompt covering with wet burlap.~~

At the Contractor's option, partial depth concrete for Class B repair may be cured with white pigmented curing compound only. When this curing is completed, the surface shall be sandblasted and allowed to dry, and the existing concrete in that vicinity shall be sandblasted, prior to placement of the overlay course.

2413.09, Sealing.

The tops and traffic sides of curbs, retrofit barrier rails, and concrete barrier rails shall be sealed in accordance with Article 2403.21, D. In addition, for Portland cement concrete floor or HPC overlay, the sealer shall be applied along each gutter line, extending 1 foot (0.3 m) onto the roadway. Other areas requiring concrete sealer may be designated in the contract documents or by the Engineer.

2413.10, Limitations of Operations.

Work on the surface shall not be commenced until the lower course meets the requirements of Article 2403.19, B.

If traffic is to be maintained during the construction period of this contract, it will be noted in the contract documents. The Contractor shall provide traffic controls that are required by the contract documents.

Night work will be permitted. ~~When daytime temperatures exceed 85°F (30°C) the Engineer may require~~

~~placement of latex modified concrete to be made at night or in the early morning hours if a satisfactory surface finish is not being achieved. In either case, a~~Adequate lights for nighttime work shall be furnished at the direction of the Engineer by the Contractor without additional compensation. The Engineer shall be given reasonable notice.

A construction dam or bulkhead shall be installed in case of major delay in the placement operation. During minor delays of 1 hour or less, the end of the placement may be protected from drying with several layers of wet burlap.

Adequate precautions shall be taken to protect freshly placed concrete from sudden or unexpected rain. The Engineer may order removal of any concrete damaged by rainfall.

Screed rails may be removed at any time after the concrete has taken initial set. Adequate precaution shall be taken during screed removal to protect the edge of the new surface from damage.

Concrete shall not be placed adjacent to a surface course less than 36 hours old, however, this restriction does not apply to a continuation of placement in a lane or strip beyond a joint in the same lane or strip.

If concrete placement is stopped or delayed for a period of 90 minutes or more, further placement shall be discontinued and may resume only after a period of not less than 12 hours. This restriction does not prohibit continuation of placement provided a gap is left in the lane or strip; the gap shall be sufficient in length for the finishing machine to clear previously placed concrete.

Preparation work will not be allowed in a lane or strip until the lane is closed to traffic. In areas where there is no traffic, preparation of the area may be started in a lane or strip adjacent to newly placed surface the day following its placement. If this work is started before the end of the 72 hour curing period, the work will be restricted as follows:

Sawing or other operations shall interfere with the curing process for the minimum practical time only, and in the immediate work area only, and the curing shall be resumed promptly.

Chipping hammers heavier than a nominal 15 pound (with a mass greater than 7 kg) class shall not be used.

Air compressors shall be operated on the floor only directly over the piers.

Loads other than construction equipment shall not be permitted on any portion of the bridge floor that has undergone preparation and prior to placement and curing of new concrete.

Traffic shall not be permitted on a finished surface course until 72 hours after placement. At temperatures below 55°F (13°C), the Engineer may require a longer waiting time.

PCC shall not be placed when the air or floor temperature is below 40°F (4°C). ~~Latex modified concrete shall not be placed when the air or floor temperature is below 45°F (7°C); however, it may be placed when these temperatures are 45°F (7°C) and a rising temperature is predicted.~~

Concrete mixture shall not be placed after October 1 and prior to April 1 without written approval of the Engineer.

2413.11, Method of Measurement.
Bridge Floor Surfacing (Class O mix) and Bridge Floor Surfacing (HPC) will be computed by the Engineer in square yards (square meters) from measurements of the areas surfaced. For bridge floor surfacing, concrete removal for Class O mix test wells may be required by the Engineer. This removal will not be measured for payment.

Class A Bridge Floor Repair (Class O mix), Class A Bridge Floor Repair (HPC), Class B Bridge Floor

Repair (Class O mix), Class B Bridge Floor Repair (HPC), Bridge Floor Overlay (Class O mix), and Bridge Floor Overlay (HPC) will be computed by the Engineer in square yards (square meters) from measurements of the areas repaired or overlaid.

Sealing, as required in Article 2413.09, will not be measured separately for payment.

Longitudinal Grooving in concrete shall be measured in accordance with Article 2412.11.

2413.12, Basis of Payment.
For the performance of acceptable work, measured as provided above, the Contractor will be paid the contract unit price in accordance with the following provisions:

For the number of square yards (square meters) of Bridge Floor Surfacing (Class O mix) or Bridge Floor Surfacing (HPC) constructed, the Contractor will be paid the contract unit price per square yard (square meter). This payment shall be full compensation for furnishing all material, equipment, forms, and labor necessary to complete this work in accordance with the contract documents.

When Section 2317 applies, payment may be modified as specified therein.

For the number of square yards (square meters) of Class A Bridge Floor Repair (Class O mix), Class A Bridge Floor Repair (HPC), Class B Bridge Floor Repair (Class O mix), Class B Bridge Floor Repair (HPC), Bridge Floor Overlay (Class O mix), and Bridge Floor Overlay (HPC) constructed, the Contractor will be paid the respective contract unit price per square yard (square meters). This payment shall be full compensation for removal of excess concrete from the project and it becoming the property of the Contractor, for furnishing all material, equipment, forms, and labor necessary to complete the work in accordance with the contract documents.

When there is no item for Class B Bridge Floor Repair (Class O mix) or Class B Bridge Floor Repair (HPC), but such work is required, payment for each square yard for 5 square yards (square meter for 4 m^2) or less will be at three times the contract unit price per square yard (square meter) for Class A Bridge Floor Repair (Class O mix) or Class A Bridge Floor Repair (HPC). Should the quantity exceed 5 square yards (4 m^2), payment shall be made as extra work.

The cost of sealing as required in Article 2413.09 shall be included in the contract unit price for Bridge Floor Surfacing (Class O mix), Bridge Floor Surfacing (HPC), Class A Bridge Floor Repair (Class O mix), Class A Bridge Floor Repair (HPC), Class B Bridge Floor Repair (Class O mix), Class B Bridge Floor Repair (HPC), Bridge Floor Overlay (Class O mix), or Bridge Floor Overlay (HPC).

The profile may be improved by raising the finished overlay surfaces up to 1/2 inch (15 mm) above that shown in the contract documents with no additional compensation to the Contractor. At each location where the raise exceeds 1/2 inch (15 mm), the Contractor will be paid, as extra work, for the materials which represent the volume in excess of the 1/2 inch (15 mm) raise.

Longitudinal Grooving in Concrete will be paid for in accordance with Article 2412.11.

Comments: This item includes changes submitted by both the Office of Materials and the Office of Construction. It was Item 9 at the March 8, 2007 meeting. At that meeting, the Committee requested to see the changes as they would appear in the ERL. Changes suggested at that meeting have been incorporated. Additional changes to Article 2413.07, A, submitted by the Office of Construction for the April meeting have been included.

Member's Requested Change (Redline/Strikeout):

2413.01 DESCRIPTION.
Surfacing bridge floors shall consist of placing a wearing course on a prepared surface, and other necessary work shown in the contract documents or specified herein.

Repair and overlay of bridge floors shall consist of removing concrete from the existing surface, replacing and overlaying with new concrete, and other necessary work shown in the contract documents or as specified. When structural repairs are included in the project, Class C or Class D concrete, as specified, may be mixed using equipment meeting requirements of Article 2413.03, B. The concrete mixture used for the overlay may be used for the repair; the water and consistency shall be as specified in Article 2403.03, A. Unless otherwise provided in the contract documents, overlay shall accomplish a raise of the existing roadway surface and shall cover the entire concrete floor surface, including those areas to be repaired. Bridge floor repair and overlay shall be classified as follows:

A. Class A Bridge Floor Repair.
Class A bridge floor repair shall consist of removing floor concrete below the level described for Bridge Floor Overlay, but less than full depth, transporting the existing concrete removed from the project, and replacing the excavated volume with concrete to a level bounding the Bridge Floor Overlay classification. Lower limit for Class A Bridge Floor Repair shall be to suitable existing concrete, as determined by the Engineer, but to at least the level of the top of the top reinforcing steel.

B. Class B Bridge Floor Repair.
Class B bridge floor repair shall consist of removing floor concrete below the level described for Bridge Floor Overlay for the full depth of the floor, transporting the existing concrete removed from the project, and replacing the excavated volume with concrete to a level bounding the Bridge Floor Overlay classification.

C. Bridge Floor Overlay.
Bridge floor overlay shall consist of removing floor concrete to a depth 1/4 inch (5 mm) below the existing, finished surface, except at drains and elsewhere as noted in the contract documents, transporting the existing concrete removed from the project, and overlaying with a concrete course of a depth designated. Thickness of the concrete overlay shall be measured from a level 1/4 inch (5 mm) below the original surface to a final raised surface as shown. Where removal to a level lower than 1/4 inch (5 mm) below the original surface is necessary because of surface fixtures, the minimum thickness of abutting overlay shall be 3/4 inch (20 mm) and shall be tapered to the full designated thickness.

~~Unless otherwise specified, the work shall be done using either Portland cement concrete or latex modified concrete, at the Contractor's option.~~

2413.02 MATERIALS.
All materials shall meet requirements for the respective items in Division 41.
Only one brand of cement shall be used during an individual placement. Class O concrete mixtures shall not contain fly ash. ~~, Type IP cement, or Type I(PM) cement.~~

Sections 4110, and 4115 shall apply to the aggregates. Only those coarse aggregates specifically allowed by Article 4115.0~~6~~5 for this work shall be used.
Mix shall be either of the following:

A. Portland Cement Concrete.
Class O PCC ~~is required and it~~ shall meet the requirements of Materials I.M. 529 and the following requirements:

The slump, measured in accordance with Materials I.M. 317 shall be 3/4 inch (20 mm) with a maximum of 1 inch (25 mm) and no minimum requirement. Testing for slump of concrete from a continuous mixer shall commence within 2 to 4 minutes after the concrete is discharged.
The intended air entrainment of the finished concrete is 6%, but the air content of fresh,

unvibrated concrete at the time of placement, as determined by Materials I.M. 318 shall be 6.5%, with a maximum variation of plus 2.0% and minus 1.0% ~~± 1.0%~~.
~~Grout for bonding new concrete to previously placed concrete shall consist of equal parts by weight (mass) of Portland cement and fine aggregate for concrete mixed with sufficient water to form a stiff slurry. The consistency shall be so that the slurry can be applied with a stiff brush or broom to the previously placed concrete in a thin, even coating that will not run or puddle in low spots. An equivalent grout of Portland cement and water, to be applied by pressure spray may be substituted with approval of the Engineer. For sealing vertical joints between adjacent lanes and at the curbs, this grout shall be thinned to paint consistency.~~

B. ~~Latex Modified~~ High Performance Concrete (HPC).
Class HPC-O PCC shall meet the requirements of Materials I.M. 529 and the following requirements:

The slump, measured in accordance with Materials I.M. 317 shall be 1 inch (25 mm) with a maximum of 3 inch (75 mm) with a maximum of 4 inch (100 mm). Testing for slump of concrete from a continuous mixer shall commence within 2 to 4 minutes after the concrete is discharged. Testing for slump of concrete from ready mix shall be done prior to placement.

A mid-range water reducing admixture meeting the requirements of Materials I.M. 403, Appendix C, shall be used. Other admixtures may be approved by the Engineer.

Air content shall be the same as required for Class O concrete.

Type IS or Type IP cement shall be used. If Type I/II is used, 25% replacement with ground granulated blast furnace slag shall be required.

Fly ash substitution rate shall not exceed 15% replacement by weight.

Grout for bonding new concrete to previously placed concrete shall consist of about 3 gallons of water to each 94 pound bag of cement. The consistency shall be so that the slurry can be applied with a stiff brush or broom to the previously placed concrete in a thin, even coating that will not run or puddle in low spots. An equivalent grout of Portland cement and water, to be applied by pressure spray may be substituted with approval of the Engineer. For sealing vertical joints between adjacent lanes and at the curbs, this grout shall be thinned to paint consistency.

~~The latex modified concrete shall be a workable mixture having the following properties or limits:~~

~~PROPERTIES OF LATEX MODIFIED CONCRETE~~	
~~Material or Property~~	~~Type 2 Concrete~~
~~Cement (parts by weight (mass))~~	~~1.0 (1.0)~~
~~Fine Aggr. (parts by weight (mass))~~	~~2.5 (2.5)~~
~~Coarse Aggr. (parts by weight (mass))~~	~~2.0 (2.0)~~
~~Latex Emulsion Admixture (gal/bag (L/kg) cement)~~	~~3.5 (0.3)~~
~~Air Content of Plastic Mix, % (Note 1)~~	~~3-6~~
~~Slump, inches (mm), maximum (Notes 1 and 2)~~	~~5 (125)~~

~~Note 1. Following sampling of the discharged, normally mixed material: the commencement of the tests shall be delayed from 4 to 4.5 minutes.~~
~~Note 2. Water may be added to obtain slump within the prescribed limits. Concrete with a slump less than 3 inches (75 mm) may be rejected if it is not placed satisfactorily and with a closed tight surface.~~

~~The formulated latex admixture shall be a nontoxic, film forming, polymeric emulsion in water to which all stabilizers have been added at the point of manufacture and shall be homogeneous and uniform in composition.~~
~~The physical properties of the latex modifier shall conform to the following requirements:~~

~~PHYSICAL PROPERTIES OF LATEX MODIFIER~~	
~~Polymer type~~	~~Styrene butadiene~~
~~Stabilizers~~	
~~(a) Latex*~~	~~Nonionic surfactants~~
~~(b) Portland cement composition~~	~~Poly dimethyl siloxane~~
~~Percent solids~~	~~46.0 - 49.0~~
~~Weight per gallon (lb at 25°C)~~	~~8.4~~
~~(Mass per liter (kg at 25°C)~~	~~(1.0)~~
~~Color~~	~~White~~
~~*Chloride content of the latex must be less than 0.5%.~~	

~~Latex admixture to be stored shall be kept in suitable enclosures which will protect it from freezing and from prolonged exposure to temperatures in excess of 85°F (30°C). Containers of latex admixture may be stored at the bridge site for a period not to exceed 10 calendar days. Such stored containers shall be covered completely with suitable insulating blanket material to avoid excessive temperatures.~~

2413.03 EQUIPMENT.
Equipment used shall be subject to approval of the Engineer and shall comply with the following:

B. Proportioning and Mixing Equipment.

1. Proportioning and mixing equipment for Portland cement concrete shall meet requirements of Article 2001.20, D, and Article 2001.21, C. In addition, the device for proportioning water shall be accurate within 1.0%, and the mixer shall be a construction or stationary concrete mixer of the rotating paddle type. A continuous mixer used in conjunction with volumetric proportioning, described above, may be used.

Sufficient mixing capacity or mixers shall be provided for either type of mixture to permit the intended quantity to be placed without interruption.

For HPC, the cement, fly ash, and GGBFS shall be a pre-blended by the producer or by using equipment capable of thoroughly mixing the materials to the tolerances in ASTM C 685 when concrete is produced using a volumetric mixer. For ready mixed concrete the cement, fly ash, and GGBFS are not required to be pre-blended.

~~**2.** Proportioning and mixing equipment for latex modified concrete shall be of a self contained, mobile continuous mixing type subject to the following:~~

~~**a.** The mixer shall have storage for sufficient bulk cement, fine and coarse~~

~~aggregate, latex modifier, and water to produce, on the site, not less than 6 cubic yards (4 m^3) of concrete. The mixer shall be capable of metering materials and producing uniform concrete.~~

~~**b.** The mixer shall be capable of positive measurement of cement being introduced into the mix. A cement meter register, visible at all times, shall indicate this quantity.~~

~~**c.** The mixer shall provide positive control of the flow of water and latex emulsion into the mixing chamber. Water use shall be indicated by a recording water meter. The flow shall be readily adjustable to provide for minor variations in aggregate moisture.~~

~~**d.** The mixer shall be capable of being calibrated to automatically proportion and blend all components of indicated composition on a continuous or intermittent basis, as required by the finishing operation, and shall discharge mixed material through a conventional chute directly in front of the finishing machine.~~

C. Placing and Finishing Equipment.

Placing and finishing equipment shall include adequate hand tools for placement of the mixture and for working it down to approximately the correct level for striking off with the screed. A self propelled finishing machine will be required for all surfacing and overlays. ~~, and the front screed shall be designed to consolidate the mixture to be placed to 100% of the rodded density.~~ The machine shall operate on supporting rails which are adequately secured to the previously placed surface and are adjustable to the correct profile without shimming, which do not deflect under the load of the machine, and which may be removed without damage to the edge of the new surface that is to remain in place. When placing the mixture in a lane abutting a previously completed lane, that side of the finishing machine adjacent to the completed lane shall be suitably equipped to travel on the completed lane. The finishing machine shall be inspected and approved before work is started on each project.

The finishing machine shall meet the following additional requirements for the type of mixture to be placed:

1. Portland Cement Concrete.

The finishing machine shall meet requirements of Article 2412.06 and shall have a mechanical strike off to provide a uniform thickness of mixture in front of the screed designed to consolidate the mixture by vibration, as specified. The front screed shall be designed to consolidate the mixture to be placed to 100% of the rodded density. The bottom face of this screed shall be at least 5 inches (125 mm) wide with a turned up or rounded leading edge to minimize tearing of the surface of the plastic concrete. Each screed shall have an effective weight (mass) of at least 75 pounds for each square foot (365 kg/m^2) of bottom face area. Each screed shall be provided with positive control of the vertical position, the angle of tilt, and the shape of the crown. Design of the finishing machine together with appurtenant equipment shall be such that positive machine screeding of the plastic concrete will be obtained within 1 inch (25 mm) of the face of the existing curbs. The length of the screed shall be sufficient to extend at least 6 inches (150 mm) beyond the line where a saw cut is intended to form the edge of a subsequent placement section, and shall overlap the sawed edge of a previously placed course at least 6 inches (150 mm). The finishing machine shall be capable of forward and reverse motion under positive control. Provision shall be made for raising the screeds to clear the screeded surface for traveling in reverse.

2. ~~**Latex Modified**~~ **High Performance Concrete (HPC).**

The finishing machine shall meet the requirements of Article 2412.06.

~~The finishing machine shall be self propelled and shall be capable of forward and reverse movement under positive control. Provision shall be made for raising all screeds to clear the screeded surface for traveling in reverse.~~ The finishing machine shall be capable of

finishing the surface to within 1 foot (0.3 m) of the edges of the area being placed. The screeds shall be provided with positive control of the vertical position.

Internal vibration equipment will be required for consolidation at the edges of the placement for Class O concrete.

2413.04 PREPARATION OF SURFACE FOR SURFACING.

Material for test holes (for PCC Class O concrete density tests) and all loose, disintegrated, or unsound concrete shall be removed from the bridge floor, as designated by the Engineer.

The thickness of all new concrete above the prepared surface shall be as specified in the contract documents. The clearance shall be checked in the following manner before concrete is placed.
A filler block having a thickness 1/4 inch (5 mm) less than the designated thickness shall be attached to the bottom of the screed; with screed guides in place, the screed shall be passed over the area to be concreted. As an alternate to passage of the finishing machine, an approved template, supported by the screed guides, may be passed over the area to be concreted. If the filler block does not clear the area to be concreted, the profile of the new surface shall be adjusted as approved by the Engineer.

In preparation for placement of new concrete, the surface shall be sandblasted or shot blasted, followed by an air blast. This cleaning shall remove all dirt, oil, and other foreign material, as well as any unsound concrete, laitance, or loose material from the surface and edges against which the surface mixture is to be placed. It is desired that the surface be roughened by the cleaning to provide satisfactory bond with the surfacing mixture. Metal floor drains and areas of the curb or railing above the proposed surface shall be protected from the cleaning.

~~For the PCC mixture, i~~It is not intended or desired that existing concrete, prepared for surfacing, be presaturated before grout and new concrete is placed. The prepared surface shall be dry to allow some absorption of the grout.

~~For the latex modified concrete, the surface of existing concrete shall be saturated but free of standing water.~~

2413.05 PREPARATION OF SURFACE FOR REPAIR AND OVERLAY.

D. General.

The thickness of concrete above the prepared surface or reinforcing steel shall be at least 3/4 inch (20 mm) and shall be greater if specified in the contract documents. The clearance shall be checked in the following manner before concrete is placed:

A filler block having a thickness 1/8 inch (3 mm) less than the overlay thickness shall be attached to the bottom of the screed; with screed guides in place, the screed shall be passed over the area to be concreted. As an alternate to passage of the finishing machine, an approved template, supported by the screed guides, may be passed over the overlay area. Where the intended clearance does not allow use of this method, a string line or other means shall be used, subject to approval of the Engineer. All old concrete which does not have sufficient clearance shall be removed. All reinforcing steel which does not have sufficient clearance shall be depressed and fastened down. It may be necessary to remove concrete beneath some reinforcement to permit depressing the reinforcement adequately. The minimum clear distance around these bars for placement of new concrete shall be 3/4 inch (20 mm).

Areas from which concrete has been removed shall be kept free of slurry produced by wet sawing of concrete joints. All of this slurry shall be removed from prepared areas before new concrete is placed.

Hand tools shall be used to remove final particles of concrete or to achieve the required depth. The entire surface, including curbs and exposed reinforcement, against which new concrete is to be placed shall be sandblasted or shot blasted. The cleaning shall be of an extent to remove all dirt, oil, and other foreign material, as well as any unsound concrete. Immediately before applying grout in preparation for placement of new concrete, the surface shall be cleaned with air blast. ~~For the Portland cement concrete,~~ It is not intended or desired that existing concrete, prepared for repair or overlay be presaturated with water before grout and new concrete is placed. The prepared surface shall be dry to allow some absorption of the grout.

At the time of placement of either PCC or ~~latex modified~~ high performance concrete, the area shall be clean and the reinforcement free of rust; rust forming because of dew on clean reinforcement overnight will not be considered objectionable, but reinforcement with a greater amount of rust shall be subject to recleaning before the concrete is placed. The area shall be cleaned by air blast before the concrete is placed.

~~For latex modified concrete, the surface shall be flushed with water and kept wet for at least 1 hour before concrete placement. Puddles of free water shall be removed before covering with concrete.~~

2413.06 PROPORTIONING AND MIXING.

For PCC, t~~T~~he mixture shall be proportioned and mixed at the project site. Ready mixed concrete will not be approved.

For HPC, ready mixed concrete equipment meeting the requirements of Articles 2001.20 and 2001.21 will be allowed.

The water reducing admixture for improved workability of ~~Portland cement~~ High Performance concrete shall be incorporated and mixed into the concrete in accordance with the manufacturer's recommendations and the Engineer's instructions.

A. Stationary Mixer.

When a construction or stationary mixer is used, proportioning and mixing shall be in accordance with applicable provisions of Article 2403.06.

B. Continuous Mixing Equipment.

When continuous mixing equipment is used, the following shall apply:

1. Mobile continuous mixers shall accurately proportion all materials for the specified mixture.

2. The proportioning equipment for each material shall be calibrated in the presence of the inspector, or the Engineer may accept a previous calibration and require satisfactory verification checks only, at the settings indicated by the previous calibration.

3. The proportioning equipment shall be operated at the speed recommended by the manufacturer during calibration, checks, or normal operation.

4. Continuous mixers shall be recharged at the site.

5. The Contractor may make yield checks or other checks and the inspector will cooperate in such checking.

6. The materials shall be mixed in an approved mixer within 1 mile (2 km) of the site of placement. They shall be mixed in accordance with the specified requirements for the equipment used. The mixture, as discharged from the mixer, shall be uniform in composition and consistency.

~~**7.** For latex modified concrete, mixing capability shall be such that finishing operations can proceed at a steady pace with final finishing completed before the formation of the plastic surface film.~~

2413.07 PLACING AND FINISHING.
An approved finishing machine will be required as specified in Article 2413.03, C. Supporting rails upon which the finishing machine travels shall be placed outside the area to be surfaced. Provisions for anchorage of supporting rails shall provide for horizontal and vertical stability; positive anchorage may be required by the Engineer. A hold down device shot into concrete will not be permitted unless the concrete is to be subsequently surfaced. Hold down devices of other types leaving holes in exposed areas will be approved provided the holes remaining are grouted full. Plans for anchoring support rails and the mixture placing procedure shall be submitted to the Engineer for approval.

~~For latex modified concrete, transverse bulkheads, equal in depth to the thickness of the surface, shall be installed to the required grade and profile prior to placing the concrete.~~

The locations of longitudinal joints may be shown in the contract documents. If not shown, the locations shall be subject to approval of the Engineer, and the approval will be based on avoiding joints in the wheel paths as much as practical.

In order to insure a junction with properly consolidated concrete, the surface course previously placed shall be sawed to a straight and vertical edge at longitudinal and transverse joints and removed before adjacent concrete is placed. The Engineer will determine the extent of such removal.

The Contractor shall take every reasonable precaution to secure a smooth riding bridge deck. Prior to placement operations, the Contractor shall review the equipment, procedures, personnel, and previous results with the Engineer, and the inspection procedures will be reviewed to assure coordination. Precautions shall include the following:

Assurance that concrete can be produced and placed within the specified limits, continuously and with uniformity.

After finishing, the Contractor shall check the surface with a 10 foot (3 m) straightedge; causes for irregularities exceeding 1/8 inch (3 mm) should be eliminated, and corrections should be made, if practical.

Each placement will be checked in accordance with Section 2317 the day following placement or before another section is placed.

After the surface has been cleaned and immediately before placing Portland cement concrete or High Performance Concrete, a thin coating of bonding grout shall be scrubbed into the dry, prepared surface. At the Contractor's option, the grout may be sprayed onto the surface in a manner subject to approval of the Engineer. Care shall be exercised to insure that all parts receive a thorough, even coating and that no excess grout is permitted to collect in pockets. The rate of progress in applying grout shall be limited so that the grout does not become dry before it is covered with new concrete. If the grout becomes dry, it shall be removed by sandblasting and new grout applied.

Concrete shall be placed in a continuous operation. The new concrete shall be manipulated and

mechanically struck off slightly above final grade. It shall then be mechanically consolidated to 100% of the rodded density, with a minus tolerance of 2%, and screeded to final grade. The rodded density will be determined in accordance with Materials I.M. 358.

The rodded density measurement is not required for HPC.

An internal vibrator shall be used for consolidation at the curb side, and along the longitudinal construction joint adjacent to a previously constructed lane for PCC Class O mix overlay.
The following applies to repair and overlay work:

Although repair classes are considered to begin 1/4 inch (5 mm) below the original concrete surface, repair concrete shall be placed monolithically with the overlay course, except as described for larger areas of Class B repair. Fresh concrete, 3 inches (75 mm) or more in thickness, shall be vibrated internally in addition to the surface screed vibration.

Areas of Class B repair 2 square yards (2 m^2) or greater shall have floor forms supported by beams or stringers. These larger areas of Class B repair shall have individual concrete replacement to the lower boundary for the superimposed overlay. Floor repair concrete, described in Article 2413.02, or Class D structural concrete, meeting requirements of Sections 2403 and 2412, may be used for the partial placements. Surfaces of these individual placements are to be left rough, and all placements for each construction stage shall be complete before the overlay course is started. If a full depth repair is staged, a beveled keyway not less than 1 1/2 inch by 3 inches (35 mm by 75 mm) shall be provided at the vertical joint. Concrete placement and reinforcing support shall comply with applicable portions of these specifications except as modified by the contract documents. The partial placement shall have a 72 hour cure as described for the overlay surface. After the cure, partial placements are to be surface dried, sandblasted or shot blasted, and cleaned prior to the application of the overlay course or grout.

~~When a tight, uniform surface has been achieved, the surface shall be given a suitable grooving, by hand methods, similar to that described in Article 2301.16, A, with the following exceptions:~~

- ~~Grooving shall be transverse to the centerline of roadway.~~
- ~~Transverse grooving shall be randomly spaced from 3/4 inch to 1 5/8 inches (20 mm by 40 mm) with no more than 50% of the spacings exceeding 1/4 inches (30 mm) with a minimum of four different spacings in a 2 foot (0.6 m) width.~~

~~This operation shall be done at a time and manner that the desired texture will be achieved while minimizing displacement of the larger aggregate particles. The texture should not extend into the areas within approximately 2 feet (0.5 m) of curbs. As soon as finishing has been completed, all vertical joints with adjacent concrete shall be sealed by painting with thinned grout.~~

The concrete temperature and theoretical evaporation rate shall be in accordance with Article 2412.05.

A. Interstate and Primary Projects.
Transverse grooving or tining in plastic concrete of bridge deck overlay (and bridge approach overlay when included in a bridge deck overlay project) will not be allowed. Longitudinal grooves shall be cut into the hardened concrete surfaces using a mechanical cutting device. Longitudinal grooving shall be done after surface correction grinding.

Longitudinal grooves shall be 1/8 inch +/- 1/64 inch (3 mm +/- 0.4 mm) in width, 1/8 inch +1/32 inch or -1/16 inch (3 mm +0.8 mm or -1.6 mm) in depth, and the grooves shall be uniformly spaced at 3/4 inch (19 mm) intervals measured from center to center of groove.

Longitudinal grooving on bridge deck overlay and double reinforced bridge approach overlay sections shall not be within the area approximately 2 feet (0.6 m) adjacent to the curbs and shall terminate approximately 6 inches (150 mm) from bridge joints. Longitudinal grooving of single reinforced and non-reinforced bridge approach sections shall not be applied within 6 inches (150 mm) of the edge of the outside lane lines.

For staged bridge deck overlay and bridge approach overlay construction the Contractor may cut longitudinal grooves in the hardened concrete at the end of each construction stage or wait until all stages have been completed. If the Contractor elects to delay cutting of the longitudinal grooves until completion of all stages, the concrete deck overlay and bridge approach overlay for any stage opened to traffic shall receive an interim coarse broom finish during placement. Within 30 calendar days following completion of the last stage of the project the Contractor shall establish temporary lane closures to accomplish longitudinal grooving for all stages. The interim coarse broom finish will not be allowed as a surface texture when opened to traffic over a winter season. If the interim coarse broom texture is present and the Contractor is not in a position to finish all stages of the project, longitudinal grooving shall be cut into the hardened concrete in order to establish an acceptable driving surface texture for the winter season.

B. Other Projects.
When a tight, uniform surface has been achieved, the surface shall be given a suitable grooving, by hand methods, similar to that described in Article 2301.16, A, with the following exceptions:

- Grooving shall be transverse to the centerline of roadway.
- Transverse grooving shall be randomly spaced from 3/4 inch to 1 5/8 inches (20 mm by 40 mm) with no more than 50% of the spacings exceeding 1/4 inches (30 mm) with a minimum of four different spacings in a 2 foot (0.6 m) width.
  This operation shall be done at a time and manner that the desired texture will be achieved while minimizing displacement of the larger aggregate particles. The texture should not extend into the areas within approximately 2 feet (0.5 m) of curbs. As soon as finishing has been completed, all vertical joints with adjacent concrete shall be sealed by painting with thinned grout.

~~Screed rails and/or construction dams shall be separated from newly placed latex modified concrete by passing a pointing trowel along their inside face. Care shall be exercised to assure that this trowel cut is made for the entire depth and length of rails or dams after the mixture has stiffened sufficiently and that it does not flow back.~~

Section 2317 shall apply to smoothness of the completed deck overlay for Primary projects and when specifically required for other projects.

2413.08 CURING.
~~Immediately after final finishing, the area finished shall be covered with white pigmented curing compound, meeting requirements of Article 4105.05, applied at a rate of not more than 135 square feet per gallon (3.3 m^2/L) . As soon as it can be placed without marring the surface, a~~ The first layer of prewetted burlap shall be placed on the concrete~~, and~~ within 10 minutes after finishing. Burlap shall be prewetted with sufficient water, prior to placement, to prevent absorption of moisture from the concrete surface. ~~t~~The concrete shall be cured as provided in the following paragraphs:

For Portland cement concrete or High Performance Concrete, the surface shall be cured for at least 72 hours. For the first 24 hours, the burlap shall be kept continuously wet by means of an automatic sprinkling or wetting system. After 24 hours, the Contractor may cover the wet burlap with a layer of 4 mil (100 µm) polyethylene film for a minimum of 48 hours in lieu of using the sprinkling or wetting system. ~~The wet burlap shall be applied within 30 minutes after the concrete has been deposited on the floor, except when the surface will be excessively marred by so doing,~~

~~as directed by the Engineer.~~ If the concrete is revibrated for Class O mix concrete because of failure to meet density requirements with initial vibration, ~~this~~ the time for placement of prewetted burlap will be extended 15 minutes. Failure to apply wet burlap within the required time shall be cause for rejecting the work so affected. Surface concrete in the rejected area shall be removed and replaced at no additional cost to the Contracting Authority.

~~For latex modified concrete, the surface shall be cured by wet burlap for at least 24 hours and be air cured for an additional 48 hours. Within 1 hour of covering with wet burlap, a layer of 4 mil (100 µm) polyethylene film shall be placed on the wet layer for the required 24 hour period for curing. The curing material shall then be removed for an additional 48 hour air cure. Burlap polyethylene sheets may be substituted for the polyethylene film with the approval of the Engineer. It is the nature of the latex modifier to form a plastic film at the surface upon drying, usually within 25 minutes in hot, dry weather. It is the intent of this specification that this film be protected from drying and cracking by prompt covering with wet burlap.~~

At the Contractor's option, partial depth concrete for Class B repair may be cured with white pigmented curing compound only. When this curing is completed, the surface shall be sandblasted and allowed to dry, and the existing concrete in that vicinity shall be sandblasted, prior to placement of the overlay course.

2413.09 SEALING.

The tops and traffic sides of curbs, retrofit barrier rails, and concrete barrier rails shall be sealed in accordance with Article 2403.21, D. In addition, for Portland cement concrete floor overlay or High Performance Concrete overlay, the sealer shall be applied along each gutter line, extending 1 foot (0.3 m) onto the roadway. Other areas requiring concrete sealer may be designated in the contract documents or by the Engineer.

2413.10 LIMITATIONS OF OPERATIONS.

Work on the surface shall not be commenced until the lower course meets the requirements of Article 2403.19, B.

If traffic is to be maintained during the construction period of this contract, it will be noted in the contract documents. The Contractor shall provide traffic controls that are required by the contract documents. Night work will be permitted. ~~When daytime temperatures exceed 85°F (30°C) the Engineer may require placement of latex modified concrete to be made at night or in the early morning hours if a satisfactory surface finish is not being achieved. In either case, a~~Adequate lights for nighttime work shall be furnished at the direction of the Engineer by the Contractor without additional compensation. The Engineer shall be given reasonable notice.

A construction dam or bulkhead shall be installed in case of major delay in the placement operation. During minor delays of 1 hour or less, the end of the placement may be protected from drying with several layers of wet burlap.

Adequate precautions shall be taken to protect freshly placed concrete from sudden or unexpected rain. The Engineer may order removal of any concrete damaged by rainfall.
Screed rails may be removed at any time after the concrete has taken initial set. Adequate precaution shall be taken during screed removal to protect the edge of the new surface from damage.

Concrete shall not be placed adjacent to a surface course less than 36 hours old, however, this restriction does not apply to a continuation of placement in a lane or strip beyond a joint in the same lane or strip.
If concrete placement is stopped or delayed for a period of 90 minutes or more, further placement shall be discontinued and may resume only after a period of not less than 12 hours. This restriction does not prohibit continuation of placement provided a gap is left in the lane or strip; the gap shall be sufficient in length for the finishing machine to clear previously placed concrete.

Preparation work will not be allowed in a lane or strip until the lane is closed to traffic. In areas where there is no traffic, preparation of the area may be started in a lane or strip adjacent to newly placed surface the day following its placement. If this work is started before the end of the 72 hour curing period, the work will be restricted as follows:

Sawing or other operations shall interfere with the curing process for the minimum practical time only, and in the immediate work area only, and the curing shall be resumed promptly.
Chipping hammers heavier than a nominal 15 pound (with a mass greater than 7 kg) class shall not be used.

Air compressors shall be operated on the floor only directly over the piers.

Loads other than construction equipment shall not be permitted on any portion of the bridge floor that has undergone preparation and prior to placement and curing of new concrete.

Traffic shall not be permitted on a finished surface course until 72 hours after placement. At temperatures below 55°F (13°C), the Engineer may require a longer waiting time.

PCC shall not be placed when the air or floor temperature is below 40°F (4°C). ~~Latex modified concrete shall not be placed when the air or floor temperature is below 45°F (7°C); however, it may be placed when these temperatures are 45°F (7°C) and a rising temperature is predicted.~~
Concrete mixture shall not be placed after October 1 and prior to April 1 without written approval of the Engineer.

2413.11 METHOD OF MEASUREMENT.
Bridge Floor Surfacing will be computed by the Engineer in square yards (square meters) from measurements of the areas surfaced. For bridge floor surfacing, concrete removal for Class O mix test wells may be required by the Engineer. This removal will not be measured for payment.

Class A Bridge Floor Repair, Class B Bridge Floor Repair, and Bridge Floor Overlay will be computed by the Engineer in square yards (square meters) from measurements of the areas repaired or overlaid. Sealing, as required in Article 2413.09, will not be measured separately for payment.

Longitudinal Grooving in concrete shall be measured in accordance with Article 2412.11.

2413.12 BASIS OF PAYMENT.
For the performance of acceptable work, measured as provided above, the Contractor will be paid the contract unit price in accordance with the following provisions:

For the number of square yards (square meters) of Bridge Floor Surfacing constructed, the Contractor will be paid the contract unit price per square yard (square meter). This payment shall be full compensation for furnishing all material, equipment, forms, and labor necessary to complete this work in accordance with the contract documents.

When Section 2317 applies, payment may be modified as specified therein.
For the number of square yards (square meters) of Class A Bridge Floor Repair, Class B Bridge Floor Repair, and Bridge Floor Overlay constructed, the Contractor will be paid the respective contract unit price per square yard (square meters). This payment shall be full compensation for removal of excess concrete from the project and it becoming the property of the Contractor, for furnishing all material, equipment, forms, and labor necessary to complete the work in accordance with the contract documents.

When there is no item for Class B Bridge Floor Repair, but such work is required, payment for

each square yard for 5 square yards (square meter for 4 m^2) or less will be at three times the contract unit price per square yard (square meter) for Class A Bridge Floor Repair. Should the quantity exceed 5 square yards (4 m^2), payment shall be made as extra work.

The cost of sealing as required in Article 2413.09 shall be included in the contract unit price for Bridge Floor Resurfacing, Class A Bridge Floor Repair, Class B Bridge Floor Repair, or Bridge Floor Overlay.

The profile may be improved by raising the finished overlay surfaces up to 1/2 inch (15 mm) above that shown in the contract documents with no additional compensation to the Contractor. At each location where the raise exceeds 1/2 inch (15 mm), the Contractor will be paid, as extra work, for the materials which represent the volume in excess of the 1/2 inch (15 mm) raise.

Longitudinal Grooving in Concrete will be paid for in accordance with Article 2412.11.

Reason for Revision: Remove latex modified overlay option and replace with high performance concrete (HPC) overlay from DS.

County or City Input Needed (X one)			**Yes**	**No**	
Comments:					
Industry Input Needed (X one)			**Yes**	**No**	
Industry Notified:	**Yes** X	**No**	**Industry Concurrence:**	**Yes**	**No**
Comments: Wayne Sunday has notified industry.					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Tom Reis / Daniel Harness	**Office:** Specifications Section	**Item 9**
Submittal Date: 4/2/07	**Proposed Effective Date:** 10/16/07	
Article No.: 2423.02 **Title:** General Requirements	**Other:**	

Specification Committee Action: Approved as is.

Deferred:	**Not Approved:**	**Approved Date:** 4/12/07	**Effective Date:** 10/16/07

Specification Committee Approved Text: See Member's Requested Change.

Comments: None.

Specification Section Recommended Text: See Member's Requested Change.

Comments:

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

2423.02, General Requirements.

Replace the second paragraph:

Before fabrication, ~~six copies of~~ shop drawings shall be submitted in accordance with Article 1105.03 ~~to the Engineer for review~~.

Reason for Revision: Add reference to working drawings in Article 1105.03. Language has been added to 1105.03 regarding submitting working drawings.

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: Tom Reis / Daniel Harness			**Office:** Specifications Section	**Item 10**
Submittal Date: 4/2/07			**Proposed Effective Date:** 10/16/07	
Article No.: 2425.03 **Title:** Design			**Other:**	
Specification Committee Action: Approved as is.				
Deferred:	**Not Approved:**	**Approved Date:** 4/12/07	**Effective Date:** 10/16/07	
Specification Committee Approved Text: See Member's Requested Change.				
Comments: None.				
Specification Section Recommended Text: See Member's Requested Change.				
Comments:				

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

2425.03, Design.

Add as the second sentence:

Shop drawings shall be submitted in accordance with Article 1105.03.

Reason for Revision: Add reference to working drawings in Article 1105.03. Language has been added to 1105.03 regarding submitting working drawings.

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: John M. Smythe	**Office:** Construction	**Item 11**
Submittal Date: February 27, 2007	**Proposed Effective Date:** October, 2007	
Article No.: 2507.04 **Title:** Method of Measurement	**Other:**	

Specification Committee Action: Approved as is.

Deferred:	**Not Approved:**	**Approved Date:** 4/12/07	**Effective Date:** 10/16/07

Specification Committee Approved Text: See Specification Section Recommended Text.

Comments: None.

Specification Section Recommended Text:

2507.04. Method of Measurement.

Replace the fourth paragraph:

~~The quantity of engineering fabric for which payment will be made, when placed as shown in the contract documents, will be the quantity shown in the contract documents in square yards (square meters).~~ The quantity of engineering fabric will be computed in square yards (square meters) from measurements of the material placed to the nearest 0.1 foot (0.1 m).

Comments:

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

2507.04 METHOD OF MEASUREMENT.
The quantity of Class A, B, or C revetment will be computed by the Engineer in square yards (square meters) from measurements of the surface as constructed to the nearest 0.1 foot (0.1 m).

Class D and Class E revetment and Erosion Stone will be measured in tons (megagrams) to the nearest 0.1 ton (0.1 Mg). Only material placed in accordance with the contract documents will be measured.

Material for a filter blanket will be measured in tons (megagrams) to the nearest 0.1 ton (0.1 Mg).

~~The quantity of engineering fabric for which payment will be made, when placed as shown in the contract documents, will be the quantity shown in the contract documents in square yards (square meters).~~ The quantity of engineering fabric will be computed in square yards (square meters) from measurements of the material placed to the nearest 0.1 foot (0.1 meter),

When Concrete Grout for Revetment or Gabion is specified in the contract documents, the Engineer will compute the volume of concrete grout furnished and placed, from the nominal volume of each batch and a count of batches. Grout unused or wasted will be estimated and deducted by the Engineer; however, no deduction will be made for a partial batch remaining at the completion of the operation.

Reason for Revision: The existing language only provides for plan quantity when placed according to the contract documents. It is rarely placed according to the contract documents. Therefore, making this a measured quantity is less confusing and more consistent with actual practice.					
County or City Input Needed (X one)			**Yes**	**No** X	
Comments: This clarifies Method of Measurement.					
Industry Input Needed (X one)			**Yes**	**No** X	
Industry Notified:	**Yes**	**No** X	**Industry Concurrence:**	**Yes**	**No**
Comments: This clarifies Method of Measurement.					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Tom Reis / Daniel Harness	**Office:** Specifications Section	**Item 12**
Submittal Date: 4/2/07	**Proposed Effective Date:** 10/16/07	
Article No.: 2522.02 **Title:** Shop Drawings	**Other:**	

Specification Committee Action: Approved as is.

Deferred:	**Not Approved:**	**Approved Date:** 4/12/07	**Effective Date:** 10/16/07

Specification Committee Approved Text: See Members Requested Change.

Comments: None.

Specification Section Recommended Text: See Member's Requested Change.

Comments:

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

2522.02, Shop Drawings.

Replace the first sentence of the first paragraph:

The Contractor shall ~~furnish the Engineer eight sets of drawings covering all apparatus required for the installation~~ submit drawings in accordance with Article 1105.03, along with a statement that methods and materials to be used in fabrication are in accordance with the contract documents.

Delete the fourth paragraph:

~~Article 1105.03 shall apply.~~

Reason for Revision: Add reference to working drawings in Article 1105.03. Language has been added to 1105.03 regarding submitting working drawings.

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: Tom Reis / Daniel Harness	**Office:** Specifications Section	**Item 13**
Submittal Date: 4/2/07	**Proposed Effective Date:** 10/16/07	
Article No.: 2523.02 **Title:** Materials	**Other:**	

Specification Committee Action: Approved as is.			
Deferred:	**Not Approved:**	**Approved Date:** 4/12/07	**Effective Date:** 10/16/07
Specification Committee Approved Text: See Member's Requested Change.			
Comments: None.			
Specification Section Recommended Text: See Member's Requested Change.			
Comments:			

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

2523.02, Materials.

Replace the first sentence of the second paragraph:

Before any items are ordered or installation is started, the following list of shop drawings must be submitted for approval in accordance with Article 1105.03:

Replace the second sentence of the third paragraph:

They shall include ~~eight sets of~~ catalog cuts, diagrams, drawings, brochures, or other descriptive data required by the Engineer.

Reason for Revision: Add reference to working drawings in Article 1105.03. Language has been added to 1105.03 regarding submitting working drawings.

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: Steve Gent	**Office:** Traffic and Safety	**Item 14**
Submittal Date: 3/20/07	**Proposed Effective Date:** October 2007	
Section No.: 2524 **Title:** Highway Signing	**Other:**	

Specification Committee Action: Approved with changes as noted.

Deferred:	**Not Approved:**	**Approved Date:** 4/12/07	**Effective Date:** 10/16/07

Specification Committee Approved Text: For Article 2524.02, A; 2524.07; 2524.08; 2524.12, D; 2524.12, E; and 2524.12, G see Specification Section Recommended Text.

2524.02, B, Type B Signs.

Replace the second sentence of the first paragraph:

The sign face material shall be reflective sheeting~~, except when nonreflectorized sheeting is specifically designated in the contract documents~~.

Replace the first sentence of the third paragraph:

Prior to fabrication, the Contractor shall submit ~~six copies of a~~ shop drawings for each Type B sign ~~for review by the Engineer~~ in accordance with Article 1105.03.

Comments: The Office of Construction asked if the Office of Traffic and Safety will be specifying posts to be used based on sign. The Office of Traffic and Safety responded they would. District 6 Construction asked if the Contractor supplies the posts. The Office of Traffic and Safety explained it depends on the project. For statewide projects, the Department supplies the posts. For new construction, the Contractor supplies them.

The Office of Traffic and Safety noted that reflectorized letters and numerals can still be used. They asked that this be put back into third sentence of the first paragraph of Article 2524.02, B.

Specification Section Recommended Text:

2524.02, A, Type A Signs.

Replace the first and second sentences of the first paragraph:

Type A signs shall be aluminum, galvanized steel, or when specifically specified, plywood sheet mounted on wood or steel breakaway posts. The sign face material shall be reflective sheeting~~, unless otherwise specified in the contract documents~~.

2524.02, B, Type B Signs.

Replace the second and third sentences of the first paragraph:

The sign face material shall be reflective sheeting~~, except when nonreflectorized sheeting is specifically designated in the contract documents~~. Sign legends shall be accomplished through use of reflectorized ~~or nonreflectorized~~ letters, numerals, symbols, and borders that are direct applied.

Replace the first sentence of the third paragraph:

Prior to fabrication, the Contractor shall submit ~~six copies of a~~ shop drawings for each Type B sign ~~for review by the Engineer~~ in accordance with Article 1105.03.

2524.07, Erection of Type A Signs.

Delete the title and entire article:

~~**2524.07 ERECTION OF TYPE A SIGNS**~~

~~Type A signs shall be erected so that the signs will be at elevations called for in the contract documents, shall be true to line and grade, and shall be truly vertical.~~

~~After installation, each 4 inch by 6 inch (100 mm by 150 mm) wood sign post shall be modified by field drilling holes as shown in the contract documents. All labor and equipment necessary for this modification shall be included in the price bid for the post and no separate payment will be made.~~

~~Wood posts shall be set in holes which are 12 inches (300 mm) in diameter and of the proper depth.~~

~~Posts shall be set to full depth at the required spacing and accurately aligned both vertically and horizontally. Post holes shall be backfilled with Class A crushed stone meeting requirements of Article 4120.04, placed in layers not more than 6 inches (150 mm) in depth. Each layer shall be thoroughly compacted, care being taken to preserve the alignment of the posts.~~

~~When posts are located within the area of paved surfaces, including paved shoulders, the excavation and backfilling shall be carefully made so that the special fill, subgrade, subbase, and pavement materials will be replaced to approximately the same depths as they were encountered when excavated. The excavated pavement or shoulder material or, where necessary, new pavement or shoulder material shall be placed to the required depth and grade in a manner approved by the Engineer.~~

2524.08, Erection of Type B Signs.

Replace the title and first sentence of the first paragraph:

Erection of Type A or B Signs.
All Type A or B signs shall be accurately erected to conform to the dimensions and details shown in the contract documents.

2524.12, D, Steel Breakaway Posts for Type B Signs.

Replace the title, first paragraph, and first sentence of the second paragraph:

2524.12, D, Steel Breakaway Posts for Type A or B Signs.
Each steel breakaway post for Type A or B signs will be measured to the nearest 0.1 foot (30 mm) of the various post sizes installed.

Payment for steel breakaway posts for Type A or B signs will be made at the contract unit prices per linear foot (meter) for the various post sizes.

2524.12, E, Concrete Footings for Steel Breakaway Posts for Type B Signs.

Replace the title:

Concrete Footings for Steel Breakaway Posts for Type A or B Signs.

2524.12, G, Excavation in Unexpected Rock.

Replace the first sentence:

Excavation in unexpected rock for wood posts for Type A or B signs, steel posts for Type A or B signs, concrete footings for Type A or B signs, delineators, and milepost marker posts will be paid for as extra work.

Comments: In Article 2524.02, B, the Specifications Section added a reference to Article 1105.03, to which is being added language providing instructions for submitting working and shop drawings.

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

Section 2524. Highway Signing.

2524.01 DESCRIPTION.
This specification covers the fabrication and erection of all traffic signs and delineators, in accordance with the contract documents. All parts used in construction of traffic signs and delineators shall be able to withstand a wind load of 30 pounds per square foot (1.4 kPa) on the sign surface.

2524.02 TRAFFIC SIGNS.
All traffic signs, except milepost markers and 6 inch by 6 inch (150 mm by 150 mm) route markers, are classified into two groups, Types A and B, as indicated in the contract documents.

Except as modified by the contract documents, signs shall be made according to the standards established in the Standard Highway Signs ~~Manual~~, 2004 edition, as published by the United States Department of Transportation.

A. Type A Signs.
Type A signs shall be aluminum, galvanized steel, or when specifically specified, plywood sheet mounted on wood or steel breakaway posts. The sign face material shall be reflective sheeting~~, unless otherwise specified in the contract documents.~~ The sign legends shall be accomplished with either the direct or reverse silk screen process, or with black nonreflective sheeting that is direct applied.

The finished signs shall conform with the details specified in the contract documents.

B. Type B Signs.
Type B signs shall be extruded aluminum highway sign panels mounted on either wood or steel breakaway posts as specified in the contract documents. The sign face material shall be reflective sheeting~~, except when nonreflectorized sheeting is specifically designated in the contract documents.~~ Sign legends shall be accomplished through use of ~~detachable,~~ reflectorized ~~or nonreflectorized~~ letters, numerals, symbols, and borders that are direct applied.

The finished signs shall conform with the details specified in the contract documents.

Prior to fabrication, the Contractor shall submit six copies of a shop drawing for each Type B sign for review by the Engineer. Each drawing shall be a scale drawing of the sign face, showing the size, arrangement, and spacing of all letters, numerals, symbols, and borders.

2524.03 DELINEATORS.
Delineators shall consist of a hermetically sealed, acrylic plastic, prismatic, reflex reflector, appropriately housed in accordance with Materials I.M. 486.07.

2524.04 MILEPOST MARKERS.
Milepost markers shall consist of green reflectorized sheeting on flat aluminum or galvanized steel sheets as for Type A signs. The reflectorized, white message shall be applied directly to the face material. The dimensions shall be as specified in the contract documents. Milepost markers shall be mounted on posts of the type specified for delineators.

2524.05 ROUTE MARKERS, 6 INCH BY 6 INCH (150 mm BY 150 mm).
Route markers, 6 inch by 6 inch (150 mm by 150 mm), shall consist of reflectorized sheeting on flat aluminum or galvanized steel sheets as for Type A signs. The sign details shall be as specified in the contract documents. 6 inch by 6 inch (150 mm by 150 mm) route markers, where specified, shall be mounted above milepost markers on the same delineator post.

2524.06 MATERIALS.
Materials shall meet requirements of Section 4164 and Section 4186.

~~**2524.07 ERECTION OF TYPE A SIGNS**~~
~~Type A signs shall be erected so that the signs will be at elevations called for in the contract documents, shall be true to line and grade, and shall be truly vertical.~~

~~After installation, each 4 inch by 6 inch (100 mm by 150 mm) wood sign post shall be modified by field drilling a horizontal 1 1/2 inch (38 mm) diameter hole, parallel to the sign face and centered on the side of the post at 4 inch (100 mm) above ground line and another at 1 foot 6 inches (460 mm) above the ground line. All labor and equipment necessary for this modification shall be included in the price bid for the post and no separate payment will be made.~~

~~Wood posts shall be set in holes which are 12 inches (300 mm) in diameter and of the proper depth.~~

~~Posts shall be set to full depth at the required spacing and accurately aligned both vertically and horizontally. Post holes shall be backfilled with Class A crushed stone meeting requirements of Article 4120.04, placed in layers not more than 6 inches (150 mm) in depth. Each layer shall be thoroughly compacted, care being taken to preserve the alignment of the posts.~~

~~When posts are located within the area of paved surfaces, including paved shoulders, the excavation and backfilling shall be carefully made so that the special fill, subgrade, subbase, and pavement materials will be replaced to approximately the same depths as they were encountered when excavated. The excavated pavement or shoulder material or, where necessary, new pavement or shoulder material shall be placed to the required depth and grade in a manner approved by the Engineer.~~

2524.08 ERECTION OF TYPE A or B SIGNS.
All Type A or B signs shall be accurately erected to conform to the dimensions and details shown in the contract documents. Any deviation from the contract documents must be approved by the Engineer before the work is started.

After installation, each 4 inch by 6 inch (100 mm by 150 mm) wood sign post shall be modified by field drilling a horizontal 1 1/2 inch (38 mm) diameter hole, parallel to the sign face and centered on the side of

the post at 4 inches (100 mm) above ground line and another at 1 foot 6 inches (460 mm) above the ground line. All labor and equipment necessary for this modification shall be included in the bid price for the post and no separate payment will be made.

Wood posts shall be set in holes which are 12 inches (300 mm) in diameter and of the proper depth.

Posts shall be set to full depth at the required spacing and accurately aligned both vertically and horizontally. Post holes shall be backfilled with Class A crushed stone meeting requirements of Article 4120.04, placed in layers not more than 6 inches (150 mm) in depth. Each layer shall be thoroughly compacted, care being taken to preserve the alignment of the posts.

Where steel breakaway posts are specified in the contract documents, footing holes shall be carefully dug or drilled to the required size at the proper location. All excavated earth shall be spread within the right-of-way to blend uniformly with the existing surface and as approved by the Engineer. Immediately before placing any concrete, the Contractor shall remove all loose and uncompacted material from the bottom of the hole. Some of the holes will be located in the bottoms of drainage ditches. In these cases the Contractor shall conduct construction operations so that water will not enter any excavated holes.

For the breakaway base, tighten all bolts to maximum with 12 inch to 15 inch (305 mm to 308 mm) wrench to bed washers and shims, and to clean bolt threads. Loosen each bolt in turn and retighten in systematic order to the torque specified in the contract documents. For the fuse plate assembly, fuse bolts shall be tightened to obtain the torque specified in the contract documents.

Stub posts and reinforcing shall be prepositioned to the proper depth as shown in the contract documents, properly aligned and secured in conformance with Article 2405.09, and the footing shall be cast to the elevation shown in the contract documents. The concrete shall be rodded in place to fill all the voids. The exposed portion of the footing shall be formed as shown in the contract documents. The provisions of Section 2403 shall apply.

After the concrete has developed the strength required by Article 2403.19, B, the post shall be attached and adjusted for correct alignment and elevation. The cap of the footing shall be shaped so that drainage is away from the base plate of the post. Excess concrete shall not be left around the holes.

Extruded panels shall be erected in accordance with the details in the contract documents. Care shall be taken to prevent damage to sign faces. Any mars, scratches, dents, or other damage to sign faces visible at a distance of 5 feet (1.5 m) shall be repaired by the Contractor at no additional cost to the Contracting Authority. Locknuts on the post clip bolts shall be tightened by means of a torque wrench to 225 inch-pounds (25 Nm) when using dry, clean, unlubricated threads. Nuts on panel bolts shall be drawn tight.

2524.09 ERECTION OF DELINEATORS, MILEPOST MARKERS, AND 6 INCH BY 6 INCH (150 mm BY 150 mm) ROUTE MARKERS.

Posts for delineators, milepost markers and 6 inch by 6 inch (150 mm by 150 mm) route markers, shall be driven.

These shall be erected so that the signs and delineator reflectors will be at elevations called for in the contract documents, shall be true to line and grade, and shall be truly vertical. Where a milepost marker is designated, the marker shall be attached to the post in lieu of a delineator. Where a 6 inch by 6 inch (150 mm by 150 mm) route marker is designated, it shall be attached above the milepost marker on the same post.

When posts are driven, a suitable driving cap shall be provided, and the signs and delineators shall be attached after driving.

Delineator posts for these signs shall be plumb and firm in the ground, spaced as shown in the contract documents, and driven to the required lines and grades. After driving, the top of the post shall have substantially the same cross section dimensions as the body of the post; battered heads will not be permitted. All posts which are bent or otherwise damaged to the extent that they are, in the opinion of the Engineer, unfit in the finished work shall be removed from the site and shall be replaced by the Contractor at no additional cost to the Contracting Authority.

2524.10 SIGN POSITIONING.
The glossy surface on sign faces may produce specular reflection. Signs shall be positioned to eliminate or minimize specular reflection in the following manner:

A. Overhead Signs.

1. Where the road grade approaching the sign is plus 2.0% or greater, the sign face vertical axis shall be parallel to a plumb line, and the horizontal axis shall be at right angles to the road.

2. Where the road grade approaching the sign is less than plus 2.0%, the sign face horizontal axis shall be at right angles with the road, and the sign face vertical axis shall be inclined to face upward at the rate of 1/8 inch per foot (10 mm/m) of vertical sign surface for each 1 % the road grade differs from plus 2.0%.

B. Ground Installations.
Ground installations will be shown in the contract documents.

After installation of signs is complete, the signs will be inspected at night by the Engineer. If specular reflection is apparent on any sign, its positioning shall be adjusted by the Contractor to eliminate or minimize this condition.

2524.11 SIGN IDENTIFICATION.
The signs shall be identified as specified in Section 4186, with the following additions:

Sign No..... (Filled in by Sign Fabricator)
Erection Date..... (Filled in by Sign Contractor)

2524.12 METHOD OF MEASUREMENT AND BASIS OF PAYMENT.
Signing, satisfactorily erected according to the contract documents will be measured and paid for as follows:

A. Type A Signs.
Type A signs will be calculated in square feet (square meters) of sign area completed in place based on the nominal dimensions of the signs.

Payment for Type A signs will be made at the contract unit price per square foot (square meter) of sign area. This payment shall be full compensation for furnishing, fabricating, and erecting the signs complete, including furnishing of the blank, application of reflective sheeting, application of the screened message, and all mounting hardware.

The area of all regular, rectangular, triangular, octagonal, and circular shaped Type A signs will be measured from the nominal given dimensions. Cutouts for rounded corners, etc., will not be deducted. The area of all irregularly shaped Type A signs, such as U.S. and Interstate route

markers, will be measured from the dimensions of a circumscribed rectangle around the route Marker.

B. Type B Signs.
Payment for Type B signs will be made on the basis of area of the vertical, front face of the signs, as specified in the contract documents, and measurement or payment will not be made for area in excess of this area.

Payment will be made at the contract unit price per square foot (square meter) of sign area. This payment shall be full compensation for furnishing, fabricating, and erecting the complete signs, including furnishing aluminum extrusions or formed steel panel, applying reflective sheeting, furnishing and applying all letters, numerals, symbols, and border to the sign and the sign to the

post, furnishing all labor, and furnishing all other details necessary to provide signs complete and erected in place, except for the required footings and posts.

C. Wood Posts for Type A or B Signs.
Each wood post for Type A or B signs will be measured to the nearest foot (0.3 m) of the various post sizes installed. When posts are placed to depths greater than the minimum depth specified, the measured length shall not include any parts placed to depths greater than 1 foot (0.3 m) more than the specified minimum.

Payment for wood posts for Type A or B signs will be made at the contract unit price per linear foot (meter). This payment shall be full compensation for furnishing and erecting the posts, including treatment and other details necessary to provide the sign posts complete and erected in place.

D. Steel Breakaway Posts for Type A or B Signs.
Each steel breakaway post for Type A or B signs will be measured to the nearest 0.1 foot (30 mm) of the various post sizes installed.

Payment for steel breakaway posts for Type A or B signs will be made at the contract unit prices per linear foot (meter) for the various post sizes. This payment shall be full compensation for furnishing, fabricating, and erecting the posts, including galvanizing and other details necessary to provide the sign posts complete and erected in place.

Unless otherwise specified in the contract documents, the measured length of steel breakaway posts shall include no more than 1 foot (0.3 m) over the length necessary to meet specified minimums.

E. Concrete Footings for Steel Breakaway Posts for Type A or B Signs.
Each concrete footing will be counted by the various sizes installed.

Payment for footings will be made at the contract unit price of each for the various sizes of "Concrete Footings". This payment shall be full compensation for excavating the hole, furnishing and placing concrete, stub post, reinforcing bars, etc., finishing, and all other details necessary to provide a complete concrete footing.

F. Delineators, Milepost Markers, and 6 Inch by 6 Inch (150 mm By 150 mm) Route Markers.
Each delineator, milepost marker, or 6 inch by 6 inch (150 mm by 150 mm) route marker will be counted by the various types installed.

Payment for delineators or milepost markers will be made at the contract unit price for each for the various types. This payment shall be full compensation for furnishing, fabricating, and erecting the delineators or milepost markers complete, including posts, reflector units, and frames for delineators, posts and milepost marker signs, all necessary fittings and attachments, and all labor necessary to complete the work.

Payment for 6 inch by 6 inch (150 mm by 150 mm) route markers will be made at the contract unit price for each. This payment shall be full payment for furnishing, fabricating, and erecting the route marker to a milepost marker post previously measured for payment, and including all necessary fittings and attachments and all labor necessary to complete the work.

G. Excavation in Unexpected Rock.
Excavation in unexpected rock for wood posts for Type A or B signs, steel posts for Type A or B signs, concrete footings for Type A or B signs, delineators, and milepost marker posts will be paid for as extra work. Unexpected rock will be considered as rock encountered during post erection, but neither visible from the roadway nor indicated in the contract documents.

Reason for Revision: To allow type A signs to use break-away steel posts.					
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 / Daniel Harness	**Office:** Specifications Section	**Item 15**
Submittal Date: 4/2/07	**Proposed Effective Date:** 10/16/07	
Article No.: 2525.01, B **Title:** Equipment and Materials	**Other:**	

Specification Committee Action: Approved as is.

Deferred:	**Not Approved:**	**Approved Date:** 4/12/07	**Effective Date:** 10/16/07

Specification Committee Approved Text: See Member's Requested Change.

Comments: None.

Specification Section Recommended Text: See Member's Requested Change.

Comments:

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

2525.01, B, Equipment and Materials.

Replace the first indented paragraph:

Shop drawings will be required for the poles and mast arms, and these shall be submitted in accordance with Article 1105.03 ~~within 45 calendar days from the date of award of contract~~.

Reason for Revision: Add reference to working drawings in Article 1105.03. Language has been added to 1105.03 regarding submitting working drawings.

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: Roger Bierbaum	**Office:** Contracts	**Item 16**
Submittal Date: March 13, 2007	**Proposed Effective Date:** October 2007 GS	
Article No.: 2528.12 **Title:** Traffic Control	**Other:**	

Specification Committee Action: Approved as is.

Deferred:	**Not Approved:**	**Approved Date:** 4/12/07	**Effective Date:** 10/16/07

Specification Committee Approved Text: See Specification Section Recommended Text.

Comments: The Office of Contracts commented AGCI had suggested clarifying what is counted as a flagger day, especially when involving 24 hour operation. The Office of Contracts also wanted to clarify situations when work starts in the evening and ends in the morning.

District 6 Construction commented flagger days used to be based on working days. It was up to the Contractor to define a working day. The flagger day would be the same as the working day. They noted the proposed revisions change that. It is now based on a calendar day. The Office of Contracts commented if a proposal note is being included to define working days, one could also be included to define flagger days. The Office of Construction was agreeable to that. They suggested making the proposed changes the default and including exceptions as a proposal note. The note can clarify that a flagger day will be paid according to the definition of a working day.

Committee decided to include changes. Exceptions to changes will be included in projects as a proposal note.

Specification Section Recommended Text:

2528.12, A, 6, a, Pilot Cars.

Replace the entire article:

a. The pilot car ~~must~~ shall be needed and used as part of preplanned work that is started that day and is intended to proceed for a major part of the day. If used less than 4 hours in a calendar day, the operation will be counted as a half-day. If a pilot car is used for more than 16 hours in a calendar day, the pilot car will be counted as 2 days.

2528.12, A, 6, b, Pilot Cars.

Replace the entire article:

b. Other pilot cars ~~must~~ shall be needed and used for at least 1 hour during the day, perhaps intermittently, and this ~~must~~ shall be the primary duty of the employee. If used less than 4 hours in a calendar day, the pilot car will be counted as a half-day.

2528.12, A, 7, a, Flaggers.

Replace the entire article:

a. The flaggers ~~must~~ shall be needed and used as part of preplanned work that is started that day and is intended to proceed for a major part of the day. If used less than 4 hours in a calendar day, the flagger will be counted as a half-day.

2528.12, A, 7, b, Flaggers.

Replace the entire article:

b. Other flaggers ~~must~~ shall be needed and used for at least 1 hour during the day, perhaps intermittently, and this ~~must~~ shall be the primary duty of the employee. If used less than 4 hours, the flagger will be counted as a half-day. If a flagger is used for more than 16 hours in a calendar day, the flagger will be counted as 2 days.

Comments:

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

6. Pilot Cars.

The Engineer will count the number of days each pilot car was used.

For a pilot car to be counted:

a. The pilot car must be needed and used as part of preplanned work that is started that day and is intended to proceed for a major part of the day. If used less than 4 hours in a calendar day, the operation will be counted as a half-day. If a pilot car is used for more than 16 hours in a calendar day, then the operation will be counted as 2 days.

b. Other pilot cars must be needed and used for at least 1 hour during the day, perhaps intermittently, and this must be the primary duty of the employee. If used less than 4 hours, the pilot car will be counted as a half-day.

Short time, emergency, or relief assignment of employees to pilot car operations will not be counted separately.

7. Flaggers.

The Engineer will count the number of days each flagger was used.

For flaggers to be counted:

a. The flaggers must be needed and used as part of preplanned work that is started that day and is intended to proceed for a major part of the day. If used less than 4 hours in a calendar day, the flagger will be counted as a half-day.

b. Other flaggers must be needed and used for at least 1 hour during the day, perhaps intermittently, and this must be the primary duty of the employee. If used less than 4 hours, the flagger will be counted as a half-day. If a flagger is used for more than 16 hours in a calendar day, then the operation will be counted as 2 days.

Reason for Revision: This was received as a suggestion from the AGC to fairly compensate contractors who work 24-hour operations.

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: John Smythe / Wayne A. Sunday	**Office:** Construction	**Item 17**
Submittal Date: March 22, 2007	**Proposed Effective Date:** October 16, 2007	
Article No.: 2532.03, B **Title:** Bridge Deck	**Other:**	

Specification Committee Action: Approved as is.

Deferred:	**Not Approved:**	**Approved Date:** 4/12/07	**Effective Date:** 10/16/07

Specification Committee Approved Text: See Specification Recommended Text.

Comments: None.

Specification Section Recommended Text:

2532.03, B, Bridge Deck.

Replace the first paragraph:

The entire surface of the bridge deck shall be ground and longitudinally grooved in accordance with Article 2412.06, A. ~~textured except the area within approximately 2 feet (0.6 m) of the railing. No areas greater than 2 feet (0.6 m) in length shall be left without texture. The total depth of concrete surface ground shall not exceed 1/4 inch (6 mm).~~

Comments:

Member's Requested Change: **(DO NOT USE "Track Changes," or "Mark-Up". Use ~~Strikeout~~/Highlight)**

2532.03 CONSTRUCTION.
Pavement surface repair (diamond grinding) shall consist of grinding and texturing the entire surface of the pavement in a longitudinal direction. Both the land area and the texture depth shall be within the specified ranges to be in compliance. It may be necessary to adjust the blade spacing during the project to stay within specified ranges.

For multiple passes, the equipment shall be carefully controlled to minimize the overlap. Overlaps shall not exceed 1 inch (25 mm).

The transverse slope of the ground concrete surface shall be uniform to a degree that there are no depressions or misalignment of slope greater than 1/4 inch in 12 feet (6 mm in 3.6 m) when tested by stringline or straightedge placed perpendicular to the center line.

In order to match the outside edge of the pavement, adjacent paved areas (for example, shoulders, curb and gutter, turn lanes, tapers, paved crossovers, and so forth) shall be ground to minimize vertical projections.

The Contractor shall be responsible for quality control of the texture. The Engineer will conduct random Quality Assurance inspections.

A. PCC Pavement.
Substantially the entire surface area of the pavement shall be ground and textured until the pavement surface on both sides of the transverse joints and all cracks are in the same plane and meet the smoothness

required. In each lane, at least 95% of the area in each 100 foot (30 m) section shall have a newly ground surface.

Grinding shall be performed in a longitudinal direction. All construction traffic entering or leaving the work area shall move in the direction of traffic of the open lane. Grinding shall begin and end at lines normal to the pavement center line within any one ground area and at the project limits. This will not be required at the end of each shift. Good transverse drainage shall be maintained at all times.

The grinding head should be assembled to produce the following tolerances on pavements with the indicated coarse aggregates:

(ENGLISH)	Limestone	Gravel
Blade segment thickness Land area between grooves*	0.130" maximum 0.100" to 0.135"	0.130" maximum 0.080" to 0.110"
Texture depth**	Target of 1/16" with average between 1/32" to 3/32"	
(METRIC)	**Limestone**	**Gravel**
Blade segment thickness Land area between grooves*	3.30 mm maximum 2.5 mm to 3.4 mm	3.30 mm maximum 2 mm to 2.75 mm
Texture depth**	Target of 2 mm with average between 1 mm to 2.5 mm	
* Based on an average of a minimum of ten measurements across the ground width for one pass. ** Based on an average of a minimum of six measurements across the ground width for one pass.		

A test area 500 feet in length and the width of the grinding head will be allowed for each new or restacked head, provided a surface texture in reasonable conformance with the specification is being produced.

B. Bridge Deck

~~The entire surface of the bridge deck shall be ground and textured except the area within approximately 2 feet (0.6 m) of the railing. No areas greater than 2 feet (0.6 m) in length shall be left without texture. The total depth of concrete surface ground shall not exceed 1/4 inch (6 mm).~~ The entire surface of the bridge deck shall be ground and longitudinally grooved in accordance with Article 2412.06, A.

(ENGLISH)	Limestone
Blade segment thickness Land area between grooves*	0.130" maximum 0.100" to 0.125"
Texture depth**	Target: 1/8" ± 1/32"
(METRIC)	**Limestone**
Blade segment thickness Land area between grooves*	3.30 mm maximum 2.5 mm to 3 mm
Texture depth**	Target: 3 mm ± 1 mm
* Based on an average of a minimum of ten measurements across the ground width for one pass. ** Based on an average of a minimum of six measurements across the ground width for one pass.	

Reason for Revision: The grooving equipment typically used for cutting longitudinal grooves has cutting heads with widths of approximately 3 feet and 4 feet. To accommodate these various cutting head widths and not overlap or gap grooving passes there needs to be a range of ungrooved area adjacent to curbs. This will enable the longitudinal grooving to be accomplished on bridges with different widths and still provide for an acceptable ungrooved area adjacent to curbs.					
County or City Input Needed (X one)			**Yes**	**No**	
Comments:					
Industry Input Needed (X one)			**Yes**	**No**	
Industry Notified:	**Yes**	**No**	**Industry Concurrence:**	**Yes**	**No**
Comments:					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Steve Gent	**Office:** Traffic and Safety	**Item 18**
Submittal Date: 3/20/07	**Proposed Effective Date:** October 2007	
Article No.: 4186.10, B **Title:** Steel Breakaway Posts for Type B Signs	**Other:**	

Specification Committee Action: Approved as is.

Deferred:	**Not Approved:**	**Approved Date:** 4/12/07	**Effective Date:** 10/16/07

Specification Committee Approved Text: Specification Section Recommended Text.

Comments: None.

Specification Section Recommended Text:

4186.10, B, Steel Breakaway Posts for Type B Signs.

Replace the title and first sentence of the first paragraph:

Steel Breakaway Posts for Type A or B signs.
Steel breakaway posts for Type A or B signs shall be of the size and type shown in the contract documents. Unless otherwise specified, steel shall meet requirements of ASTM A 36/A 36M.

Comments:

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

4186.10 SIGN POSTS.
Sign posts shall be of the following types for the sign or signs specified:

A. Wood Posts for Type A or B Signs.
Wood posts for Type A or B signs shall be of the type and size shown in the contract documents.

Wood sign posts shall meet requirements of Section 4164.

B. Steel Breakaway Posts for Type A or B Signs.
Steel breakaway posts for Type A or B signs shall be of the size and type shown in the contract documents. Unless otherwise specified, steel shall meet requirements of ASTM A 36/A 36M. Fabrication shall be in accordance with Section 2408. Posts shall be galvanized after fabrication except as noted. The coating shall be applied by the hot dip process, in compliance with ASTM A 123, Grade 85. Posts shall be cleaned and pickled before such application.

Fasteners for breakaway sign posts shall be high strength bolts, nuts, and washers meeting requirements of Article 4153.06, B.

Washers shall meet requirements of ANSI B18.22.1 for the bolts specified, shall be made of steel, and shall be capable of withstanding the specified minimum load of the bolt on which they will be used without sign of failure. Washers with dimensions other than those specified may be approved by the Engineer.

Heavy hexagonal, semi-finished nuts and jam nuts shall be used on the anchor bolts. Nuts shall meet requirements of ANSI B18.2.2. Nuts may be tapped oversize only enough to product finger free fit. Regular hexagonal jam nuts may be used when approved by the Engineer.

Bolts (including the entire length of the anchor bolts), nuts, and washers, shall be galvanized according to ASTM A 153, Class A coating.

Holes in the fuse plates and splice plates shall be drilled. Notches in the base plates and fuse plates shall be provided so that no metal projects beyond any face of the plate and the edges of the notches are smooth and true. All bearing surfaces of base plate and fuse plate assembly shall be smooth and free of beads or runs.

For the fuse plate assembly, the post cut shall be accomplished by either sawing or flame cutting, and may be made either before or after galvanizing of the post. If the cut is made after galvanizing, the damaged area shall be repaired by painting or smoldering.

Before fabrication, six copies of shop drawings for the steel breakaway sign posts shall be submitted to the Engineer for review.

Reason for Revision: To allow type A signs to use break-away steel posts.

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 / Daniel Harness			**Office:** Specifications Section		**Item 19**
Submittal Date: 4/2/07			**Proposed Effective Date:** 10/16/07		
Developmental Specification: DS-01026 **Title:** Removal of Concrete Box Girder Bridges			**Other:**		
Specification Committee Action: Approved as is.					
Deferred:	**Not Approved:**	**Approved Date:** 4/12/07		**Effective Date:** 10/16/07	
Specification Committee Approved Text: See attached Draft DS.					
Comments: None.					
Specification Section Recommended Text:					
Comments:					
Member's Requested Change: (Do not use **'Track Changes'**, or **'Mark-Up'**. Use ~~**Strikeout**~~ and **Highlight**. See attached Draft DS.					
Reason for Revision: Add reference to working drawings in Article 1105.03. Language has been added to 1105.03 regarding submitting working drawings.					
County or City Input Needed (X one)			**Yes**	**No** X	
Comments:					
Industry Input Needed (X one)			**Yes**	**No** X	
Industry Notified:	**Yes**	**No** X	**Industry Concurrence:**	**Yes**	**No**
Comments:					

Draft DS-010XX
(Replaces DS-01026)

Iowa Department of Transportation

DEVELOPMENTAL SPECIFICATIONS
FOR
REMOVAL OF CONCRETE BOX GIRDER BIRDGES

Effective Date
October 16, 2007

THE STANDARD SPECIFICATIONS, SERIES 2001, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE DEVELOPMENTAL SPECIFICATIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

01026.01 DESCRIPTION
This item shall consist of removal of all portions of an existing structure, except the portions that may be required or permitted to be left in place. Unless otherwise provided, all structures or parts of structures to be removed shall become the property of the Contractor. Work shall be performed in accordance with these Developmental Specifications and Section 2401 of the Standard Specifications.

01026.02 BRIDGE REMOVAL
The Contractor shall submit a complete Bridge Removal Plan to the Engineer detailing procedures and sequence for removing portions of the bridge, including all features necessary to remove the bridge in a safe and controlled manner. The removal plans, indicating detailed sequences of operations, shall be submitted to the Engineer for review and approval, at least, 30 calendar days prior to start of removal operations of the existing bridge.

The Contractor shall, in accordance with Article 1105.03 of the Standard Specifications, submit working drawings, with design calculations, ~~to the Engineer~~ for the proposed Bridge Removal Plan. The Bridge Removal Plan shall be prepared by a Professional Engineer licensed in the State of Iowa. The design calculations shall be adequate to demonstrate the stability of the structure during all stages of the removal operations. Calculations shall be provided for each stage of bridge removal and shall include dead and live load values assumed in the design of protective covers. At a minimum, a stage will be considered to be partial removal of the top slab, sidewalk, or portions of the superstructure, in any span; or bent caps or columns at support locations.

Concrete superstructures may be removed by any means consistent with regulations regarding safety and protection of adjacent property. Where portions of existing substructures lie wholly or in part within limits for a new structure, they shall be removed as necessary to accommodate construction of the proposed structure.

The Contractor's Professional Engineer, licensed in the State of Iowa, shall inspect and be present during the removal operations of any bridge component that may affect the structural stability of the remaining structure. Should an unplanned event occur, the Contractor's Professional Engineer licensed in the State of Iowa shall immediately submit the procedure of operation proposed to correct or remedy the occurrence to the Engineer for approval.

A. Bridge Removal Plans.
The Bridge Removal Plan shall include the following:

1. The bridge removal sequence for the entire structure, including staging of bridge removal.

2. Type of equipment and locations on and/or adjacent to the structure during removal operations.

3. Temporary support shoring or temporary bracing if required.

4. Locations where work is to be performed over and/or adjacent to traffic.

5. Details and locations of protective covers or other measures to assure that bridge removal operations will not endanger the public or damage other highway facilities.

6. Proposed bridge removal date. Refer to the bridge plans for any applicable event date restrictions.

7. Contact names, and office and cellular phone numbers for individuals responsible for the demolition.

8. Details of safety measures to be used during the removal operations (law enforcement for site security, barricades, etc.).

9. Provisions for control of dust from removal operations.

10. Proof of insurance coverage for the demolition activities, including adequate coverage for basic and aggregate. Insurance coverage shall be in accordance with Article 1107.02 of the Standard Specifications for the specific method of removal.

B. Bridges over Roadways that may be Closed to Traffic.
The following additional requirements apply to the removal of portions of the existing bridge that are over or adjacent to roadways that may be closed to public traffic:

1. The closure of roadways to public traffic shall conform to the Traffic Control Plan.

2. The following City of Des Moines officials shall be notified by the Contractor 48 hours prior to actual demolition:

Fire Chief	515.283.4237
Police Chief	515.283.4800
City Traffic Engineer	515.283.4973
City Engineer	515.283.4920

3. Prior to closing of a roadway to traffic to accommodate bridge removal operations, the Contractor shall have all necessary workers, materials, and equipment at the site as needed to proceed with the removal work in an expeditious manner. While the roadway is closed to public traffic, work shall be pursued promptly and without interruption until the roadway is reopened to public traffic.

4. All removal operations over or adjacent to the traveled way shall be performed during periods of time that the roadway is partially or completely closed to the public traffic except as otherwise specified in these Developmental Specifications.

5. Preliminary work shall be limited to operations that will not reduce the structural strength or stability of the bridge, or any element thereof, to a level that would constitute a hazard to the public. Such preliminary work shall also be limited to operations that cannot cause debris or any other material to fall onto the roadway. Protective covers may be used to perform preliminary

work such as chipping or cutting the superstructure into segments, provided the covers are of sufficient strength to support all loads and are sufficiently tight to prevent dust and fine material from sifting down onto the traveled way. Protective covers shall extend at least 4 feet (1.2 m) beyond the limit of the work underway. Bottom slabs of box girders may be considered to be protective covers for preliminary work performed on the top slab inside the limits of the exterior girders.

6. Temporary support shoring, temporary bracing, and protective covers shall not encroach closer than 8 feet (2.4 m) horizontally from the edge or 14.5 feet (4.4 m) vertically above any traffic lane or shoulder that is open to public traffic.

7. During periods when the roadway is closed to public traffic, debris from bridge removal operations may be allowed to fall directly onto the lower roadway provided adequate protection from damage is furnished for all highway facilities. Prior to reopening the roadway to public traffic, all debris, protective pads, and devices shall be removed and the roadway swept clean with wet power sweepers or equivalent methods.

8. The removal operations shall be conducted in such a manner that the portion of the structure not yet removed remains in a stable condition at all times.

01026.03 REMOVAL METHODS

Method for bridge removal shall be cutting/shearing, blasting, or another approved method.

A. Cutting / Shearing

Existing bridge superstructure and pier columns may be reduced into smaller sections to allow for partial removal. Smaller sections may be lifted by cranes or dropped on the pavement below provided that all the requirements of this Developmental Specification are met.

B. Blasting

The Contractor is permitted to use explosives for removal of the existing bridge superstructure and pier columns, provided the requirements outlined in this Developmental Specification are satisfied. Existing foundations shall not be blasted.

01026.04 USE OF EXPLOSIVES

The requirements of Section 1107.10 of the Standard Specifications and the following shall apply:

A. Pre and Post-Blast Property Survey Requirements

1. Description

The locations of the affected properties shall be determined by a Contractor's representative qualified in vibration analysis/monitoring and damage assessment associated with blasting. The Contractor shall arrange with property owners affected by the project the rights-of-entry to their properties in order to engage in a pre-blast and post-blast property damage survey. The Contractor shall submit a Pre and Post-Blast Property Survey Report to the Engineer to document the investigation of the buildings on these properties.

2. Investigation Methods

The investigation shall consist of visually inspecting and recording all existing defects in the structures. The structures shall be thoroughly inspected from top to bottom, inside and out. The Report shall include names of inspectors, date of inspections, and descriptions and locations of defects. In addition, the Contractor shall mark existing cracks in such a way that future observations would indicate whether cracks continue to open or spread. Photographs shall be used in verifying written descriptions of damaged areas.

The Contractor shall arrange for professional photography capable of producing sharp, grain-free, high-contrast pictures with good shadow details for construction monitoring at the properties.

Photographs shall be taken so that details of the buildings will be clear and well defined. The intent is to procure a record of the general physical condition of the buildings. Camera location shall be changed for each of the photographs and shall be varied so that all portions of the buildings' exterior surfaces will be covered by the view.

Each photograph shall contain the following information:

I-235, Polk County
Project No.: _____
Property Address:
Building Description:
View _____
Looking _____
Date _____
Photographer _____

Photographs shall be 8 inches by 10 inches (200 mm by 250 mm), black and white glossy, mounted on paper with a flap for binding.

Before any blasting operations for demolition, the Contractor shall have record photographs taken of the portions of all the buildings affected by the proposed bridge demolition. Prints of each view shall be made available to the Engineer within 2 weeks after the exposure has been made and prior to the actual demolition activity.

The Contractor shall conduct a second inspection of each affected property once blasting is complete. The Contractor shall visually inspect and photograph each structure to verify the post-blast condition. The Contractor shall follow the same inspection procedures as previously outlined herein before for the pre-blast survey.

The Pre and Post-Blast Property Survey Report shall be typed on bond paper in text form with headings, indexes, etc., and shall be submitted within 30 calendar days of the final blasting. An evaluation of the property impacts from the blasting activities and final recorded seismograph charts shall be included in the Report. Rights for subsequent use shall become the property of the Contracting Authority.

B. Ground Vibration Monitoring

1. Description
Work under this item shall consist of furnishing seismograph(s) and employing a trained operator to continuously monitor ground vibration at anticipated critical locations determined by the Contractor's vibration analysis. The purpose of the monitoring is to assess potential damages to adjacent structures due to blasting activities.

2. Equipment
The seismograph shall be a continuous monitoring instrument capable of producing a continuous strip recording of the seismic readings, or a continuous dated report of all seismic events exceeding a predetermined threshold. The seismograph shall be supplied with all accessories necessary for making seismographic observations.

3. Monitoring Procedures
The Contractor, in the presence of the Engineer, shall take seismograph readings prior to blasting to establish an ambient index. The seismograph shall be placed to continuously monitor all blasting activities. Attentive observation of the seismographic readings shall be made during all blasting operations.

Ground vibration shall be measured as the particle velocity. The blasting activities shall not

generate ground vibration with maximum peak particle velocity that would result in damage, as determined by the Contractor, but not to exceed 12.7 mm per second at frequencies below 40 Hz, or 50.8 mm per second at frequencies greater than 40 Hz; or alternatively, a maximum of 12.7 mm per second peak particle velocity below 10 Hz, and a maximum of 50.8 mm per second above 40 Hz, and a maximum of 0.20 mm displacement between 10 and 40 Hz. Particle velocity shall be recorded in three mutually perpendicular directions. The maximum allowable peak particle velocity shall apply to each of the three measurements.

C. Blasting Plan

The Blasting Plan shall be submitted no later than 30 calendar days prior to bridge removal for review by the Engineer and shall provide the following information:

1. List of at least three projects within the last 5 years on which the Contractor has removed similar bridge structures using explosives. The list shall contain names and phone numbers of owners' representatives who can verify the Contractor's participation on those projects.

2. Name and experience record of the Contractor's superintendent in charge of the bridge removal operations and the explosives personnel.

3. Provisions for transport, security, and use of explosives including locations. It is anticipated that explosives will not be delivered to the site until just before they are needed. On site storage will not be permitted. A City Fire Department inspector and off-duty police officer shall be present while explosives are within the City limit.

4. Application of explosives for structure removal shall be identified as in accordance with explosive manufacturer's instructions. Detailed plans showing how the structure will be prepared for demolition, the type and amount of explosives to be used. Information including type of blasting 'covers' to be used to control flying material.

5. Securing of any required permits.

6. Details of seismograph monitoring including number of seismograph units, locations, and name/experience of trained operator who will continuously monitor ground vibration near buildings or other existing structures.

01026.05 ROAD CLOSURE LIMITS

Depending on the method of removal employed, the Contractor will be allowed to close I-235 to traffic using either of the following traffic control schemes outlined below:

A. The Contractor will be allowed to close I-235 to traffic between 12:00a.m. and 2:00 p.m. Sunday to allow for complete superstructure removal over the traveled way. Lane closure may be allowed between 2:00 p.m. Sunday and 6:00 a.m. Monday to complete the bridge removal operation; during this period a minimum of one traffic lane in each direction shall remain open and the Contractor will be limited to performing debris removal and clean up.

B. The Contractor will be allowed to close I-235 to traffic for brief periods not to exceed 20 minutes between 9:00 p.m. and 6:00 a.m. weekdays to allow for partial removal of the structure.

01026.05 SUMMARY OF SUBMISSIONS AND NOTIFICATIONS

A. The following submittal requirement shall apply for all methods of bridge removal.

Activity	Due
Bridge Removal Plan	30 calendar days prior to removal
Notifications	48 hours prior to actual demolition

B. If explosives are in any way used for bridge removal, the following additional submittal and notification requirements shall apply:

Activity	Due
Blasting Plan	30 calendar days prior to blasting
Pre-blast photos	To be made available prior to blasting
Pre- and Post-Blast Property Survey Report	30 calendar days following final blasting
Copies of any required permits	To be made available prior to blasting

The Engineer will complete the review of the Bridge Removal Plan and Blasting Plan, if applicable, within 21 calendar days of the date the entire plan is received. The Contractor shall submit six copies of the Bridge Removal Plan and Blasting Plan, if applicable, on sheets not to exceed the 11 inches by 17 inches (280 mm by 430 mm) size.

01026.06 METHOD OF MEASUREMENT

Removal of all material from the bridge, including removal in stages, will be measured as lump sum. No measurement will be made of individual items on the bridge.

01026.07 BASIS OF PAYMENT

The lump sum price bid for Removal of Existing Structures shall be full compensation for furnishing all material, equipment, and labor and for performance of all work including removal plans as required, safety and protective measures, cleanup, and disposal of non-salvaged materials.

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Tom Reis / Daniel Harness	**Office:** Specifications Section	**Item 20**
Submittal Date: February 27, 2007	**Proposed Effective Date:** July 17, 2007	
Developmental Specification: DS-01043 **Title:** Sanitary Sewer (SUDAS) **Developmental Specification:** DS-01044 **Title:** Storm Sewer (SUDAS) **Developmental Specification:** DS-01046 **Title:** Water Main (SUDAS)	**Other:**	

Specification Committee Action:

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

Specification Committee Approved Text:

Comments: The Specifications Section handed out a sheet of differences SUDAS had noted between proposed revisions and current SUDAS specs. Most were editorial and the Specifications Section has addressed them. The Specifications Section noted that SUDAS states in Section 3010, 1.08 A, 2, b, over-excavation is incidental. When the SUDAS Developmental Specifications were originally written, it was not. The Office of Construction asked if the DSs were being evaluated for inclusion in the book or for continued use as DSs. The Specifications Section noted they wanted to evaluate them for use as DSs. They noted that the intent is in the future to replace the current Standard Specifications for storm and sanitary sewer with the SUDAS DSs.

There was some confusion as to how SUDAS defines over-excavation in this situation. The SUDAS Director was unable to attend the meeting, so the Specifications Section will discuss over-excavation with him and report back to the Committee.

FHWA expressed some concern that use of the SUDAS DSs could allow contractors to use HDPE pipe under Primary roadways in areas where they shouldn't.

The Office of Construction expressed concern with SUDAS DSs making some items incidental that the Department would normally not. The Office of Local Systems noted that items such as these are often made incidental so the local agency doesn't need to measure them. The Office of Construction noted the SUDAS DSs refer to a number of figures. They wanted to know how they are incorporated into the contract documents. The Specifications Section explained they would be included in the plans. They commented the Office of Design is working with SUDAS to unify a number of standards.

The Specifications Section noted that Section 3010, 1.08 A, states no separate payment will be made for unclassified excavation. When the SUDAS DSs were originally written, unclassified excavation was not addressed in the SUDAS specifications for this situation. The Specifications Section also noted SUDAS uses the term "weight tickets". The Department uses the term "scale tickets". The Office of Construction further noted the Department requires them for certification purposes. SUDAS states they are to be provided only when requested.

The Committee decided to proceed with updating the DSs to match current SUDAS specifications. The Specifications Section will meet with SUDAS to discuss the above issues.

Specification Section Recommended Text: See the Draft DSs in the **W:\Highway\Specifications\Exchange\SUDAS DSs** folder.

These include changes suggested by SUDAS. The Specifications Section will work with SUDAS to clarify issues associated with over-excavation, unclassified excavation, use of HDPE pipe, and scale tickets.

When these issues are resolved, the Specifications section will post final draft versions on the W drive (or e-mail them to those who do not have access to the W drive) and notify Committee members.					
Comments: The proposed effective date is the July letting.					
Member's Requested Change: (Do not use **'Track Changes'**, or **'Mark-Up'**. Use ~~**Strikeout**~~ and **Highlight**. See the Revised Developmental Specifications located in the **W:\Highway\Specifications\Exchange\SUDAS DSs** folder.					
Reason for Revision: Update to revisions included in the latest release of the SUDAS Specifications.					
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: Tom Reis / Daniel Harness	**Office:** Specifications Section	**Item 21**
Submittal Date: 4/2/07	**Proposed Effective Date:** 10/16/07	
Developmental Specification: DS-01068 **Title:** Mechanically Stabilized Earth (MSE) Retaining Wall	**Other:**	

Specification Committee Action: Approved as is.			
Deferred:	**Not Approved:**	**Approved Date:** 4/12/07	**Effective Date:** 10/16/07
Specification Committee Approved Text: See attached Draft DS.			
Comments: None.			
Specification Section Recommended Text:			
Comments:			

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

See attached Draft DS.

Reason for Revision: Add reference to working drawings in Article 1105.03. Language has been added to 1105.03 regarding submitting working drawings.

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

Draft DS-010XX

(Replaces DS-01648)

Iowa Department of Transportation

DEVELOPMENTAL SPECIFICATIONS
FOR
MECHANICALLY STABILIZED EARTH (MSE) RETAINING WALL

Effective Date
October 16, 2007

THE STANDARD SPECIFICATIONS, SERIES 2001, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE DEVELOPMENTAL SPECIFICATIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

01068.01 DESCRIPTION.

This work consists of construction of mechanically stabilized earth (MSE) retaining walls in accordance with this specification and in reasonably close conformity with the lines, grades, design, and dimensions shown on the plans or established by the Engineer. MSE walls are defined as large panel retaining wall systems which use mesh or strips in the soil backfill behind a concrete wall facing to limit backfill stresses by reinforcing the soil structure.

01068.02 DESIGN.

A. Wall Design Engineer.

The wall design shall be performed by a Professional Engineer licensed in the State of Iowa that prepares and seals the design submittals as defined in this specification.

B. Design Requirements.

The design by the wall system supplier shall consider the internal stability of the wall mass. Wall design shall be as per Section 5, 'Retaining Walls', of the AASHTO Standard Specifications for Highway Bridges.

Design calculations shall include a summary of all design parameters used, including material types, strength values and assumed allowable soil bearing pressure, assumed load and loading combinations, and factor of safety parameters.

Earth reinforcing, and their connections to concrete panels, shall be designed for corrosion over the design life using the following electrochemical criteria:

Requirement	Test Method
Resistivity > 2,000 ohm-cm	AASHTO T 288
Chlorides < 200 ppm	AASHTO T 291
Sulfates < 300 ppm	AASHTO T 290

All appurtenances behind, in front of, under, mounted upon, or passing through the wall such as drainage structures, utilities, or other appurtenances shown on the plans shall be accounted for in the stability design of the wall.

Unless otherwise noted on the plans, a minimum cover of 4 feet (1.2 m) shall be provided from the top of the leveling pad to finish grade.

Where wall or wall sections intersect with an angle of 130 degrees or less on the backfill side, a special vertical corner element panel shall be used. The corner element panels shall cover the joint of the panels that abut the corner, and allow for independent movement of the abutting panels. Corner elements shall not be formed by connecting standard facing panels that abut the acute corner.

The face panels shall be designed to accommodate differential settlement of 1 foot in 100 feet (0.3 m in 30 m). The spacing between adjacent panels shall be designed to be at least 3/4 inch (19 mm). Where shown on the plans, slip joints to accommodate excessive differential settlement shall be included.

C. Submittals.

For Interstate and Primary projects, the MSE supplier shall provide the Office of Design, Soils Design Section with preliminary (non-structural) design calculations which include estimated maximum applied (required) MSE wall bearing pressures, reinforcing strip or mesh lengths, and random backfill requirements (if other than Class 10 backfill) prior to preparation of their final MSE plans.

The Contractor shall submit ~~seven copies of the~~ design computations and ~~ten sets of~~ approved final MSE system construction drawings ~~at least four weeks prior to beginning construction~~ in accordance with Article 1105.03 of the Standard Specifications.

These construction drawings shall include all details, dimensions, and cross-sections necessary to construct the wall and shall include, but shall not be limited to the following:

1. An elevation sheet or sheets for each wall.

2. An elevation view of the wall which shall include the elevation at the top of the wall at all horizontal and vertical break points and at least every 15 feet (5 m) along the face of the wall, all steps in the leveling pads, the designation as to the type of panel, the length of soil reinforcing elements, the distance along the face of the wall to where changes in length of the soil reinforcing elements occur, and an indication of the final ground line and maximum calculated bearing pressures.

3. Details of the architectural treatment. Refer to plans for details and nominal dimensions.

4. All panel details shall show all dimensions necessary to construct the element, all reinforcing steel in the element, and the location of soil reinforcing connection devices embedded in the panels.

5. The details for connections between the concrete panel and the soil reinforcements.

6. A typical cross section or cross sections showing the elevation relationship between ground conditions and proposed grades.

7. General notes pertaining to design criteria and wall construction.

8. The details for diverting soil reinforcements around obstructions such as piles, catch basins, and other utilities.

9. Clearly indicated details for construction of walls around drainage facilities.

10. General location of subdrain and outlets of the internal drainage system.

01068.03 MATERIALS

The wall system shall be manufactured by a company on the approved manufacturer's list in Materials I.M. 445, Appendix E.

A. Concrete Panels.

1. Concrete.

Cement shall be Type I, meeting requirements of Section 4101 of the Standard Specifications. Cement content per cubic yard (cubic meter) of concrete for face panels and precast coping sections shall be not less than 600 pounds (360 kg) nor more than 700 pounds (420 kg).

Concrete aggregates shall meet requirements of Sections 4110 and 4115 of the Standard Specifications. Coarse aggregate shall be Class 3 durability, as defined in Article 4115.04 of the Standard Specifications. The use of gravel is subject to approval by the Engineer, based on past history of deleterious and stain-producing material found in the aggregate source.

Air entrainment shall be obtained by addition of an approved air-entraining agent. The air content of fresh, unvibrated concrete, as determined by AASHTO T 152, shall be 6.5% as a target value, with a maximum variation of ± 1.0%. When specified or authorized by the Engineer, approved admixtures for the purpose of improving workability or for retardation may be used according to the Engineer's instructions.

The final mix design is subject to the approval of the Engineer.

2. Compressive Strength.

The concrete in reinforced earth face panels shall have the following minimum compressive strength.

Strength prior to moving	Strength at 28 days
1800 psi	4000 psi
(12.4 MPa)	(27.6 MPa)

Acceptance of the concrete face panels with respect to compressive strength will be determined on a lot basis. The lot will consist of all production units (batches of concrete or panels) produced within a consecutive 7 day production period. Production units will be randomly selected in accordance with the production day sample sizes of Table A and tested for compressive strength. Compression tests shall be made on the test specimens in accordance with Materials I.M. 315.

Table A

Production Day Quantities	Sample Size
35 cubic yards (27 m^3) or less (50 panels or less)	1
35-70 cubic yards (27-54 m^3) (50 –100 panels)	2
70-100 cubic yards (54-81 m^3) (100-150 panels)	3
Over 100 cubic yards (81 m^3) (150 panels)	5

A minimum of four test cylinders shall be cast for each production unit sampled. All of the specimens shall be cured in accordance with this Developmental Specification.
Two specimens shall be tested at 7 days and 2 at 28 days. A test will be the average compressive strength of 2 cylinders.

Acceptance of the lot will be made if all acceptance tests in a lot are greater than 4000 psi (27.6 MPa) or provided no individual 28 day compressive-strength test result falls below 3500 psi (24.8 MPa), and the average 28 day compressive strength of all test results of the lot equals or exceeds the acceptance limits set forth in Table B.

The acceptance limits of Table B shall also apply to core compressive strength test results.

Table B. Lot Acceptance Limits

Number of Lot Acceptance Tests	Average of all Lot Acceptance Tests Must Equal or Exceed these Limits
3-7	4000 psi + 0.33R*
	(27.6 MPa + 0.33R*)
8-15	4000 psi + 0.44R*
	(27.6 MPa + 0.44R*)
16+	4000 psi+ 0.46R*
	(27.6 MPa + 0.46R*)

*R is the range – the difference between the highest and lowest acceptance test result.

3. Reinforcement.
Reinforcement steel shall be per Article 4151.03 of the Standard Specifications and shall also be epoxy coated per Article 4151.03, B.

4. Casting.
Earth reinforcement connections or ties, PVC pipe, and lifting devices shall be set in place to the required dimensions and tolerances, prior to casting. The panels shall be cast on a flat area, the front face of the panel at the bottom, the back face at the upper part. Reinforcement connection guides shall be set on the rear face. The concrete in each unit shall be placed without interruption and shall be consolidated by use of an approved vibrator, supplemented by such hand-tamping as may be necessary to force the concrete into the corners of the forms and to prevent the formation of stone pockets or cleavage planes. Clear form oil of the same manufacturer shall be used throughout the casting operation.

5. Concrete Finish.
The formed front face shall have a uniform surface as designated. The rear face of the panel shall be roughly screeded to eliminate open pockets of aggregate and surface distortions.

6. Marking.
The date of manufacture, production lot number, and piece-mark shall be clearly scribed on the rear face of each panel.

7. Fasteners.
Bolts and nuts for fasteners, where required, shall be of type and length recommended by the Wall Design Engineer; high strength, conforming to ASTM A 325 or equivalent, and galvanized.

8. Tolerances.
All units shall be manufactured within the following tolerances:

a. Lateral position of the strips within 1 inch (25 mm)
b. All dimensions within 1/4 inch (5 mm)
c. Angular distortion with regard to the height of the panel shall not exceed 1/4 inch in 5 feet (5 mm in 1.5 m).
d. Surface defects on smooth-formed surfaces shall not exceed 1/8 inch in 5 feet (2.5 mm in 1.5 m). On textured surfaces, surface defects shall not exceed 5/16 inch in 5 feet (8 mm in 1.5 m).

9. Curing.
As soon as practical after casting, but not later than 30 minutes, the panels shall be covered with wet burlap and kept wet. Within two hours of the initial covering, water shall be applied to the burlap by means of a continuous, pressure-sprinkling system that is effective in keeping the burlap wet during the initial curing period. The initial curing period shall continue until the minimum moving strength is obtained.

After the initial curing period is complete, panels may be moved from the casting beds to a secondary curing area and covered with one layer of wet burlap and one layer of 2 mil (50 µm) plastic, secured to retain curing moisture. The concrete face panels shall not be uncovered more than 30 minutes during the moving process. Curing shall continue until the specified strength is obtained.

Steam curing procedures may be approved by the Engineer.

10. Removal of Forms.
The forms shall remain in place until they can be removed without damage to the unit.

11. Testing and Inspection.
Acceptability of the precast units will be determined on the basis of compression tests and visual inspection.

The precast units will be considered acceptable, regardless of age, when compression test results indicate the concrete will meet the specified 28-day strength. The Contractor or the Contractor's supplier shall furnish facilities and collaborate with the Engineer so that all necessary sampling and testing is done in an expeditious and satisfactory manner, subject to approval of the Engineer. Panels will be considered acceptable for placement in the wall when 7-day strengths exceed 80% of 28-day requirements.

12. Rejection.
Units may be subject to rejection because of failure to meet any of the requirements specified above. In addition, any or all of the following defects may be sufficient cause for rejection:

a. Defects that indicate imperfect molding.
b. Defects indicating honeycombed or open-texture concrete.

13. Handling, Storage, and Shipping.
All units shall be handled, stored, and shipped in such a manner as to eliminate the danger of chipping, cracks, fractures, and excessive bending stresses. Panels in storage shall be supported on firm blocking located immediately adjacent to earth reinforcing connections to avoid damage.

B. Leveling Pad.
This concrete may be any mix the supplier markets as having a nominal strength of 3500 psi (24.1 MPa).

C. Joint Materials.

1. Horizontal and Vertical Joints.
Cover for horizontal and vertical joints between panels shall be a polyester fabric meeting requirements of Article 4196, C, of the Standard Specifications and acceptable to the MSE wall company. Adhesives used to temporarily attach the fabric to the back of the facing panels shall be subject to approval by the Engineer.

2. Bearing or Filter Pads.
Where required, bearing and filter pads shall be of the quality and dimensions recommended by the MSE wall company, subject to approval of the Engineer.

D. Subdrains.
Subdrains shall be perforated, plastic pipe of one of the types described in Article 4143.01, C, of the Standard Specifications. If the size is not designated, the nominal diameter shall be not less than 4 inches (100 mm) nor more than 6 inches (150 mm).

Standard Road Plan RF-19E Type A outlet shall be provided and fitted with a Standard Road Plan RF-19E rodent guard.

E. Backfill.
Granular Backfill material for the entire reinforced earth zone shall be furnished by the Contractor, unless otherwise specified in the contract documents. When identified as MSE wall design requirement in the contract documents, the granular backfill for any core-outs, other remedial/ ground improvement location, or behind the reinforced zone, shall be furnished by the Contractor unless otherwise specified in the contract documents. Contractor furnished Granular Backfill material shall meet the requirements of Section 4133 of the Standard Specifications, except that the % passing the No. 200 (75 micron) sieve shall not exceed 5.0%.

The backfill shall meet the following criteria for electrochemical requirements:

Requirement	Test Method
Resistivity > 3000 ohm-cm	AASHTO T 288
pH range 5 to 10	AASHTO T 289
Chlorides < 100 ppm	AASHTO T 291
Sulfates < 200 ppm	AASHTO T 290
Organic content < 1%	AASHTO T 267

The Engineer will take two samples from the source of the granular backfill material to determine the electrochemical levels. The source of backfill shall be approved by the Engineer before placement.

F. Earth Reinforcing.
All reinforcing shall be carefully inspected to insure they are true to size and free from defects that may impair their strength and durability.

1. Reinforcing and Tie Strip.
Tie strips shall be shop-fabricated from hot-rolled steel conforming to the minimum requirements of ASTM A 570, Grade 50, or equivalent. Galvanization shall conform to the minimum requirements of ASTM A 123 or equivalent. Reinforcing strips shall be hot rolled from bars to the required shape and dimensions. Their physical and mechanical properties shall conform to ASTM A 572, Grade 65, or equivalent. Galvanization shall conform to ASTM A 123. Strips shall be cut to lengths and tolerances shown on the plans or recommended. Holes for bolts shall be punched in the locations shown.

2. Reinforced Mesh
Reinforcing mesh shall be prefabricated from smooth bars meeting the requirements of ASTM A 82 and A 185. Reinforcing mesh shall be galvanized in accordance with ASTM A 123. The mesh connector shall be galvanized in accordance with ASTM A 153. The mesh shall be cut to lengths and tolerances shown on the plans or on the shop drawings.

01068.04 CONSTRUCTION

A. Construction Supervision.
MSE units and reinforcement material suppliers shall provide a qualified and experienced representative on site at beginning of wall construction for up to 3 work days at no additional cost to the Contracting Authority. The Contractor's field construction supervisor shall have demonstrated experience and be qualified to direct all work at the site.

B. Excavation.
Excavation shall conform to the limits and construction stages shown on the contract documents. Any core-outs or other remedial/ground improvement procedures identified in the construction drawing shall be completed and approved prior to start of MSE wall construction. Temporary or other excavation lines shown or depicted in the construction drawings are for right of way, quantity calculation, and/or other design purposes only.

C. Foundation Soil Preparation.
The foundation for the structure shall be graded level for a width equal to or exceeding the length of reinforcing mesh or strips, unless otherwise shown on the construction drawings. Prior to wall construction, the foundation shall be compacted with a smooth-wheel, vibratory roller.

D. Leveling Pad.
At each panel leveling pad, an unreinforced concrete leveling pad shall be provided as shown on the construction drawings. The footing shall be cured a minimum of 24 hours before placement of wall panels.

E. Wall Erection.

1. Panels.
For erection, panels are to be handled by means of a lifting device set into the upper edge of the panels. Panels should be placed in successive horizontal lifts in the proper sequence as backfill placement proceeds. As fill material is placed behind a panel, the panels shall be maintained in position by means of temporary wooden wedges placed in the joint at the junction of the two adjacent panels on the external side of the wall. External bracing may also be required for the initial lift. Vertical tolerances and horizontal alignment tolerance shall not exceed 3/4 inch (19 mm) when measured along a 10 foot (3 m) straight edge. The maximum allowable offset in any panel joint shall be 3/4 inch (19 mm). The overall vertical tolerance of the wall shall not exceed 1/2 inch per 10 feet (12.5 mm per 3 m) of wall height.

2. Coping.
The coping shall be placed as shown on the construction drawings. Precast coping units shall be mixed, cast, and cured with the same concrete mixture and in the same manner as used for construction of the panels. Cast-in-place coping may be constructed in the same manner or Class C structural concrete may be used; however, the aggregates shall meet the same quality requirements as are specified in Article 01048.03, A, 1.

F. Subdrains.
The subdrains shall be installed behind the bottom course of panels in direct contact with the granular backfill material. A second subdrain shall be installed at the base of the temporary excavation backslope, behind the reinforced earth zone, and at an elevation similar to the subdrain behind the bottom course of panels. If required, vertical pipes shall be placed as shown on the plans. The subdrain shall be installed as shown in the construction drawings to maintain gravity flow of water to outside of the reinforced earth zone. The subdrain should outlet into a storm sewer access or along a slope at an elevation lower than the lowest point of the pipe within the reinforced earth zone.

The contract documents may require additional subdrain at the base of the granular backfill in a core-out, if used.

Porous backfill, in accordance with Section 4131 of the Standard Specifications, shall be placed around the subdrain to a minimum cover of 3 inches (75 mm).

G. Backfill Placement.
Backfill placement shall closely follow the erection of each lift of panels. At each level for earth reinforcing, backfill should be roughly leveled before placing and connecting reinforcement.

Reinforcing shall be placed normal to the face of the wall. The placement of lifts shall closely follow panel erection. The Contractor shall decrease this lift thickness, if necessary, to obtain the specified density.

At the end of each day's operations, the Contractor shall shape the last level of backfill so as to permit runoff of rainwater away from the wall face.

Backfill shall be compacted in accordance with Article 2107.08 of the Standard Specifications. The Granular Backfill in the reinforced zone and any Granular Backfill placed behind the reinforced zone shall be placed as shown in the construction drawings in maximum 8 inch (200 mm) lifts and compacted to a minimum 95% of standard Proctor density (ASTM D 698). The moisture limits shall be between 1% under optimum moisture to not more than 2% over optimum moisture content. Backfill compaction shall be accomplished without disturbance or distortion of earth reinforcing and panels. Tamping-type rollers or other rollers which damage the reinforcing shall not be used. The required compaction in a strip 3 feet (1 m) wide adjacent to the backside of the wall shall be achieved using light mechanical tampers; however, compaction within this strip will not be subjected to density testing.

Granular Backfill and/or other materials placed in a core-out or other remedial/ground improvement location shall be compacted to a minimum of 98% of Standard Proctor density or as otherwise defined in the construction documents.

H. Earth Reinforcing Placement.
Tie strips or mesh shall be placed in horizontal layers as detected in the construction drawings. When tie strips or mesh can not be placed as detailed in the construction drawings, the Contractor shall submit a modified placement plan as recommended by the Wall Design Engineer for approval by the Engineer.

I. Surface Water Control
The cross sections in the contract documents will show excavation for any temporary backslope behind the reinforced earth zone. The backslope shall be protected from surface water which will affect stability of the backslope. Positive control and discharge shall be provided for surface water in the area behind the backslope. If a gravity outlet is available, the base of any core-out excavation shall be drained by temporary trench outlet or subdrain until Granular Backfill is installed in the core-out.

01068.05 METHOD OF MEASUREMENT.
The work involved in construction of Mechanically Stabilized Earth Retaining Walls will be measured as follows:

A. Mechanically Stabilized Earth Retaining Wall.
The Engineer will measure the area of Mechanically Stabilized Earth Retaining Wall in square feet (square meters), from measurements of the front face of the wall in place. The height will be measured from the top of the leveling pad to the top of the wall, including coping.

B. Granular Backfill Material.
The quantity of Granular Backfill material, in tons or cubic yards (megagrams or cubic meters), that is placed in the reinforced earth zone; identified as an MSE wall design requirement in the contract documents for any core-out or other remedial/ground improvement location; or placed in the temporary excavation zone behind the reinforced earth zone as shown in the contract documents, will be measured in tons or cubic yards (megagrams or cubic meters).

C. Excavation.
Excavation for preparing the reinforced earth zone for construction of the wall and any core-outs or other remediations/ground improvement areas included in the contract documents will be classed and measured according to Section 2102 of the Standard Specifications.

01068.06 BASIS OF PAYMENT.
Payment for construction of Mechanically Stabilized Earth Retaining Walls, satisfactorily placed, will be as follows:

A. Mechanically Stabilized Earth Retaining Wall.
For the number of square yards (square meters) of Mechanically Stabilized Earth Retaining Wall constructed, the Contractor will be paid the contract unit price per square yard (square meter). This payment shall be full compensation for furnishing and erecting the MSE retaining wall including the design, foundation preparation, leveling pad, panels, coping, earth reinforcement placement, and subdrains in accordance with the contract documents. Subdrains within core-out areas, if required in the contract documents, will be measured and paid for separately.

B. Granular Backfill Material.
For Contractor furnished Granular Backfill material for the reinforced earth zone; any core-outs or other remedial/ground improvement locations; and placed in the temporary excavation zone behind the reinforced earth zone as shown in the contract documents, the Contractor will be paid for the quantity of material furnished, hauled, actually placed, and compacted for the contract unit price per ton or cubic yard (megagram or cubic meter) up to the contract quantity.

If the Contractor determines that the slope shown for the temporary excavation zone in the contract documents is not adequate for safety, they shall provide written notification to the Engineer, including a copy of a slope stability analysis, and identification of the additional quantity of Granular Backfill that will be needed, before the work begins. The slope stability analysis shall be done by a Professional Engineer licensed in the State of Iowa. The cost of the slope stability analysis shall be the responsibility of the Contractor. If approved by the Engineer, the additional quantity for Granular Backfill will be adjusted in accordance with Article 1109.03, A, of the Standard Specifications.

C. Excavation.
For the quantity of each class of excavation for preparing the reinforced earth zone and any core-outs or other remediation/ground improvement areas included in the contract documents for construction of the wall, the Contractor will be paid as provided in Article 2102.14, A, of the Standard Specifications. This will normally be included for payment with other excavation required by the contract documents.

If the Contractor determines that the slope shown for the temporary excavation zone in the contract documents is not adequate for safety, they shall provide written notification to the Engineer, including a copy of a slope stability analysis, and identification of the additional quantity of excavation that will be needed, before the work begins. The slope stability analysis shall be done by a Professional Engineer licensed in the State of Iowa. The cost of the slope stability analysis shall be the responsibility of the Contractor. If approved by the Engineer, the additional quantity for excavation will be adjusted in accordance with Article 1109.03, A of the Standard Specifications.

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Jim Berger	**Office:** Materials	**Item 22**
Submittal Date: March 2007	**Proposed Effective Date:** October 2007	
Developmental Specification: DS-01093 **Title:** Pavement Smoothness	**Other:**	

Specification Committee Action: Defer to next meeting. Materials will re-submit with revised incentives.

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

Specification Committee Approved Text:

Comments: The Office of Materials explained they have added conditions for which the SS should not be applied. They stated guidelines will be placed in the Design Manual. The Office of Design commented they don't normally pick applicable SSs for projects. The Office of Materials responded it would need to be stated in plans which applies.

The Specifications Section asked if this SS would be the default for all Interstate and Primary unless stated otherwise in plans. The Office of Materials verified this. The Specifications Section suggested making a reference to this SS part of field exam checklist. The criteria for use of this SS could be placed in a technical memorandum and attached to the SS on the website. Designers could refer to the technical memorandum for appropriate application of zero blanking band. The Office of Design wanted to know if someone will be on the field exam to make the decision. The Office of Materials commented that District Materials Engineer should be able to.

The Office of Contracts wanted to know who would add the SS to Project Scheduling System (PSS). The Specifications Section commented it would be automatic for all Interstate and Primary projects. The Specifications Section suggested placing this SS in the GS now. The Office of Contracts would not need to add to every Interstate and Primary project. A plan note could be used to assign the SS.

District 6 asked who adds DSs. The Office of Design noted they add them to PSS, but refer to a list provided to them. The Specifications Section commented that most SSs are tied to a bid item. They noted this would be an SS that would not be tied to a bid item.

The Specifications suggested the possibility of adding the proposed SS to the book as Section 2316, B and renumbering the revised Section 2316 as Section 2316, A. The Office of Construction asked if there are automatic checks that can check to see if an SS applies. The Office of Contracts verified this. The Specifications Section commented they will leave as an SS for now and the Office of Contracts will add the SS to the project.

The Office of Materials noted contractors feel incentives for multi-lane and Interstate pavements should be higher. Levels are based on 1994 values. The Office of Construction noted that contractors may be already including incentives as part of bid. They aren't sure that raising incentives will result in smoother pavements. District 6 Construction added that higher incentives may bring in more bidders. The Statewide Operations Bureau expressed concern that it may only reward contractors who are already doing well. The Office of Construction noted this may force those not doing as well to improve. The Office of Materials will insert some numbers and bring back to next meeting.

The Office of Construction noted that in a meeting with AGCI, AGCI requested changing the language in Section 2317 to begin and end segments at expansion joints when joints are replaced or new. When a raise plate has been installed, it is impossible to avoid a bump. The Office of Construction will submit revised language for Section 2317 for the May meeting.

Specification Section Recommended Text:					
Comments:					
Member's Requested Change: **(Do not use 'Track Changes', or 'Mark-Up'. Use ~~Strikeout~~ and Highlight.** See attached Draft SS-010XX					
Reason for Revision: Move the DS to and SS for general use.					
County or City Input Needed (X one)			**Yes**	**No** X	
Comments:					
Industry Input Needed (X one)			**Yes** X	**No**	
Industry Notified:	**Yes** X	**No**	**Industry Concurrence:**	**Yes**	**No**

Comments:

-The specification and IM is written for a profilograph. The requirements need to be changed to better accommodate the profilers. Testing to a day's end header and testing side roads are problems. Maybe test all side roads at the end at one time. Maybe allow stopping 500'+ short of the header on PCC.

-Need to clearly identify how to handle things like utility access in the testing path and railroad crossings. Mathy said MN and WI DOT have a good process for handling RR crossings.

-Urban paving especially when matching curb and gutter affects ride especially when held tight to the elevation of the curb and gutter.

-P.I for 2" overlays. The suggestion was to provide the Design Office guidance on when to require the P.I. on single lift sections. Sometimes it's reasonable to have and sometimes the cost isn't justified.

-Still some concern over the impact of the existing pavement on the ride quality of the overlay.

-It can be inefficient to try to run the high speed profiler after each day's paving especially on 4-lane with lane closures in place. Mathy indicated the other states they work in have gone away from the daily testing. South Dakota does all the acceptance testing.

-Reporting was brought up by the industry. Maybe it is time to allow the computer printout from the computerized profiler and profilographs. Some inconsistencies on what residencies expect was mentioned.

-Contractors would like us to consider the provision for grinding into incentive on individual segments. Suggested they bring it up at the joint ICPA-Spec Meeting.

-Contractors feel we still need to do something with the grind level on side roads. We talked about the 0.2" band for county and city side roads and 0.0" band for primary side roads. Asked the contractors to propose what they feel is a reasonable grind level.

-Contractors discussed PCC overlays. More difficult to get ride quality.

Draft SS-010XX
(Replaces DS-01093)

Iowa Department of Transportation

SUPPLEMENTAL SPECIFICATIONS
FOR INTERSTATE AND PRIMARY
PAVEMENT SMOOTHNESS

Effective Date
October 16, 2007

THE STANDARD SPECIFICATIONS, SERIES 2001, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SUPPLEMENTAL SPECIFICATIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

Replace all of Section 2316 with the following:

~~**Section 2316. Pavement Smoothness**~~

010XX.01 GENERAL.
Pavement smoothness shall be evaluated for all Interstate and Primary main line pavement surfaces, and all other road surfaces included on Primary projects, except when specifically excluded or modified by the contract documents. ~~Pavement smoothness shall not be evaluated for all other roads unless specified in the contract documents.~~ Main line pavement is defined as all permanent pavement for through lanes. ~~traffic lanes, including tapers to parallel lanes or through lanes at intersections, tapers to climbing lanes, and tapers to ramps and loops. Pavement smoothness shall also be evaluated for all interchange ramps and loops, side roads, auxiliary lanes, and bridge approaches.~~ Exclusions from profilograph testing are detour pavement, shoulders, crossovers, and individual sections of pavement less than 50 feet (15 m) in length.

~~If this specification is required by contract documents on non-Primary projects let by the Department, it will be added in its entirety without modification.~~

The Engineer may determine the pavement smoothness according to Materials I.M. 341 using a 10 foot (3 m) straightedge or rolling straightedge on surfaces excluded from profilograph testing. The variation of the surface from the testing edge of the straightedge shall not exceed 1/8 inch (3 mm) between any two contacts, longitudinal or transverse. The Contractor shall correct all irregularities exceeding the specified tolerance using equipment and methods approved by the Engineer. After the Contractor has corrected an irregularity, the Engineer may perform monitor testing of the area to verify compliance with the specified tolerance.

010XX.02 EQUIPMENT.
The Contractor shall provide and operate an Ames type or California type profilograph to produce a profilogram (profile trace) of the surface tested ~~determine the pavement profile~~ in accordance with Materials I.M. 341. Other types of profilographs or profilers that produce compatible results and meet the requirements of Materials I.M. 341 may be used. The Contractor's operator shall be trained and certified to operate the profilograph as required by the Contracting Authority.

If the Contractor's profilograph has a mechanical recorder, the Contractor shall provide automated trace reduction equipment in accordance with Materials I.M. 341. If the Contractor's profilograph has a computerized recorder, the trace produced will be evaluated without further reduction.

010XX.03 SURFACE TOLERANCES, TESTING, AND EVALUATION.
A pavement ~~section~~ segment is defined as a continuous area of finished pavement 0.1 mile (161 m) in length and one lane (10 to 12 foot (3.0 to 3.7 m) nominal) in width. A partial ~~section~~ segment resulting from an interruption of the continuous pavement surface (i.e. bridge approaches, side road tie-ins, the cessation of the daily paving operations, etc.) is subject to the same evaluation as a whole ~~section~~ segment.

A. Tolerances.
The Contractor shall produce pavement with an average profile index per 0.1 mile (161 m) ~~section~~ segment as shown in the ~~t~~Table 010XX.03 below.

TABLE 010XX.03: TOLERANCE FOR AVERAGE PROFILE INDEX PER 0.1 MILE (161m)
(0 inch blanking band)

Surface Type	Profile Index For greater than 45 mph	Profile Index For 45 mph or less and ramps
	Inches per mile (mm/km)	Inches per mile (mm/km)
PCC Pavement	~~45.0 or less (710 or less)~~ 40.0 or less (630 or less)	65.0 or less (1025 or less)
HMA Pavement	~~40.0 or less (630 or less)~~ 35.0 or less (550 or less)	45.0 or less (710 or less)

B. Testing.
The Contractor shall determine the pavement profiles for each lane according to the procedures for one lane, as shown in Materials I.M. 341 except for main line traffic lanes ~~and through lanes~~ which will be tested in the wheel paths. Round the trace scallops to the nearest 0.01 inch (0.1 mm). The wheel paths are defined as the 3 feet (0.9 m) and 9 feet (2.7 m) from the center line or lane line. Average the two wheel path profile indexes for each ~~section~~ segment. Additional profiles may be taken only to define the limits of an out-of-tolerance surface variation. The Engineer may use a 10 foot (3 m) straightedge (or other means) to detect irregularities outside the required trace paths. The Engineer may also use the straightedge to delineate the areas that require corrective action.

Bridge approaches shall be tested according to Section 2317 of the Standard Specifications.

C. Evaluation.
The Contractor shall determine a profile index based on the 0 inch (0 mm) blanking band following the same procedures shown in Materials I.M. 341 for each ~~section~~ segment of finished pavement surface except for:

1. Primary ~~S~~side road~~s~~ connections less than 600 feet (180 m) in length.
2. Non-primary side road connections, which shall be evaluated according to Section 2316 of the Standard Specifications.
~~**2**~~**3.** Bridge approaches, ~~less than 50 feet (15 m)~~ which shall be evaluated according to Section 2317.
~~**3**~~**4.** Storage lanes, turn lanes, and other auxiliary lanes less than 600 feet (180 m).
~~**4**~~**5.** Pavement less than 8.5 feet (2.6 m) in width.
~~**5**~~**6.** The 16 feet (5 m) before and the 16 feet (5 m) beyond the ends of the section when the Contractor is not responsible for the adjoining surface.
~~**6**~~**7.** ~~On HMA single lift pavement overlays pavements with no milling.~~ Single lift pavement overlays 2 inches (50 mm) or less in thickness, unless the existing surface has been corrected by milling or scarification.

~~7~~**8.** Runout tapers on HMA overlays at existing pavement, bridges, or bridge approach sections where the thickness is less than the design thickness.

~~The Contractor shall determine, for information only, a profile index based on the 0.2 inch (5.1 mm) blanking band.~~

For the following situations, the profile index will be evaluated. If the average profile index exceeds the tolerances listed in Article 010XX.03, A, the Contractor may elect to eliminate that area from the profile index for the day's paving operation and evaluate the area using a 10 foot (3 m) straightedge as outlined in Article 010XX.01.

1. Horizontal curves with a centerline radius of less than 1000 feet (300 m) and the pavement within the superelevation transition of such curves.
2. Crest and sag vertical curves with an L/A < 100 where L is the length of curve in feet and A is the grade change in percent (L/A < 30.5 where L is the length in meters and A is the grade change in percent).

The Contractor shall determine a daily average profile index for each day's paving operation. A day's paving operation is defined as a minimum of 0.1 mile (161 m) ~~section~~ segment of pavement placed in a day. If less than 0.1 mile (161 m) ~~section~~ segment is paved, the day's production will be grouped with the next day's production. If the production of the last day of project paving is less than 0.1 mile (161 m) ~~section~~ segment, it will be grouped with the previous day's production.

During the first 3 days of the paving operation, and after long shut-down periods, the pavement shall be tested and the test report furnished to the Engineer and District Materials Engineer by the end of the next day worked following the placement. On HMA pavement, the testing shall be performed as soon as the pavement has cooled sufficiently to permit testing. The Engineer and the Contractor will use the results of the initial testing to evaluate the paving methods and equipment. If the initial paving operation produces acceptable results, the Contractor may continue paving.

If the day's average profile index exceeds the values in Table 010XX.03 ~~45.0 inches per mile (710 mm/km) (65.0 inches per mile (1025 mm/km) on roadways with posted speeds of 45 mph or less)~~, the paving operation will be suspended until corrective action is taken by the Contractor. When the paving is resumed, the paving operations will be evaluated with the start-up testing procedures in the preceding paragraph.

The Contractor shall make the profilogram and evaluation available to the Engineer and District Materials Engineer during the project and furnish both at the end of the project. The evaluation of the trace shall be performed according to Materials I.M. 341. The test report shall be furnished to the Engineer within 2 working days after placement of the pavement and again within 2 working days after any corrections are made.

010XX.04 CORRECTIVE ACTIONS.
The pavement will be evaluated in 0.1 mile (161 m) ~~sections~~ segments using the profilograph, to determine pavement ~~sections~~ segments where corrective work or pay adjustments will be necessary. Each individual profilograph trace will be evaluated (not the average of multiple traces) to determine the areas where corrective action on 0.5 inches (12.7 mm) bumps and dips is needed.

Within each 0.1 mile (161 m) ~~section~~ segment, all areas representing high points (bumps) or low points (dips) with deviations in excess of 0.5 inches (12.7 mm) in a length of 25 feet (7.6 m) or less shall be corrected by the Contractor regardless of the profile index value. Pavement ~~sections~~ segments excluded from profile index evaluation in Article 010XX.03 shall be evaluated for high points and low points with deviations in excess of 0.5 inches (12.7 mm) in a length of 25 feet (7.6 m) or less and shall be corrected by the Contractor.

Bumps and dips equal to or exceeding 0.5 inches (12.7 mm) in a length of 25 feet (7.6 m) or less shall be identified separately.

A. Roadways with a posted speed greater than 45 mph.
Any 0.1 mile (161 m) ~~section~~ segment, including bumps, having an initial average profile index of greater than those tolerances shown in Article 010XX.03, A, shall be corrected to reduce the average profile index to those shown in ~~the t~~Table 010XX.04 below, or replaced at the Contractor's option. On ~~sections~~ segments where corrections are made, the Contractor shall test the pavement to verify that corrections have met the average profile index as shown in ~~the t~~Table 010XX.04 below.

B. Roadways with a posted speed of 45 mph, or less, and ramps.
Any 0.1 mile (161 m) ~~section~~ segment, including bumps, having an initial average profile index of greater than those tolerances shown in Article 010XX.03, A, shall be corrected to reduce the average profile index to those shown in ~~the t~~Table 010XX.04 below, or replaced at the Contractor's option. On ~~sections~~ segments where corrections are made, the Contractor shall test the pavement to verify that corrections have met the average profile index as shown in ~~the t~~Table 010XX.04 below.

TABLE 010XX.04: AVERAGE PROFILE INDEX PER 0.1 MILE (161 m) AFTER CORRECTIONS (0 inch blanking band)

Surface Type	Profile Index For greater than 45 mph	Profile Index For 45 mph or less and ramps
	Inches per mile (mm/km)	Inches per mile (mm/km)
PCC Pavement HMA Pavement	40.0 or less (630 or less) 40.0 or less (630 or less)	65.0 or less (1025 or less) ~~45.0 or less (710 or less)~~ 50.0 or less (790 or less)

C. Bridge approach sections shall be corrected according to Section 2317 of the Standard Specifications. ~~having an initial average profile index of 65.1 inches per mile (1026 mm/km) or greater shall be corrected to reduce the profile index to 65.0 inches per mile (1025 mm/km) or less on each trace, or replaced at the Contractor's option. On sections where corrections are made, the pavement will be tested by the Contractor to verify that corrections have produced a profile index of 65.0 inches per mile (1025 mm/km) or less for each trace.~~

D. Corrective work shall be at the Contractor's expense except for the 16 feet (5 m) before and the 16 feet (5 m) beyond the end of the section when the Contractor is not responsible for the adjoining surface. Corrective work shall be completed prior to determining pavement thickness.

Bush hammers or other impact devices will not be permitted.

1. PCC Pavement.
On PCC pavement, corrections shall be made using an approved profiling device or by removing and replacing the pavement. The corrective methods used by the Contractor shall be applied to the full lane width. When completed, the corrected area (full lane width) shall have uniform texture and appearance, with the beginning and ending of the corrected area squared normal to centerline of the paved surface. Where surface corrections are made, transverse grooving will not be required.

2. HMA Pavement.
On HMA pavement, corrections shall be made by diamond grinding, by overlaying the area, by replacing the area, or by inlaying the area. If the surface is corrected by diamond grinding, the work and equipment shall be the same as specified for PCC pavement except that the ground surface shall be covered with a seal coat in accordance with Section 2307 of the Standard Specifications with the following modifications:

The binder bitumen may be the emulsion or cutback asphalt used for tack coat, applied at a rate of 0.10 gallon per square yard (0.7 L/m^2). Hand methods may be used for spraying.

The cover aggregate shall be sand, applied at a rate of 10 pounds per square yard (5 kg/m^2). Hand methods may be used may be used for spreading. The sand shall be slightly damp, but with no free moisture, as determined by visual inspection. Embedment shall be by at least one complete pneumatic roller coverage.

This seal coat is intended to be placed immediately after the diamond grinding is completed in the travel lane. The Engineer may approve this construction when road surface temperatures are below 60ºF (16ºC).

Labor, equipment, and materials used for this seal coat will not be paid for, but shall be considered incidental to other items.

If the surface is corrected by overlay, replacement, or inlay, the surface correction shall begin and end with a transverse saw cut normal to the pavement lane lines or edge lines within any one area. The profile of the surface must be smooth with no bumps or dips at the beginning or end ~~or~~ of correction.

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

E. ~~The Engineer may perform profilograph testing on the surface for monitoring and comparison purposes. The procedure for monitoring and comparing results is in Materials I.M. 216.~~ The Engineer will perform verification testing to validate the contractor's certified quality control testing. If the Engineer's verification test results validate the Contractor's test results, the Contractor's results will be used for acceptance. Disputes between the Contractor's and Engineer's test results will be resolved in accordance with Materials I.M. 341. The Engineer may test the entire project length if it is determined that the Contractor certified test results are inaccurate, and the Contractor will be charged for this work at a rate of $400.00 per mile ($250.00 per kilometer), per profile track, with a minimum charge of $800.00. Furnishing inaccurate tests may result in decertification of the Contractor's certified operator.

On lanes over 8.5 feet (2.6 m) in width, for through traffic which requires matching the surface of the new pavement to the surface of an existing pavement, an Average Base Index (ABI) will be determined according to Section 2316 of the Standard Specifications. ~~calculated as shown in Materials I.M. 341; this will be the smoothness base in inches per mile (millimeters per kilometer) for payment for the new pavement unless otherwise specified. The schedule for adjusted payment for the ABI is in Article 2316.05. Should the surface of the existing pavement be specified for correction, smoothness testing for ABI calculation shall be done after correction. Surface correction is required for smoothness exceeding ABI +50 for any section for posted speeds greater than 45 mph or exceeding ABI +85 for any section for posted speeds of 45 mph or less and ramps.~~

010XX.05 PAY ADJUSTMENTS.

Pay adjustments will be based on the initial average profile index determined for the ~~sections~~ segments prior to performing any corrective work. Areas excluded from the profilograph testing and bridges approaches will not be subject to price adjustments.

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

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

A. PCC Pavement.

The payment will be adjusted as shown in ~~the t~~Table 010XX.05A below according to the posted or proposed speed.

TABLE 010XX.05A: SCHEDULE FOR ADJUSTMENT PAYMENT FOR PCC PAVEMENTS (0 inch blanking band)

Profile Index For greater than 45 mph	Profile Index For 45 mph or less and ramps	Dollars per 0.1 mi. ~~section~~ segment per lane	
Inches per mile (mm/km)	Inches per mile (mm/km)	Interstate & Multi-Lane Divided Segments	Other Primary Segments
22.0 or less (345 or less)	25.0 or less (395 or less)		+850.00
22.1 to 23.5 (346 to 370)			+650.00
23.6 to 26.0 (371 to 410)	25.1 to 30.0 (396 to 475)		+450.00
26.1 to ~~45.0~~ 40.0 (411 to ~~710~~ 630)	30.1 to 65.0 (476 to 1025)		0.00
40.1 to 45.0 (631 to 710)	65.1 to 70.0 (1025 to 1105)		-$450.00
45.1 or more (711 or more)	~~65.1~~ 70.1 or more (~~1026~~ 1105 or more)		0.00*

* These ~~sections~~ segments must be corrected to the levels shown in ~~the t~~Table 010XX.04 ~~in Article 2316.04~~.

B. HMA Pavement.

The payment will be adjusted as shown in ~~the t~~Table 010XX.05B below according to the posted or proposed speed.

TABLE 010XX.05B: SCHEDULE FOR ADJUSTMENT PAYMENT FOR HMA PAVEMENTS (0 inch blanking band)

Profile Index For greater than 45 mph	Profile Index For 45 mph or less and ramps	Dollars per 0.1 mi. ~~section~~ segment per lane	
Inches per mile (mm/km)	Inches per mile (mm/km)	Interstate & Multi-Lane Divided Segments	Other Primary Segments
10.0 or less (160 or less)			+750.00
10.1 to 11.5 (161 to 180)	15.0 or less (235 or less)		+500.00
11.6 to 13.5 (181 to 215)			+350.00
13.6 to 15.5 (216 to 245)	15.1 to 20.0 (236 to 315)		+200.00
15.6 to ~~40.0~~ 35.0 (246 to ~~630~~ 550)	20.1 to 45.0 (316 to 710)		0.00
35.1 to 40.0 (551 to 630)	45.1 to 50.0 (711 to 790)		-200.00
40.1 or more (631 or more)	~~45.1~~ 50.1 or more (791 or more)		0.00*

* These ~~sections~~ segments must be corrected to the levels shown in ~~the t~~Table 010XX.04 ~~in Article 2316.04~~.

~~**C. Pavements using ABI.**~~

~~**SCHEDULE FOR ADJUSTMENT PAYMENT FOR PAVEMENTS USING ABI (0 inch blanking band)**~~

~~Profile Index For greater than 45 mph~~	~~Profile Index 45 mph or less and ramps~~	~~Contract Price Adjustment~~
~~Inches per mile (mm/km)~~	~~inches per mile (mm/km)~~	~~Dollars per section*~~
~~0 to ABI~~ ~~ABI +.1 (1) to ABI +30.0 (470)~~ ~~ABI +30.1 (471) to ABI +40.0 (630)~~ ~~ABI +40.1 (631) to ABI+50.0 (790)~~	~~0 to ABI~~ ~~ABI +0.1 (1) to ABI +45.0 (710)~~ ~~ABI +45.1 (711) to ABI +65.0 (1025)~~ ~~ABI +65.1 (1026) to ABI +85.0 (1340)~~	~~0.00~~ ~~300.00~~ ~~500.00~~ ~~800.00~~

~~* Payment will be based on results after correction.~~

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Tom Reis / Daniel Harness	**Office:** Specifications Section	**Item 23**
Submittal Date: 4/2/07	**Proposed Effective Date:** 10/16/07	
Supplemental Specification: SS-01020 **Title:** Pre-Engineered Steel Truss Recreational Trail Bridge	**Other:**	

Specification Committee Action: Approved as is.			
Deferred:	**Not Approved:**	**Approved Date:** 4/12/07	**Effective Date:** 10/16/07
Specification Committee Approved Text: See attached Draft SS.			
Comments: None.			
Specification Section Recommended Text:			
Comments:			

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

See attached Draft SS.

Reason for Revision: Add reference to working drawings in Article 1105.03. Language has been added to 1105.03 regarding submitting working drawings.

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

Draft SS-010XX
(Replaces SS-01020)

Iowa Department of Transportation

SUPPLELMENTAL SPECIFICATIONS
FOR
PRE-ENGINEERED STEEL TRUSS
RECREATIONAL TRAIL BRIDGE

Effective Date
October 16, 2007

THE STANDARD SPECIFICATIONS, SERIES 2001, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SUPPLEMENTAL SPECIFICATIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

01020.01 DESCRIPTION.
These Supplemental Specifications are for an engineered truss bridge of welded steel construction and shall be regarded as minimum standards for design and construction.

The bridge shall be manufactured by a company on the approved manufacturer's list in Materials I.M. 557, Appendix D.

01020.02 DESIGN.
A minimum of 5 years experience in design and fabrication of engineered bridge trusses is required for an approval of a manufacturer. In addition, a manufacturer requesting approval shall provide information regarding similar projects that were previously completed, including references.

Structural design of the bridge shall be by a Professional Engineer licensed in the State of Iowa. Allowable Design Stresses shall be in accordance with the "Standard Specifications for Highway Bridges" adopted by AASHTO.

A. Design Loads and Related Requirements.

1. The bridge shall be designed for an evenly distributed live load of 85 pounds per square foot (4 kPa) applied to the complete width of the deck area shown in the plans. The bridge shall also be designed to withstand a concentrated load located at mid-span equal to 10,000 pounds (4.5 Mg) plus 30% for impact loading. Vehicle loads are occasional and shall be 20,000 cycles or less. The bridge shall be designed for buoyancy due to submergence.

2. The bridge shall be designed for a minimum horizontal wind load of 30 pounds per square foot (1.4 kPa) applied to the entire truss as if fully enclosed. Seismic and loads combinations shall be applied in accordance with the AASHTO Specifications for Highway Bridges noted in these Supplemental Specifications. No other horizontal loads need to be applied to the bridge.

3. Bridge camber at center of bridge span shall be 1% of the total bridge span. The bridge shall be cambered to offset full dead load deflections.

4. The bridge shall be designed to accommodate a temperature differential of 100°F (38°C). Teflon or other approved slip pads shall be placed between the bearing and setting plates provided by the bridge manufacturer. At least 1 inch (25 mm) clearance shall be provided between the bridges and the abutments.

5. Welded Tubular Connection Design shall be in accordance with the Structural Welding Code from ANSI/AWS D1.1, Chapter 10 Tubular Structures.

6. Shop Drawings: Manufacturer's standard schematic drawings and diagrams:

a. Shop drawings shall be unique drawings, prepared to illustrate the specific portion of the project.

b. All relative design information such as member sizes, bridge reactions, and general notes shall be clearly specified on the shop drawings.

c. Shop drawings shall be accurately prepared to be complete in every respect. The shop drawings shall have cross referenced details and sheet numbers. All shop drawings shall be signed and sealed by a Professional Engineer licensed in the State of Iowa.

d. Shop drawings shall be submitted in accordance with Article 1105.03 of the Standard Specifications.

7. Maximum deflection due to live load plus impact shall not exceed that specified in the plans.

8. If intermediate piers are required for the bridge over a railroad, a minimum 25 foot (7.62 m) horizontal and vertical clearance, or a distance as specified elsewhere in the contract documents, from the track is required.

B. Geometry.

1. Low profile (pony truss) half through truss design.

2. Provide one diagonal per panel. Chords, diagonals, verticals, and bracing shall be tube steel.

3. The bridge shall be a minimum 72 inches (1.8 m) from top of deck to top of railing.

01020.03 Materials.

A. Structural Thickness.
Structural tubing shall have a minimum material thickness of 1/4 inch (6 mm). All other structural members shall have a minimum material thickness of at least 5/16 inch (8 mm).

B. Unpainted Bridges.
The bridges shall be unpainted and fabricated from high strength weathering steel. All fabrications shall be produced from high strength, low alloy, atmospheric corrosion resistant ASTM A 606 or ASTM A 242 plate and structural shapes. Minimum yield (F_y) shall be greater than 50,000 psi (345 MPa).

C. Field Splices.
Field splices shall be bolted with high strength bolts in accordance with ASTM A 325. Type 3 bolts are required for Weathering Steel bridges, in accordance with ASTM A 325 or A 490. Field connection bolts shall be tightened by the "turn of the nut method" to obtain proper torque.

D. Welding Materials.
Welding materials shall be in accordance with the AWS. Welders shall be certified in accordance with AWS D1.1.

E. Railings and Accessories.

1. All railings shall be located on the inside surface of the trusses. The railings shall be fabricated from steel. Rub rail shall be fabricated from 2 inch by 8 inch (50 mm by 200 mm) treated wood.

2. The railings shall have a smooth inside surface with no protrusions or depressions.

3. In accordance with AASHTO, the top railings shall be a minimum of 54 inches (1.4 m) above the floor for bicycle applications.

4. Safety railings shall have a maximum opening of 4 inches (100 mm). All ends of angles and tubes shall be welded and ground smooth.

F. Toe Plates.
Toe plates are required. Use 6 inch x 5/16 inch (150 mm x 8 mm) plate located 2 inches (50 mm) above the floor decks.

G. Anchor Bolts.
Anchor bolts shall be provided by the manufacturer.

01020.04 Construction.

A. Fabrication.
Quality, fabrication, and shop connections shall be in accordance with AASHTO Specifications for Highway Bridges noted in these Supplemental Specifications.

B. Welding.

1. Welding operators shall be properly accredited experienced operators, each of whom shall submit satisfactory evidence of experience and skill in welding structural steel with the kind of welding to be used in the project, and who have demonstrated the ability to make uniform good welds meeting the size and type of weld required.

2. Welding shall be in accordance with Article 2408.13 of the Standard Specifications. Welds shall utilize E70 or E80 series electrodes that have the same weathering characteristics as corrosion-resistance steel, or the gas metal arc welding process (Short Circuiting Transfer) with Carbon Dioxide/Argon shielding gas with ER80-D2 filler material conforming to AWS A5.28.

C. Quality Assurance.
All costs associated with the following inspection requirements for fabrication and finishes shall be paid by the manufacturer.

1. Welded tubular connections qualified per AWS D1.1-94 using short circuited gas metal arc process.

2. All welds to be visually inspected.

3. Base material certifications to be supplied by the material suppliers.

D. Weld Testing.
Nondestructive weld testing shall be performed by an independent agency, and shall be paid for by the manufacturer.

1. Ten percent of all welds to be magnetic particle tested.

2. Ultrasonic testing of all top and bottom chord, full penetration welds.

E. Finishes.
Unpainted bridges of weathering steel shall be sand blasted in accordance with the SSPC Surface Preparation Specification No. 6.

F. Delivery and Erection.

1. The bridge shall be delivered by truck to a location nearest to the site accessible by roadways. The Contractor shall be responsible for unloading the bridge from the truck at the time of arrival.

2. The manufacturer shall notify the Contractor in advance of the expected arrival time. Information regarding delays after the truck departs the plant such as inclement weather, delays in permits, rerouting by public agencies, or other circumstances shall be passed on to the Contractor as soon as possible.

3. The manufacturer shall advise the Contractor of the actual lifting weights, attachment points, and all other pertinent information needed to install the bridge. Unloading, splicing, bolting, and proper lifting equipment is the responsibility of the Contractor.

01020.05 METHOD OF MEASUREMENT.
The Engineer will measure, by count, each Pre-engineered Steel Truss Recreational Trail Bridge installed.

01020.06 BASIS OF PAYMENT.
For each Pre-engineered Steel Truss Recreational Trail Bridge furnished and erected, the Contractor will be paid the unit contract price. This payment shall be full compensation for designing, manufacturing, delivering, erecting, and assembling the unit complete as shown in the contract documents, with all foundations, footings, abutments, piers, pier caps, bearing plates, pads, bolts, anchor bolts, grouting, decking, railing, and any other materials, labor, and equipment necessary to complete the bridge in place.

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Tom Reis / Daniel Harness			**Office:** Specifications Section		**Item 24**
Submittal Date: 4/2/07			**Proposed Effective Date:** 10/16/07		
Supplemental Specification: SS-01027 **Title:** Modular Block Retaining Wall			**Other:**		
Specification Committee Action: Approved as is.					
Deferred:	**Not Approved:**	**Approved Date:** 4/12/07		**Effective Date:** 10/16/07	
Specification Committee Approved Text: See attached Draft SS.					
Comments: None.					
Specification Section Recommended Text:					
Comments:					
Member's Requested Change: (Do not use **'Track Changes'**, or **'Mark-Up'**. Use ~~**Strikeout**~~ and **Highlight**. See attached Draft SS.					
Reason for Revision: Add reference to working drawings in Article 1105.03. Language has been added to 1105.03 regarding submitting working drawings.					
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:					

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(Replaces SS-01027)

Iowa Department of Transportation

SUPPLEMENTAL SPECIFICATIONS
FOR
MODULAR BLOCK RETAINING WALL

Effective Date
October 16, 2007

THE STANDARD SPECIFICATIONS, SERIES 2001, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SUPPLEMENTAL SPECIFICATIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

01027.01 DESCRIPTION.
This work includes furnishing and installing modular block retaining wall units, wall fill, and granular backfill to the lines and grades shown on the plans. Modular block retaining walls are defined as systems that usually do not require mesh or strips in the backfill behind the wall facing to limit backfill stresses by reinforcing the soil structure.

01027.02 DESIGN.

A. Wall Design Engineer.
The wall design shall be performed by a Professional Engineer licensed in the State of Iowa that prepares and seals the design submittals as defined in this Supplemental Specification.

B. Submittals.
Prior to the beginning of the wall construction, ~~T~~the Contractor shall, in accordance with Article 1105.03 of the Standard Specifications, submit for approval ~~to the Engineer~~ detailed design calculations including soil bearing pressure, construction drawings, and shop drawings prepared and sealed by the Wall Design Engineer ~~for approval at least 30 days prior to the beginning of the wall construction~~. If required, a detailed explanation of the design properties and quality control test limits for the geogrid reinforcement shall be submitted with the design.

01027.03 MATERIALS.
The wall shall be manufactured by a company on the approved manufacturer's list in Materials I.M. 445.04.

A. Concrete Units.
Exterior dimensions may vary. Each unit is required to have a minimum of 0.5 square foot (0.046 m^2) of face area and an 8 inch (200 mm) maximum vertical dimension. The face of the block shall be straight with split face texture.

Units shall have angled sides and capable of attaining concave and convex alignment curves minimum radius of 5.0 feet (1.5 m).

Units shall be interlocked with connector pins recommended by the supplier/manufacturer or by integrally cast shear lugs.

Units shall be interlocked as to provide minimum of 1/4 inch (6 mm) of setback per each course of wall height.

Connector pins shall be of the type, size, and design recommended by the supplier/manufacturer for the type of masonry unit and backfill reinforcement material used in the wall.

B. Leveling Pad.
The type of materials used for the leveling pad shall be as recommended by the supplier/manufacturer. If granular material is recommended for the leveling pad, it shall be specific backfill meeting the requirements of Section 4132 of the Standard Specifications. If unreinforced concrete is recommended for the leveling pad, it shall be Class C concrete meeting the requirements of the Materials I.M. 529 and Section 2403 of the Standard Specifications.

C. Unit Fill.
Unit fill is defined as the granular material that is within the concrete facing units.

Fill for units shall be porous backfill meeting the requirements of Section 4131 of the Standard Specifications.

D. Backfill.
If required, backfill shall be granular backfill, meeting the requirements of Section 4133 of the Standard Specifications.

E. Tieback Reinforcement.
Tieback reinforcement, when required, shall be of type, size, and design recommended by the supplier/manufacturer.

01027.04 CONSTRUCTION.

A. Excavation.
The Contractor shall excavate in accordance with Section 2102 of the Standard Specifications. This includes benching of the existing roadway foreslopes and the excavation area under the pad line. The Contractor shall be careful not to disturb existing embankment materials beyond what is needed to construct the wall.

At locations where the wall is to be constructed adjacent to a fill section, the fill shall be constructed and compacted to 95% Standard Proctor Density prior to beginning wall construction. After the fill has been constructed, the cut shall be made to permit a minimum of 12 inches (300 mm) beyond the wall to be backfilled with granular materials that meet the requirements of Section 4131 of the Standard Specifications. Granular material shall be placed and compacted on a course-by-course basis.

B. Foundation Soil Preparation.
The Contractor shall prepare foundation soil as required for the leveling pad.
Foundation soil shall be examined by the Engineer to assure that the actual foundation soil strength meets or exceeds the assumed design bearing strength. Soils not meeting required strength shall be removed and replaced with soil meeting the design criteria.

The earth foundation shall have a density equal to or greater than 90% Standard Proctor Density. The earth foundation shall be stepped at the required intervals to keep it a minimum 1 foot (300 mm) below the finished grade.

The Contractor shall place granular backfill as replacement material for over excavation in the foundation soil. The Contractor shall compact the replacement material in accordance with Article 2107.08 of the Standard Specifications.

C. Leveling Pad.
The Contractor shall place the leveling pad a minimum of 6 inches (150 mm) in thickness. The Contractor shall construct the leveling pad to insure complete contact of the retaining wall unit with the leveling pad. Gaps will not be allowed between the retaining wall unit and the leveling pad.

D. Unit Installation.
The Contractor shall ensure that units are in full contact with the leveling pad.

The Contractor shall place units side by side for the full length of wall alignment. Alignment may be done by means of a string line or offset from the base line.

The Contractor shall install connecting pins and fill units, and tamp fill.

The Contractor shall sweep all excess material from top of units and install the next course. The Contractor shall ensure each course is completely filled prior to proceeding to the next course.

The Contractor shall place each course so that pins protrude into adjoining courses a minimum of 1 inch (25 mm) or to tolerances recommended by the supplier/manufacturer. Two pins are required per unit. The Contractor shall repeat the above procedure for each course to the top of wall height.

At the end of each course where the wall changes elevation, the Contractor shall turn the units into the backfill. The Contractor shall place units to create the minimum radius possible. The Contractor shall install a minimum of 3 units into the grade. Only the front face of the units shall be visible from the side of the wall.

E. Backfill Placement.
Granular backfill placement for the reinforcing wall shall closely follow the erection of each lift of wall. At each level for reinforcing, backfill shall be roughly leveled before placing and connecting reinforcement. Reinforcing shall be placed normal to the face of the wall. The placement of the lifts shall closely follow panel erection. The Contractor shall decrease this lift thickness, if necessary, to obtain the specified density.

At the end of each day's operations, the Contractor shall shape the last level of backfill to permit runoff of rainwater away from the wall face.

The Contractor shall compact granular backfill in accordance with Article 2107.08 of the Standard Specifications. The moisture limits shall be from 3% under optimum moisture to not more than the optimum moisture content.

The Contractor shall place and compact backfill without disturbing or distorting the tieback reinforcement or the wall. The Contractor shall not use tamping-type rollers or other rollers that may damage the reinforcing. The Contractor shall use light mechanical tampers to achieve the required compaction in a strip 3 feet (1 m) wide adjacent to the backside of the wall, however, compaction within this strip will not be subjected to density testing.

F. Tieback Reinforcement Installation For Retaining Walls, Where Specified.
The Contractor shall place the tieback reinforcement horizontally on compacted backfill, connect it to the concrete wall units and embed it a minimum of 12 inches (300 mm). The Contractor shall hook reinforcement over pins, pull taut, and anchor before backfill is placed on the tieback reinforcement.

The Contractor shall remove slack in the tieback reinforcement at the wall unit connections.

The Contractor shall place tieback reinforcement at the proper elevation and orient it as recommended by the supplier/manufacturer.

The Contractor shall correct orientation (roll direction) of the tieback reinforcement, if applicable, as recommended by the supplier/manufacturer.

The Contractor may secure the tieback reinforcement in-place with staples, pins, sand bags, or backfill depending on the fill properties, fill placement procedures, and weather conditions.

Overlaps:

1. The Contractor does not need to overlap uniaxial tieback reinforcement in the across-the-roll direction, except to contain the fill at the slope face when wrap-around facing is used. The Contractor shall overlap uniaxial tieback reinforcement a minimum of 48 inches (1.2 m) in the roll direction.
2. The Contractor shall spread a layer of compacted backfill, a minimum of 4 inches (100 mm) in thickness, between uniaxial tieback reinforcement layers in the area to be overlapped.

01027.05 METHOD OF MEASUREMENT.
The Engineer will measure the area of Modular Block Retaining Wall in square feet (square meters), from measurements of the front face of the wall in place. The height will be measured from the top of the leveling pad to the top of the wall, including cap block.

01027.06 BASIS OF PAYMENT.
For the quantity of Modular Block Retaining Wall constructed, the Contractor will be paid the contract unit price per square foot (square meter). This payment shall be full compensation for furnishing and erecting the modular block retaining wall, including the design, excavation, foundation soil preparation, leveling pads, concrete units, connector pins, unit fill for inside the blocks, granular backfill, and tieback reinforcement if required, in accordance with the contract documents.

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Tom Reis / Daniel Harness			**Office:** Specifications Section		**Item 25**
Submittal Date: 4/2/07			**Proposed Effective Date:** 10/16/07		
Supplemental Specification: SS-01028 **Title:** Segmental Retaining Wall			**Other:**		
Specification Committee Action: Approved as is.					
Deferred:	**Not Approved:**	**Approved Date:** 4/12/07		**Effective Date:** 10/16/07	
Specification Committee Approved Text: See attached Draft SS.					
Comments: None.					
Specification Section Recommended Text:					
Comments:					
Member's Requested Change: (Do not use 'Track Changes', or 'Mark-Up'. Use ~~Strikeout~~ and Highlight. See attached Draft SS.					
Reason for Revision: Add reference to working drawings in Article 1105.03. Language has been added to 1105.03 regarding submitting working drawings.					
County or City Input Needed (X one)			**Yes**	**No** X	
Comments:					
Industry Input Needed (X one)			**Yes**	**No X**	
Industry Notified:	**Yes**	**No** X	**Industry Concurrence:**	**Yes**	**No**
Comments:					

Draft SS-010XX
(Replaces SS-01028)

Iowa Department of Transportation

SUPPLEMENTAL SPECIFICATIONS
For
SEGMENTAL RETAINING WALL

Effective Date
October 16, 2007

THE STANDARD SPECIFICATIONS, SERIES 2001, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SUPPLEMENTAL SPECIFICATIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

01028.01 DESCRIPTION.
This work includes furnishing and installing segmental retaining wall units, wall fill, and granular backfill to the lines and grades shown on the plans. Segmental retaining walls (SRW) are defined as systems which usually require mesh or strips in the backfill behind the wall facing to limit backfill stresses by reinforcing the soil structure.

01028.02 DESIGN.

A. Wall Design Engineer.
The wall design shall be performed by a Professional Engineer licensed in the State of Iowa that prepares and seals the design submittals as defined in this Supplemental Specification.

B. Minimum Design Requirements.
Retaining walls shall be designed in accordance with ASTM C 90 and recommendations of the National Concrete Masonry Association (NCMA) Design Manual for Segmental Retaining Walls. The following table summarizes the minimum design criteria and is based upon the structure being critical:

External Stability	Minimum Factor of Safety
Sliding, Fs_{sl}	1.5
Overturning, Fs_{ot}	2.0
Bearing Capacity, Fs_{bc}	2.0

Internal Stability	Minimum Factor of Safety
Tensile Overstress, Fs_{to}	1.2
Pullout, Fs_{po}	1.5

Local Stability	Minimum Factor of Safety
Fs_{sl} (Maximum Unreinforced Height)	1.5
Fs_{ot} (Maximum Unreinforced Height)	2.0
Shear Facing Units, Fs_{sc}	1.5
Facing Connection Strength, Fs_{cs}	1.5
Global Stability	1.5

C. Submittals.
Prior to the beginning of reinforced SRW construction, ~~T~~the Contractor shall, in accordance with Article 1105.03 of the Standard Specifications, submit for approval ~~to the Engineer~~ detailed design

calculations including soil bearing pressure, construction drawings, and shop drawings prepared and sealed by the Wall Design Engineer ~~for approval at least 30 days prior to the beginning of reinforced SRW construction~~. A detailed explanation of the design properties for the geogrid reinforcement shall be submitted with the design. Additionally, the quality control test limits for the geogrid meeting those design requirements shall be submitted.

01028.03 MATERIALS.
The wall shall be manufactured by a company on the approved manufacturer's list in Materials I.M. 445.04.

The supplier of all substantial material components and the Wall Design Engineer shall have demonstrated experience in reinforced soil-reinforced SRWs for previous projects.

A. Concrete Units.
Concrete segmental units and cap blocks shall conform to the requirements of ASTM C 1372 except that they shall have a minimum 28 day compressive strength of 5500 psi (40 MPa) for any one individual unit, and 6000 psi (41 MPa) for the average of three units. The 24 hour water absorption rate shall not exceed 5%. The top surface of cap blocks shall be sloped 10:1 from front to back or from a crown at the center.

Sampling and testing of block shall conform to ASTM C 140, except that Section 6.2.4 shall be replaced with:

> The specimens shall be coupons cut from a face shell of each unit and sawn to remove any face shell projections. The coupon size shall have a height to thickness ratio of 2 to 1 before capping and a length to thickness ratio of 4 to 1. The coupon shall be cut from the unit such that the coupon height dimension is in the same direction as the unit height dimension. Compressive testing of full size units shall not be permitted. The compressive strength of the coupon shall be assumed to represent the net area compressive strength of the whole unit.

Freeze-thaw durability testing will be required as described in ASTM C 1372 Sections 4.2, 4.2.1, and 7.3. Testing shall be in accordance with ASTM C 1262.

Specimens shall meet weight (mass) loss limits for testing in water as required in ASTM C 1372 Section 4.2.1.

Specimens shall also be tested in a 3% saline solution and conform with either of the following:

1. The weight (mass) loss of each of five test specimens at the conclusion of 40 cycles shall not exceed 1% of its initial weight (mass); or
2. The weight (mass) loss of four out of five specimens at the conclusion of 50 cycles shall not exceed 1.5% of its initial weight (mass).

Testing shall be continued until one of the following occurs:

1. The weight (mass) loss each of five test specimens exceeds 2% of its initial weight (mass); or
2. The weight (mass) loss of one of the five test specimens exceeds 2.5% of its initial weight (mass); or
3. The specimens have been tested for at last 100 cycles.

Complete durability test reports for water and saline conditions, including the cycle number at which failure occurred, shall be submitted to the Engineer.

All units shall be sound and free of cracks or other defects that would interfere with the proper placing of the unit or significantly impair the strength of permanence of the construction.

SRW units dimension shall not differ more than ±1/16 inch (±1.5 mm).

B. Leveling Pad.
The type of materials used for the leveling pad shall be as recommended by the supplier/manufacturer. If granular material is recommended for the leveling pad, it shall be specific backfill meeting the requirements of Section 4132 of the Standard Specifications. If unreinforced concrete is recommended for the leveling pad, it shall be Class C concrete meeting the requirements of the Materials I.M. 529 and Section 2403 of the Standard Specifications.

C. Unit Fill.
If required by the construction drawings, fill of concrete units in place shall be Porous Backfill meeting the requirements of Section 4131 of the Standard Specifications.

D. Subdrains.
The subdrains shall be a minimum of 4 inches (100 mm) in diameter and meet the requirements of Article 4143.01, B, of the Standard Specifications.

Standard Road Plan RF-19E Type A outlet shall be provided and fitted with a Standard Road Plan RF-19E rodent guard.

E. Backfill.
The fill soil material in the entire reinforced earth zone shall be Granular Backfill meeting the requirements of Section 4133 of the Standard Specifications.

F. Geogrid Reinforcement.
The type, strength, and placement location of the reinforcing geogrid reinforcement shall be determined by the Wall Design Engineer. The design properties of the reinforcement shall be determined according to the procedures outlined in NCMA Section 3.5. Detailed test data shall be submitted to the Engineer for approval at least 30 days prior to construction and shall include strength, creep, site damage, and pullout testing.

Geogrid reinforcement shall be of a type recommended by the block supplier to be compatible with the facing units, with a minimum long term design strength of 1500 pounds per foot (1000 kg/m). The geogrid shall be a regular grid structure having an aperture geometry and rib and junction cross-sections sufficient to permit significant mechanical interlock with the granular backfill material. The geogrid shall have high continuity of tensile strength through all ribs and junctions of the grid structure. The geogrid shall have high resistance to deformation under sustained long term design load while in service and shall also be resistant to ultraviolet degradation, to damage under normal construction practices, and to all forms of biological or chemical degradation normally encountered in the granular backfill material.

G. Certifications.
Contractor shall submit to the Engineer a notarized manufacturer's certification, at least 14 days prior to the preconstruction conference, stating that the SRW units meet the requirements of this Supplemental Specification.

Contractor shall submit a notarized manufacturer's certification signed and sealed by an officer of the manufacturer, prior to start of work, stating that the geogrid reinforcement meets the requirements of the SRW unit manufacturer and this Supplemental Specification.

01028.04 CONSTRUCTION.

A. Construction Supervision.
SRW units and geogrid reinforcement material suppliers shall provide a qualified and experienced representative on site at beginning of wall construction for up to 3 days at no additional cost to the Contracting Authority.

The Contractor's field construction supervisor shall have demonstrated experience and be qualified to direct all work at the site.

B. Excavation.
Contractor shall excavate to the lines and grades shown as the reinforced earth zone on the construction drawings. Contractor shall take precautions to minimize over-excavation. Excavation support, if required, shall be designed and at no additional cost to the Contracting Authority.

C. Foundation Soil Preparation.
Foundation soil shall be excavated as required for base course leveling pad dimensions and limits of reinforced earth zone as shown on the construction drawings.

Foundation soil shall be examined by the Engineer to assure that the actual foundation soil strength meets or exceeds the assumed design bearing strength. Soils not meeting required strength shall be removed and replaced with soil meeting the design criteria.

The earth foundation shall have a density equal to or greater than 90 percent Standard Proctor Density. The earth foundation shall be stepped at the required intervals to keep it a minimum 2 foot (600 mm) below the finished grade.

D. Leveling Pad.
The Contractor shall place the leveling pad a minimum of 6 inches (150 mm) in thickness.
The Contractor shall construct the leveling pad to insure complete contact of the retaining wall unit with the leveling pad. Gaps shall not be allowed between the retaining wall unit and the leveling pad.

E. Unit Installation.
Materials shall be installed at the proper elevation and orientation shown in the plans. The concrete segmental units and geogrid reinforcement shall be installed in general accordance with the approved submittals in Section 01028.02, B. The plans shall govern in any conflict between the two requirements.

F. Subdrains.
Subdrains shall be installed as shown in the construction drawings to maintain gravity flow of water to outside of the reinforced earth zone. The subdrains shall outlet into a storm sewer access or along a slope at an elevation lower than the lowest point of the pipe within the SRW reinforced earth zone.

Porous backfill, in accordance with Article 01028.03, C, shall be placed around the subdrain to a minimum cover of 3 inches (75 mm).

G. Backfill Placement.
The granular backfill shall be compacted in accordance with Article 2107.08 of the Standard Specifications. The granular backfill shall be placed as shown on the construction drawings in maximum 8 inch (200 mm) lifts and compacted to a minimum 95% of standard Proctor density (ASTM D 698). The moisture limits shall be between 3% under optimum moisture to not more than the optimum moisture content. Backfill shall be placed, spread, and compacted in such a manner that eliminates the development of wrinkles and/or movement of the geogrid reinforcement.

Only hand-operated compaction equipment shall be allowed within 3 feet (1 m) of the front of the wall face.

Tracked construction equipment shall not be operated directly on the geogrid reinforcement. A minimum backfill thickness of 6 inches (150 mm) is required prior to operation of tracked vehicles over the geogrid reinforcement. Turning of tracked vehicles should be kept to a minimum to prevent tracks from displacing the fill and damaging the geogrid reinforcement.

Rubber-tired equipment may pass over the geogrid reinforcement, if in accordance with the manufacturer's recommendations. Sudden braking and sharp turning should be avoided.

H. Geogrid Installation.
Overlap of the geogrid in the design strength direction shall not be permitted. The design strength direction is that length of geogrid reinforcement perpendicular to the wall face and shall be one continuous piece of material. Adjacent sections of geogrid shall be butted in a manner to assure 100% coverage after placement.

Geogrid reinforcement should be installed under tension. Apply a nominal tension to the reinforcement and maintain it by staples, stakes, or hand tensioning. The tension applied may be released after the geogrid reinforcement has been covered and held in place with soil fill.

01028.05 METHOD OF MEASUREMENT.

A. Segmental Retaining Wall.
The Engineer will measure the area of Segmental Retaining Wall in square feet (square meters), from measurements of the front face of the wall in place. The height will be measured from the top of the leveling pad to the top of the wall, including coping or cap block.

B. Granular Backfill Material.
The quantity of granular backfill material hauled and placed in the reinforced earth zone will be measured in tons or cubic yards (megagrams or cubic meters) as stipulated in the contract documents.

C. Excavation.
Excavation for preparing the reinforced earth zone for construction of the wall will be classed and measured according to Section 2102 of the Standard Specifications.

01028.06 BASIS OF PAYMENT.

A. Segmental Retaining Wall.
For the quantity of Segmental Retaining Wall constructed, the Contractor will be paid the contract unit price per square foot (square meter). This payment shall be full compensation for furnishing all materials, tools, and labor for the performance of all work necessary to construct the wall, in accordance with the contract documents, including the design, foundation preparation, leveling pad, geogrid fabric, porous backfill, and subdrains.

B. Granular Backfill Material.
For Contractor furnished granular backfill material for the reinforced earth zone, the Contractor will be paid for the quantity of material furnished, hauled, placed, and compacted for the contract unit price per ton or cubic yard (megagram or cubic meter) as stipulated in contract documents.

C. Excavation.
For the quantity of each class of excavation for preparing the reinforced earth zone for construction of the wall, the Contractor will be paid as provided in Article 2102.14, A, of the Standard Specifications. This will normally be included for payment with other excavation required by the contract documents.