Iowa Department of Transportation

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

June 12, 2008

Members Present:	John Adam	Statewide Operations Bureau
	Tom Reis, Chair	Specifications Section
	Daniel Harness, Secretary	Specifications Section
	Gary Novey	Office of Bridges & Structures
	Roger Bierbaum	Office of Contracts
	Larry Jesse	Office of Local Systems
	Jim Berger	Office of Materials
	Doug McDonald	District 1-Marshalltown RCE
	Dan Redmond	District 4-District Materials
	Troy Jerman	Office of Traffic & Safety
Members Not Present:	Mike Kennerly	Office of Design
	Bruce Kuehl	District 6-District Construction
	John Smythe	Office of Construction
Advisory Members Present:	Tom Parham	FHWA
Others Present:	Deanna Maifield	Office of Design
	Kevin Merryman	Office of Construction

Tom Reis, Specifications Engineer, opened the meeting. Before discussing the agenda items, the Office of Construction was asked to comment on some new items for incentives that will be added to contracts starting with the October 21, 2008 letting. Incentives will be added for pavement smoothness, pavement thickness, and coarseness workability. A proposal note will explain the items. The Office of Contracts added this would put these incentives into the cash flow models. They noted these are incentives that are normally paid on projects and affect overruns on change orders. These would be non-participating items and would apply only to Primary and Interstate projects. The following items were then discussed in accordance with the agenda dated June 1, 2008:

1. Article 4115.04, Aggregate Use Durability Requirements.

The Office of Materials requested a change to specify that crushed stone be used for architectural concrete.

2. DS-01081, Night Work Lighting.

The Office of Construction requested a change to modify the requirements for night work lighting.

3. DS-01083, Fabric Formed Concrete Structure Revetment.

The Office of Bridges and Structures requested a change to eliminate shop drawings.

4. DS-01110, Modular Lane Separator System.

The Specifications Section requested a change to remove the list of approved manufacturers from the specification and to open up the specification to allow additional products.

5. DS-01096, Water Main.
DS-01097, Sanitary Sewer.
DS-01098, Storm Sewer.

The Specifications Section requested changes to several Developmental Specifications to reflect changes to the SUDAS specifications.

6. Section 2541, Crack and Joint Cleaning and Sealing (HMA Surfaces).
Section 2542, Crack and Joint Cleaning and Sealing (HMA Surfaces).

The Specifications Section requested changes to address concerns over proper identification of what should be sealed both during the field exam and during construction, and establish a predetermined price for sealant material.

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Jim Berger	**Office: Materials**	**Item 1**
Submittal Date: 05.14.2008	**Proposed Effective Date:** April 2009	
Article No.: 4115.04 **Title:** Aggregate Use Durability Requirements**.**	**Other:**	

Specification Committee Action: Approved as is.

Deferred:	**Not Approved:**	**Approved Date:** 6/12/08	**Effective Date:** 4/21/09

Specification Committee Approved Text:

Article 4115.04, Aggregate Use Durability Requirements.

Add following the table:

Use crushed stone coarse aggregate for:

- Aesthetic concrete cast with form liners or rustication. This includes Mechanically Stabilized Earth (MSE) walls and noise walls.
- Concrete receiving color sealer or texture treatments.

Concrete for precast box culverts that are to receive color sealer.

Comments: The Office of Materials explained the District Materials Engineers have noted problems with staining on architectural concrete, especially MSE walls. After the meeting, the Specifications Section discovered that DS-01105, Mechanically Stabilized Earth (MSE) Retaining Wall, calls for Class 3 durability aggregate. The Specifications Section and Office of Materials agreed to remove the text regarding Class 2 durability.

Specification Section Recommended Text:

4115.06, Architectural Concrete.

Add as a new article:

Use Class 2 durability crushed stone coarse aggregate for:

- Aesthetic concrete cast with form liners or rustication. This includes Mechanically Stabilized Earth (MSE) walls and noise walls.
- Concrete receiving color sealer or texture treatments.
- Concrete for precast box culverts that are to receive color sealer.

Comments: Since the emphasis of the requested change is specifying crushed stone coarse aggregate be used for architectural concrete, the Specifications Section is suggesting this change be added as a new article rather than as a note to Table 4115.04, which places emphasis on aggregate durability.

Member's Requested Change (Redline/Strikeout):

Section 4115. Coarse Aggregate for Portland Cement Concrete

Add: As the last note to Table 4115.04

For aesthetic concrete cast with form liners or rustication use crushed stone coarse aggregate. This includes MSE and Noise walls. Use crushed stone coarse aggregate for concrete receiving color sealer or texture treatments and concrete for precast box culverts for bikeways and pedestrian traffic.					
Reason for Revision: Specifying crushed stone for architectural concrete to avoid aggregate staining.					
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 Smythe	**Office:** Construction	**Item 2**
Submittal Date: May 19, 2008	**Proposed Effective Date:** October 2008	
Article No.: DS-01081 **Title:** Night Work Lighting	**Other:**	

Specification Committee Action: Approved as is.			
Deferred:	**Not Approved:**	**Approved Date:** 6/12/08	**Effective Date:** 9/16/08

Specification Committee Approved Text: See attached Draft DS.

Comments: The Office of Construction explained the main purpose of lighting is to let motorists know there is construction activity. After a site visit, they concluded that lighting that extends out 25 feet (7.62 m) is adequate. This will allow several types of portable lighting to meet the Specifications.

The Office of Construction asked if this DS could be implemented sooner than October 2008. The Specifications Section will change the Effective Date to September 16, 2008.

Specification Section Recommended Text: See attached Draft DS.

Comments:

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

See attached specification.

Reason for Revision: Contractors have found it difficult to find portable lights meeting the specifications. Light towers do not work well. These revisions will open up the specification to allow other products to be used.

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

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

Comments: The Office of Construction visited a construction site to investigate other potential light equipment that would meet the revised specification.

DRAFT DS-01XXX
(Replaces DS-01081)

Iowa Department of Transportation

DEVELOPMENTAL SPECIFICATIONS
FOR
NIGHT WORK LIGHTING

Effective Date
September 16, 2008

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.

01XXX.01 DESCRIPTION
This work consists of furnishing, installing, operating, maintaining, moving, and removing night time lighting to illuminate construction work areas for night work when construction activities (vehicles, equipment, or workers) are within 15 feet (4.6 m) of an open lane of traffic. Night work is defined as work performed between 30 minutes before sunset and 30 minutes after sunrise.

01XXX.02 LIGHTING PLAN
The Contractor shall submit a lighting plan to the Engineer for review no later than the Preconstruction Conference. The lighting plan shall show the areas to be illuminated, type and layout of the lighting systems, and calculations of the averaged maintained lighting intensity.

Night work lighting shall be provided in areas where construction equipment or workers are active within 15 feet (4.6 m) of an open lane of traffic ~~,~~ and shall illuminate the work area and extend a minimum of ~~50 feet (15.2 m)~~ 25 feet (7.6 m) in advance and beyond the work area ~~ahead and behind such equipment or workers~~. The lighting shall provide a minimum intensity of 5 foot candles (54 lux) over the entire ~~work~~ area described above. The light sources shall be positioned to not interfere with or impede traffic in any direction and not cause glare for motorists or spillover onto adjacent properties.

Illumination may be accomplished by using a combination of portable lights, floodlights, equipment lights, roadway lights (temporary or existing), or other lighting methods that will provide the required minimum lighting intensity.

The Engineer may require modifications to the lighting setup in order to fit field conditions.

01XXX.03 LIGHT METER
The Contractor shall furnish to the Engineer one light meter capable of measuring light intensity in foot candles (lux). Instructions for operating the light meter shall be provided to the Engineer. The light meter will remain the property of the Contractor upon completion of night work.

01XXX.04 TRAFFIC CONTROL
All vehicles, except ready mix trucks, hauling material to or from the work area during night work as

described in Article DS-01XXX.01 shall display a minimum 16 inch by 48 inch (400 mm by 1200 mm) sign with the legend “DO NOT FOLLOW - INTO WORK AREA” as shown in the appendix of this ~~Developmental S~~specification. The sign shall be orange with black lettering using Type VII (Iowa) sheeting. The sign shall be kept clean in order to maintain its visibility.

All ~~Contractor's~~ vehicles and equipment (except for hand operated equipment) operating or parked within 15 feet (4.6 m) of an open lane of traffic and all vehicles and equipment entering or exiting the work area shall display amber high intensity rotating, flashing, or oscillating lights.

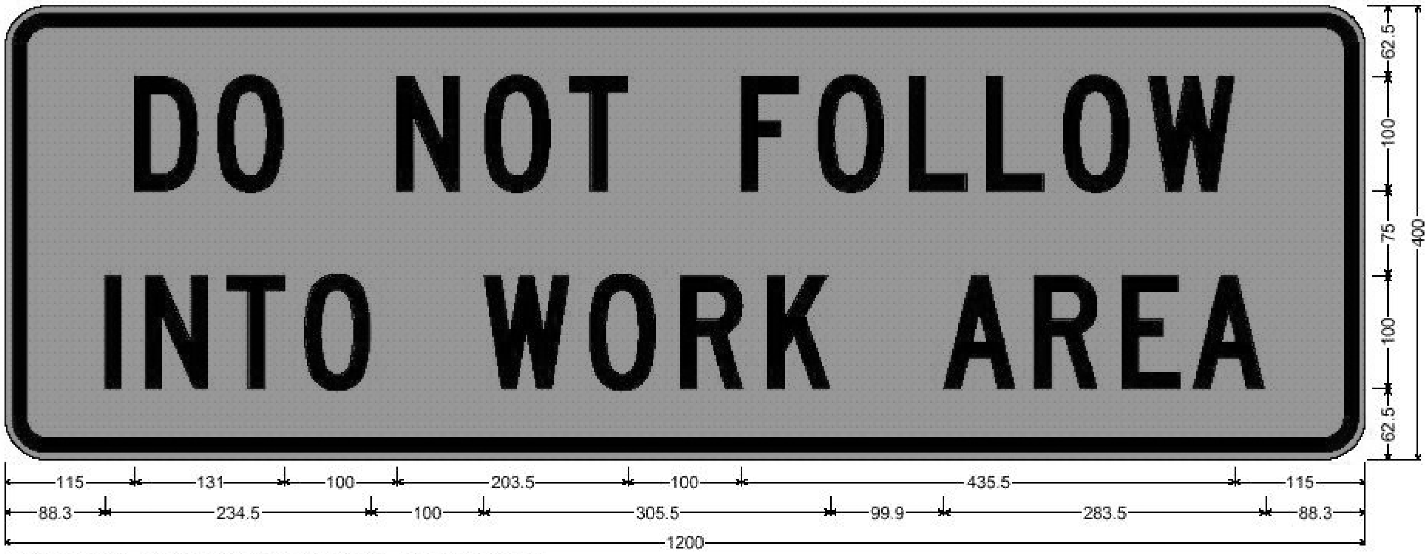
All traffic control devices shall be placed and removed when possible, during daytime hours, unless otherwise specified in the contract documents.

The Contractor shall continually review all traffic control devices, including monitoring of lights, to ensure proper installation and working order.

01XXX.05 METHOD OF MEASUREMENT AND BASIS OF PAYMENT.
All costs associated with furnishing, installing, operating, maintaining, moving, and removing night work lighting and other traffic control requirements required by this ~~Developmental S~~specification, shall be considered incidental to the lump sum bid price for Mobilization.

APPENDIX

METRIC

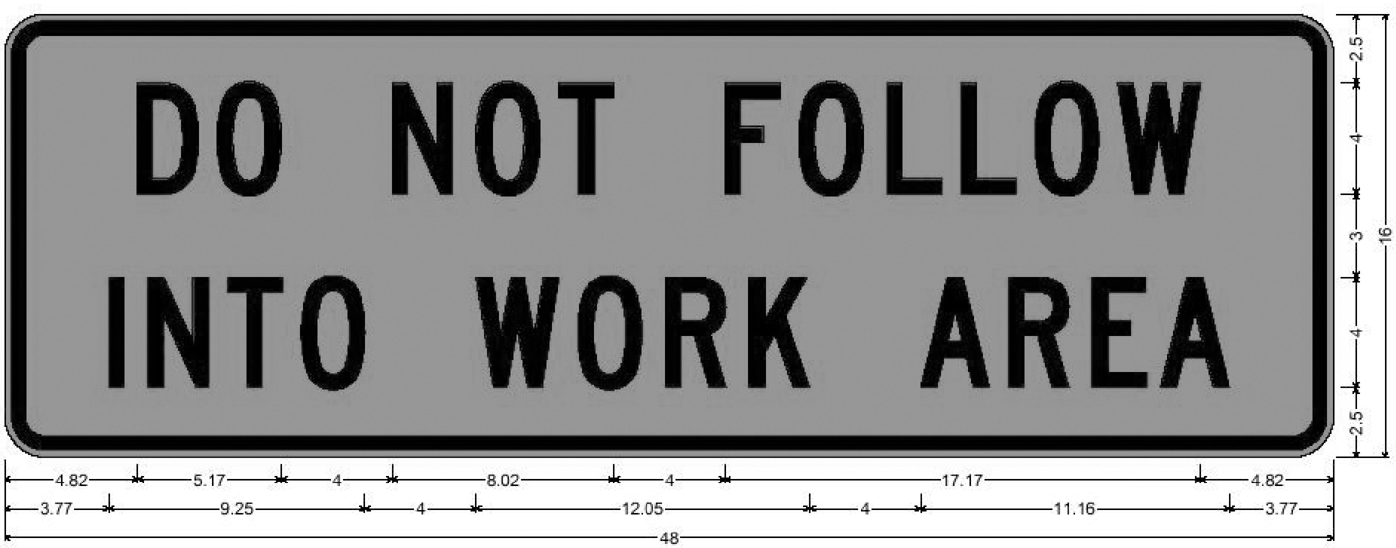


37.5mm Radius, 12.5mm Border, 6.3mm Indent, Black on Orange;
"DO NOT FOLLOW" C; "INTO WORK AREA" C;
Table of widths and spaces.

115.0	D 55.5	17.0	O 58.5	100.0	N 55.5	21.5	O 58.5	17.0	T 51.0	100.0	F 51.0	17.0	O 58.5	21.5	L 51.0	17.0	L 51.0	17.0	O 58.5	17.0	W 76.0	115.0

88.3	I 14.0	21.5	N 55.5	17.0	T 51.0	17.0	O 58.5	100.0	W 76.0	17.0	O 58.5	21.4	R 55.5	21.5	K 55.5	100.0	A 63.5	17.0	R 55.5	21.5	E 51.0	11.5	A 63.5	88.3

ENGLISH



1.50" Radius, 0.50" Border, 0.25" Indent, Black on Orange;
"DO NOT FOLLOW" C; "INTO WORK AREA" C;
Table of widths and spaces.

4.82	D 2.19	0.67	O 2.31	4.00	N 2.19	0.84	O 2.32	0.67	T 2.00	4.00	F 2.00	0.68	O 2.31	0.84	L 2.00	0.68	L 2.00	0.67	O 2.32	0.67	W 3.00	4.82

3.77	I 0.56	0.84	N 2.19	0.68	T 2.00	0.67	O 2.31	4.00	W 3.00	0.68	O 2.31	0.85	R 2.18	0.84	K 2.19	4.00	A 2.50	0.68	R 2.19	0.84	E 2.00	0.45	A 2.50	3.77

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Gary Novey	**Office:** Bridges and Structures	**Item 3**
Submittal Date: 6/3/08	**Proposed Effective Date:** September 16, 2008	
Article No.: DS-01083 **Title:** Fabric Formed Concrete Structure Revetment	**Other:**	

Specification Committee Action: Approved as is.

Deferred:	**Not Approved:**	**Approved Date:** 6/12/08	**Effective Date:** 9/16/08

Specification Committee Approved Text: See attached Draft DS.

Comments: The Office of Local Systems pointed out that the list of approved manufacturers for Modular Lane Separators is being placed in a Materials I.M. The Specifications Section noted they will work with the Office of Materials to develop a similar Materials I.M. for the list of approved manufacturers in DS-01083.

Specification Section Recommended Text: See attached Draft DS.

Comments:

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

See attached Draft DS

Reason for Revision: Eliminate shop drawing requirement and make fabric forms plan quantity items.

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

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

DRAFT DS-01XXX
(Replaces DS-01083)

Iowa Department of Transportation

DEVELOPMENTAL SPECIFICATIONS
FOR
FABRIC FORMED CONCRETE STRUCTURE REVETMENT

Effective Date
September 16, 2008

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

01XXX.01 DESCRIPTION.
This work consists of constructing fabric formed concrete revetment as shown on the plans. The revetment is normally used adjacent to bridge substructure units to protect the substructure from excessive scour.

The fabric formed revetment shall consist of specially woven, double-layer synthetic forms filled with a pumpable, fine aggregate concrete grout in such a way as to form a stable revetment of required thickness, weight (mass), and configuration.

The configuration of fabric formed revetment on this project shall be 'Articulating Block Mat' with reinforced polyester cable, and/or 'Armor Units' with or without reinforced with polyester cable in accordance with the contract documents.

01XXX.02 MATERIALS.

A. Fabric Forms.

1. Manufacturers and Products.
Acceptable manufacturers and products are as follows:

- **a.** Donnelly Fabricators, Inc., 970 Henry Terrace, Lawrenceville, GA 30045, telephone 770.339.0108. Products: Texicon™ Articulating Block Mat, Texicon™ Concrete Bags.
- **b.** Hydrotex Synthetics, Inc., 74 Perimeter Center East, Suite 7420, Atlanta, GA 30346-1803, telephone 800.225.0023. Products: Hydrotex™ Articulating Block Mat, Hydrocast™ Armor Units.
- **c.** Armorform, Inc., P.O. Box 710, Jefferson, GA 30549, telephone 706.367.4661. Products: Armorform™ Articulating Block Mat, Armorform™ Armor Bags.
- **d.** Approved equal to the above named products.

The fabric forms supplied shall meet the details and specifications of the above named products as modified by this specification.

2. Fabric and Cables.

Fabric forms shall be fabricated to conform to the dimensions shown in the contract documents. ~~When the plan indicates a finished dimension, t~~ The fabric form dimension shall be adjusted to provide the finished dimension shown following filling with concrete grout including allowances for form material in anchor, terminal, or toe trenches as applicable. See Article 01XXX.02, C, for the requirements for concrete grout for the fabric formed concrete revetment (concrete grout).

The fabric forms shall be composed of synthetic yarns formed into a woven fabric. Yarns used in the manufacture of the fabric shall be composed of nylon and/or polyester. Forms shall be woven with a minimum of 50% textured yarns by weight (mass) to improve adhesion to the concrete grout and to improve filtration. Each layer of fabric shall conform to the physical, mechanical, and hydraulic requirements referenced herein. The fabric forms shall be free of defects or flaws that significantly affect their physical, mechanical, or hydraulic properties.

Fabric used to fabricate the fabric forms shall meet or exceed the values shown for the properties shown in the following table:

Table A - Fabric Form Minimum Property Requirements

Property	Test Method	Units	Armor Unit	Articulating Block Mat
Composition of Yarns			Nylon or Polyester	Nylon or Polyester
Mass Per Unit Area (double-layer)	ASTM D 5261	oz/yd^2 (g/m^2)	14 (470)	12 (403)
Thickness	ASTM D 5199	mils (mm)	28 (0.7)	25 (0.6)
Mill Width		in (m)	76 (1.92)	76 (1.92)
Wide-Width Strip Tensile Strength -Machine	ASTM D 4595	lbf/in (kN/m)	190 (33.2)	140 (24.5)
- Cross	ASTM D 4595	lbf/in (kN/m)	140 (24.5)	110 (19.3)
Elongation at Break - Machine	ASTM D 4595	%	20	20
- Cross	ASTM D 4595	%	30	30
Trapezoidal Tear Strength - Machine	ASTM D 4533	lbf (N)	180 (800)	150 (665)
- Cross	ASTM D 4533	lbf (N)	115 (510)	100 (445)
Apparent Opening Size (AOS)	ASTM D 4751	U.S. Std. Sieve (mm)	60 (0.250)	40 (0.425)
Flow Rate	ASTM D 4491	gal/min/ft^2 (l/min/m^2)	50 (2035)	90 (3665)

Notes:
1. Conformance of fabric to specification property requirements shall be based on ASTM D 4759.
2. All numerical values represent minimum average roll values (i.e., average of test results from any sample roll in a lot shall meet or exceed the minimum values). Lots shall be sampled according to ASTM D 4354.

Mill widths of fabric shall be a minimum of 76 inches (1.92 m). Each selvage edge of the top and bottom layers of fabric shall be reinforced for a width of not less than 1.35 inches (35 mm) by adding a minimum of 6 warp yarns to each selvage construction. Mill width rolls shall be cut to the length required, and the double-layer fabric separately joined, bottom layer to bottom layer and top layer to top layer, by means of sewing thread, to form multiple mill width panels with sewn seams on not less than 72 inch (1.82 m) centers.

All factory-sewn seams shall be downward facing upon completion of the revetment. All seams sewn in the factory shall be not less than 90 lbf/in (15.7 kN/m) when tested in accordance with ASTM D 4884. All sewn seams and zipper attachments shall be made using a double line of U.S. Federal Standard Type 401 stitch. All stitches shall be sewn simultaneously and be parallel to each other, spaced between 0.25 inches to 0.75 inches (6 mm to 9 mm) apart. Each row of stitching shall consist of 4 to 7 stitches per inch (per 25.4 mm). Thread used for seaming shall be

nylon and/or polyester. Field sewing shall be permitted only to join the factory assembled fabric form panels together.

Cables, when required, shall be constructed of high tenacity, low elongation, and continuous filament polyester fibers. Cable shall have a core construction comprised of parallel fibers contained within an outer jacket or cover. The weight (mass) of the parallel core shall be between 65% to 75% of the total weight (mass) of the cable.

Cable nominal size and rated breaking strength shall be as specified in the following sections for the type and size of fabric formed revetment. Cable splices shall be made with aluminum compression fittings selected so that the resultant cable splice from use of a single fitting shall provide a minimum of 80% of the rated breaking strength of the cable. A minimum of two fittings per splice, separated by a minimum of 6 inches (153 mm) of cable overlap, shall be used at each splice. Upon completion of the revetment all fittings shall be encased by concrete grout within the fabric form.

a. Articulating Block Mat.

Fabric forms shall consist of double-layer woven fabric joined together by narrow perimeters of interwoven fabric into a matrix of rectangular compartments that form a concrete articulating block mat. Cords shall connect the two layers of fabric at the center of each compartment. The cords shall be interwoven in two sets of four cords each, one set for the upper layer and one set for the bottom layer. Each cord shall have a minimum breaking strength of 160 lbf (710 N) when tested in accordance with ASTM D 2256.

Fabric form compartments shall be offset one half a compartment length, in the mill width direction, to form a bonded concrete block pattern. The mill width direction for articulating block mat shall be the flow direction shown on the plans unless otherwise noted.

Fabric form compartments shall each have four grout ducts, two on each side parallel to the mill width direction, to allow passage of the concrete grout between adjacent compartments. Two additional grout ducts, one on each side perpendicular to the mill width direction, is permissible. The concrete grout filled, cross sectional area of each grout duct shall be no more than 10% of the maximum filled cross sectional area of the block transverse to the duct.

Grout stops shall be installed at predetermined mill width intervals to regulate the distance of lateral flow of concrete grout. The grout stop material shall be nonwoven filter fabric. The grab tensile strength of the filter fabric shall be not less than 90 lbf/in (400 N) when tested in accordance with ASTM D 4632.

Cables shall be installed between the two layers of fabric and through the compartments in a manner that provides for longitudinal and lateral binding of the finished articulating block mat. Two revetment cables perpendicular to mill width direction shall pass through each compartment. One revetment cable parallel to the mill width direction shall pass through the approximate center of each compartment.

The cables shall enter and exit the compartments through opposing grout ducts. As an alternate, cable ducts may be provided for insertion of revetment cables between compartments. The diameter of each cable duct shall be 1.0 inch (25.4 mm) maximum.

All cables, within each compartment shall be completely embedded in the concrete grout.

Articulating block mat nominal finished dimensions and properties for the specified size shall be per the following table:

Table B - Articulating Block Mat Properties			
Size	**4 inch**	**6 inch**	**8 inch**

	(100 mm)	(150 mm)	(200 mm)
Average Thickness, inches (mm)	4.0 (100)	6.0 (150)	8.0 (200)
Mass Per Unit Area, lb/ft^2 (kg/m^2)	45 (220)	68 (330)	90 (440)
Mass per Block, lb (kg)	88 (39.8)	188 (85.2)	325 (148)
Nominal Block Dimensions, inches (mm) [C]	20x14 (508x356)	20x20 (508x508)	20x26 (508x660)
Cable Nominal Diameter, inches (mm)	0.250 (6.35)	0.312 (7.94)	0.312 (7.94)[B]
Cable Average Breaking Strength, lbf (kN)	3700 (16.47)	4500 (20.03)	4500 (20.03)[B]
Concrete Coverage[A], ft^2/yd^3 (m^2/m^3)	75 (9.1)	50 (6.1)	38 (4.6)

[A] For information only.
[B] When the contract documents require 0.375 inches (9.53 mm) cable, the Average Breaking Strength shall be 7000 lbf (31.15 kN).
[C] Mill width direction x perpendicular to mill width direction.

b. Armor Units/Concrete Bags.

Fabric forms shall consist of two layers of woven fabric sewn together. When filled with concrete grout they shall form a concrete Armor Unit (concrete bag).

Self-sealing filling valves, suitable for use with an injection pipe at the end of a pump hose for concrete grout, shall be installed at predetermined locations.

When Armor Units are specified, the fabric forms shall be similar to the typical unreinforced bags produced by the manufacturers specified above.

When Armor Units Reinforced are specified, the following modifications to the typical unreinforced bag shall be made:

1) The fabric form shall be continuous along its length. The intent is to provide a continuous width and thickness of fabric formed concrete along the substructure unit being protected. ~~If the Armor Unit is placed around the circumference of a pier, the unit shall be continuous around the pier.~~

2) Grout stops shall be installed as required to regulate the distance of flow of concrete grout. The grout stop material shall be nonwoven filter fabric. The grab tensile strength of the filter fabric shall be not less than 90 lbf/in (400 N) when tested in accordance with ASTM D 4632.

3) Longitudinal cables shall be spaced evenly across the cross section of the Armor Unit. The number of longitudinal cables required are shown in the following table:

Table C - Armor Unit Properties			
Size - Width Unfilled Fabric Form in (m)	**No. Longitudinal Cables[B]**	**Filled Thickness in (mm) Volume of Concrete[A] ft^3/ft (m^3/m)**	**Filled Thickness in (mm) Volume of Concrete[A] ft^3/ft (m^3/m)**
24 (0.61)	2	6 (15) 0.8 (0.07)	9 (23) 1.1 (0.10)
36 (0.91)	2	6 (15) 1.3 (0.12)	9 (23) 1.8 (0.17)
48 (1.22)	3	9 (23) 2.6 (0.24)	12 (30) 3.2 (0.30)
60 (1.52)	4	9 (23) 3.3 (0.31)	12 (30) 4.2 (0.39)
72 (1.83)	5	9 (23) 4.1 (0.38)	12 (30) 5.2 (0.48)
84 (2.13)	6	9 (23) 4.8 (0.45)	12 (30) 6.5 (0.60)
96 (2.44)	7	12 (30) 7.2 (0.67)	15 (38) 8.8 (0.82)

108 (2.74)	8	12 (30) 8.2 (0.76)	15 (38) 10.0 (0.93)

(A) For information only.
(B) For Reinforced Armor Units

Longitudinal cables shall be spliced at joints.

Cables shall be nominally 0.250 inches (6.35 mm) in diameter and their rated average breaking strength shall be not less than 3700 lbf (16.47 kN). Cords shall connect the cables to the fabric form as required to position the cables near the center of the finished armor thickness.

Armor Units nominal finished dimensions and properties for the specified size shall be per Table C above.

B. Delivery.
The fabric forms shall be kept dry and wrapped such that they are protected from the elements during shipping and storage. If stored outdoors, they shall be elevated and protected with a waterproof cover that is opaque to ultraviolet light. The fabric forms shall be labeled as per ASTM D 4873.

~~The Contractor shall submit layout and/or shop drawings a minimum of 2 weeks prior to installation. These drawings shall include the dimensions of the fabric form panels, location and type of field seams, and field splicing requirements.~~

The Contractor shall submit a manufacturer's certificate that the supplied fabric forms meet the criteria of these specifications, as measured in full accordance with the referenced test methods and standards. The certificates shall include the following information about each fabric form delivered:

Manufacturer's name and current address;
Full product name;
Style and product code number;
Composition of yarns; and
Manufacturer's certification statement.

C. Concrete Grout for Fabric Formed Concrete Revetment.
Materials for concrete grout for the fabric formed concrete revetment (concrete grout) shall meet the requirements of the following:

Item	Standard Specification Section
Portland Cement	4101
Fine Aggregate	4110, 4111, or 4112
Water	4102
Admixtures	4103
Fly Ash	4108

The concrete grout shall consist of a mixture of Portland cement, fine aggregate, water, admixtures, and fly ash so proportioned and mixed as to provide a pumpable slurry. Pozzolan and grout fluidizer may be used at the option of the Contractor.

The consistency of the concrete grout delivered to the concrete pump shall be proportioned and mixed as to have an efflux time of 9 to 12 seconds when passed through the 0.75 inch (19 mm) orifice of the standard flow cone that is described in ASTM C 939.

The concrete grout shall have an air content of not less than 5% nor more than 8% of the volume of the grout. The mix shall obtain a compressive strength of 2000 psi (13,750 kPa) at 28 days when tested in conformance with Materials I.M. 315.

Mix proportions shall be similar to that for Concrete Grout for Revetment or Gabion per Article 2507.02, B, of the Standard Specifications. The Contractor shall be responsible for supplying a mix design to the Engineer that meets the above requirements. The Contractor shall submit samples of fine aggregate, cement, and fly ash intended for use to the Engineer before the work begins. After the mix has been designated, it shall not be changed without approval of the Engineer.

01XXX.03 CONSTRUCTION.

A. Equipment.

Mixing and pumping equipment used in preparation and handling of the concrete grout shall be approved by the Engineer. Proportioning and mixing equipment shall meet requirements of Articles 2001.20 and 2001.21 of the Standard Specifications. Sufficient mixing capacity of mixers shall be provided to permit the intended pour to be placed without interruption. All oil or other rust inhibitors shall be removed from the mixing drums, stirring mechanisms, and other portions of the equipment in contact with the grout before the mixers are used. The pumping equipment shall have a variable flow rate to provide enough pressure for pumping without breaking the fabric.

B. Site Preparation.

Areas on which fabric forms are to be placed shall be constructed to the lines, grades, contours, and dimensions shown on the plans. All obstructions such as roots and projecting stones shall be removed. Where such areas are below the allowable grades, they shall be brought to grade by placing compacted layers of select material. The thickness of layers and the amount of compaction shall be as specified by the Engineer. Where required by the contract documents, soft and otherwise unsuitable subgrade soils shall be identified, excavated, and replaced with select materials in accordance with the Standard Specifications.

Excavation and preparation of aprons as well as anchor, terminal, or toe trenches shall be done in accordance with the lines, grades, contours, and dimensions shown on the plans. Immediately prior to placing the fabric forms, the Engineer will inspect the prepared area, and no forms shall be placed until the area has been approved.

C. Fabric Form Placement.

Engineering fabric shall be placed on the graded surface approved by the Engineer when required by the contract documents. Fabric forms shall be placed over the engineering fabric, when required, and within the limits shown on the plans. The fabric forms shall be anchored as required to prevent displacement during curing of grout. Anchorages requiring connection to the structure and not shown on the plans require approval by the Engineer prior to use.

Where fabric formed concrete is placed adjacent to a substructure unit, the fabric forms shall be placed so that the filled fabric formed revetment shall be flush with the substructure unit. Placement of the fabric forms prior to filling shall consider the contraction of the fabric form during filling.

All field seams shall be made using two lines of U.S. Federal Standard Type 101 stitches. Thread used for seaming shall be nylon and/or polyester. All sewn seams shall be downward facing. Zipper seams shall be permitted unless noted otherwise in the contract documents. The finished strength of the field seams shall comply with manufacturer's recommendations.

All cables crossing a field seam shall be spliced in conformance with the Article DS-01XXX.02, A, 2, above. Upon completion of the revetment all splice fittings shall be encased by concrete grout within the fabric form.

Where fabric formed concrete units/mats lap on top of previously installed units, 6 mils (150 µm) polyethylene sheeting shall be placed on top of the underlying unit to prevent bonding prior to placement of the engineering fabric and fabric forms for the succeeding layer.

Immediately prior to filling with the concrete grout, the Engineer will inspect the assembled fabric forms, and no concrete grout shall be pumped until the fabric seams have been approved. At no time shall the unfilled fabric forms be exposed to ultraviolet light (including direct sunlight) for a period exceeding 5 calendar days.

1. Articulating Block Mat.
Adjacent fabric form panels shall be joined before filling with concrete grout by field sewing or zippering the two bottom layers of fabric together and the two top layers of fabric together. Lap joints shall only be used at locations shown in the contract documents.

2. Armor Units.
Typical unreinforced Armor Units shall be joined together following placement of concrete grout as shown in the contract documents.

Reinforced Armor Units shall be joined before filling with concrete grout by field sewing or zippering the two bottom layers of fabric together and the two top layers of fabric together to form a continuous unit.

D. Proportioning and Mixing Concrete Grout.
All materials shall be accurately measured by volume or weight (mass) as they are fed into the mixer. The quantity of water shall be such as to produce a grout having a pumpable consistency. Time of mixing shall be not less than 1 minute. If agitated continuously, the grout may be held in the mixer or agitator for a period not exceeding 2 1/2 hours in temperatures below 70°F (21°C) and for a period not exceeding 2 hours at higher temperatures. If there is a lapse in a pumping operation, the grout shall be recirculated through the pump or through the mixer drum (or agitator) and pump.

E. Concrete Grout Placement.
Concrete grout shall be pumped in such a way that excessive pressure on the fabric forms and cold joints are avoided. A cold joint is defined as one in which the pumping of the concrete grout into a given form is discontinued or interrupted for an interval of 45 or more minutes.

After the concrete grout has set, all anchor, terminal, and toe trenches shall be backfilled and compacted, as specified by the Engineer.

Foot traffic on the filled form shall be restricted to an absolute minimum for 1 hour after filling.

If a fabric formed concrete unit/mat is to bear on previously installed units, the lower units must be allotted a minimum of 4 hours of cure time before beginning installation of a succeeding, vertically adjacent course of fabric formed unit(s). Abutting fabric formed concrete units/mats may be installed immediately after placement of the preceding unit(s).

The freshly pumped fabric formed concrete shall not be washed (sprayed) under pressure with water in an effort to clean or remove spills from its surface. The cement film that bleeds through the top layer of the fabric form shall be maintained through curing on finished surfaces exposed to sunlight. Should the film be removed in these areas, the film shall be repaired by spreading a thin layer of a water-cement paste over the effected area.

1. Articulating Block Mat.
Following the placement of the fabric forms, small slits shall be cut in the top layer of the fabric form to allow the insertion of the filling pipe at the end of the concrete grout pump hose. These slits shall be of the minimum length to allow proper insertion of the filling pipe. Concrete grout shall be pumped between the top and bottom layers of fabric, filling the forms to the recommended thickness and configuration. Holes in the fabric forms left by the removal of the filling pipe shall be temporarily closed by inserting a piece of nonwoven fabric or similar material. The nonwoven fabric shall be removed when the concrete grout is no longer fluid and the grout surface at the hole shall be cleaned and smoothed by hand.

2. Armor Units.
Following the placement of the fabric form, the filling pipe at the end of the concrete grout pump hose shall be inserted through the self-sealing filling valve. Concrete grout shall be pumped between the top and bottom layers of fabric, filling the forms to the recommended thickness and configuration.

When the contract documents require joining of adjacent Armor Units by inserting reinforcement bar dowels or staples into the Armor Units, the dowels or staples shall be inserted into the filled unit(s) not less than 0.5 hour and not more than 1 hour after filling of the unit, unless directed otherwise by the Engineer. When the contract documents require joining of vertically adjacent Armor Units, reinforcing dowels shall be driven into the lower unit in the time frames specified in this paragraph. The vertically adjacent fabric form shall then be placed over the reinforcing dowels. The dowels shall be forced through the bottom layer of the vertically adjacent fabric form prior to filling that form.

01XXX.04 METHOD OF MEASUREMENT.

A. Fabric Formed Concrete Revetment.
The quantity of Fabric Formed Concrete Revetment of the type specified, in square yards (square meters), will be the quantity shown in the contract documents ~~for each installation to the nearest 0.1 foot (0.1 m).~~

B. Engineering Fabric.
The quantity of Engineering Fabric will be measured in accordance with Article 2507.04 of the Standard Specifications.

C. Concrete Grout.
The quantity of Concrete Grout for Fabric Formed Concrete Revetment will be measured in accordance with Article 2507.04 of the Standard Specifications.

01XXX.05 BASIS OF PAYMENT.

A. Fabric Formed Concrete Revetment.
The Contractor will be paid the contract unit price for Fabric Formed Concrete Revetment of the type specified per square yards (square meters). This payment shall be full compensation for all work, including furnishing the forms and all equipment, tools, and labor necessary to place the forms ready for filling with grout and any required work following filling. The work includes but is not limited to joining field seams, cable splices, plastic for lap areas, reinforcing bars to join Armor Units.

Unless otherwise noted in the contract documents, this payment shall also be full compensation for any bank shaping, excavation, and backfilling necessary to complete the work in conformance with the contract documents.

B. Engineering Fabric.
The Contractor will be paid for the Engineering Fabric in accordance with Article 2507.05 of the Standard Specifications.

C. Concrete Grout.
The Contractor will be paid for the Concrete Grout for Fabric Formed Concrete Revetment in accordance with Article 2507.05 of the Standard Specifications.

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Tom Reis / Daniel Harness	**Office:** Specifications	**Item 4**
Submittal Date: 6/1/08	**Proposed Effective Date:** October 2008	
Article No.: DS-01110 **Title:** Modular Lane Separator System	**Other:**	

Specification Committee Action: Approved as is.			
Deferred:	**Not Approved:**	**Approved Date:** 6/12/08	**Effective Date:** 10/21/08

Specification Committee Approved Text: See attached Draft DS.

Comments: The Office of Materials commented the Alaska DOT has a page of approved products and manufacturers on their website. It can be updated as needed. In addition, manufacturers can submit their products for approval online. It is a proprietary system and the server would be off site. The Committee agreed it is worth looking into.

The Office of Contracts asked what happens if a project has been advertised with this DS and a Contractor receives permission to use a product not on the approved list. They wanted to know if the Contractor could use the product with that project's letting, or if they would be required to wait until the next letting to use the product. The Specifications Section explained the Contractor would be required to wait until the next letting, unless there is a mutual benefit work order to allow the product to be added to the project.

Specification Section Recommended Text:

Comments:

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

See attached DS.

Reason for Revision: The list of approved manufacturers is now in Materials I.M. 488.05. Other changes proposed will allow a fourth vendor to qualify.

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-01XXX
(Replaces DS-01110)

Iowa Department of Transportation

DEVELOPMENTAL SPECIFICATIONS
FOR
MODULAR LANE SEPARATOR SYSTEM

Effective Date
October 21, 2008

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.

01XXX.01 GENERAL.
The modular lane separator system consists of a combination of longitudinal curb units and upright flexible, retroreflective posts. The modular units shall interface with each other to form a continuous longitudinal channelizing system. The modular lane separator system shall be designed to allow a radius or curve as required by roadway geometry. The complete system shall be NCHRP 350 compliant. A copy of the FHWA approval letter may be required by the Engineer.

The modular lane separator system shall be one of the approved systems listed in Materials I.M. 488.05. Other modular lane separator systems may be approved by contacting the Manufactured Products Engineer at 515.239.1259.

All damaged curb units or posts shall be repaired or replaced by the Contractor no later than 24 hours after the damage is reported to the Contractor.

All holes left in the pavement or bridge deck when the modular lane separator system is removed shall be repaired by the Contractor.

Upon completion of the project, the modular lane separator system will remain the property of the Contractor.

01XXX.02 CURB UNIT.
The curb shall be a modular design and shall be fastened to the underlying pavement or bridge deck according to the manufacture's recommendations. The curb unit shall be a mountable design to allow for emergency vehicle crossovers. Each curb unit shall have a minimum of one drainage scupper or other drainage system to allow for cross drainage under the curb module.

Each curb unit shall have a minimum length of 36 inches (0.9 m), height of 2 to 4 inches (50 to 100 mm), and width of 7 to 12 1/2 inches (170 to ~~310~~ 320 mm). Each curb unit shall be yellow if used in a work zone installation or a permanent installation adjacent to yellow pavement markings, and white if used in a permanent installation adjacent to white pavement markings.

01XXX.03 UPRIGHT POST.
Each modular curb unit shall include at least one upright post. Posts shall be manufactured from flexible plastic. Posts shall be spaced uniformly along the channelizing system spaced at no greater than 42 inches (1.1 m). Posts shall be orange in color if used in a work zone installation, yellow if used in a permanent installation adjacent to yellow pavement markings, and white if used in a permanent location adjacent to white pavement markings.

Posts shall be a minimum of ~~22~~ 26 inches (~~550~~ 650 mm) in height, and a minimum of 2 inches (50 mm) width facing traffic. Two 6 inch (150 mm) bands of Type III/IV retroreflective sheeting shall be placed near the top of each post, with a maximum 4 inch (100 mm) space between the bands. The top band shall be located no more than 2 inches (50 mm) from the top of the post. The retroreflective sheeting shall be white if used in a work zone or permanent installation adjacent to a white pavement marking, and yellow if used in a permanent installation adjacent to yellow pavement markings. Posts shall be easily replaceable under traffic conditions.

~~**01XXX.04 LIST OF APPROVED MANUFACTURERS.**~~
~~The following modular lane separator systems are approved for use in Iowa.~~

~~Filtrona Extrusion, Davidson Traffic Control Products: FG 300 Curb System~~
~~Impact Recovery Systems: Tuff Curb~~
~~Qwick Kurb, Incorporated: Qwick Kurb System~~

~~Other modular lane separator systems may be approved by contacting the Manufactured Products Engineer at 515.239.1259~~

01XXX.0~~5~~4 METHOD OF MEASUREMENT.
The Engineer will measure the length of the Modular Lane Separator System installed in feet (meters).

01XXX.0~~6~~5 BASIS OF PAYMENT.
For the number of feet (meters) of Modular Lane Separator System measured, the Contractor will be paid the contract unit price per foot (meter). This payment shall include the installation, maintenance, repair, removal of the modular lane separator system, and all required pavement or bridge deck repair.

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Tom Reis / Daniel Harness	**Office:** Specifications	**Item 5**
Submittal Date: 6/5/08	**Proposed Effective Date:** October 2008	
Article No.: DS-01096 **Title:** Water Main **Article No.:** DS-01097 **Title:** Sanitary Sewer **Article No.:** DS-01098 **Title:** Storm Sewer	**Other:**	

Specification Committee Action: Approved with possible changes.

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

Specification Committee Approved Text:

Comments: The Office of Construction had several comments. They noted compressive strength or 28 day strength is specified in several locations. A mix type should be specified instead. They also noted epoxy coated bars should be used for structures, especially sanitary structures. They also questioned why only a precast invert is allowed for precast structures. They suggest allowing a cast-in-place. The Specifications Section will discuss these items with SUDAS and let them decide if they need to present these issues to their Board of Directors.

The Specifications Section noted SUDAS will be holding a meeting with their Board of Directors for final approval for their changes to their manuals. This may impact the SUDAS DSs. The Specifications Section will notify the Specification Committee of changes.

Specification Section Recommended Text:

Comments:

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

See the revised DSs for Water Main, Sanitary Sewer, and Storm Sewer located in the W:\Highway\Specifications\Exchange\SUDAS DSs folder.

Reason for Revision: SUDAS has revised Divisions 3, 4, 5, and 6 of their specifications to correspond.

County or City Input Needed (X one)	**Yes** X	**No**
Comments: City and County input has been handled through SUDAS.		

Industry Input Needed (X one)			**Yes** X	**No**	
Industry Notified:	**Yes** X	**No**	**Industry Concurrence:**	**Yes**	**No**
Comments: The ICPA, APAI, and AGCI have been invited to the SUDAS meetings at which the					

specifications were discussed and approved.

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Tom Reis	**Office:** Specifications	**Item 6**
Submittal Date: 05.30.2008	**Proposed Effective Date:** 09.16.2008	
Section No.: 2541 **Title:** Crack and Joint Cleaning and Sealing (HMA Surfaces). **Section No.:** 2542 **Title:** Crack and Joint Cleaning and Sealing (PCC Pavement).	**Other:**	

Specification Committee Action: Approved the revised DRAFT specification as is.

Deferred:	**Not Approved:**	**Approved Date:** 6/12/08	**Effective Date:** 9/16/08

Specification Committee Approved Text:

Comments: The Specifications Section handed out a revised DRAFT specification. The Specifications section noted the changes will also address how shoulders are to be handled.

Specification Section Recommended Text:

Comments:

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

See attached DRAFT specification.

Reason for Revision: To address concerns over what should be sealed both during the field exam and during construction. This change will also establish a predetermined price for sealant material to help prevent unbalancing bids.

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

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

Comments: Following the Specification Committee approval, these specifications will be sent to the AGCI. A portion of the reasoning for modifying was at the request of the industry.

DRAFT SS-010XX
(New)

Iowa Department of Transportation

SUPPLEMENTAL SPECIFICATIONS
FOR
SECTION 2541, CRACK AND JOINT CLEANING AND SEALING (HMA SURFACES)
and
SECTION 2542, CRACK AND JOINT CLEANING AND SEALING (PCC PAVEMENT)

Effective Date
September 16, 2008

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.

Section 2541, Crack and Joint Cleaning and Sealing (HMA Surfaces).

Add as the second paragraph of Article 2541.01 of the Standard Specifications:

Crack and joint cleaning and sealing is intended to address transverse (thermal) cracking, longitudinal cracking, joint reflective cracking, low severity fatigue cracking, and low severity block cracking. Crack and joint cleaning and sealing is not intended to clean or seal moderate or high severity block cracking, moderate or high severity fatigue cracking, edge cracking, alligator cracking, or mat slippage cracking. Definitions for these pavement distress types can be found in the 'Distress Identification Manual for the Long-Term Pavement Performance Program' (Publication No. FHWA-RD-03-031, dated June 2003, web address: http://www.tfhrc.gov/pavement/ltpp/reports/03031/03031.pdf

Replace the first sentence of Article 2541.06, A:

The Engineer will calculate the number of miles (kilometers) of main line pavement and shoulders on which cracks and joints were cleaned and sealed to the nearest 0.1 mile (0.1 kilometer).

Add as the second paragraph of Article 2541.06, A:

Shoulders 4 feet (1.2 meters) or less in width will not be measured separately for payment.

Add as the third sentence Article 2541.07, A:

Shoulders 4 feet (1.2 meters) or less in width shall be considered incidental to the price bid for Crack and Joint Cleaning and Sealing (HMA Surfaces).

Replace the first sentence of Article 2541.07, B:

For the number of pounds (kilograms) measured, the Contractor will be paid the predetermined contract unit price per pound (kilogram).

Section 2542, Crack and Joint Cleaning and Sealing (Portland Cement Concrete Pavement).

Add as the second paragraph of Article 2542.01 of the Standard Specifications:

Crack and joint cleaning and sealing is intended to address longitudinal cracking, transverse cracking, and corner breaks. Crack and Joint cleaning and sealing is not intended to clean or seal durability ("D") cracking or map cracking. Definitions for these pavement distress types can be found in the 'Distress Identification Manual for the Long-Term Pavement Performance Program' (Publication No. FHWA-RD-03-031, dated June 2003, web address: http://www.tfhrc.gov/pavement/ltpp/reports/03031/03031.pdf

Replace the first sentence of Article 2542.07, A:

The Engineer will calculate the number of miles (kilometers) of main line pavement and shoulders on which cracks and joints were cleaned and sealed to the nearest 0.1 mile (0.1 km).

Add as the second paragraph of Article 2542.07, A:

Shoulders 4 feet (1.2 meters) or less in width will not be measured separately for payment.

Add as the third sentence of Article 2542.08, A:

Shoulders 4 feet (1.2 meters) or less in width shall be considered incidental to the price bid for Crack and Joint Cleaning and Sealing (PCC Pavement).

Replace the first sentence of the first paragraph of Article 2542.08, B:

For the number of pounds (kilograms) measured, the Contractor will be paid the predetermined contract unit price per pound (kilogram).