Iowa Department of Transportation

MINUTES
OF
IOWA DOT SPECIFICATION COMMITTEE MEETING

July 14, 2005

Members Present:	Tom Reis, Chair	Specifications Section
	Daniel Harness, Secretary	Specifications Section
	Keith Norris	District 2-Dist. Mat. Engineer
	Bruce Kuehl	District 6-Dist. Const. Engineer
	Gary Novey	Office of Bridges & Structures
	John Smythe	Office of Construction
	Roger Bierbaum	Office of Contracts
	Jim Berger	Office of Materials
	Doug McDonald	District 1 - Marshalltown RCE Office
Members Not Present:	John Adam	Statewide Operations Bureau
	Mike Kennerly	Office of Design
	Larry Jesse	Office of Local Systems
	Troy Jerman	Office of Traffic & Safety
Advisory Members Present:	Max Grogg	FHWA
Advisory Members Not Present:	Jim Rost	Office of Location & Environment
	Larry Stevens	SUDAS
Others Present:	Will Stein	Office of Design
	Donna Buchwald	Office of Local Systems
	Chris Poole	Office of Design

Tom Reis, Specifications Engineer, opened the meeting. The following items were discussed in accordance with the July 7, 2005 agenda, with addition of Item 5:

1. Article 1109.05, Partial Payments.

The Office of Construction requests a change to Article 1109.05 that will bring the specifications into alignment with current practices.

2. Article 2407.02, Materials.

The Office of Materials requests changes to Article 2407.02 that will correct a conflict with Article 4115.04 concerning aggregate durability.

3. Article 2529.02, Materials.

The Office of Materials requests several changes to Article 2529.02 that will allow patching mixtures to use Type I, I(SM) cement.

4. Article 2530.02, Materials.

The Office of Materials requests several changes to Article 2530.02 that will allow patching mixtures to use Type I, I(SM) cement.

5. Article 2303.03 G, Miscellaneous Construction.

The Specification Section requests several changes to Section 2303 that will add a provision to ensure that projects are not opened to traffic without Stop Sign Rumble Strips.

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: John Smythe	**Office:** Construction	**Item 1**
Submittal Date: June 27, 2005	**Proposed Effective Date:** April 2006	
Article No.: 1109.05 **Title:** Partial Payments	**Other:**	

Specification Committee Action:			
Deferred:	**Not Approved:**	**Approved Date:** 7/14/05	**Effective Date:** 4/18/06

Specification Committee Approved Text: See Specification Section Recommended Text.

Comments: None.

Specification Section Recommended Text:

1109.05, A, Progress Payments.

Delete the first sentence of the fourth paragraph:

~~The Engineer will certify that each payment is just and unpaid.~~ The Contractor shall sign the final voucher certifying the quantities are just and unpaid.

Comments: None.

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

Delete the first sentence of the third paragraph of Article 1109.05.A

~~The Engineer will certify that each payment is just and unpaid.~~ The Contractor shall sign the final voucher certifying the quantities are just and unpaid.

Reason for Revision: The Engineer is currently not signing progress vouchers and this change will reflect current practice. The requirement for the contractor's signature on progress vouchers was eliminated in January 1991. Furthermore, it is not appropriate to include the Engineer's procedures in the specification.

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

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: J. Berger	**Office:** Materials	**Item 2**
Submittal Date: June, 2005	**Proposed Effective Date:** April, 2006	
Article No.: 2407.02 **Title:** Materials (Precast and Prestressed Concrete Bridge Units)	**Other:**	

Specification Committee Action:

Deferred:	**Not Approved:**	**Approved Date:** 7/14/05	**Effective Date:** 4/18/06

Specification Committee Approved Text:

Article 2407.02, A, Aggregates:

Replace the second paragraph:

The coarse aggregate shall be ~~either~~ the durability ~~class 3 or 3i as~~ described in Article 4115.04.

Comments: None.

Specification Section Recommended Text:

Article 2407.02, A, Aggregates:

Replace the second paragraph:

The course aggregate shall be ~~either~~ the durability ~~class 3 or 3i as~~ described in Article 4115.04.

Comments:

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

2407.02 MATERIALS.
The materials used in prestressed and precast concrete shall meet the requirements of Division 41 for the respective material, and the following:

A. Aggregates.
Sections 4110, 4111, and 4115 shall apply. The gradation of the coarse aggregate shall meet the requirements of Section 4109, Aggregate Gradation Table, Gradation No. 3, except that 100% shall pass the 1 inch (26.5 mm) sieve or Gradation No. 5. When the absolute volume of the coarse aggregate in a mixture is more than 55% of the absolute volume of the total aggregate, Gradation No. 5 shall be used. Aggregates similar to Class V shall be used only when 30% or more of the total weight (mass) of aggregate is limestone.

The course aggregate shall be ~~either~~ the durability ~~class 3 or 3i as~~ described in Article 4115.04.

Or ~~The course aggregate shall be either durability class 3 or 3i as described in Article 4115.04~~					
Reason for Revision: The current 2407.02 language on durability is incorrect and in conflict with 4115.04.					
County or City Input Needed (X one)			**Yes**	**No** X	
Comments:					
Industry Input Needed (X one)			**Yes**	**No** X	
Industry Notified:	**Yes**	**No**	**Industry Concurrence:**	**Yes**	**No**
Comments:					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Todd Hanson/Jim Berger	**Office:** Materials	**Item 3**
Submittal Date: May 5, 2005	**Proposed Effective Date:** April 2006	
Article No.: 2529.02 **Title:** Materials (Full Depth Finish Patches)	**Other:**	

Specification Committee Action:

Deferred:	**Not Approved:**	**Approved Date:**	**Effective Date:** 4/18/06

Specification Committee Approved Text: Article 2529.02, B; Article 2529.02, B, 3; Article 2529.03, B, 4; Article 2529.03, B, 6; Article 2529.03, B, 8; and Article 2529.03, B, 9 see Specification Section Recommended Text.

Article 2529.02, B, 1, Slump.

Add as the second paragraph:

When a Type A Mid Range water reducing admixture is used, the slump, tested prior to the addition of calcium chloride, shall be between 1 inch (25 mm) and 4 inches (100 mm) as a target range, allowing a maximum of 5 inches (125 mm).

Article 2529.02, B, 8, Transit Mix Concrete.

Replace the first sentence:

Transit Mix Concrete~~, with Type I or Type II Cement,~~ shall be from a plant from which the concrete can be delivered and placed within 60 minutes from ~~time the cement is placed in contact with the aggregate~~ the start of mixing.

Comments: The Office of Materials wants to implement these changes right away. The Office of Local Systems asked if a second paragraph could be added to 2529.02, B, 4 and 2529.02, B, 9 that "mix containing Type A mid-range water reducer admixture is also tested before addition of calcium." The Office of Materials investigated a little further and recommended the above text for Article 2529.02, B, 1.

The Office of Construction noted that implementation of cure times and temperatures should be implemented as a whole, not just for Type I. We want to get a note out to the Iowa Ready Mix Association and the contractors' associations to make them aware of the changes. The Office of Contracts asked how we let people who are not members of these associations know about the changes. The Office of Construction suggested putting in the Letting Bulletin or placing in a proposal note. The Office of Contracts expressed concern that if we notify the contracting industry, but don't make this an official change some non-DOT project engineers may enforce what is in the Standard Specifications book rather than what is in the contract documents. They suggested creating a Supplemental Specification. The Office of Construction suggested a proposal note pointing out that changes have been made to Articles 2529.02 and 2530.03. The committee agreed to this idea. The changes will be referenced in a proposal note for the September letting.

After the meeting, the Office of Construction noted that industry suggested we make the changes to Article 2529.02, B, 8 shown above.

Specification Section Recommended Text:

Article 2529.02, B, Portland Cement Concrete.

Delete the second paragraph:

~~Class M mixtures with a minimum 5 hour cure time shall not contain fly ash.~~

Article 2529.02, B, 1, Slump.

Add as the second paragraph:

When a Type A Mid Range water reducing admixture is used, the slump shall be between 1 inch (25 mm) and 4 inches (100 mm) as a target range, allowing a maximum of 5 inches (125 mm).

Article 2529.02, B, 3. Temperature.

Replace the first paragraph:

The temperature of Full Depth Portland Cement Concrete **patching** material, as delivered on the job site, shall be as required in paragraph 4. ~~greater than 75°F (24°C) for a 5 hour patch and 65°F (18°C) for a 10 hour patch.~~ Heating of water, aggregate, or both, may be necessary to meet this requirement. The cost of heating shall be considered incidental to patching.

Article 2529.02, B, 4, Cement.

Replace the entire article:

Cement for Class M mixes shall meet requirements of Section 4101. ~~Type I or Type II cement shall be used in patching concrete. Type IP, I (PM), IS, and I(SM) cement shall not be used in patching concrete unless approved in Materials I.M. 401.~~

~~At the Contractor's option, Class C fly ash may be substituted for up to 10%, by weight (mass), of the cement mixtures. Concrete mixtures with a 5 hour curing time shall not contain fly ash.~~

The cement types and maximum allowable substitution rates shall be as follows:

Patch Type	Cement Type	Maximum Allowable Substitution	Minimum Mix Temperature
5 Hour	Type I, Type II Type I(SM)	0% Fly Ash 0% Fly Ash	75°F (24°C) 80°F (27°C)
10 Hour	Type I, Type II Type I(SM)	10% Fly ash 0% Fly Ash	65°F (18°C) 70°F (21°C)

Article 2529.02, B, 6, Water Reducer.

Replace the entire article:

A Type A Mid Range water reducing admixture may be used at the Contractor's option. It shall be one listed in Materials I.M. 403, and use shall be at the dosage recommended by the manufacturer.

Article 2529.02, B, 8, Transit Mix Concrete Containing Type I or Type II Cement.

Replace the title:

Transit Mix Concrete ~~Containing Type I or Type II Cement~~.

Article 2529.02, B, 8, Transit Mix Concrete.

Replace the first sentence of the first paragraph:

Transit Mix Concrete~~, with Type I or Type II Cement,~~ shall be from a plant from which the concrete can be delivered and placed within 60 minutes from the time the cement is placed in contact with the aggregate.

Article 2529.02, B, 8, Transit Mix Concrete.

Add as the last sentence:

The concrete shall be placed within 30 minutes after introduction of calcium chloride.

Article 2529.02, B, 9, Concrete Mixtures.

Add as the last sentence:

The Engineer may waive the use of calcium chloride on patches cured longer than 10 hours.

Comments: Is industry, county, or city input needed?

Member's Requested Change (Redline/Strikeout):

B. Portland Cement Concrete.
It is the intention to obtain concrete with a high early strength for early opening to traffic. The concrete shall meet the requirements of the current Materials I.M. 529 with the following modifications:

~~Class M mixtures with a minimum 5 hour cure time shall not contain fly ash.~~

1. Slump.
Slump, measured in accordance with Materials I.M. 317 prior to addition of calcium chloride solution, shall be between 1 inch (25 mm) and 2 1/2 inches (65 mm) as a target range, allowing a maximum of 3 inches (75 mm). If calcium chloride solution is not to be added, the slump shall be between 1 inch (25 mm) and 3 inches (75 mm) as a target range, allowing a maximum of 4 inches (100 mm).

When a Type A Mid Range water reducing admixture is used, the slump shall be between 1 inch (25 mm) and 4 inches (100 mm) as a target range, allowing a maximum of 5 inches (125 mm).

2. Air Entrainment.
The entrained air content of the unconsolidated concrete will be determined according to Materials I.M. 318, prior to addition of calcium chloride if it is to be added. The air entrainment, when calcium chloride is to be added, shall be 5.0%, with a tolerance of ± 2.0%. The air entrainment, when no calcium chloride is to be added, shall be 6.5%, with a tolerance of ± 1.5%.

3. Temperature.
The temperature of Full Depth Portland Cement Concrete patching material, as delivered on the job site, shall be as required in paragraph 4. ~~greater than 75°F (24°C) for a 5 hour patch and 65°F (18°C) for a 10 hour patch.~~ Heating of water, aggregate, or both, may be necessary to meet this requirement. The cost of heating shall be considered incidental to patching.

4. Cement.
Cement for Class M mixes shall meet requirements of Section 4101. ~~Type I or Type II cement shall be used in patching concrete. Type IP, I (PM), IS, and I(SM) cement shall not be used in patching concrete unless approved in Materials I.M. 401.~~

~~At the Contractor's option, Class C fly ash may be substituted for up to 10%, by weight (mass), of the cement mixtures. Concrete mixtures with a 5 hour curing time shall not contain fly ash.~~

The cement types and maximum allowable substitution rates shall be as follows:

Patch Type	Cement Type	Maximum Allowable Substitution	Minimum Mix Temperature
5 Hour	Type I, Type II Type I(SM)	0% Fly Ash 0% Fly Ash	75°F (24°C) 80°F (27°C)
10 Hour	Type I, Type II Type I(SM)	10% Fly ash 0% Fly Ash	65°F (18°C) 70°F (21°C)

5. Calcium Chloride.
When calcium chloride is required, it shall be furnished in water soluble form and added to the mixture, at the job site. The calcium chloride solution shall be a commercial 32% solution, or equivalent, prepared by the Contractor as follows:

PROPORTIONS FOR 32% CALCIUM CHLORIDE SOLUTIONS		
Type of Solid Calcium Chloride	Pounds (Grams) Solid per gallon (liter) of water	Solution produced per gallon (liter) of water
Type 1 - Regular Flake (77% material) Type 2 - Concrete Flake or pellets (94% material)	7 (840 g/L) 5 (600 g/L)	1.35 1.18

The solution shall be added at the rate of 2.75 gallons per cubic yard (13.6 L/m^3) of concrete. Alternate calcium chloride solutions of different concentrations may be approved by the Engineer, provided appropriate adjustments in the total concrete composition are made.

The mixture shall be agitated until the calcium chloride is completely in solution, and agitation shall be continued, as necessary, to maintain uniformity. The calcium chloride will crystallize out of a 32% solution at 20°F (-7°C), so the solution must be maintained at a higher temperature at all times.

Except when using continuous mixing equipment described in Article 2001.20, D, the calcium chloride solution shall be present in the mix for at least 2 minutes of mixing.

6. Water Reducer.
A Type A Mid Range water reducing admixture may be used at the Contractor's option. It shall be one listed in Materials I.M. 403, and use shall be at the dosage recommended by the manufacturer.

7. Aggregate Durability.
Unless otherwise specified, coarse aggregate shall have the proper class of durability as defined in Article 4115.04, C.

8. Transit Mix Concrete ~~Containing Type I or Type II Cement~~.
Transit Mix Concrete~~, with Type I or Type II Cement,~~ shall be from a plant from which the concrete can be delivered and placed within 60 minutes from the time the cement is placed in contact with the aggregate. The time may be extended to 90 minutes when a retarding admixture, used in accordance with Materials I.M. 403, including temperature dosage guidelines, and at the Contractor's expense, is added at the plant. Continuous mixing equipment using volumetric proportioning may be used in accordance with Article 2001.20, D. The concrete shall be placed within 30 minutes after the introduction of the calcium chloride.

9. Concrete Mixtures.
Concrete for PCC patches shall be Class M mixtures with calcium chloride. The engineer may waive the use of calcium chloride on patches cured longer than 10 hours.

10. Curing and Opening Time.
PCC patches placed on multi-lane sections shall be cured a minimum of ten hours before opening to traffic. PCC patches placed on two-lane sections shall be cured a minimum of 5 hours before opening to traffic. These restrictions may be modified in the plans or by the Engineer for specific situations.

Reason for Revision: A large number of ready mix plants only have Type I(SM) cement available. Research in the Materials Laboratory has shown that Type I(SM) achieves equal strength to Type I/II cements if the cure temperature is increased or when a mid range water reducer is used. This change will accommodate all sources of Type I(SM) for patching.

It is requested that this specification be allowed retroactive as a mutual benefit.

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: Todd Hanson/Jim Berger	**Office:** Materials	**Item 4**
Submittal Date: May 5, 2005	**Proposed Effective Date:** April 2006	
Article No.: 2530.03 Materials **Title:** Materials (Partial Depth Finish Patches)	**Other:**	

Specification Committee Action:

Deferred:	**Not Approved:**	**Approved Date:** 7/14/05	**Effective Date:** 4/18/06

Specification Committee Approved Text: Article 2530.03, B, 2 and Article 2530.03, B, 4, f, see Specification Section Recommended Text.

Article 2530.03, B, 4, a, Slump.

Add as the second paragraph:

When a Type A Mid Range water reducing admixture is used, the slump, tested prior to the addition of calcium chloride, shall be between 1 inch (25 mm) and 4 inches (100 mm) as a target range, allowing a maximum of 5 inches (125 mm).

Article 2530.03, B, 4, c, Temperature.

Replace the first sentence of the paragraph:

The temperature of Class B patching material, as delivered to the job site, shall be as required in paragraph d ~~greater than 75°F (24°C)~~.

Article 2530.03, B, 4, d, Cement.

Replace the entire article:

Cement for Class M concrete mixtures shall meet the requirements of Section 4101. ~~Type IP, I(PM), IS, and I(SM) cement shall not be used in patching concrete unless approved in~~ Materials I.M 401~~.~~

~~At the Contractor's option, Class C fly ash may be substituted for up to 10%, by weight (mass), of the cement. Concrete mixtures with a 5 hour curing time shall not contain fly ash.~~

The cement types and maximum allowable substitution rates shall be as follows:

Patch Class	Cement Type	Maximum Allowable Substitution	Minimum Mix Temperature
C	Type I, Type II Type I(SM)	10% Fly ash 0% Fly Ash	65°F (18°C) 65°F (18°C)
B	Type I, Type II Type I(SM)	0% Fly Ash 0% Fly Ash	75°F (24°C) 80°F (27°C)

Article 2530.03, B, 4, h, Transit Mix Concrete.

Replace the first sentence:

Transit Mix Concrete~~, with Type I Cement,~~ shall be from a plant from which the concrete can be delivered and placed within 60 minutes from ~~time the cement is placed in contact with the aggregate~~ the start of mixing.

Comments: Office of Materials pointed out that instead of cure time, the minimum mix temperature is based on patch class (either B or C). They also noted the minimum mix temperature for Class C patch with Type I(SM) cement should be 65º instead of 70º. The Office of Specifications noted that the changes will be referenced in a proposal note for the September letting.

After the meeting, the Office of Materials recommended the above text for Article 2530.02, B, 4, a.

After the meeting, the Office of Construction noted that industry suggested we make the changes to Article 2530.03, B, 4, h shown above.

Specification Section Recommended Text:

Article 2530.03, B, 2, Class B Patching Material.

Replace second sentence of first indented paragraph:

When calcium chloride is used in a mixture, the concrete shall be placed within ~~15~~ 30 minutes after the introduction of the calcium chloride.

Article 2530.03, B, 4, a, Slump.

Add as the second paragraph:

When a Type A Mid Range water reducing admixture is used, the slump shall be between 1 inch (25 mm) and 4 inches (100 mm) as a target range, allowing a maximum of 5 inches (125 mm).

Article 2530.03, B, 4, c, Temperature.

Replace the first sentence of the first paragraph:

The temperature of Class B patching material, as delivered to the job site, shall be as required in paragraph d ~~greater than 75°F (24°C)~~.

Article 2530.03, B, 4, d, Cement.

Replace the entire article:

Cement for Class M concrete mixtures shall meet the requirements of Section 4101. ~~Type IP, I(PM), IS, and I(SM) cement shall not be used in patching concrete unless approved in Materials I.M 401.~~

~~At the Contractor's option, Class C fly ash may be substituted for up to 10%, by weight (mass), of the cement. Concrete mixtures with a 5 hour curing time shall not contain fly ash.~~

The cement types and maximum allowable substitution rates shall be as follows:

Cure Time	Cement Type	Maximum Allowable Substitution	Minimum Mix Temperature
5 Hour	Type I, Type II Type I(SM)	0% Fly Ash 0% Fly Ash	75°F (24°C) 80°F (27°C)
10 Hour	Type I, Type II Type I(SM)	10% Fly ash 0% Fly Ash	65°F (18°C) 70°F (21°C)

Article 2530.03, B, 4, f, Water Reducer.

Replace the entire article:

A Type A Mid Range water reducing admixture may be used at the Contractor's option. It shall be one listed in Materials I.M. 403, and use shall be at the dosage recommended by the manufacturer.

Article 2530.03, B, 2, h, Transit Mix Concrete Containing Type I Cement.

Replace the title:

Transit Mix Concrete ~~Containing Type I Cement~~

Article 2530.03, B, 2, h, Transit Mix Concrete Containing Type I Cement.

Replace the first sentence of the first paragraph:

Transit mix concrete ~~containing Type I cement~~ shall be from a plant from which the concrete can be delivered and placed within 60 minutes from the time the cement is placed in contact with the aggregate.

Comments: Is industry, county, or city input needed?

Member's Requested Change (Redline/Strikeout):

2530.03 MATERIALS.
Materials for partial depth finish patches shall meet the requirements for the type of material specified.

A. Hot Mix Asphalt Patching Material.
The patching material for HMA patches shall meet the requirements of Section 2303. The mixture size shall be 3/8 or 1/2 inch (9.5 mm or 12.5 mm) unless otherwise designated in the contract documents. The mixture shall meet or exceed 300,000 ESAL HMA criteria.

Tack coat bitumen for HMA patches shall be as specified in Article 2303.02, E.

B. Portland Cement Concrete Patching Material.
The patching material for PCC patches shall meet one of the following requirements. When patching encroaches on an adjacent lane which is open to traffic or when there is patching on two lane pavements or other locations where overnight closures are not permitted, Class A or Class B patching material shall be used. On pavements with three or more lanes and where overnight closure is permitted, Class C patching material shall be used.

1. Class A Patching Material.
Class A patching material shall be a modified Portland cement type manufactured to provide rapid set and high early strength. It shall meet the requirements of Materials I.M. 491.20.

When a mortar is furnished, coarse aggregate shall be added in the quantity recommended by the manufacturer.

2. Class B Patching Material.
Class B patching material shall be high early strength rapid set (5 hour) PCC meeting the requirements of Materials I.M. 529 and the following requirements:

The patching material shall be a Class M mixture with calcium chloride. Class M mixtures with calcium chloride shall not contain fly ash. When calcium chloride is used in a mixture, the concrete shall be placed within ~~15~~ 30 minutes after the introduction of the calcium chloride. Coarse aggregate shall meet the requirements of Article 4115.06 and Section 4109, Gradation No. 5.

When Class B patching material is furnished for partial depth patches, it may also be furnished for full depth patches.

3. Class C Patching Material.
Class C patching material shall be a PCC mixture with an early set that will allow time of opening to traffic in 24 hours to 36 hours as directed by the Engineer. Coarse aggregate shall meet the requirements for Class B patching material. Class M mixture meeting the requirements of the current Materials I.M. 529 without the addition of calcium chloride shall be used.

When Class C patching material is furnished for partial depth patches, it may also be furnished for full depth patches.

4. Modifications to Mixtures for Class B and Class C Patching Material.
The following modifications shall apply to the PCC mixtures for Class B and Class C patching material:

a. Slump.
Slump, measured in accordance with Materials I.M. 317 prior to addition of calcium chloride solution, shall be between 1 inch and 2 1/2 inches (25 mm and 65 mm) as a target range, allowing a maximum of 3 inches (75 mm). If calcium chloride solution is not to be added, the slump shall be between 1 inch and 3 inches (25 mm and 75 mm) as a target range, allowing a maximum of 4 inches (100 mm).

When a Type A Mid Range water reducing admixture is used, the slump shall be between 1 inch (25 mm) and 4 inches (100 mm) as a target range, allowing a maximum of 5 inches (125 mm).

b. Air Entrainment.
The entrained air content of the unconsolidated concrete will be determined according to Materials I.M. 318, prior to addition of calcium chloride if it is to be added. The air entrainment when calcium chloride is to be added shall be 5.0%, with a tolerance of ± 2.0%. The air entrainment when no calcium chloride is to be added shall be 6.5%, with a tolerance of ± 1.5%.

c. Temperature.
The temperature of Class B patching material, as delivered to the job site, shall be as required in paragraph d. ~~greater than 75°F (24°C).~~ The temperature of Class C patching material, as delivered to the job site, shall be greater than 65°F (18°C). Heating of water, aggregate, or both may be necessary to meet this requirement. The cost of heating shall be considered incidental to patching.

d. Cement.
Cement for Class M concrete mixtures shall meet the requirements of Section 4101. ~~Type IP, I(PM), IS, and I(SM) cement shall not be used in patching concrete unless approved in Materials I.M 401.~~

~~At the Contractor's option, Class C fly ash may be substituted for up to 10%, by weight (mass), of the cement. Concrete mixtures with a 5 hour curing time shall not contain fly ash.~~

The cement types and maximum allowable substitution rates shall be as follows:

Cure Time	Cement Type	Maximum Allowable Substitution	Minimum Mix Temperature
5 Hour	Type I, Type II Type I(SM) *	0% Fly Ash 0% Fly Ash	75°F (24°C) 80°F (27°C)
10 Hour	Type I, Type II Type I(SM)	10% Fly ash 0% Fly Ash	65°F (18°C) 70°F (21°C)

e. Calcium Chloride.
Where calcium chloride is required, it shall be furnished in water solution form and added to the mix, at the job site. The calcium chloride solution shall be a commercial 32% solution, or equivalent, prepared by the Contractor:

PROPORTIONS FOR 32% CALCIUM CHLORIDE SOLUTIONS (ENGLISH)		
Type of Solid Calcium Chloride	Pounds Solid per gallon of water	Solution produced per gallon of water
Type 1 - Regular Flake (77% material) Type 2 - Concrete Flake or pellets (94% material)	7 5	1.35 1.18

PROPORTIONS FOR 32% CALCIUM CHLORIDE SOLUTIONS (METRIC)		
Type of Solid Calcium Chloride	Grams Solid per liter of water	Solution produced per liter of water
Type 1 - Regular Flake (77% material) Type 2 - Concrete Flake or pellets (94% material)	840 g/L 600 g/L	1.35 1.18

The solution shall be added at the rate of 2.75 gallons per cubic yard (13.6 L/m^3) of concrete. Calcium chloride solutions of different concentrations may be approved by the Engineer, provided appropriate adjustments in the total concrete composition are made.

Caution. The mixture shall be agitated until the calcium chloride is completely in solution, and agitation shall be continued, as necessary, to maintain uniformity. The calcium chloride will crystallize out of a 32% solution at 20°F (-7°C), so the solution must be maintained at a higher temperature at all times.

Except when using continuous mixing equipment described in Article 2001.20, D, the calcium chloride solution shall be present in the mix for at least 2 minutes of mixing.

f. Water Reducer.
A Type A Mid Range water reducing admixture may be used at the Contractor's option. It shall be one listed in Materials I.M. 403, and use shall be at the dosage recommended by the manufacturer.

g. Aggregate Durability.
Unless otherwise specified, coarse aggregate shall have the proper class of durability, as defined in Article 4115.04, C.

h. Transit Mix Concrete ~~Containing Type I Cement~~.
Transit mix concrete ~~containing Type I cement~~ shall be from a plant from which the concrete can be delivered and placed within 60 minutes from the time the cement is placed in contact with the aggregate. The time may be extended to 90 minutes when a retarding admixture, used in accordance with Materials I.M. 403 including temperature dosage guidelines and at the Contractor's expense, is added at the plant. Continuous mixing equipment using volumetric proportioning may be used in accordance with Article 2001.20, D.

i. Prepackaged Mixture.
A prepackaged mixture, proportioned as specified above for Class B or Class C matching material may be furnished as a Class B or Class C patching material with the approval of the Engineer. The coarse aggregate for prepackaged mixtures shall be limited to that meeting requirements of Article 4115.06. The prepackaged mixtures shall be mixed in an on-site paddle type mixer or proportioned and mixed with continuous mixing equipment using volumetric proportioning in accordance with Article 2001.20, D.

Reason for Revision: A large number of ready mix plants only have Type I(SM) cement available. Research in the Materials Laboratory has shown that Type I(SM) achieves equal strength to Type I/II cements if the cure temperature is increased or when a mid range water reducer is used. This change will accommodate all sources of Type I(SM) for patching.

It is requested that this specification be allowed retroactive as a mutual benefit.

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: Tom Reis	**Office:** Specifications	**Item 5**
Submittal Date: July 14, 2005	**Proposed Effective Date:** April 2006	
Article No.: 2303.03, G **Title:** Miscellaneous Construction	**Other:**	

Specification Committee Action:

Deferred:	**Not Approved:**	**Approved Date:** 07/14/05	**Effective Date:** 4/18/06

Specification Committee Approved Text:

2303.03, G, 5, Stop Sign Rumble Strips.

Add as new article:

5. Stop Sign Rumble Strips.

The Contractor shall place Stop Sign Rumble Strips prior to opening roadway sections to traffic if the plans include the bid item Rumble Strip Panel (In Full Depth Patch). The Contractor may accomplish this by construction of the permanent Rumble Strip Patch or by constructing temporary rumble strip panels meeting the final pattern and location of the Stop Sign Rumble Strip indicated in the plans.

2303.06, Basis of Payment.

Add as the fourth sentence of the first paragraph:

The installation of temporary Stop Sign Rumble Strips will not be paid for separately, but shall be considered incidental to the price bid for the HMA course for which it is applied.

Comments: Originally there was a note on the Standard Road Plan to the effect that rumble strips should be in place before opening a lane. The note was removed several revisions ago. The Office of Design asked if a detail should be created showing how to place rumble strips. The Specifications Section responded by noting the specification would state how and where the strips would be placed. District 6 asked if this specification would apply to new and replacement rumble strips. The Specifications Section verified this and noted this would apply even if rumble strips are not currently in place, but the plans call for them. The FHWA note that the method doesn't need to be stated, just the result. The Office of Contracts noted that contractors would have to bid cutting rumble strips in (the most expensive method) unless they knew beforehand what other methods the Engineer will allow. The Specification Section recommended removing the language that describes the methods for constructing temporary rumble strips. The rest of the Committee agreed. The Office of Contracts asked why rumble strip construction is incidental to the mix rather than the bid item for rumble strip panel. The Specifications Section responded by stating the rumble strip patch will likely be done by patching contractor. Making the rumble strip construction incidental to the mix will more accurately place the cost with the contractor doing the work.

Specification Section Recommended Text:

2303.03, G, 5, Stop Sign Rumble Strips.

Add as new article:

5. Stop Sign Rumble Strips.
The Contractor shall place Stop Sign Rumble Strips prior to opening roadway sections to

traffic if the plans include the bid item Rumble Strip Panel (In Full Depth Patch). The Contractor may accomplish this by construction of the permanent Rumble Strip Patch or by constructing temporary rumble strip panels by one of the following methods:

- Cutting rumble strips into the HMA surface
- Other methods approved by the Engineer

Regardless of the method used, the final pattern and location of the Stop Sign Rumble Strip shall match that indicated in the plans.

2303.06, Basis of Payment.

Add as the fourth sentence of the first paragraph:

The installation of temporary Stop Sign Rumble Strips will not be paid for separately, but shall be considered incidental to the price bid for the HMA course for which it is applied.

Comments: This revision is intended to ensure that resurfacing projects are not opened to traffic without Stop Sign Rumble Strips.

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

Reason for Revision:

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