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REVISION OF SECTION 403
HOT MIX ASPHALT

Section 403 of the Standard Specifications is hereby revised for this project as follows:

Subsection 403.02 shall include the following:

The design mix for hot mix asphalt shall conform to the following:

◆ **Table 403-1**

Property	Test Method	Value For Grading				
		▲ S()	▲ SG()	▲ SX()	▲ ST() _[mso1]	▲ Patching
Air Voids, percent at: N (design)	CPL 5115	3.5 – 4.5	3.5 – 4.5	3.5 – 4.5	4.0 – 5.0	3.5 – 4.5
Lab Compaction (Revolutions): N (design)	CPL 5115	♥	♥	♥	♥	♥
Stability, minimum	CPL 5106	♥	♥	♥	♥	♥
Aggregate Retained on the 4.75 mm (No. 4) Sieve <u>for S, SG, and SX, and on the 2.36mm (No. 8) Sieve for ST</u> with at least 2 Mechanically Induced fractured faces, % minimum _[mso2]	CP 45	♥	♥	♥	♥	♥
Accelerated Moisture Susceptibility Tensile Strength Ratio (Lottman), minimum	CPL 5109 Method B	80	80	80	80	80
Minimum Dry Split Tensile Strength, kPa (psi)	CPL 5109 Method B	205 (30)	205 (30)	205 (30)	205 (30)	205 (30)
Grade of Asphalt Cement, Top Layer		PG__	PG__	PG__	PG__	PG__
Grade of Asphalt Cement, Layers below Top		PG__	PG__	PG__	PG__	PG__
Voids in the Mineral Aggregate (VMA) % minimum	CP 48	See Table 403-2	See Table 403-2	See Table 403-2	See Table 403-2	See Table 403-2
Voids Filled with Asphalt (VFA), %	AI MS-2	♥	♥	♥	♥	♥
Dust to Asphalt Ratio Fine Gradation Coarse Gradation	CP 50	0.6 – 1.2 0.8 – 1.6	0.6 – 1.2 0.8 – 1.6	0.6 – 1.2 0.8 – 1.6	0.6 – 1.2 0.8 – 1.6	0.9 – 2.0 1.1 – 2.2
	<p>Note: AI MS-2 = Asphalt Institute Manual Series 2</p> <p>Note: The current version of CPL 5115 is available from the Region Materials Engineer.</p> <p>Note: Mixes with gradations having less than 40% passing the 4.75 mm (No. 4) sieve shall be approached with caution because of constructability problems.</p> <p>Note: Gradations for mixes with a nominal maximum aggregate size of one-inch or larger are considered a coarse gradation if they pass below the maximum density line at the #4 screen. Gradations for mixes with a nominal maximum aggregate size of ¾ inch or smaller are considered a coarse gradation if they pass below the maximum density line at the #8 screen. Gradations for mixes with a nominal maximum aggregate size of ½ inch or smaller are considered a coarse gradation if they pass below the maximum density line at the #16 screen.</p>					

All mix designs shall be run with a gyratory compaction angle of 1.25 degrees and properties must satisfy Table 403-1. Form 43 will establish construction targets for Asphalt Cement and all mix properties at Air Voids up to 1.0 percent below the mix design optimum.

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Table 403-2_[ms03]

Minimum Voids in the Mineral Aggregate (VMA)			
Nominal Maximum Size*, mm (inches)	***Design Air Voids **		
	3.5%	4.0%	4.5%
37.5 (1½)	11.6	11.7	11.8
25.0 (1)	12.6	12.7	12.8
19.0 (¾)	13.6	13.7	13.8
12.5 (½)	14.6	14.7	14.8
9.5 (¾)	15.6	15.7	15.8
4.75 (3/4 No. 4)	16.6	16.7	16.8
* The Nominal Maximum Size is defined as one sieve larger than the first sieve to retain more than 10%. ** Interpolate specified VMA values for design air voids between those listed. *** Extrapolate specified VMA values for production air voids beyond those listed.			

The Contractor shall prepare a quality control plan outlining the steps taken to minimize segregation of HMA. This plan shall be submitted to the Engineer and approved prior to beginning the paving operations. When the Engineer determines that segregation is unacceptable, the paving shall stop and the cause of segregation shall be corrected before paving operations will be allowed to resume.

⊖ CDOT approved nonstandard mixes (NSM) may be allowed on this project in accordance with CP 59 as incorporated herein. Unique requirements for NSM design, production and acceptance testing as documented during CDOT NSM approval shall be submitted and approved prior to creation of the Form 43 and before any NSM production on the project. Delays to the project due to NSM submittal and review will be considered within the Contractor's control and will be non-excusable.

♣ The hot mix asphalt shall not contain any reclaimed asphalt pavement.

♠ Hot mix asphalt for patching shall conform to the gradation requirements for Hot Mix Asphalt (Grading __).

■ A minimum of 1 percent hydrated lime by weight of the combined aggregate shall be added to the aggregate for all hot mix asphalt.

Acceptance samples shall be taken ●.

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Subsection 403.03 shall include the following:

▼ The Contractor shall use an approved anti-stripping additive. The amount of additive used shall be a minimum of 0.5 percent by weight of the asphalt cement. The additive shall be added at the refinery or at the hot plant. If liquid anti-stripping additive is added at the plant, an approved in-line blender must be used. The blender shall be in the line from the storage tank to the drier drum or pugmill. The blender shall apply sufficient mixing action to thoroughly mix the asphalt cement and anti-stripping additive.

♪ The Contractor shall construct the work such that all roadway pavement placed prior to the time paving operations end for the year, shall be completed to the full thickness required by the plans. The Contractor's Progress Schedule shall show the methods to be used to comply with this requirement.

Delete subsection 403.05 and replace with the following:

403.05 The accepted quantities of hot mix asphalt will be paid for in accordance with subsection 401.22, at the contract unit price per ton for the bituminous mixture.

Payment will be made under:

Pay Item	Pay Unit
Hot Mix Asphalt (Grading __)(__)(PG ____)	Ton
Hot Mix Asphalt (Grading __)(__)	Ton
Hot Mix Asphalt (Patching)(Asphalt)	Ton _[mso4]

Aggregate, asphalt recycling agent, additives, hydrated lime, and all other work necessary to complete each hot mix asphalt item will not be paid for separately, but shall be included in the unit price bid. When the pay item includes the PG binder grade, the asphalt cement will not be measured and paid for separately, but shall be included in the work. When the pay item does not include the PG binder grade, asphalt cement will be measured and paid for in accordance with Section 411. Asphalt cement used in Hot Mix Asphalt (Patching) will not be measured and paid for separately, but shall be included in the work.

Excavation, preparation, and tack coat of areas to be patched will not be measured and paid for separately, but shall be included in the work.

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INSTRUCTIONS TO DESIGNERS (delete instructions and symbols from final draft):

- ◆ Delete from Table 403-1 those pavement gradings and properties not applicable to this project.
- ▲ For Gradings S, SG, and SX insert the designation which is a part of the pay item in the parentheses. Use additional columns for gradings S, SG, and SX which require separate design mixes for different lab compaction requirements. Separate pay items with different designations for different lab compaction requirements are to be used.
- ♥ See Chapter 3 of Pavement Design Manual
- ♣ Delete this note when the standard special provision Revision of Section 401 - Reclaimed Asphalt Pavement is included in the project.
- ♠ Include this when excavation and patching in the roadway are required. Fill in the blank with the Grading used to designate the gradation requirements for patching.
- Include this requirement where hydrated lime is needed to prevent stripping, as determined by the Region Materials Engineer.
- Complete this sentence with either "at the location specified in Method A of CP 41" or "at the location specified in either Method B or C of CP 41", as determined by the Region Construction and Materials personnel. Or, if preferred by the Region, delete the sentence altogether.
- ▼ To be used only on projects where the need for a liquid anti-stripping additive is indicated by engineering considerations.
- ♪ This requirement is to be added when reflective cracking is a concern, such as asphalt overlays of concrete pavement. Use when directed by the Region.
- θ Include this paragraph when allowed by the Region Materials Engineer. Contractors proposing to use NSM shall supply detailed design, production and acceptance testing requirements prior to completion of the Form 43. Approved NSM submittals shall contain all of this information prior to CDOT approval. Only CDOT Approved NSM will be allowed for use on the project.