



# LESSON LEARNED: I-64 SEGEMENT II CCPRM

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**New Contracting Process (Design-Build), New  
Material (CCPRM), New Specifications,  
What could go wrong???**

**No problems, just challenges!**

# Specifications

- **Three new specifications for cold central plant recycled material (CCRPM) and full depth reclamation (FDR).**
- **Two specifications for CCPRM; one for production and one for placement (July 16, 2015).**
- **One specification for FDR (July 16 2015).**
- **First CCPRM Test Sections placed in late September 2017.**

## CCPRM Modifications/Clarifications

- **Production (October 27, 2017)**
- **Sampling CCPRM for Gradation**
- **CCPRM handling procedures until “pills” are fabricated for indirect tensile strength (ITS) testing, AASHTO T 283 Section 11**
- **Time limit between sampling and ITS specimen fabrication**
- **Moisture content determination**
- **ITS Test Specimen Fabrication, Compaction Method and Size**
- **ITS Test Specimen Curing, Temperature and Time**
- **Gradation**
- **Asphalt Content Determination**

# CCPRM Modifications/Clarifications

- **Production & Placement (January 10, 2018)**
- **Use Of Marshall Apparatus solely for manufacture of ITS specimens**
- **Moisture content of CCPRM before placement of next layer**
- **Temperature for CCPRM Placement**
- **Minimum ITS values for Acceptance**
- **CCPRM Compaction Requirements**

# CCPRM ITS Values for Acceptance

## What Specification Says:

**For acceptance of Mix Design, ITS has to be equal to or greater than 45 psi**

## Paragraph V. 5.:

**Dry Indirect Tensile Strength - When foamed asphalt is used as the recycling agent, acceptance for Dry Indirect Tensile Strength will be based on results of samples taken in a stratified random manner at a frequency of at least one per day or one per 1,000 tons per mix per day if more than 1,000 tons are produced daily. The job-mix target Dry Indirect Tensile Strength shall not be less than 98.0%.**

# CCPRM ITS Values for Acceptance

**What Specification Says (continued):**

**Paragraph V. 5. (continued):**

**The Contractor shall immediately cease production and notify VDOT's Project Manager when results fall below 98.0% of the approved job-mix target. The Contractor shall make any necessary corrective actions to the mix and provide verification to VDOT's Project Manager that it conforms to the approved job-mix formula. Should the results fall below the minimum specified in Table 4, the material represented by the failing results shall be removed and replaced at no cost. With approval of VDOT's Project Manager, subsequent paving operations can resume.**



## CCPRM ITS Values for Acceptance

- **Mix Design had an ITS Dry value of 62 psi (>>45 psi)**
- **Average ITS values for acceptance based on three specimens**
- **Variability of test specimen values**

# CCPRM ITS Values for Acceptance

**What we agreed to:**

**More than three specimens can be made at the time of production sampling, and can be tested after the specified 72 hour cure.**

**ITS for Acceptance**

- **VDOT accepted “Target” ITS value of 50 psi**
- **ITS values less than 50 psi but greater than 45 psi trigger a review of production/mix design processes/attributes**
- **If ITS values fall below 45 psi, production stops until ITS values exceed 45 psi**

# CCPRM Field Compaction Criteria

## Specification says:

### Paragraph V. 2.:

Rolling shall be performed until the material reaches a density of 98% of the maximum theoretical density from the mix design as measured via a nuclear density gauge using direct transmission.

# CCPRM Field Compaction Criteria

Specification says (continued):

Paragraph VI. 1.:

The average of the subplot density measurements will be compared to the target nuclear density established by the approved job mix design to determine the acceptability of the lot. Once the average density of the lot has been determined, the Contractor will not be permitted to provide additional compaction to raise the average. If two consecutive sublots produce density results less than 98 percent of the maximum theoretical density, the Contractor shall immediately notify VDOT's Project Manager and institute corrective action to bring lot density to at least 98% of the maximum theoretical density. By the end of the day's operations, the Contractor shall furnish the test data developed during the day's recycling to VDOT's Project Manager. The Contractor shall verify the results every lot by performing a field proctor (AASHTO T180, Method D). The field proctor shall be at least 98% of the maximum theoretical density from the approved mix design.

# CCPRM Field Compaction Criteria

**What we agreed to:**

**The use of one point field proctors (AASHTO T 180, Method D: Modified Proctor, 6” mold) to check that material being produced is in accordance with mix design and to set “density” for that day/sub-lot. One point field proctor has to be within + or – 5 pcf of mix design maximum density.**

**Accepted roller pattern established by Test Strip constructed**

**Accepted up to two additional passes by roller if initial field densities low.**

# CCPRM Field Compaction Criteria

**What we agreed to:**

**To use the following table as a standardized disposition for average lot densities that do not conform to the requirement of 98% of the maximum theoretical density.**

<b>% of Maximum Theoretical Density</b>	<b>% of Payment</b>
<b>98.0 or greater</b>	<b>100</b>
<b>97.0 to less than 98.0</b>	<b>95</b>
<b>96.0 to less than 97.0</b>	<b>90</b>
<b>Less than 96.0</b>	<b>Remove and Replace</b>

## CCPRM, What We Did Not Change

**Temperature Requirement for Production and Placement. Minimum production and placement temperature still 50<sup>0</sup> F.**

**Stockpiling: Specification did not address stockpiling of material for later use. Applied the Missouri Principal – “Show Me”**

**Thank you!**

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# VDOT RECYCLING SPECIAL PROVISION REVISION

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# PRESENTATION OUTLINE

- **Background of current Recycling Special Provisions (SPs)**
- **Why do we need to revise current Recycling SPs?**
- **Highlights of SPs Revision Process**
- **Major Changes on the Revised Recycling SPs.**
- **What is Next?**

# Background of current Recycling SPs

- **Current VDOT Recycling Special Provisions:**
  - ✓ Special Provision for Cold-In Place Recycling ([SP315-000410-00](#))
  - ✓ Special Provision for Cold Central Plant Recycling Material ([SP211-000400-00](#))
  - ✓ Special Provision for Cold Central Plant Recycling Material Placement ([SP315-000400-00](#))
  - ✓ Special Provision for Full Depth Reclamation ([SP315-000420-00](#))
- **Current Special Provisions were published in July 2015**

# Why Do we need to Revise Current Recycling SPs?

- **Current SPs were based on limited project experience.**
- **More Data available from recently completed recycling projects.**
- **Lessons learned from I-64 Recycling project.**
- **Availability recently published national specifications and guidelines.**
  - ✓ Basic Asphalt Recycling Manual (BARM)
  - ✓ AASHTO Recycling Provisional Special Provisions

# Why Do we need to Revise Current Recycling Spec?

- **Recent Research publications at local and national level.**
- **More Local knowledge and experiences.**
- **To minimize project level changes and have consistency.**

# Highlights of SPs Review Process

## □ Step 1

- **Adopting lessons learned from past projects**
  - ✓ By organizing lesson learned sessions
- **Review of national best practices, manuals, & AASHTO specs.**
  - ✓ Asphalt Reclaiming and Recycling Associations (ARRA)
    - Basic Asphalt Recycling Manual
    - ARRA – Recycling Mix Design & Construction Guidelines
  - ✓ AASHTO Recycling specs.
  - ✓ Wirtgen Recycling Manual

# Highlights of SPs Review Process

## □ Step 2

- **After incorporating feedbacks from project staff, and lessons learned sessions CO Materials distributed draft SPs to internal stakeholders for review.**
- **Internal Stakeholders**
  - ✓ Districts Materials Section
  - ✓ VTRC
  - ✓ CO Materials Section
- **Incorporation of Internal Stakeholders Feedbacks into draft special provisions.**

# Highlights of SPs Review Process

## □ Step 3

- **Distributing Draft SP to External Stakeholders**
- **External Stakeholders**
  - ✓ Virginia Asphalt Association (VAA)
  - ✓ Old Dominion Highway Contractor Associations (ODHCA)
  - ✓ American Concrete Pavement Association – Mid Atlantic
  - ✓ Virginia Transportation Construction Alliance (VTCA)
  - ✓ Southeast Cement Promotion Association
  - ✓ Asphalt Recycling and Reclamation Association (ARRA)
  - ✓ Wirtgen America
  - ✓ FHWA
- **Addressing External Stakeholders Feedbacks**



# Major Changes on the Revised Recycling SPs. – CCPRM Material

- **Job-Mix Formula**

*Within the first production lot, the Contractor may revise the approved JMF using the production materials from lot 1. The revised JMF shall include at a minimum the Moisture Density Relations AASHTO T 180 Method D, percentage by weight of stabilizing agent content, Target gradation for sieve sizes 1.5", ¾", 3/8", No. 4 and No. 200 (including any aggregate to be added), and shall meet the CCPRM Mix Design criteria of Table 4 at the approved stabilizing agent(s) content*

- **CCPRM Mix Design Requirement (Foam)**

- ✓ Minimum ITS 53 psi

- **Raveling Requirement (Emulsion)**

- ✓ Maximum 6%

- ~~Low Temperature Thermal Cracking Requirement~~

# Major Changes on the Revised Recycling SPs. – CCPRM Material

- **Quality Control Plan – (Cold Recycling Certification)**

*A list of the individuals performing the Quality Control and Acceptance processes who are Cold Asphalt Recycling Plant and/or Field certified in the VDOT Materials Certification program as outlined in Section 200.06 of the VDOT Road and Bridge Specifications.*

- **Indirect Tensile Strength**

% of Job-Mix Target Dry Indirect Tensile Strength	% of Payment
53 psi or greater	100
45 psi to 52 psi	95
Less than 45*	Remove and Replace

# Major Changes on the Revised Recycling SPs. (CCPRM Placement)

- **Equipment**

*Rollers shall conform to Section 315.03(c) of the Specifications. Additionally; at least one pneumatic roller shall have a minimum gross operating weight of not less than 50,000 lbs. (22,600 kg). Pneumatic rollers shall have properly working scrapers and water spraying systems. At least one double drum vibratory roller shall have a gross operating weight of not less than 24,000 lbs. (10,800 kg) and a width of 78 inches (1980 mm).*

- **Nuclear Gauge Density Measurement**

*Nuclear gauge in backscatter mode for CCPRM layer depth of 3.0 inches or less, or the direct transmission mode for CCPRM layer depth greater than 3.0 inches*

# Major Changes on the Revised Recycling SPs. (CCPRM Placement)

- **Acceptance – Density**

*The control strip (CS) will be acceptable if both the field proctor (AASHTO T 180, Method D) and the CS nuclear density average is at least 98 percent of the maximum dry density (MDD) from the approved mix design.*

% of Target Control Strip Density	% of Payment
98.0 or greater	100
97.0 to less than 98.0	95
96.0 to less than 97.0	90
Less than 96.0	75

# Major Changes on the Revised Recycling SPs. – CIR

- **Quality Control Plan – (Cold Recycling Certification)**

*A list of the individuals performing the Quality Control and Acceptance processes who are Cold Asphalt Recycling Plant and/or Field certified in the VDOT Materials Certification program as outlined in Section 200.06 of the VDOT Road and Bridge Specifications.*

- **CIR Mix Design ITS Requirement (Foam)**

- ✓ Minimum ITS 53 psi

- **Raveling Requirement (Emulsion)**

- ✓ Maximum 6%

- ~~• **Low Temperature Thermal Cracking Requirement**~~

# Major Changes on the Revised Recycling SPs. – CIR

- **Requirement of Technical Representative**

*Should the initial trial section fail, the Contractor shall construct a second trial section on the project site and shall have a Technical Representative present during mixing and placing operations for the second trial section.*

- **Nuclear Gauge Density Measurement**

*Nuclear gauge in backscatter mode for CIR layer depth of 3.0 inches or less, or the direct transmission mode for CIR layer depth greater than 3.0 inches*

# Major Changes on the Revised Recycling SPs. – CIR

- **Acceptance – Density**

*The control strip (CS) will be acceptable if both the field proctor (AASHTO T 180, Method D) and the CS nuclear density average is at least 98 percent of the maximum dry density (MDD) from the approved mix design.*

% of Target Control Strip Density	% of Payment
98.0 or greater	100
97.0 to less than 98.0	95
96.0 to less than 97.0	90
Less than 96.0	75

# Major Changes on the Revised Recycling SPs. – FDR

- **Quality Control Plan – (FDR Certification)**

*A list of the individuals performing the Quality Control and Acceptance processes who are Cold Asphalt Recycling Plant and/or Field certified in the VDOT Materials Certification program as outlined in Section 200.06 of the VDOT Road and Bridge Specifications.*

- **Requirement of Technical Representative**

*Should the initial trial section fail, the Contractor shall construct a second trial section on the project site and shall have a Technical Representative present during mixing and placing operations for the second trial section.*



# Major Changes on the Revised Recycling SPs. – FDR

- **Mix Design Gradation Requirement**

Design Range		
Sieve Size	Percentage by Weight Passing Square Mesh Sieves (in)	
	Lower	Upper
2.0"	100	100
3/8"	55	90

- **Number of Specimens for mix design**

*Three specimens shall be produced and tested for each mix design. The average strength of the specimens shall be within the specified range with no individual specimen having a strength value that varies more than 100 psi from the minimum or maximum value.*

# Major Changes on the Revised Recycling SPs. – FDR

- **Verification of Stabilizing Agent Dosage Rate**

*Contractor shall verify the dosage rate at the start of a day's production and twice per 1,000 linear feet ~~ten times per lot~~.*

*If testing of 2,000 linear feet meets the dosage rate within 0.20 percentage points of the approved JMF, the Engineer may reduce the frequency of testing to 1 test per 1,000 feet. However, if the dosage rate is beyond the tolerance at any time during an approved reduced frequency, testing shall resume at a rate of twice per 1,000 linear feet. The Engineer reserves the right to require verification of the dosage rate by the Contractor at any time.*

# What is Next?

- **Publish all recycling SPs.**
- **Evaluate and Monitor**
- **Improve as needed**

**Thank you!**  
**Questions?**

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