

# Virginia Criteria for Use of Corrosion Resistance Reinforcement

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# INTRODUCTION

- **High performance concrete used today can provide a bridge service life of more than 75 years as currently recommended by FHWA.**
- **However, epoxy coated reinforcement cannot provide adequate corrosion protection for structures designed for a 75-year+ service life.**

# Introduction Continued

- **Consequently, VDOT has implemented a plan to discontinue the use of epoxy coated and galvanized bars and to use corrosion-resistant metallic reinforcing bars (CRR).**
- **This presentation covers the special provisions for the CRR and the CRR to specify based on the bridge element and the functional classification and location of the structure.**

# Instructional Memorandum

- **Number: IIM- S&B-81.3**
- **General Subject: Corrosion Resistant Reinforcing Steels**
- **Specific Subject: Plan Modifications for Projects with CRR**
- **Date: January 26, 2010**

## **CRR Approved for Use**

- **Low-carbon chromium  
(ASTM A1035/A1035M)**
  - **Stainless steel clad\*  
(AASHTO designation: MP 13M/MP 13-04)**
  - **Solid stainless steel (ASTM A955/A955M)**
- \* Currently not produced in the U.S. Federal aid projects require an approved waiver to meet the Buy America clause.**

# CRR Implementation

<b>Ad.</b>	<b>Projects</b>	<b>Notes</b>
<b>2008</b>	<b>Designated</b>	<b>All 3 types of CRR allowed.</b>
<b>2009</b>	<b>Designated</b>	<b>15 experimental projects with specific CRR designated. Other projects ASTM A1035 and A955 allowed.</b>
<b>&lt; 9-2010</b>	<b>Case by case</b>	<b>All 3 types of CRR allowed.</b>
<b>&gt; 9-2010</b>	<b>All</b>	<b>All 3 types of CRR allowed.</b>

# CRR Applications

- **New Construction**
- **Widening**
- **Superstructure replacement**
- **Repair**
- **Rehabilitation**

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**Research has shown no adverse affects from lapping CRR with black, epoxy coated or galvanized reinforcement (Ontario Ministry of Transportation).**

# **CRR based on Functional Classification for following Elements**

**Deck slabs**

**Diaphragms for prestressed beams**

**Medians, Sidewalks, parapets, rails,  
median barriers and terminal walls**

**Piers and bents under joints (use black bars  
in columns)**

**Prestressed concrete slabs (except strand)**

**Reinforced concrete slabs**

# CRR for Functional Classification

<b>Classification</b>	<b>A1035</b>	<b>MP 13M</b>	<b>A955</b>
<b>Freeway</b>			<b>X</b>
<b>Rural Principal Arterial</b>			<b>X</b>
<b>Rural Minor Arterial</b>		<b>X</b>	
<b>Rural Collector Road</b>	<b>X</b>		
<b>Rural Local Road</b>	<b>X</b>		
<b>Urban Principal Arterial</b>			<b>X</b>
<b>Urban Minor Arterial</b>		<b>X</b>	
<b>Urban Collector Street</b>	<b>X</b>		
<b>Urban Local Street</b>	<b>X</b>		

# CRR for Functional Classification

**If MP 13M (Clad) is indicated but not being produced in the U.S. prior to bidability review, A1035 shall be specified.**

# **A1035 shall be specified for the following Elements**

- **Abutment neat work (except footing bars)**
- **Box Culverts with 0 to 2-ft fills**
- **Prestressed concrete beams (except strand)**
- **Rigid frames with less than 2-ft fill**

# Design for CRR

- **Yield strength = 60 Ksi**
- **See Office Practice Manual Structure and Bridge, Volume V- Part 2, Chapter 7 file nos. 07.100.3 and 07.101-1 thru -3**

# CRR for Functional Classification

	<b>A1035</b>	<b>MP 13M</b>	<b>A955</b>
<b>Bar Sizes</b>	<b>All</b>	<b>All except #4, #9, #11</b>	<b>All</b>
<b>Bar Lengths</b>	<b>40-ft: all sizes 60-ft: all sizes except #3</b>	<b>39-ft: all available sizes</b>	<b>40-ft: all sizes 60-ft: all sizes</b>

**MP 13M: Standards detailed #4 need to be revised to #5. Pin diameters need to be checked/revised and bar length may need to be adjusted.**

# Plan Changes for CRR

## Title (Front) Sheet General Notes

Replace the reinforcing steel note with the note for CRR:

All reinforcing steel shall be deformed and shall conform to ASTM A615 grade 60 except for steel noted as CRR which shall conform to the special provision for CRR.....

CRR shall conform to one or more of 3 types.....

## Plan Changes for CRR Cont.

**Standard Sheets have been revised (Epoxy and galvanized replaced with CRR).**

**Standard BPP-1 has been revised. For tidal areas the epoxy coated alternative has been deleted. Spirals are designated as galvanized bars.**

**Special Provision to be included: S223  
CRR.**

# References

1. Weyers, R; M. Brown and M. Sprinkel, *Summary Report on the Performance of Epoxy Coated Reinforcing Steel in Virginia* VTRC 06-R29, Virginia Transportation Research Council, Charlottesville, Virginia, 2006.
2. Sprinkel, Michael; Richard Weyers; Chris Blevins; Andrei Ramniceanu; and Sean A Weyers, *Failure and Repair of Deck Closure Pour on Interstate 81*, Transportation Research Board, D.C., 2010.

# QUESTIONS?

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