

VIRGINIA DEPARTMENT OF TRANSPORTATION

STRUCTURE AND BRIDGE DIVISION

INSTRUCTIONAL AND INFORMATIONAL MEMORANDUM

GENERAL SUBJECT: Corrosion Resistant Reinforcing Steels (CRR)	NUMBER: IIM-S&B-81.1
SPECIFIC SUBJECT: Plan Modifications for Projects with CRR	Date: April 30, 2009
	SUPERSEDES: IIM-S&B-81
DIVISION ADMINISTRATOR APPROVAL: /original signed/ Kendal R. Walus, P.E. State Structure and Bridge Engineer Approved: April 30, 2009	

Changes are shaded.

INTRODUCTION:

Based on research completed at the Virginia Transportation Research Council (VTRC) and at Virginia Tech, the Structure and Bridge Division in consultation with the FHWA has decided that to achieve a 75-year or longer life for our bridges, we should discontinue the use of epoxy coated bars and galvanized bars. While many types of corrosion resistant reinforcing steels had been studied, the decision was made to use the following three types of deformed bars:

1. Reinforcing steel bars conforming to ASTM A1035/A1035M (low carbon, chromium)
2. Stainless steel reinforcing bars conforming to ASTM A955/A955M – UNS designations: S24100, S30400, S31603, S31653, S32101, S32201, S32205
3. Stainless reinforcing steel clad bars conforming to AASHTO designation: MP 13M/MP 13-04

At this time stainless clad bars are not produced in the U.S. (the bar and the cladding). Projects with Federal Aid require an approved waiver from the FHWA to meet the “Buy America” clause (23 CFR Section 635.410). Therefore, at this time the stainless clad bars will not be used except for projects designated as “experimental.”

Once stainless clad reinforcing bars are being produced in the U.S. in sufficient quantities, all three types of CRR steel bars will be allowed.

DESIGNATED PROJECTS:

For designated projects with corrosion resistant reinforcing steel (CRR), the following changes must be made to the plan sheets:

TITLE (FRONT) SHEET:

GENERAL NOTES: The following notes will replace the current reinforcing steel note. Information in double parenthesis is for designer information only.

All reinforcing steel shall be deformed and shall conform to ASTM A615 Grade 60 except for reinforcing steel noted as CRR (corrosion resistant reinforcement) indicated on plan sheets and in the reinforcing steel schedule. All reinforcing bar dimensions on the detailed drawings are to centers of bars except where otherwise noted and are subject to fabrication and construction tolerances. *((Note: Some of the bars in the reinforcing steel schedule will be black bars while others may be CRR.))*

Reinforcing steel noted as epoxy coated or galvanized on plan sheets or in the reinforcing steel schedule shall be corrosion resistant reinforcement. *((This note is needed so that the current standards can be used without modifications. After full implementation of CRR in January 2010 the reinforcement notes will be changed on the applicable standards.))*

Corrosion resistant reinforcing steels shall conform to one of the **two** types (ASTM A1035 or stainless steel) listed in the copied note. The minimum yield strength shall be: 100 ksi for ASTM 1035 and 60 ksi for stainless steel. *((This note is needed as the minimum yield strength for ASTM A1035 reinforcing steel is greater than 60 ksi)).*

If a specific CRR type is to be designated for the project, the third note above will be replaced by one of the following:

FOR DESIGNATED PROJECTS WITH ASTM A1035 REINFORCING STEEL:

As an FHWA / STATE experimental project, the reinforcement designated as corrosion resistant shall be ASTM A1035 reinforcing steel. The minimum yield strength shall be 100 ksi. No substitutions shall be allowed.

FOR DESIGNATED PROJECTS WITH STAINLESS REINFORCING STEEL:

As an FHWA / STATE experimental project, the reinforcement designated as corrosion resistant shall be stainless reinforcing steel. The minimum yield strength shall be 60 ksi. No substitutions shall be allowed.

FOR DESIGNATED PROJECTS WITH STAINLESS CLAD REINFORCING STEEL:

As an FHWA / STATE experimental project, the reinforcement designated as corrosion resistant shall be stainless clad reinforcing steel. The minimum yield strength shall be 60 ksi. No substitutions shall be allowed.

QUANTITY TABLES SHEET:

There are four bid items in the Trns.port for corrosion resistant reinforcing steel. The item codes are listed in the office practice, Manual of the Structure and Bridge Division, Volume V – Part 2, Chapter 3 as follows:

File number	CRR Location	Item Code
03.06-1	Bridge superstructure	61704
03.07-1	Bridge substructure	65204
03.09-1	Structural widening or repair superstructure	68104
03.10-1	Structural widening or repair substructure	69104

For CRR projects already completed with epoxy coated reinforcement, the title(s) in the quantity block(s) need to be changed from “Epoxy coated reinforcing steel” to “Corrosion resistant reinforcing steel.”

STANDARD SHEETS:

At the present, some standard sheets specify bars to be epoxy coated or galvanized, for example, prestressed concrete beam sheets, concrete parapets and railing, etc. Until full implementation in 2010, there will be projects without CRR and those with CRR steels. For CRR projects, no changes need to be made to the standard sheet as this is covered by the second reinforcing steel note indicated in the GENERAL NOTES on the first page of this memorandum: “Reinforcing steel noted as epoxy coated or galvanized on plan sheets or in the reinforcing steel schedule shall be corrosion resistant reinforcement.” The affected standards will be revised prior to full implementation of CRR.

REINFORCING STEEL SCHEDULE:

Bars designated as CRR need to be shown as CORROSION RESISTANT REINFORCEMENT in the reinforcing steel schedule.

WHAT STEEL IS TO BE DESIGNATED AS CRR?

For designated projects with CRR, all reinforcement that is currently noted as being either epoxy coated or galvanized will be changed to CRR. For reference, see VDOT Modifications to the AASHTO *Standard Specifications for Highway Bridges* (Articles 8.22.5 and 8.22.6) and the VDOT Modifications to the *LRFD Bridge Design Specifications* (IIM-S&B-80) with the following clarifications:

Abutment neatwork: Applies to all abutment types including semi-integral and full integral and to slabs with deck extensions.

Pier caps under joints: All reinforcement in pier except that extending from below into cap such as columns, piles, stem, etc.

Pile caps under joints: All reinforcement in pier except that extending from below into cap such as columns, piles, stem, etc.

DESIGN ISSUES:

Design is to be based on a yield strength of 60 ksi for all three types of CRR.

Hooks, lap lengths and development lengths are in accordance with the design specifications using a yield strength of 60 ksi. See also the office practice (Manual of the Structure and Bridge Division, Volume V – Part 2, Chapter 7, file nos. 07.100.3 and 07.101-1 thru -3).

TIMETABLE FOR CRR IMPLEMENTATION:

Ad date	Projects	Notes
2008	Designated projects	All three types of CRR were allowed
2009	Designated projects	Fifteen projects are considered FHWA/VDOT experimental projects and a specific type of CRR is designated. Other projects may be designated for CRR in which case both types are allowed.
2010	All projects	Both types of CRR are allowed

NOTE: The full implementation date set for 2010 may be adjusted pending the outcome of the fifteen experimental projects being advertised in 2009.

COPIED NOTES:

The following copied notes dealing with CRR must be included in the project:

c223ag1 (Section 223(e)): Designates the type of steels

c406bg0 (Section 406.04): Designates measurement and payment

CC: Chief Engineer
Chief of Systems Operations
Division Administrators
District Administrators
District Construction Engineers
District Maintenance Engineers
Assistant State Structure and Bridge Engineers
District Structure and Bridge Engineers
Residency Administrators
Structure and Bridge Program Managers
FHWA: Bridge Section