Corrosion Resistant Reinforcing Steel (12 Projects)

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Why Use CRR?

• Lab and field studies evaluated the performance of uncoated reinforcement (UR), epoxy coated reinforcement (ECR) and corrosion resistant reinforcement (CRR) in decks.

Disadvantages of ECR in decks

• Cracks are 33 % wider when ECR is used.
• Epoxy loses adhesion to steel as it ages.
• The permeability of epoxy increases with age.
• Epoxy cracks with age.

Epoxy Loses Adhesion With Age

Why Use CRR?

• Time to corrosion of UR and ECR was estimated at 25 to 50 years for VDOT concretes (1977-1995).
• ECR was estimated to increase the time to corrosion-induced spalling by only 5 years.
• Time to corrosion for CRR is > 4.5 times that of UR.
• Time to corrosion of CRR was estimated at more than 200 years.

Epoxy Cracks With Age
### Why Use CRR?

- Crack control is better than ECR.
- Corrosion protection in cracks is better than ECR.
- Initial cost is $\geq$ ECR.
- Life cycle cost is $<$ ECR.

### Section 223 Steel Reinforcement

CRR shall conform to the requirements of one of the following standards:

- ASTM A955/A955M - 06a Standard and Specification for Deformed and Plain Stainless Steel Bars for Concrete Reinforcement.

### Section 223 Steel Reinforcement

- Revisions being reviewed by VDOT Specifications committee and the FHWA.

### ASTM A1035/A1035M

- Will have an upper limit on yield strength as ductility may still be an issue.
- Has been adopted into the AASHTO LRFD Construction Specifications.
- Has not yet been adopted into the design specifications.

### Available Products

- MMFX-2 by Steel Corporation of America, Inc.
- EnduraMet 32 by the Carpenter Company
- 2101, 2201, 2205, 304, 316 Stainless Steels

### VDOT Plan to Use CRR

- 2007: modify design standards to specify CRR in decks (one to one replacement for Grade 60 rebars).
- January – December 2008: Advertise 12 projects (approximately 10%).
- January – December 2009: Advertise 24 – 30 projects (approximately 30%).
- January 2010: Full implementation.
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Thank you.

Questions?