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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.

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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.

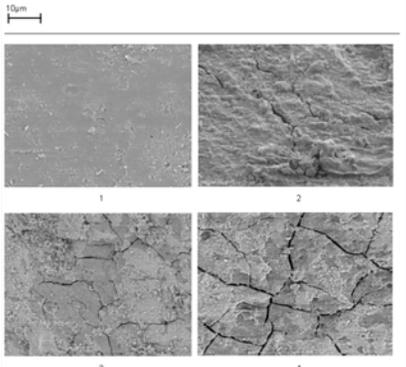
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Epoxy Loses Adhesion With Age



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Epoxy Cracks With Age



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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.



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 A1035/A1035M – 05 Standard Specification for Deformed and Plain, Low-carbon, Chromium, Steel Bars for Concrete Reinforcement.
- ASTM A955/A955M - 06a Standard and Specification for Deformed and Plain Stainless Steel Bars for Concrete Reinforcement.
- AASHTO Designation: MP 13M/MP 13-04, Standard Specification for Stainless Steel Clad Deformed and Plain Round 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.

Thank you.

Questions?

