

ANTI-CORROSION TIMES

REPORTING ON INDUSTRY NEWS, NOTEWORTHY APPLICATIONS & NEW DEVELOPMENTS ON FUSION BONDED EPOXY COATINGS FOR CORROSION PROTECTION OF REINFORCING STEEL.

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ANTI-CORROSION TIMES

is a publication of the Concrete Reinforcing Steel Institute, a not-for-profit trade association providing valuable resources for the design and construction of quality cast-in-place reinforced concrete. Published biannually, the Anti-Corrosion Times is produced to help specifiers, engineers, architects, fabricators and end-users receive the most recent information about how and where epoxy-coated reinforcing steel is used, recent technical changes and information resources.

Send any questions or comments regarding the Anti-Corrosion Times to John M. Prentice, Manager of Corrosion Protection at CRSI.

► *Rebuilding Chicago's Wacker Drive*

. . . Design Objective: 100 year service life



Photo Courtesy of Toltec

► *. . . To achieve a 100 year service life*

The Chicago Department of Transportation (CDOT) set an ambitious design goal of 100-year service life for this historic roadway. The reconstruction was needed because of the deterioration of the old concrete structure caused by corrosion. Daniel Burnham and Edward Bennett never considered this problem when they brought the original plan to the

Commercial Club of Chicago in 1906, because the most corrosive factor, deicing salts, wasn't used on the roadway until about 1962. To achieve the design objective, all new components of the rebuilt structure must work together to prevent the deterioration caused by deicing salts. For this reason, corrosion resistant epoxy-coated reinforcing bars were specified for the new cast-in-place concrete structure. In the finished structure all but a small

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► Rebuilding Wacker Drive . . . continued from page 1

percentage of the concrete on the Wacker Drive project will include epoxy-coated reinforcing bars.

The \$200 million dollar budget for rebuilding Wacker Drive, twenty-five times the original 1926 cost, is

■ A New Mix Design for High Performance Concrete (HPC)

CDOT specifications require a roadway slab to be crack resistant and fit into the existing structure's dimensional limits. In addition, the upper

its goal. In fact, the 28 day compressive strength was limited to 65.5 Mpa (9,500 psi) to minimize cracking caused by temperature changes or shrinkage. There was also a strict requirement for chloride permeability, to minimize the penetration of deicing salts into the concrete matrix. The inclusion of over 4,000 tons of epoxy-coated reinforcing bars was an integral element of the design of the structure. The use of epoxy-coated reinforcing bars as a cost effective and durable corrosion protection system has been well documented over the last thirty years.



Photo Courtesy of Toltec

Originally planned as a precast project, Walsh Construction value-engineered cast-in-place concrete pavement to help control the tight schedule. Walsh also developed a rolling formwork system that is moved quickly from section to section.

provided by the State of Illinois Department of Transportation (IDOT), CDOT and the Federal Highway Administration (FHWA). The project is divided into three phases. The first began in February 2001; last phase completion is due in November 2002.

Wacker Drive is a vital artery into and out of the heart of Chicago. Prior to reconstruction, more than 180,000 vehicles used the two-level thoroughfare daily. Because of its importance, the need to reduce traffic disruption and meet all schedules is critically important. To control the tight schedule, Walsh Construction, Inc., a subsidiary of The Walsh Group and primary contractor on the project, value engineered the project. Cast-in-place concrete was selected to replace precast concrete which was originally specified.

MATERIALS SPECIFIED

Epoxy-coated Reinforcement, straight and fabricated bar	
Contract A	1,700 tons
Contract B	1,000 tons
Contract C	1,500 tons
. Total Three Phase Project	
High Performance Concrete (HPC)	35,900 cu yds
Cast-in-place Concrete	14,400 cu yds
Concrete Pavement	57,300 sq yds
Cement	70,160 tons

deck structure had to accommodate an increase in the lower level vertical clearance of 12 inches. To help achieve these objectives, a High Performance Concrete (HPC) mix was specially designed by Wiss, Janney, Elstner Associates Inc. (WJE) and the University of Illinois Chicago (UIC). This mix was designed with maximum durability, not compressive strength as

■ CRSI Certified Epoxy Coater Meets All Requirements

Keeping that much epoxy-coated reinforcement supplied to the project is a rigorous task, but one that Toltec Steel Services, Inc. of Kankakee, IL, a CRSI certified epoxy coating plant, is able to meet with their new coating and fabrication facility. During the initial phase, Toltec typically delivered three truckloads of epoxy coated reinforcing bars to the staging area at a time. This takes superior scheduling and coordination between Toltec, IDOT and the contractor. IDOT has to inspect each truckload at the Toltec plant before it is shipped. The inspection criteria, loading, shipping and job site handling, all must conform to the specifications set forth in ASTM A775/A775M-01, ASTM3963 and the project specifications.

■ Epoxy Coating, Proven Corrosion Resistance

Since CDOT maintains a policy to achieve dry pavement on the main arterial streets, deicing salts are used liberally throughout the city. In fact, a previous Mayor lost his bid for reelec-

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► Michigan Reconstructs Southfield Freeway

On March 9, 2001, the reconstruction of M-39, known as the Southfield Freeway, began well ahead of the scheduled spring start date and was completed in August 2001. The more than \$35 million reconstruction project is funded by the Michigan II Plan and TEA-21.



To achieve the extended service life required by the designers, 2,500 tons of epoxy-coated reinforcing bars were used. This major highway rebuilding project along a 4.7-mile stretch of M-39 from I-94 to M-153 includes improvements to fifteen ramps, six bridges plus new lighting and signage. The six

bridges were rebuilt first, using epoxy-coated reinforcing bars in the deck and columns. Once the bridges were completed, work on the freeway began and continued through the end of August 2001.

To achieve an aggressive schedule of under six months and to minimize delays to the more than 174,000 motorists per day, traffic flow had to be maintained and the schedule milestones had to be met. To address motorist inconvenience and the negative impact on businesses, the project was divided into 5 stages with construction also scheduled at night and during week-ends. Incentives for early completion and penalties for missing critical schedule elements were part of the project specifications and served to keep the project on schedule. This required close cooperation and coordination between the CRSI epoxy coating plant and the entire construction team.

MDOT's goal of extended service life and reduced maintenance on this



highway in the decades ahead was made possible because the vital components of the concrete structures were protected against corrosion with epoxy-coated reinforcement. ♦

Epoxy Coating:

ABC COATING CO. OF MICHIGAN, INC.

Contractors:

C.A. HULL, DAN'S EXCAVATING, DETROIT, MI

Owner:

MICHIGAN DEPARTMENT OF TRANSPORTATION

► Rebuilding Wacker Drive . . . continued from page 2

tion because of the city's inability to keep the streets clear of snow. To achieve the design objective of 100 year service life, epoxy-coated reinforcing bars are specified in all of the areas which are subject to deicing salts. The substructure, superstructure, decks slabs and road-

ways all contain epoxy-coated reinforcement. For many decades, epoxy coating has proven to be an effective and economical method of protecting against corrosion and the damage associated with it. ♦



PRINCIPALS FOR WACKER DRIVE

Epoxy Coating and Fabrication:

TOLTEC STEEL SERVICES, INC.

Primary Contractor:

WALSH CONSTRUCTION

Concrete Supplier:

PRAIRIE MATERIAL SALES

Design Engineer:

J. MULLER INTERNATIONAL

Concrete Consultant:

WISS JANNEY ELSTNER ASSOCIATES

Owner:

CITY OF CHICAGO

► **CRSI Epoxy Coating Plant Certification Continues to Grow**

The CRSI Voluntary Epoxy Coating Plant Certification program started over a decade ago, in response to the need for a more dependable, consistent coating on steel reinforcing bars. The program continues to grow, and has played an instrumental role in epoxy coating becoming the most widely used corrosion protection material for steel reinforcement in concrete structures. At present, thirty-two epoxy coating plants are CRSI certified.

The CRSI Voluntary Epoxy Coating Plant Certification program is overseen by the Plant Certification Committee of CRSI. Plant inspections are performed by an inspection agency which conducts in depth unannounced plant inspections. Some of the important quality issues addressed in these inspections include

coating thickness, anchor profile, surface contamination, and maximum holidays.



It is accepted in the epoxy coating industry that during the more than ten year existence of the certification program, great strides have been made in the overall quality and consistency of epoxy-coated steel reinforcing bars. In addition,

members of the Plant Certification Committee have contributed to on going development of the CRSI Plant Certification Program, as well as ASTM standards for epoxy-coated steel reinforcing bars. In recognition of this effort many state and provincial transportation departments require that epoxy-coated steel reinforcing bars come from plants that have an on going quality program with third party inspections such as the CRSI certified plants. Continuous improvement of the Quality Control Program has been instrumental in providing a cost effective corrosion protection material for steel reinforcement.

For additional information about the voluntary program, contact Scott Humphreys, Epoxy Coating Plant Certification Program Manager at CRSI.

State/Province Transportation Agencies Requiring Certified Plants as of January 2002

Arkansas	Indiana	Virginia	Wisconsin
North Carolina	Utah	Minnesota	Alberta
Idaho	New Hampshire	West Virginia	New Mexico
Oregon	Kansas	Nevada	Ontario

► **Visit the CRSI Webpage on Epoxy-Coated Reinforcement**

www.crsi.org/epoxy

- ✓ Streamlined groupings
- ✓ Easy access to downloadable literature
- ✓ CRSI certified plants listed with contact information

Coming soon, videos on epoxy-coated reinforcing steel manufacturing, fabrication and field handling.



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