CRSI

# ANTI-CORROSION TIMES

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

## In this issue



**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 T. Prentice, Director of Marketing.

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## New 580,000 square foot Capitol Visitor Center makes extensive use of Epoxy-Coated Rebar

*Artist's rendering of the entrance to the Capitol Visitor Center from First Street SE.*

*In 1970, one million visitors came to see Congress at work at the U.S. Capitol Building in Washington, D.C. The visitor count grew to three million in 2000.*

*This 300% increase in visitors prompted Congress to direct the Architect of the Capitol to design and build a new Capitol Visitor Center (CVC) that would welcome all in 'an atmosphere of free and open access.'*

*Preparatory construction began in the fall of 2001, including relocation of utilities and visitor screening facilities.*

Major construction began in July, 2002 and the project is presently on track for completion in September, 2006.

Work on the CVC is proceeding in several successive phases with some overlap—"Sequence 1: Foundation / Structure" and "Sequence 2: Interior / Systems." The original design (completed prior to 9/11) was reviewed and up-dated in light of the 9/11 security awareness.

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Construction documents were completed during the winter of 2001-2002. The first major construction contract was awarded in the spring of 2002.

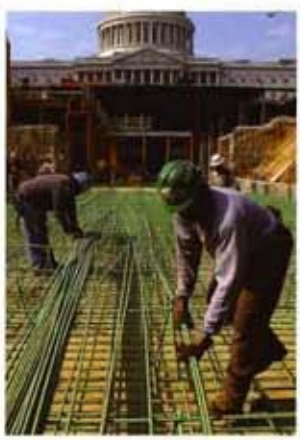
This contract, called "Sequence 1: Foundation/Structure" and worth nearly $100 million, was awarded to Centex Construction Company, whose Mid-Atlantic Division is headquartered in Fairfax, Virginia. The contract involved site demolition, slurry wall construction, excavation, construction of columns, installation of site utilities, construction of the concrete and steel structure, waterproofing, and construction of a new service tunnel. Steel and concrete framework, steel decking and a concrete cover for the roof and interior floor slabs were also completed.

Manhattan Holdings, Inc. was awarded the contract for "Sequence 2: Build-out of the interior spaces/Installation of electrical, mechanical and plumbing systems," plus coordination with existing Capitol Building systems where the CVC connects within the U.S. Capitol Building, completion of the above ground East Front Plaza, related site work and additional security related elements.

**Four fundamental goals guided the design of the New Capitol Visitor Center (CVC):**

1. SECURITY: The CVC is to provide a secure public area in which to screen, welcome and manage a large number of visitors and delivery vehicles, while protecting the Capitol Building and its occupants.

2. VISITOR EDUCATION: The CVC is to host and present lively and informative programs on the workings and history of Congress, the legislative process and the architecture of the Capitol Building.



3. VISITOR COMFORT: The CVC is to provide the amenities, comfort, and convenience for visitors appropriate to the world's most recognizable symbol of democracy and one of the nation's most visited tourist destinations. All access to the Capitol Building will be through the spacious, climate-controlled CVC. It's to be a state-of-the-art reception center with movie theaters, gift shops, a virtual museum, auditorium, historical displays, restrooms and cafeteria. And, the CVC is to be fully accessible to persons with disabilities.

4. FUNCTIONAL IMPROVEMENTS: The CVC will alleviate the physical limitations of the Capitol Building by providing modern, efficient facilities for such functions as truck loading and deliveries, improved connections to The Senate and House office buildings and improve vertical circulation with new elevators.

*In the center of the project site, workers assemble reinforcing steel for one of the walls inside the screening area just beyond the CVC entrances.*

**4,600 tons of epoxy-coated rebar were specified to protect the structure against corrosion for many years to come.**

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## Reinforcing Bars

Rebar was bid under three contracts: slurry walls, tunnels and the main building.

1,700 tons of epoxy-coated rebar were used in the slurry walls. The contractor was Boston Nicholson and the epoxy-coated rebar was supplied by Harris Rebar, Bethlehem, PA. Reinforcement for the tunnels was also supplied by Harris Rebar and installed by Flippo Construction Company, Inc. A total of 2,000 tons were used; 1,700 tons were epoxy-coated and 300 tons were uncoated bar.

Reinforcement for the main building was supplied by SMI Rebar, Virginia. With the entire project below ground level, 1,200 tons of epoxy-coated rebar were used on the top, or plaza level, which is covered by landscaping. An additional 3,500 tons of uncoated bar were used in the main structure.

With the objective of a long service life for the plaza level, which is exposed to the elements, epoxy-coated rebar was the material of choice. This was also the case for the slurry walls and tunnels.

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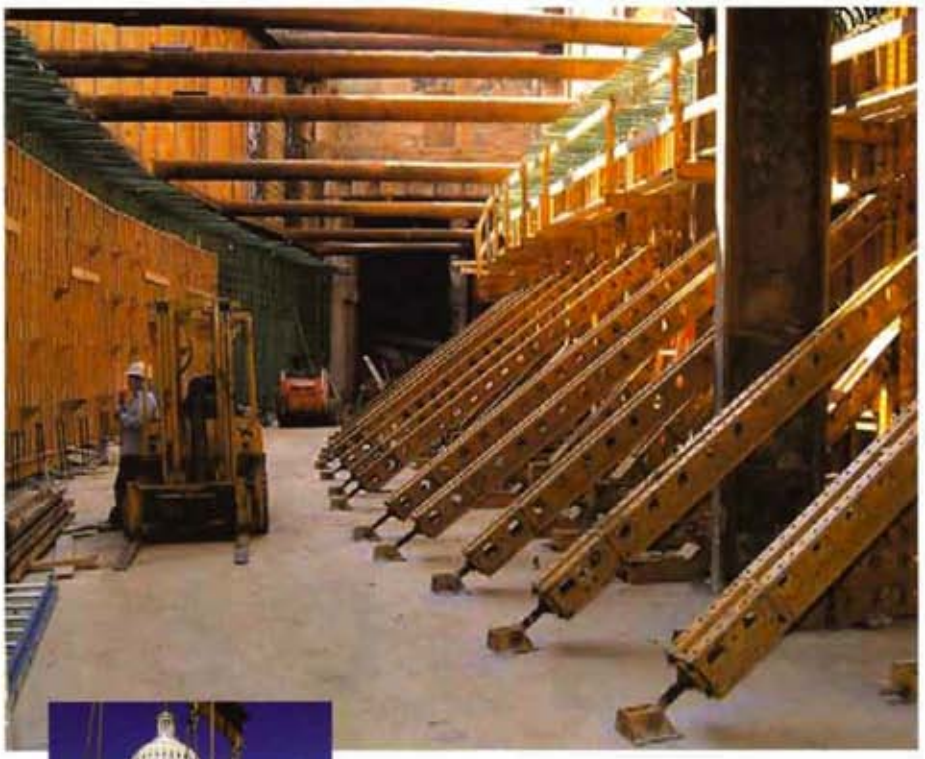

*Steel braces stabilize the formwork for a concrete wall in the CVC truck tunnel*

## CVC Facts

- *CVC encompasses 580,000 square feet (the Capitol Building is 775,000 square feet) on three levels below ground, requiring a 196,000 square-foot excavation including 170,000 square feet for House and Senate expansion space.*
- *The footprint covers 5 acres (approximately 193,000 square feet), larger the Capitol Building footprint.*
- *A total of 8,400 tons of steel reinforcing bars will be used; 4,600 tons of epoxy-coated rebar and 3,800 tons of uncoated rebar.*
- *Excavation required the removal of 50,000 truckloads of soil.*
- *The perimeter foundation wall includes 2,100 linear feet of slurry wall and 494 tie-backs.*
- *The structure will utilize 135 steel columns and 50 concrete columns. Steel columns weigh as much as 20 tons each.*
- *A 27 inch-thick roof deck will be capped with granite pavers that match the historic Frederick Law Olmsted hardscape features, such as granite fountains and seatwalls.*

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### CVC Budget

The project's overall budget is $351 million. That includes a base budget of $265 million for the core visitor center facility and a new truck tunnel; $38.5 million for security enhancements (added after 9/11) and $48 million to accommodate unforeseen site conditions, additional management costs for scope changes, increases in security requirements and additional contingencies. ■

**The new CVC, one of the nation's most frequented tourist destinations, will have three levels below grade with landscaping above.**

| Project Team: | |
|---|---|
| **Owner:** | U.S. Federal Government |
| **Architectural Firm:** | Architect of the Capitol |
| **Sequence 1:** | |
| **Epoxy Coater/Fabricator:** | Harris Rebar, PA |
| **Contractor:** | Centrex Construction Company |
| **Sequence 2:** | |
| **Epoxy Coater:** | ABC Coating, NC |
| **Rebar Fabricator:** | SMI Rebar, VA |
| **Contractor:** | Manhattan Holdings, Inc. |

# The Shoreham, a 48-story High-Rise Built with 3,100 Tons of Reinforcing Steel Bars


*The new Shoreham is located in a development called Lakeshore East, near the intersection of the Lake Michigan shoreline and the Chicago River. The 765,000-square-foot property is a 48-story structure, 450 feet tall, that includes 548 residential rental units, 11,000 square feet of retail space and parking for 373 cars.*

This cast-in-place high-rise utilizes an innovative use of off sets and proportions of balconies, glass and concrete walls, and exposed vertical and horizontal concrete elements (walls and floor slabs).

Adjacent to the high-rise is a 5-story wing that includes a 4-level open parking garage with a park on the roof. In addition, on the other side of the roadway is a second open parking garage with a 4-story elevated parking deck and a fifth level, an elevated accessway from Wacker Drive. Both parking garages and all levels open to the weather use epoxy-coated reinforcement to protect against corrosion from salts, reduce maintenance and increase service life. 350 tons of epoxy-coated steel reinforcing bars were used in both parking garages and for the new elevated roadway that leads to the building.

In all, 3,100 tons of steel reinforcing bars were used in the construction of this new structure. Internally, 2,750 tons of uncoated reinforcing bars were used.

Scheduled for completion in August, 2005, the Shoreham will become the newest addition to Chicago's sky line. Features include a party room, fitness center, garden, lounge and business center with library and a new 6-acre park adjacent to the property. Future plans also call for a new Chicago Public Elementary School to serve the area. ■

| Project Team: | |
|---|---|
| **Developers:** | NPP Residential & Development<br>Magellan Development Group, Ltd. |
| **Architectural Firm:** | Lowenberg & Associates |
| **Master Architect:** | Skidmore, Owings & Merrill, LLP |
| **Epoxy Coater/Fabricator:** | Toltec Industries, Inc. |
| **Contractor:** | Walsh Construction |
| **Structural Engineer:** | Magnusson Klemencic Associates |

# New Gulf Coast Condominium to use epoxy-coated rebar in all garage levels


*Galveston, Texas was once known as a laid-back city on an island just two miles offshore in the Gulf of Mexico. Today, it is a trendy weekend and vacation destination. Additionally, the aging baby boomer generation has now discovered this island city. Guarded by a 17-foot seawall, Galveston is connected to the Texas mainland by a hurricane-resistant concrete bridge. Culturally rich, the city has one of the state's most interesting collections of historic buildings.*

*With out-of-towners investing in homes near the shore and baby boomers moving to coastal communities, the construction of numerous new residential properties is progressing rapidly.*

To accommodate baby boomer retirement living, a new Galveston project is under construction. The 15-story "Emerald by the Sea" condominium building is on a site adjacent to the Gulf coast. The condominiums will offer dramatic views of the Gulf, beach and harbor.

Designed by the well-known Randall Davis, this new structure is designed with cast-in-place concrete and architecturally accented with exterior glass, mosaic tile and plaster. Construction of the parking levels is the first phase. In this salt-air environment, all floor levels of the parking garage have been specified to be built with epoxy-coated rebar to protect against corrosion. After completion of the ground floor guest parking, construction will continue with additional parking levels, four pools, a 35 seat theater and the actual condominiums above. A penthouse is planned for the top of the tower on the fifteenth floor. ■

| Project Team: | |
|---|---|
| **Developer:** | Spencer Partnership |
| **Architect:** | Randall Davis |
| **Epoxy Coater:** | ABC Coating, TX |
| **Rebar Fabricator:** | Katy Steel |

**The Borman Expressway**

*Consists of 13 miles of highway stretching from the Indiana/Illinois border to I-65 and is among the busiest expressways in the country, accommodating approximately 160,000 vehicles per day, 40% of which are trucks. In 2003, reconstruction of the Borman Expressway was begun with completion expected in 2009. The reconstruction will accommodate expected traffic growth for the next 20 years.*

This $300 million project includes an agreement between the Illinois Department of Transportation (IDOT) and the Indiana

Department of Transportation (INDOT). IDOT will be coordinating the reconstruction from the Illinois state line east into Indiana to Calumet Avenue and will proceed in conjunction with the reconstruction of the Kingery Expressway, just west of the Illinois border. INDOT is coordinating the remaining construction within the Indiana border.

# Reconstruction of one of the busiest highways in the U.S., The Borman Expressway, I-80/I-94

The Borman Expressway was built in the 1950's to accommodate 60,000 cars per day. In the 1970's, it was widened to three lanes in each direction, but the original concrete pavement was never replaced. The reconstruction includes complete removal and replacement of existing pavement, an additional lane added to each direction, new collector-distributor lanes, new redesigned interchange ramps, new sound barrier walls, new lighting system and signage, and new drainage facilities.

Three design-build contracts totaling approximately $140.5 million have been awarded for this project to date.

## First Contract

Rieth-Riley Construction Co., Inc. was awarded the first contract for $55.3 million for replacing pavement, retaining walls, noise barriers and four bridges along the 3.5 miles of expressway from Calumet Avenue to State Road 912 (Pine Ave). Over 3 million pounds of epoxy-coated reinforcement were used for this first contract. It was used in the bridge decks, shoulders, retaining walls and the concrete barrier/wall. Epoxy-coated rebar was specified for corrosion protection, necessary for a long service life. Work began March 1, 2004 and finished ahead of the December 1, 2004 deadline, earning a $1.25 million bonus for early completion.

## Second Contract

This $21.5 million design-build contract was awarded to Superior Construction/E & B Paving Joint Venture for reconstruction of the Grant Street and Broadway Interchanges. In the superstructure and bridge deck, 900,000 pounds of epoxy-coated rebar was required. Epoxy-coated rebar was used because it met the design criteria for this project.

## Third Contract

In May 2004, a $63.8 million design build contract was also awarded to Superior Construction/E & B Paving Joint Venture. This project requires laying 5 miles of concrete pavement through the central Borman Expressway area, including the addition of a fourth lane in each direction. While this section does not include bridges or retaining walls, it does have challenges, including poor soil and the placing of 600,000 yards of concrete.

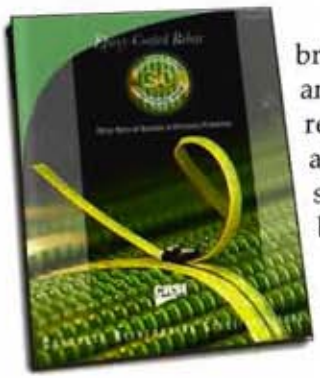
| Project Team: | |
|---|---|
| **Owners:** | IDOT & INDOT |
| **Contract 1:** | |
| **Epoxy Coater:** | Gerdau Ameristeel |
| **Contractor:** | Reith-Riley Construction Co. |
| **Contract 2:** | |
| **Epoxy Coater:** | Midwest Pipe Coating |
| **Contractor:** | Superior Construction/E&B Paving Joint Venture |

## Future Contracts

Future contracts will be awarded as design-build contracts and will continue through completion of this project in 2009. Construction will begin on the I-65 Interchange in 2007 with completion scheduled in 2009.

Look for updates on this ongoing project in future issues of the *Anti-Corrosion Times*. ■

## New '30 Year' Milestone Brochure, "Thirty Years of Success in Corrosion Protection"



This new 16-page, full color brochure celebrates the 30th anniversary of epoxy-coated rebar. The first specified application for epoxy-coated steel reinforcing bars was in bridges.

Here's an outline of the brochure content:

- *Early Years and the Players*
- *Fusion-Bonded Coaters join CRSI*
- *Plant Certification*
- *Research Findings*
- *Epoxy Coating Economics*
- *Recent Outstanding Projects*

For your FREE copy of the '30 Year' Milestone brochure, contact:

CONCRETE REINFORCING STEEL INSTITUTE
Phone: 847/517-1200 • Fax: 847/517-1206
Website: www.crsi.org • E-mail: jprentice@crsi.org ■

## Long-time ECR Plant Inspector Retires

**We wish Greg the best in his well-deserved retirement.**

Greg Hedien

Greg Hedien joined Wiss, Janney, Elstner Associates, Inc. (WJE) in 1968 and worked as the Laboratory Supervisor for the Materials Laboratory. He was lead technician for WJE on over 25 structural integrity tests performed on nuclear power plants across the United States. His duties included supervising the installation and monitoring of strain gages and sensitive extensometers for structural integrity tests. He worked on bridges, dams, high-rise buildings, installing and monitoring instrumentation to record strains and deflections.

In 1991, Greg assisted with the development of the CRSI Plant Certification Program for fusion-bonded epoxy-coated reinforcing steel applicators. Since that time, Greg has visited nearly every certified epoxy coating plant in North America. His hands-on experience as well as mechanical and technical knowledge helped the Epoxy Certification Program grow and change through the years, incorporating new tests and procedures as the process evolved. His professional attitude and technical expertise was valued by plant personnel, CRSI staff and CRSI members. ■

**Acknowledgements:**

U.S. Capitol Visitors Center...Tom Fontana, CVC Project Communications Officer for the Architect of the Capitol,
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Shoreham...Tim Smock, Toltec Steel Services, Kankakee, IL
...Bob Orlow, Walsh Construction, Chicago, IL
...Dave Fields, Magnusson Klemencic Associates
...Larry Schaffel, Magellan Development Group, Ltd., Chicago, IL
...Christina Gaylor, NPP Residential & Development, Chicago, IL
Emerald Condominiums...Bob Anderes, ABC Coating Company, Inc., Waxahachie, TX
...Tina Valenciano, Personette & Associates, Galveston, TX
Borman Expressway...Indiana and Illinois DOTs
...Chris Reynolds, Reith Riley Construction, Gary, IN
...Dan Sopczak, Superior Construction/E&B Paving

. . . Special thanks to the above for their help with information and photos for articles in this issue.

**Errata:** In the *Anti-Corrosion Times* Winter 2004-05 issue, the article on the New San Fransisco-Oakland Bay Bridge, Fletcher Coating, Orange, CA was inadvertinently omitted as one of the epoxy-coated rebar suppliers. Also omitted in the Marquette Interchange article was Milwaukee Transportation Partners, Engineers on the project.