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anti-corrosion times

Reporting on industry news, noteworthy applications and new developments of the fusion bonded coating system for corrosion prevention.

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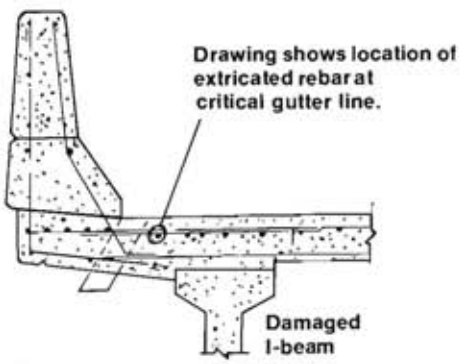
DAMMED UP ICE BREAKS UP BRIDGE — PROVES 8 YEAR EPOXY-COATED STEEL GOOD AS NEW

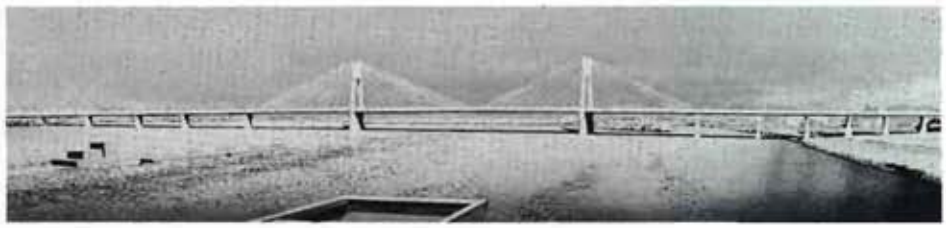
The record cold weather of the 1985 winter created exceptional ice cover in the relatively shallow Kankakee River in northern Illinois. Early spring thaws and fast-flowing current sent huge chunks of ice downstream.

In its path was the 8 year old interstate highway I-55 precast, prestressed concrete I-beam bridge. As huge chunks of ice impacted the span, tremendous upward and horizontal forces fractured a precast deck beam. In order to repair the beam, it was necessary to dismantle part of the deck which it supported. In the process of breaking up the concrete, portions of the deck mat epoxy-coated bars were extricated from surrounding concrete. Illinois DOT officials were pleased to find the epoxy coating intact essentially as it was when installed 8 years before (see photo).

The Kankakee River at I-55 flows through an area of severe freeze-thaw cycles; hence, the bridge was subjected to heavy intermittent salting during the 8 year period. Moreover, the bar photographed was located along the deck gutter line near the parapet (see drawing), where salt and other deleterious materials tend to collect before passing through drains or being removed by maintenance crews.



Actual sample of original 8 year old epoxy-coated rebar. Absolutely no sign of corrosion.



HIGH, WIDE AND HANDSOME

That's the first cable-stayed bridge over the Mississippi — and the first use of epoxy-coated strand in the cable stays

The wide Mississippi River is a real challenge to bridge designers. To span it with economy and grace isn't easy.

But the Illinois Department of Transportation has done it — meeting both objectives handsomely. Now under construction is this cable-stayed bridge at Quincy, Illinois.

Unlike a suspension bridge, where the deck is carried by vertical cables attached to suspension cables, the cable-stayed bridge is carried directly by cables hung at angles from tall towers.

The Quincy bridge has a main channel span of 900 feet, with two adjacent spans of 440 feet. From the underside of deck to water is 60 feet.

There are 56 cables supporting the entire deck structure; 14 extending down from each side of each tower. Each cable consists of multiple epoxy-coated (7-wire) strands. Number of strands per cable range from 18 to 61. Individual strands are fusion bonded epoxy-coated for corrosion protection. Individual cables are encased in polyethylene pipe at the construction site, then grouted. Except for steel girders for cable stays, the superstructure is segmental post-tensioned concrete deck panels. Epoxy-coated reinforcing steel is used in parapets and for both mats in the concrete deck system.

Epoxy-coating — a wise specification for low future maintenance considering the year after year exposure to deicing salts and moisture to be faced by this bridge. Prime consultant on this project is Booker Associates, Inc., St. Louis, MO. The cable-stayed bridge consultant is Modjeski and Masters, Harrisburg, PA.

EPOXY-COATED REBAR STANDS GUARD TO SAFEGUARD ILLINOIS BRIDGE BARRIER

Interstate Route 294 winds around Chicago to the west, starting at I-90 in Indiana. In its 80 mile trip to the Wisconsin line there are dozens of overpasses and river crossing bridges. It's one of the busiest interstate highways in the world. Also one subject to four or five months of snow and ice conditions.

To provide safe, swift winter travel for highway users requires heavy deicing procedures. Repeated salt spraying plus constant splashing of chemical laden slush constitute torture of the highest degree for the concrete barriers.

To upgrade all its parapets to the New Jersey design, the Illinois Highway Authority is slipforming new barriers parallel to the existing structures. The engineers specify epoxy-coated steel for the reinforcing cages so they can put future maintenance out of mind.

Bridge decks get epoxy-coated rebar

As bridges on the tollway system require rehabbing, the concrete decks are rebuilt using epoxy-coated reinforcing steel. This construction means a maximum future of minimal maintenance.

WISCONSIN SERVES UP MORE SUPER HIGHWAYS

Two years ago, the Wisconsin Department of Transportation captured worldwide interest with its pioneering highway technology. In rebuilding a 32 mile section of busy interstate highway around Madison in one season, it did two things that made big news: It recycled the old concrete as aggregate for the new concrete and it specified epoxy-coated rebar for the entire length of the continuously reinforced concrete pavement (CRCP).

More CRCP in '85 and '86

Now, Wisconsin is treating the motoring public to still more superior pavement. Starting at the Illinois-Wisconsin state line, it has recycled a 10 mile length of I-90 with 24 foot wide, 10 inch thick CRCP utilizing epoxy-coated rebar. It will be a long time before Wisconsin-bound travelers will see road work along here again — even though this highly traveled route has a certain future of heavy salting to maintain winter driving safety.

Moving north to the central part of the state, fifteen miles of Interstate 90 and 94 to where they split for LaCrosse and Eau Claire were also reconstructed in 1985. Again, epoxy-coated CRCP was the design. This 11" thick slipformed section also used the old concrete crushed as aggregate for the new mix. Longitudinal steel was #6 bars at 6 inch spacing. Transverse steel was #4 bars at 4 foot spacing. Percent of steel was 0.667%.

For work done in 1985 and planned for 1986, Wisconsin is adding nearly 113 lane miles of CRCP Interstate pavement. This represents over 13,000 tons of epoxy-coated reinforcing steel. Added to the epoxy-coated rebar used in 1984 for the 32 mile I-90 -94 reconstruction project, total epoxy-coated reinforcing steel exceeds 29,000 tons.

For protection against the ravages of chloride penetration and for sheer future road performance assurance, Wisconsin is making all the right moves.

Epoxy-coated rebar was set on bar chairs for close placement control.

MORE SEMINARS ON EPOXY -COATED REBAR ANNOUNCED

Presented in 14 cities in 1985 to 1,039 engineers, contractors and ironworker instructors, the popular CRSI seminar, "Epoxy-coated Rebar — A Corrosion Protective System" is now scheduled for additional presentations.

The concentrated 1-1/2 hour seminars constitute a comprehensive report on the epoxy-coated rebar system of corrosion prevention and cost effectiveness of its use in the design and construction of bridges, parking structures, waste treatment and industrial plants. Attesting to the value of an in-house seminar conducted on location, Sverdrup & Parcel and Associates, St. Louis wrote "We want to express our appreciation for the excellent seminar presented on January 8, 1986. Sverdrup is always eager to keep abreast of current technology; and, since we have many applications for epoxy-coated reinforcing (including transportation, industrial and environmental), your seminar is a valuable service to our company."

For more information on these seminars, call or write. Also ask about the feasability of an in-house seminar, or the practicability of new audio-visual presentations now in the process of development. The latter will be adapted for small audience participation and availability upon short notice.

STATES EXPAND USE OF EPOXY-COATED REBARS FOR BRIDGE PROTECTION

When the FHWA's research initially spawned the epoxy-coated rebar system of corrosion prevention in the mid-70's, application by states was essentially confined to bridge decks with only the top mat epoxy-coated. Then, it was not so readily apparent that chlorides, from salt applied to the deck or "air-borne", could wreak havoc with bridge components beyond the deck itself.

As a consequence, states, along with the Federal Highway Administration, are increasingly seeing the wisdom of expanded protection for new or replacement bridges. For example, Massachusetts recently decided that all reinforcing bars in the superstructure shall be epoxy-coated — except in prestressed concrete beams, intermediate diaphrams and approach slabs. Rebars in substructure components to be epoxy-coated include those in piers above the level of the construction joint at the footing-column interface and those directly under beam seats and in the faces of the abutments. End post rebars shall be epoxy-coated as well. Policy includes the 2-mat epoxy-coated system for bridge decks.

Based on observed deterioration and relative cost evaluations, the Colorado Department of Highways has a similarly expanded program up for approval. Maine has evaluated all aspects of the epoxy-coated rebar (ECR) system and now appears favorably disposed towards a policy incorporating its adoption on a selective basis.

2-Mat coated system preference growing

A survey by CRSI Epoxy Coating member firms early this year determined that essentially all states and provinces in the United States and Canada specify the ECR system of corrosion prevention for one or more aspects of new bridges exposed to chlorides, either airborne or by virtue of salt applications for safety reasons.

Twenty-two states were reported to specify the ECR system for selected substructure components; 18 for superstructure elements on a selective basis. The survey showed 31 states specify the 1-mat ECR system for bridge decks; whereas 17 states now require both top and bottom mats be epoxy-coated. Two years ago only 6 states utilized the 2-mat system. Initially, the 2-mat system was virtually non-existent because one mat epoxy-coated was deemed cost-effective on a life-cycle basis.

Meantime, the growth of the 2-mat system reflects the fact that the cost of epoxy-coated rebars has come down dramatically (like **80%** in 10 years). Now, notwithstanding established merit in the 1-mat system, states rationalize that the greater protection assurance achieved in epoxy-coating both mats of reinforcing steel well justifies the small premium paid for the second mat.

CURVED BRIDGE FAST TRACKED FOR SINGLE SEASON COMPLETION

Replacing a vital suburban bridge on a busy route calls for speed. Make it a curved section and you have a troublesome new twist.

Not so in this case. It's a striking curved span of reinforced concrete. The Illinois Department of Transportation promised the Chicago suburb of La Grange that it would get its new bridge — and in one short season.

Kenny Construction Company, Wheaton, Illinois did the job while maintaining traffic on busy Ogden Avenue — and did it on time.

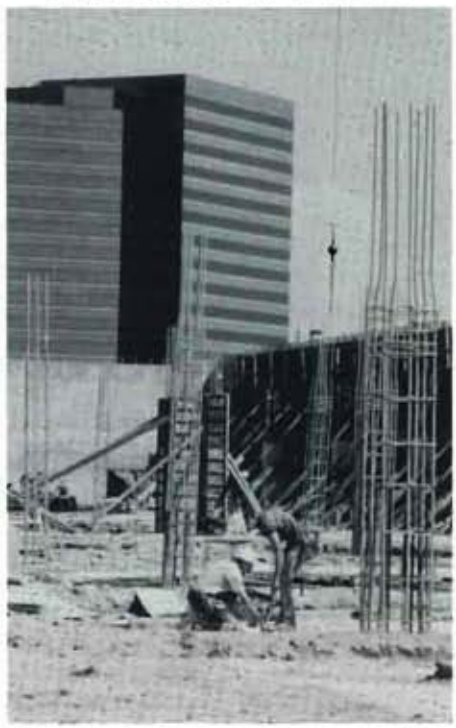
The engineers of the Illinois Department of Transportation wisely specified Grade 60 fusion bonded epoxy-coated reinforcing steel for the entire super structure (on existing piers) — deck and parapets. It's good insurance that it will be a long, long time before this bridge will have to be redone again.

SOARING ICE PALACE SETS MOOD FOR HOT TIME AT ST. PAUL WINTER CARNIVAL

For over 100 years, St. Paul, Minnesota has been building giant ice palaces to celebrate its famous winter carnivals. This year's design fantasy, reaching up more than 129 feet, was constructed of 30,000 blocks of ice on an epoxy-coated reinforced steel concrete slab 1-1/2 feet thick. The ice palace is taken down before it melts down, but the concrete slab built this year will be there ready for future palaces — for a long time.

HOW TO PUT A 5 STORY OFFICE BUILDING ATOP A 2 LEVEL GARAGE

— AND KEEP IT THERE



There was a time putting an office building over a parking garage, exposed to deicing chemicals, could have meant future problems. Years of tracked in salts could cause serious corrosion damage and expense.

This new reinforced concrete, 244,000 square foot 5 story executive office building in growing Itasca, Illinois will never end up in the underground parking levels because of corroded concrete members. The engineers called for epoxy-coated rebar in the columns and beams to prevent such a risk. The two level parking slabs are also epoxy-coated rebar reinforced. The structure was designed by Skidmore, Owings & Merrill of Houston for Trammell-Crow, Itasca.

Topped out in January, 1986, it will be ready for its lucky tenants in August. 300 Park Place, as it's called, is of 1-way joist design and constructed by HCB Contractors, Itasca.

CANADA THINKS BIG IN BRIDGES

From a "World's Longest" to a "1st in Cantilevered Design"

You've got to look up to Canada. It's a big country that does things in a big way. Like bridges.

Two pioneering new bridge projects are making records — one in British Columbia and the other in Ontario.

Vancouver, B.C. Taking shape here is what is described as the world's longest cable-stayed span. A striking structure of immense proportions; it consists of 45 spans in all, including five river crossings. To be completed in the spring of 1987 over the Fraser River near Vancouver; it's called the Annacis Island highway bridge and it's over 14 miles long, including approaches. The towers from which cables are hung at varying angles rise 160m (525 feet) above the river.

The design, by Buckland & Taylor Ltd. and CBA Engineering, Ltd., for the British Columbia Ministry of Transportation and Highways, has a composite steel and concrete deck structure. The $130 million bridge is a challenging project demanding sophisticated engineering to predict and control loads in the cables and stresses in the deck as the bridge grows in balanced cantilever fashion from the two concrete towers.

Altogether, more than 4,000 tons of epoxy-coated rebar are required for piers and deck reinforcements — with epoxy-coating a prudent specification in this corrosive environment.

Hamilton, Ontario. Another majestic water span, the Burlington Bay Skyway near Hamilton has generated unusual interest because of its design and scope.

It's the first cantilevered segmental cast-in-place concrete bridge structure in this bustling province. The 1.6 mile bridge has structural steel frame supported by massive concrete piers.

The concrete deck system, reinforced with epoxy-coated rebars, was constructed using a pair of form travellers. These moved towards each other from the bridge's two highest piers; another two were moved **away** from the two piers towards the next set of piers. Sixty five segments were formed this way.

Completed in late 1985, the $39 million spectacular is the largest bridge project ever undertaken in the province. Engineers at the Ontario Ministry of Transportation and Communications specified approximately 3000 tons of epoxy-coated reinforcing steel for the piers, supports and deck. Wise insurance against future corrosion problems.

WHAT IN THE WORLD IS NEW IN CONCRETE?

18,000 professionals saw for themselves at 12th WORLD OF CONCRETE. Epoxy-coating booth big attraction.

Concrete contractors and designers in concrete got a concentrated education in new products, equipment and methods at the near record World of Concrete '86 in Atlanta, February 16-20.

Over 600 exhibitors were on hand to display the latest in concrete wares and systems. There were 45 seminars, live demonstrations and a film festival.

The Concrete Reinforcing Steel Institute and Epoxy Coating Committees had side by side exhibits staffed with experts who provided updates on the rapid growth of epoxy-coated reinforcing steel as a modern, cost-effective method of corrosion prevention.

ENGINEERS WANT TO LEARN ABOUT EPOXY-COATING!

That's why they made this ad in CIVIL ENGINEERING the **all-time high producer of inquiries.**

You're looking at the most effective ad for generating reader response that ever appeared in CIVIL ENGINEERING magazine. This Concrete Reinforcing Steel Institute-Epoxy Coating message in the September, 1985 issue of this American Society of Civil Engineers' publication has generated nearly 500 requests for technical data. That's more than ever recorded by this magazine. It indicates the keen interest engineers have in this corrosion prevention development.

Shouldn't you have all the facts, too? Ask for your "Kit of Epoxy-Coated Rebar Facts and Technical Data".

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