

# anti-corrosion times

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

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## 12-Story Minneapolis Condominium Goes Down 2 Stories for Parking



The Woodlake Point Condominiums sit between two lakes in a suburban Minneapolis location. This elegant new structure posed interesting problems for its structural engineer, Rehder-Wenzel, Inc., Bloomington, Minnesota.

"It could almost be classed as a worst case scenario" a spokesman commented — building in relatively weak, wet and sandy soil — compounded by the problem of protecting an underground, heated parking garage against the corrosion conditions set up by deicing salt tracked in through Minnesota's long winters.

Laying a mat of crushed rock below the footings solved the structural problems with the poor soil. To combat the potential problems caused by deicing salts, the designers specified that the reinforcing steel for the garage ramps be epoxy-coated. This included all bars, chairs and accessories above slab mid-depth.

Investors in these deluxe condominium homes can rest comfortably knowing its designers planned well for their future with a lasting, low maintenance parking facility.



Moving into phase II this year, the contractor paved the northbound bridge deck by pumping concrete from the street below.

## One of the World's Busiest — — Chicago's Airborne Dan Ryan Expressway Reconstructed with Continuously Reinforced Concrete Pavement and Epoxy-Coating Protection

In the 17 years since it was built, Chicago's I-90 Dan Ryan Expressway has been taking the pounding of over 220,000 vehicles a day. One particularly abused section is 6 miles of elevated roadway just south of the "Loop" central business district.

The steel girders, concrete deck and substructure of this vital link were showing serious signs of trouble as a direct result of corrosion caused by deicing salts. Reconstruction became an urgent necessity. With traffic volume this high, and the highway so critical to Chicago's major transportation system, the job had to be done speedily—and right!

The Illinois Department of Transportation made careful plans to complete the job in two seasons to minimize traffic disruption. For the first phase in 1988, traffic was diverted onto the northbound 4 lanes while extensive reconstruction proceeded on the southbound 4 lanes.

In phase I, a substantial incentive of \$37,500 per day was provided in the contract for early completion. Phase I construction included rehabilitation and reconstruction of numerous piers, erection of 950 tons of steel girders and pouring 14,525 cubic yards of concrete for the piers,



The final beam, adorned with an American flag, was placed on August 8 this year. The entire project, reconstruction of the south and northbound lanes, enlarged from 8 to 10 lanes, was completed ahead of schedule; earning the contractors substantial bonuses.

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# Twin Concrete Bridges Will Send Miami-Cruise Ship Passengers Off in Style



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Pleasure cruising is a burgeoning industry. Passenger ships are being built larger, faster, more luxurious and with more amenities to attract growing numbers of pleasure-seeking vacationers.

One of the larger ports for the growing cruise ship fleet is Miami, Florida. Here, dozens of beautiful vessels depart regularly on Caribbean and South American cruises. Miami's port for cruise ships is Dodge Island. And, that's the problem.

The only access from the mainland is over an old, 2-lane bridge. With the increasing volume of cars, taxis and trucks from the mainland, the bridge would soon be inadequate to handle the traffic demands.



Computer simulations of the Dodge Island twin concrete bridges as they will appear when completed.

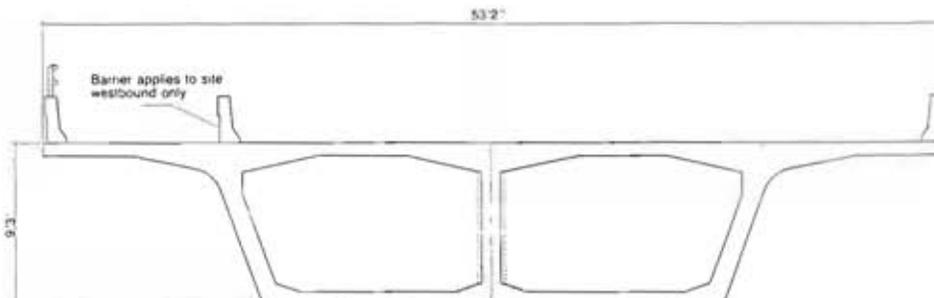


(Photo Top Left) Construction of the Pier foundation (within Biscayne Bay) proceeds with epoxy-coated reinforcing steel. The original bridge with railroad trestle is beside the new structure.

The solution was the design of high-level twin segmental concrete bridges 2,522-feet long and 106-feet wide with a vertical clearance of 65-feet above mean high water. Construction of the piers' foundation within Biscayne Bay is underway right now by Misener Marine Construction, Inc., Tampa, Florida.

The Dade County Public Works & Port of Miami and the bridge engineers, Beiswenger, Hoch & Associates, Inc., Miami, specified that all reinforcing steel in these footings and piers be epoxy coated.

When construction of the twin precast segmental concrete double box sections gets underway, these and all components of the superstructure will also have Grade 60 epoxy-coated reinforcing steel. The five lane wide spans have been designed with a long future in mind — including provision for the addition of a people-mover system.



**Dan Ryan** *continued from page 1*

superstructure and decks. With the emphasis on speed, the contractors finished the first phase 13 days ahead of schedule!

## Built To Last

The engineers at IDOT are seeing to it that the reconstructed Dan Ryan will be more than a match for the immense amount of traffic this lifeblood of Chicago's interstate system must handle.

The new, heavy-duty, five-lane elevated structure was designed with a 7-1/2-inch concrete deck—with all rebar epoxy coated to guard against future corrosion. This protective measure was also specified for related superstructures and retaining walls. The strong defense against corrosion provided by epoxy-coated rebar is an added safeguard that it will be a long time before motorists traveling this \$183 million dollar improvement will be inconvenienced again.

Where the Dan Ryan returns to grade as it enters the "Loop" area and in all connecting ramps, 13-inch thick continuously reinforced concrete pavement was the order. All rebar is epoxy-coated to prolong pavement life.

Phase II construction was well ahead of schedule, with completion of this ambitious project celebrated on September 30, 1989 — a full month before the original deadline.



View of the paving on one of the ramps where the contractor used a pump to place some of the concrete at this location.



As the Dan Ryan enters the "Loop" area, the roadway returns to grade. Here, the concrete pavement is being placed over the epoxy-coated rebar.

Photos courtesy American Concrete Pavement Association.

# Who Says Multi-Level Parking Structures Can't be Objects of Grace and Beauty?

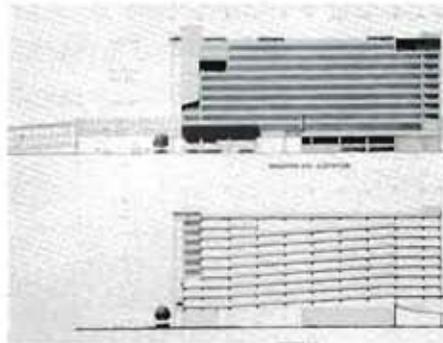


Here's a sight to please the most demanding critic of parking garage esthetics—the new Tropicana Transportation Center in Atlantic City.

This cast-in-place, 11-story, 1,100-car parking garage was uniquely suited to the properties of concrete. Cast-in-place concrete permitted maximum interior space utilization while providing a structural base for a future twenty-story-plus tower. The parking structure itself was designed as a moment-resistant frame with maximum clear space for parking and circulation. Shear walls were confined to the first floor where parking space is not required.

Designers of the \$16,364,000 structure were faced with an environmental hurdle. Located only two blocks from the ocean, it was clear that some measures would be needed to preserve the longevity of the concrete building. Therefore, epoxy coating was used on all reinforcing steel. "We needed to protect the building's rebar from ocean salt which is present due to the structure's proximity to the ocean," states Timothy Carroll, Construction Manager for David Jacobson Associates, Ventnor, NJ, architects. Mr. Carroll observed, "By applying the epoxy, we have greatly enhanced this building's ability to withstand the harsh salt environment."

Grade 60 epoxy-coated reinforcing steel was used in the 7,700 psi concrete columns and 5,000 psi concrete slabs and beams. The structural engineer was Walker Parking Consultants, Philadelphia, PA. Perini Corporation, Farmingham, MA was the contractor.



It is interesting to note that an estimated \$8.5 billion will have been spent in the U.S. between 1985 and 1989 on the design, development and construction of new parking structures. The number one material being used to build these structures is cast-in-place, reinforced concrete. In addition, epoxy-coating is playing an increasingly important role in protecting his huge investment.



Bird's eye view of the whale and dolphin pavilion under construction. Note what will be underwater viewing ports for visitors. (Photo by Ray Hartill Ariel Photography, Indianapolis.)



## New Indianapolis Zoo is "Big Fish" In Aquarium World

A new enclosed water pavilion has been added to the Indianapolis Zoo—giving this Indiana city of 800,000 people a world class aquarium.

Located on a 64-acre downtown site on the banks of the White River, the aquarium is now home for four killer whales, four beluga whales and eight bottle-nosed dolphins.

Visitors are put in a aquatic mood as they enter the "Water" building under a glass canopied waterfall. Proceeding into the pavilion, they encounter a cold water exhibit with swimming polar bears. A large underwater viewing area permits them to observe their swimming habits and antics.

The big attraction is the huge seawater home of the whales and dolphins. This large 2.3 million gallon "sea" is the performing area for the mammals as they go through their trained routines—amazing children and adults alike.

The designer of the aquarium, James Architects & Engineers, Inc., Indianapolis, intended that this new facility be a long lasting asset to the city. That's why they specified that all reinforcement in the seawater tank and other structures be epoxy coated. For minimal added cost, they are providing maximum added protection and value.

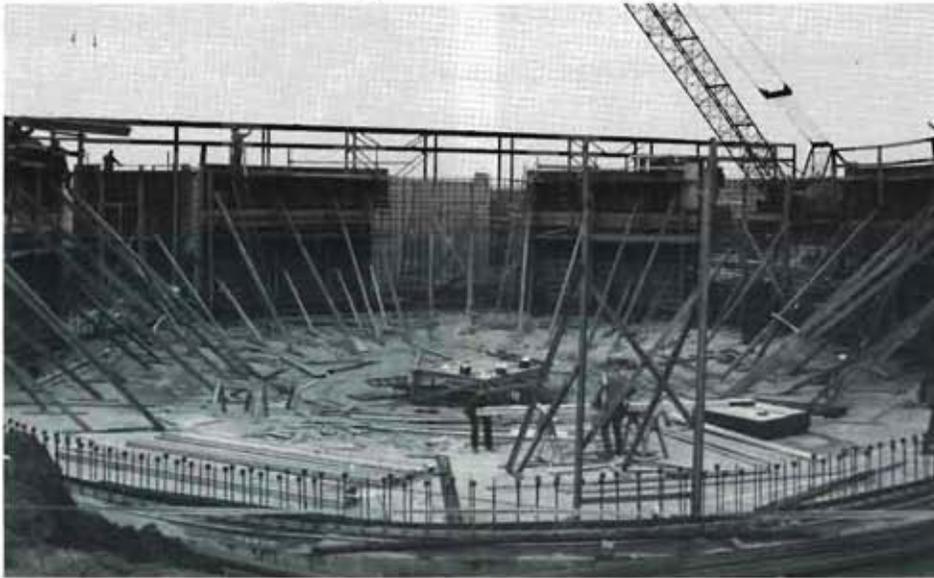
Owner of this world class facility is The New Indianapolis Zoo. Construction managers were Geupel DeMars, Inc., Indianapolis.



Construction of the huge tank for whales and dolphins.

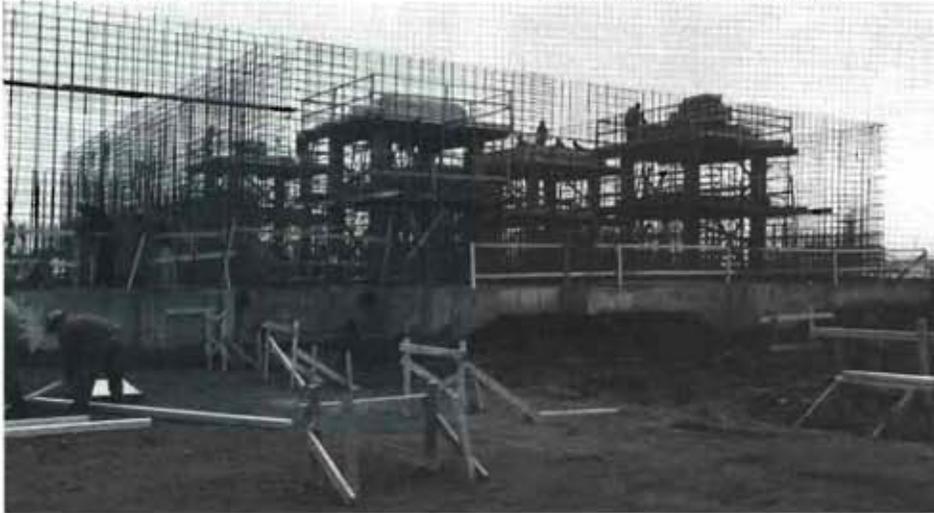
(Photos courtesy James Architects & Engineers, Inc.)

## Plastics Plant Expands with 12th Wastewater Treatment Tank —All with Epoxy-Coated Rebar



▲ One of the large clarifiers constructed of reinforced concrete. Grade 60 epoxy-coated rebar was used in this and the other treatment facilities of this giant installation.

▼ Equalization tank with epoxy-coated rebar being installed prior to forming.



GE Plastics' Lexan® resin continues to find new applications and markets. It's used in a wide range of products in the automotive, packaging, electrical and building products industries, to name just a few.

The manufacture of Lexan® resin requires large quantities of water in its industrial process. The steadily growing demand for its product meant increasing the capacity of its wastewater treatment facility when GE Plastics enlarged its Burksville, Alabama plant recently. For GE Plastics expansion plans, engineered by Fluor Daniel, Inc., Greenville, South Carolina, a new wastewater effluent treatment tank was designed. Now in service, this is tied into nine previously constructed basins and two large clarifiers—all engineered and constructed by Fluor Daniel, Inc.

The latest addition measures 90-feet by 40-feet by 20-feet deep. The cast-in-place concrete structure, like the eleven others, is reinforced with epoxy-coated rebar. Altogether, over 1,500 tons of epoxy-coated steel was used. The extra protection against future corrosion problems provided by the fusion-bonded epoxy-coating made it a logical and cost-effective choice for the designers.

A rapidly growing trend among engineers of water and waste-treatment plants is to specify epoxy-coated reinforcing steel in their plans. It's the same story with designers anxious to shield their concrete structures against corrosion induced distress regardless of where the threat of attack may come from — harsh chemicals, deicing salts, seawater, auto exhaust or sewage.

(Photos courtesy Fluor Daniel, Inc.)

## Epoxy-Coated Rebar Helps Restore Health to Aging Interstate System

With our vast interstate system approaching the end of its design life, steps are necessary to preserve its vital transportation function. Actually, pavements on most of this highway system have been subjected to far more abuse than anticipated because of the growing number and weight of interstate trucks.

Here's how Iowa is keeping its miles of interstate in safe, smooth-driving condition. When a section of concrete pavement develops a crack that could spell failure, it rushes a maintenance crew to the scene to perform full-depth patching. The damaged concrete is sawn out to subbase which is then compacted. Dowel holes are

drilled to exact diameter and depth in the adjoining slab and air-blasted clean.

Epoxy-coated dowels are then inserted with a grout that anchors them in vertical and horizontal alignment. Concrete is poured and finished to level with original concrete.

This method has demonstrated superior performance compared to partial depth patching because of its ability to provide load transfer between the patch and the original concrete. What's more, the epoxy coating of the rebar helps protect against premature failure of the dowel due to corrosion.

