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anti-corrosion times

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

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Visitors Treated to a Whale of a Time in Baltimore

Beluga whales grow to a length of 16-feet and weigh 3,000 pounds

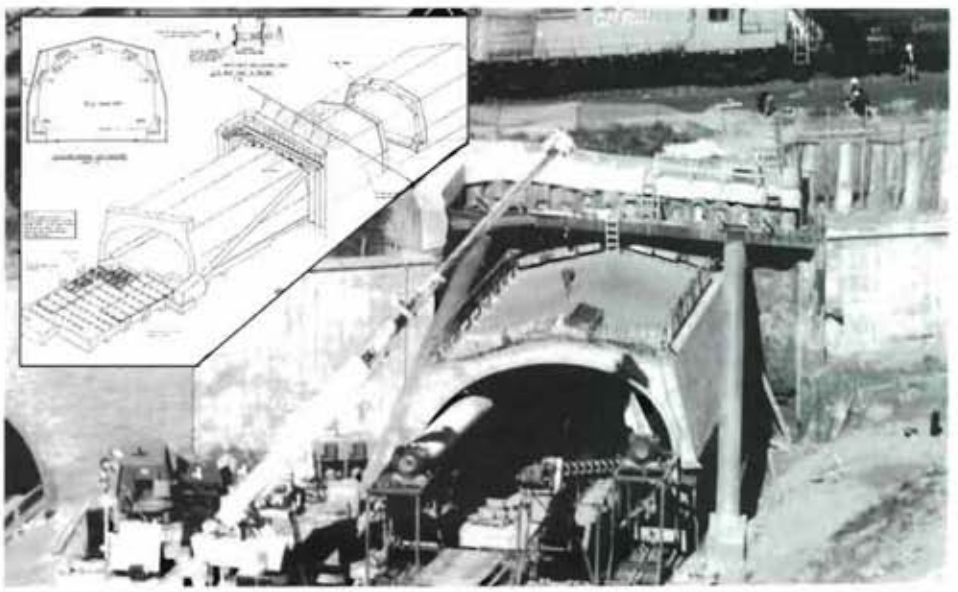
There's a big, new attraction being readied at the National Aquarium of Baltimore. In a new mammal pavilion, beluga whales and dolphins soon will be performing in a 727,000 gallon glass-walled pool to the amusement of spectators in a 1,300 seat amphitheater.

Located next to the existing aquarium, a striking six-story structure was constructed on a 230-foot wide concrete platform extending 400-feet into Baltimore's inner harbor. The reinforced concrete building, with its dramatic sloping steel roof, makes an interesting addition to Baltimore's skyline.

All 850 tons of reinforcing steel in the wharf and pavilion was specified to be epoxy-coated. A wise decision considering this project's saline environment inside and out — the large tank that's the salt water home to the whales and dolphins — and the brackish corrosion-threatening water in the harbor. Completion is scheduled for late 1990.

Credit for this impressive aquarium addition goes to the architect, James R. Grieves & Associates, Baltimore. The structural engineers are Montgomery Engineers, Reston, Virginia and Whitman, Regardt & Associates, Baltimore. The contractor is Gust K. Newberg Construction Co., Baltimore.

(Photo courtesy National Aquarium of Baltimore)



Schematic drawing and photo of tunnel construction and jacking system.

Concrete Tunnel Cast Outside— Jacked into Embankment

How to construct a new car tunnel under a busy railroad without the long interruption a cut and cover method would cause? Solution: Build the tunnel beside the rail embankment, then jack it through. That's the innovative method used by this contractor for this Toronto improvement.

To construct a new two lane highway access ramp from a high-rise development to the Don Valley Parkway, the engineering consultant, Delcan Corporation, Toronto, and the tunnel contractor, Mathews Contracting, Inc., Mississauga, Ontario, turned to an innovative method of construction — building the 115-foot long tunnel just *outside* the embankment. A mining shield cast on the leading edge enabled workers to operate mini-excavators and air spades for the excavating operation.

The owner, Metropolitan Toronto Dept. of Roads and Traffic, stipulated there could be no interruption in traffic to the railroad above or an adjoining car tunnel.

A concrete slab was cast in the future roadway in front of the embankment. On this working base, forms were set to cast the reinforced concrete tunnel structure. With an eye to the prevention of future rebar corrosion problems, all reinforcing steel in the exterior face of the tunnel structure was epoxy-coated.

The arched structure was divided into two sections to be moved independently in order to reduce the loading on jacks and to facilitate steerage. To reduce friction between the moving concrete arch and soil, polyethylene sheets and bentonite slurry were used.

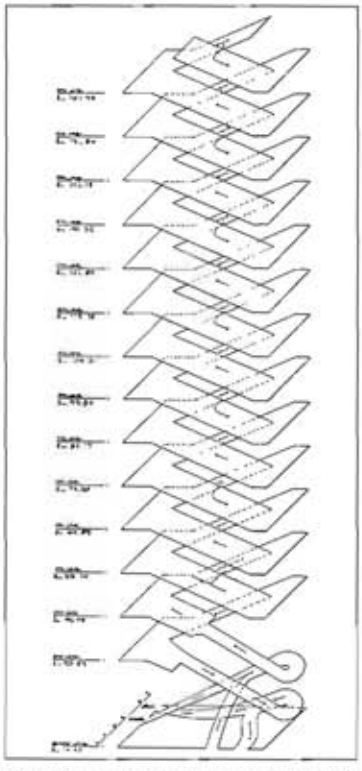
When all was ready, the 2,200 ton structure was inched forward by seventy-five jacks with more than 5,000 tons of pushing power. Workers mined about 1-foot ahead completely around the first section and then the unit was jacked ahead. It required only eleven days for the historic push!

(Photos courtesy Delcan Corp.)

Looking into tunnel as first section is jacked slowly in place while excavation goes on.

Skyscraper Parking Structure in the Chicago Tradition

Artist's rendering of 15 story parking structure.



Schematic shows how double helix design eases traffic flow.

Chicago is internationally famous for its high rise buildings: Sears Tower; John Hancock building; the new 311 South Wacker Drive Building, world's tallest concrete office structure soaring 839 feet.

This year, another distinctive high rise joined this elite group — Chicago's tallest parking facility. The Lake/Wells Street parking garage rises 15 stories to accommodate 840 cars.

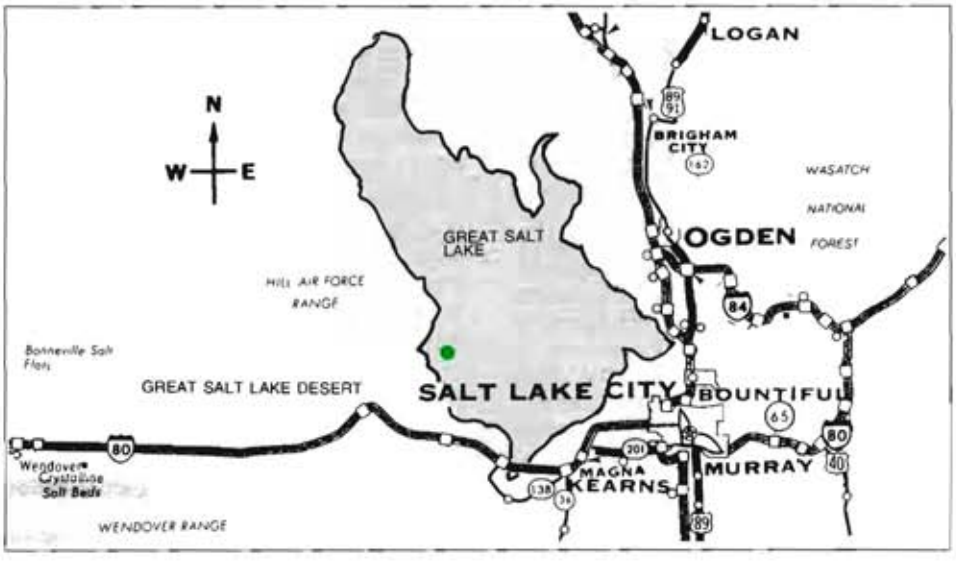
Located in Chicago's famed Loop, the new facility is a development of the Lake and Wells General Partnership and was designed by Desman Associates, Chicago, architects and engineers. The Mayfair Company, Chicago, is the contractor.

The building adjoins and complements a 38 story reinforced concrete building at 180 North LaSalle Street and is connected by a covered walkway. The parking facility has ground floor retail space and two entrances, one on each street. To speed up traffic flow, there is a double-helix ramping system which allows vehicles to rise two floors with each complete revolution. Every level is named after a different planet to aid in remembering where you have parked your car.

Chicago is also famous for its long, tough winters — ice, snow, cold. That's why the designers specified epoxy-coated reinforcing steel for all ramps. Both top and bottom steel are epoxy-coated as well as all stirrups. It's the effective way to spare projects like this from corrosion induced distress for a greater lifetime of maintenance freedom. Tons of epoxy-coated rebar attest to the planning given to the construction of this structure for maximum protection against tracked in salt-laden snow and ice, continuous freeze-thaw cycles and unending exposure to exhaust fumes.

(Photos courtesy Desman Associates, Chicago)

Great Salt Lake Pumped Down to Size



Salt is essential to human life. It had such economic importance in early England the English word "salary" was derived from the Latin *salarium* — meaning an allowance of salt made to Roman soldiers.

Salt is found in abundance around the world. In fact, the salt-water of Great Salt Lake in Utah was becoming so abundant, the lake level had risen to threaten flooding interstate I-80, a runway at the Salt Lake City airport and the Union Pacific Railroad crossing.

The only practical solution was to lower the lake level — and then keep it in check. To do this, a giant pumping station was built on the west side of the 80-mile long, 70-mile wide lake. In this concrete structure, three huge pumps were installed. Large pipes lead from the lake up and over Hogup Ridge into a desert valley to the west.

With continuous around the clock pumping, the lake gradually started to drop. After billions of gallons of brackish water were pumped, the lake level was finally lowered a safe 3-inches to avoid further flooding problems.

To construct the pump house structure and its large pump bases, all concrete had to be reinforced to resist the destructive sodium chloride environment. The constant threat of corrosion was solved by specifying all rebar be protected by fusion bonded epoxy-coating. Over 500 tons of this rebar were used. This cost-effective safeguard is helping promote a long future for this vital installation.

Twin precast bridges will cross the Colorado River and Railroad. All segments and piers are cast using epoxy coated reinforcing.

Last Miles of Interstate System Fly High

One of the greatest engineering challenges in the entire 42,799 mile U.S. interstate highway system is soon to be conquered. Look at the map of the entire interstate network. Only in Colorado will you see a stretch of highway where the blue line marking an interstate route turns to red; meaning the roadway was not up to interstate requirements.

Here, for a 12-mile stretch along the Colorado River east of the town of Glenwood Springs, four lane I-70 constricts to 2 lanes. At this mile high location in the Rocky Mountains, Glenwood canyon narrows to allow only this single passage to squeeze through. With towering rock on both sides, there is barely room for the existing 2 lane highway to share space with the Colorado River and the Denver & Rio Grande Railway.

Soon this shortcoming in the vast interstate system will be solved. Interstate 70 will take to the air to add another separate 2 lane concrete highway for opposite direction travel. Where the canyon is too narrow to blast out right of way space beside the present highway, the extra lanes are being constructed at an elevated level.

Perhaps the toughest, most defiant part of the project is high in the air where I-70 crosses the Colorado River and the railroad. To construct the crossing involved two unique features — a segmental bridge structure and unusually high bridge piers. Because this critical span will be exposed to attacks from ice and snow and repeated application of deicing chemicals, the engineers wisely specified that epoxy-coated reinforcing steel be used. Over 3,100 tons, to be exact, are going into the unusually high piers and the deck.

Slow going. Placing segmented section on high pier.

A completed section. Existing I-70 in foreground.

The engineer for this impressive project is Figg and Muller, Denver. The general contractor is Flatiron/Prescon Joint Venture, Glenwood Springs, Colorado. The Project Manager for the Colorado Department of Highways is G.P. Violette, Glenwood Springs.

(Photos courtesy Flatiron/Prescon and Colorado Dept of Highways.)

Mechanical insertion of epoxy-coated bars by the moving slipform paver is gaining rapid acceptance by engineers and contractors.

This shows the other method of placing epoxy-coated contraction joint assemblies on the road base ahead of the paving operation.

Highway Depts. Turn to Epoxy Coating For Longer Lasting Pavement Jointing

Concrete highways expand and contract with the seasons. That's why engineers design in joints at 18-20-foot intervals. These joints are sealed against water and ice to prevent corrosion of the steel dowel assemblies that provide load transfer across the joints.

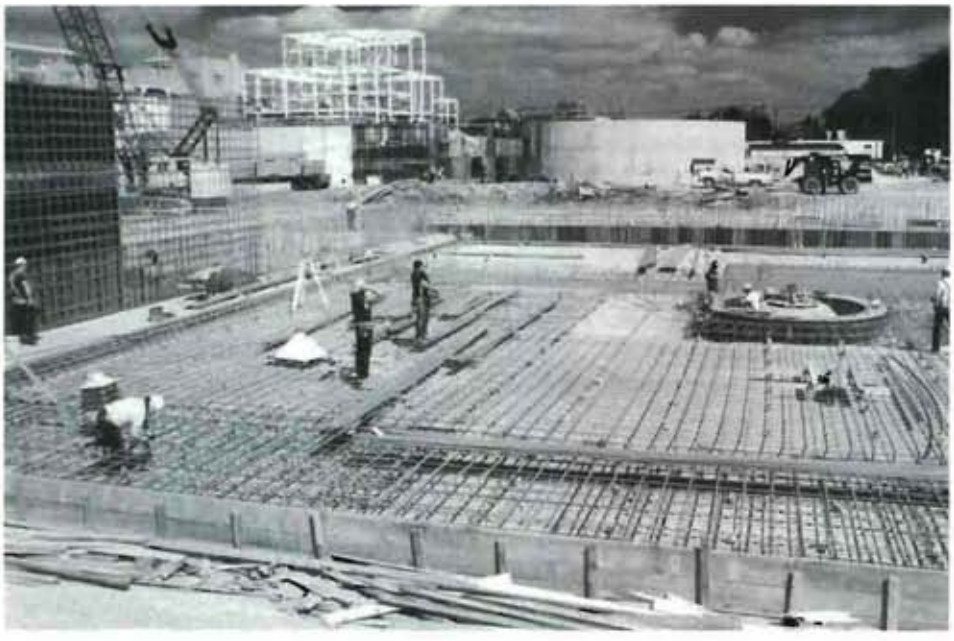
Today there is a new method of placing the transfer assemblies — the automatic insertion of epoxy-coated dowels by the slipform paver which puts down and finishes the pavement. Another method is to manually position epoxy-coated steel bar assemblies where transverse contraction joints would be sawed into the pavement.

You can see the labor and time saving advantages of mechanical dowel insertion. The use of single epoxy-coated dowel bars over an assembly of bars and wire supports means there is less "parts" to cause future problems.

It's another case of "epoxy-coating to the rescue" to provide long-term protection against corrosion problems — and, therefore, lower concrete highway construction costs and maintenance delays to the motoring public.

(Top photo courtesy Guntert & Zimmerman)

Recycling Old Paper into New Saves Mountains of Pulpwood



Construction views of two of the many separation tanks with their all-epoxy-coated rebar design.

Huge wastewater treatment facility shows environmental concerns of paper mill

There's a paper making company in Wisconsin that's being applauded on *two* counts. First, it takes in scrap paper and converts it into new paper products saving on vast amounts of otherwise required fresh pulpwood. Second, the effluent from the process that de-inks the old paper for use as pulp in making new paper, is thoroughly treated before its released as clean water.

In one of the largest installations of its kind anywhere, the wastewater treatment plant at Wisconsin Tissue, Menasha, is showing the way for its extreme protection of nature's water supply. This state of the art facility, with its extensive tank farm for primary, secondary and tertiary treatment of the mill water, represents a multi-million dollar investment for the public's good.

Engineered by Simons/Eastern, Atlanta, Georgia and CPR Associates, De Pere, Wisconsin the system is attracting worldwide interest for its advanced design and operating efficiency. The water that leaves the treatment center will be so pure and clean, it can support abundant fish life.

Because the processing water from the de-inking and paper making operations is corrosive, the various circular and rectangular concrete settling tanks are wisely protected against corrosion. To do this, the engineers specified that *all* reinforcing steel be epoxy-coated. Grade 60 rebar having this built-in safeguard against possible future maintenance problems. The fusion-bonded process of epoxy-coating is the most cost-effective method available for corrosion control in reinforced concrete structures.

This Wisconsin company is indeed a good example of how to be a good neighbor and protector of the environment. Not to mention its major contribution to the conservation of our pulpwood resources by its recycling program.

The large deinking building where scrap paper is processed to remove all ink. The effluent is then fully treated to become clean water.

(Photos courtesy CPR Associates, Inc.)