

Load Reduction Fill / Retaining Wall Backfill

Soldier Field, Chicago, IL

2002

Density: 30 pcf

Volume: 30,000 cy

An economical solution was designed to minimize the vertical loading and the differing amount of earth pressure bearing on the north four-story, 2,500-car, underground parking structure for the Renovation of Soldier Field. Due to the poor existing fill soils along Lake Michigan, backfilling the structure with PROVOTON foam concrete greatly decreased the vertical loading on the wall footing foundation, reducing the amount of piling used, and to limit differential settlement. The rigid body of the PROVOTON foam concrete minimized the lateral loading from the backfill against the north wall, allowing for the use of pre-cast panels.

Cost studies for the underground garage comparing cast-in-place concrete versus precast concrete found that the precast was \$25 million cheaper than cast-in-place. Also for scheduling, the precast was used because it goes up much faster than cast-in-place.

Constructed on the roof of the north garage is a park-like plaza featuring attractive landscaping that helps hide the garage from view. The primary objective of the rooftop park was to blur the edges of the parking garage by projecting the landforms of the surrounding park onto the parking garage.

To the south, a new, two-story, 1,600-space parking structure replaced an existing surface lot. PROVOTON foam concrete was used to backfill against the precast panels of the partially buried parking structure to limit lateral pressures on the precast panels.

PROVOTON foam concrete was also used to backfill under certain architectural features from the original stadium that were being incorporated into the new renovation. Due to limited access to these underground areas, the foam concrete was very economical choice compared to other methods of support.



PROVOTON foam concrete being placed against north garage walls.



PROVOTON foam concrete was used to backfill and support original exterior stairway.

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North garage during placement of PROVOTON foam concrete.



Car ramp entrance off of McFetridge Drive to north garage between park.

Parking Garages To Camouflage Cars

Precast selected to frame two parking facilities for speed of erection

By Jeffrey Steele

For years, driving by Soldier Field meant gazing at acre upon acre of parking lots, in addition to a rundown stadium.

The beauty of the new Soldier Field is that it will be surrounded by parkland. That meant hiding parking below grass, trees and other attractive physical features.

Parking will be divided between two garages: a 2,500-car multilevel garage, known as the North Garage, and a 1,600-car, one-level structure called Waldron Garage, south of the stadium.

Because of their designs, neither garage will detract from motorists' view of the lakefront as they drive past the new Soldier Field, officials say.

Utility Lines Caused Woes

There were hurdles to surmount even before a single shovel of dirt could be overturned for the garages' foundations.

Buried utilities were to be moved to construct the garages, said Alice Hoffman, president of Hoffman Management Partners LLC, the Chicago-based developer's representative for the Chicago Bears.

"None of them were in the places they were shown to be on the existing site plans," Hoffman said. "You call up a company called Dig Safe and they come out and locate them. But by then, you've already bid the work and designed it. So if there's a change, you have to pay the cost overruns."

According to Mark Simonides, project executive with TBMK, the joint-venture general contractor made up of Turner Construction Co., Barton Malow Co. and Kenny Construction Co., some 2,550 pieces of precast concrete were used to create the North Garage, and about 890 precast concrete pieces make up Waldron Garage.

Precast concrete was chosen, rather than poured-in-place concrete, because of schedule considerations. "Precast, once you get the foundations in, goes quicker than cast-in-place concrete," said Joseph Burns, Chicago-based principal of New York's Thornton-Tomasetti Engineers, the structural engineering company on the Soldier Field project.

Precast concrete also fit more effectively into the budget, Hoffman said. "We did cost studies and found out precast was about \$25 million cheaper than cast-in-place," she added.

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PROVOTON
Foam Concrete

Parking Garages To Camouflage Cars

Both parking garages are connected to the stadium for quick and convenient fan access. The new Soldier Field bears on the North Garage, so when fans enter the North Garage and park in their pre-assigned parking spaces, they will be able to walk through the garage right into the stadium, Simonides said. Fans will also have direct access from the top deck of the North Garage into one of the mezzanine concourses within Soldier Field.

Waldron Garage is also linked to the stadium. It features vehicular access off 18th Street, Burns said. Pedestrians will use an underpass beneath Waldron Drive to enter Soldier Field.

Bowl Sits on North Garage

The North Garage is connected to the north end of the stadium, and is four stories tall where it meets the stadium, fitting below the north end zone seats. The north end zone seating bowl actually rests upon the top of the southern portion of the garage, Simonides said.

Because the grade along the garage slopes up as it moves north toward McFetridge Drive, the garage is just two stories high at its north end. On the roof of the garage is a park-like plaza featuring attractive landscaping that helps hide the garage from view.

From the standpoint of Thornton Tomasetti, the chief issues were geometrical.

"The garage is very rectilinear, but there's a diagonal slot that allows for a passage into the stadium from McFetridge Drive and also serves as the pedestrian entrance to the garage," Burns said. "And this slot has a granite water wall that's also serving as a memorial. It's different from a typical rectilinear garage, where all the columns and beams are at right angles."

Another challenge was the differing amount of earth pressure bearing on the garage. A great deal of pressure was exerted on the structure at its north end along McFetridge Drive, but little, if any, on the south end underneath the stadium.

"We used a product called PROVOTON foam concrete as backfill," Burns said. "It was used as backfill around the north end to limit differential settlement and to reduce unbalanced earth pressure on the garage."

The floor of the North Garage is at the same level as the playing surface. Digging into the earth to create subterranean garage levels would not have worked, because the water table is mere feet below the playing surface this close to the lake, Burns noted.

However, excavation did take place in building the garage, because the foundations of the park district administrative building, demolished in September 2001, had stood there.

"We had to excavate for foundations, for our own pile caps and foundation walls," Simonides said. "There really wasn't what I would consider mass excavation, just mainly structural excavation."

A Curvaceous Garage

Situated between Waldron Drive and 18th Street, the Waldron Garage features several distinctive differences from ordinary garages, among them its curving design and the fact that it supports tree planters, Burns noted.

"The design for the tree planters is the challenge," he said. "That's what makes this different from many typical one-story designs. The perimeter of the garage is circular, and that also makes it challenging and different from a typical garage. Typically, you'll see a precast deck in the suburbs that's just a big rectangular. But because of the design of the museum campus, they wanted more of a curved perimeter."

Hoffman describes the garage as teardrop in shape - a choice some fans might deem appropriate given the home team's recent tradition of disappointing its followers. "It's got curved walls, is very pretty and is sunk 6 ft. into the ground," she added.

"It rises 6 ft. above the existing ground, and the idea is to keep that elevation below the elevation of Lake Shore Drive, so people driving by on Lake Shore Drive will see the lake, not the garage.

Furthermore, we planted large trees on top of this garage to additionally mask it."