Fairview Hospital Parking Garage

The Fairview Hospital Parking Garage is a six-level, precast concrete parking garage (approximately 735 cars), built in 1975. The hospital is located in a residential area, so a very limited area is available for employee, patient, and visitor parking. The original parking garage construction consisted of precast concrete double-tees placed on precast columns and beams. A concrete topping was then installed over the precast tee units. Heavy use of deicing salts over the years, plus carbonation, had caused severe deterioration in the columns, beams, and slab soffits. Phase I of the project was to repair the lowest two levels of the structure.

Column deterioration prior to repair

Double-tee deterioration prior to repair

Because there is limited surface area parking for visitors, patients, and employees, the parking garage is a necessity and could not be closed for repairs. The design team was challenged with repairing the lower levels of the structure while still maintaining traffic in the garage, diverting flow to the upper levels. Repair areas were sectioned off with caution tape so traffic lanes could remain open to allow access to the upper levels. A major goal for the project was to minimize down time throughout the life of the repair project, keeping the inconvenience to a minimum. The tight schedule was further complicated with a tight budget, with a cost of approximately $500,000.

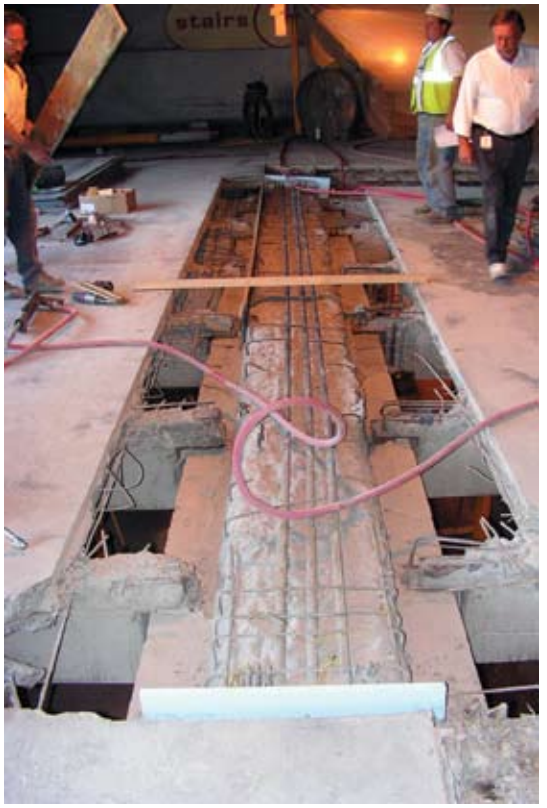
For Phase I of the repair, the contractor conducted a condition survey of the garage. The survey found that many of the main girders (beams), columns, and double-tee stems had several inches of deterioration. It was also noted that some deteriorated areas had been previously repaired in the late 1990s. The project scope for Phase I was to repair the precast concrete beams, columns, and double-tee units.

The specification called for chipping hammers to be used to remove deteriorated concrete. Project logistics included consideration of the time of work during the day to minimize any inconvenience to the local residents. The perimeter of each repair area was sawcut, per ICRI Technical Guideline No. 03732, "Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays." For partial depth repairs, an adequate surface profile was provided to help ensure that proper bonding of the repair material would be achieved. The exposed steel was then either treated or replaced.

A portion of the repairs included the complete reconstruction of the precast tee-bearing ends. Some edges of the precast tees required full-depth repair, whereas others required surface patches only. The column and beam repairs were formed and the repair material was placed from the level above. Shoring was required if traffic loads came within 60 ft (18 m) of the patch repair (excluding column areas) until the repair material reached a compressive strength of 2500 psi (17.2 MPa).

Deck surface preparation, and in some areas, full-depth repair

Surface preparation of a beam



Preparation for full-depth replacement

Shoring

At times, it became difficult to place shoring. Shoring was necessary to stabilized the repair area and minimize deflection during the repair material curing period, all the while supporting the upper levels that remained accessible to traffic.

Safety was a major consideration on this project. Garage users had to be protected from the work zones, and repair project worker safety was a major detail because workers were involved in the repair while traffic passed nearby.

ICRI Technical Guideline No. 03733, "Guide for Selecting and Specifying Materials for Repair of Concrete Surfaces," assisted in determining which areas were to receive ready mixed concrete and which areas received a rapid setting, prepackaged concrete repair material. Ready mixed concrete accounted for about 25% of the work. The remaining concrete repair areas required faster turn-around time so a rapid setting, prepackaged concrete repair material was used.

To meet the structural demands for the project, the specification called for low slump concrete with 5% microsilica and with a high-range water reducer (superplasticizer). The mixture design called for a 1.5 to 2.5 in. (3.8 to 6.4 cm) maximum slump, increasing to 8 in. (20.3 cm) after the addition of the high-range water reducer. A minimum of 5000 psi (34.5 MPa) compressive strength after 28 days was the performance requirement. The rapid setting repair material was required to meet similar workability and performance criteria. The concrete and repair material remained in the forms for 3 days to allow

Underside of finished deck repair

Fairview Hospital Parking Garage

adequate cure time. Forms were then removed and the area was reopened for parking.

Finally, an anti-corrosion coating was applied to any exposed steel in the partial- and full-depth repairs.

The Fairview Hospital Parking Garage repair project was challenging in that the garage had to remain open during repairs. It was difficult repairing the lower two levels while traffic was diverted through the construction area to the upper floors of the structure. Another major construction challenge was constructing scaffolding to provide adequate support while not interfering with traffic flow. The confined area and short down-time demands made product selection a key component in the repair process. The design and construction team worked together with strong communication to ensure that the challenges were met and the owner was satisfied.

Fairview Hospital Parking Garage

Owner
Fairview Hospital/Cleveland Clinic
Cleveland, OH

Project Engineer/Designer
Barber & Hoffman, Inc.
Cleveland, OH

Repair Contractor
Donley's Resotration Group, LLC
Cleveland, OH

Material Suppliers/Manufacturers
Charles Phipps Company
Cleveland, OH

The Euclid Chemical Company
Cleveland, OH