

RSIO

Case History Report

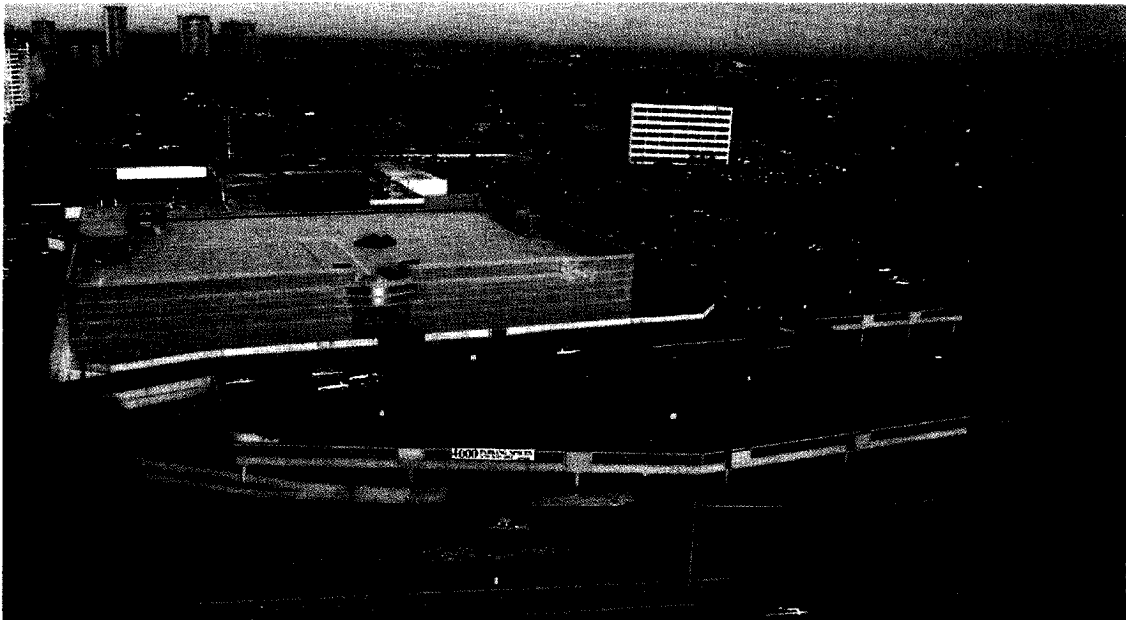
Parking Structure

Reinforced Concrete a Fitting Choice for Shopping Mall "Wrap-Around" Deck

In a major multi-million dollar expansion of its Fairview Shopping Mall in Don Mills, the owner has constructed an elevated parking structure to accommodate the expected added flow of shopper traffic. With 1.2 million sq. ft. of building positioned on a non-elastic 46 acre site, the 440,000 sq. ft. new parking deck will provide space for an additional 1,200 cars.

Compounding the difficult site problems of limited access and inadequate space for storing construction materials, the sprawling, irregularly shaped building dictated the design of a "wrap-around parking structure."

An elevated "Wrap-Around" parking structure was designed for the irregular site. ▼





Minimum Shopper Inconvenience

Construction scheduling was expected to be difficult since the structure had to be built without unduly restricting shopper movement in and out of the building. Further, the work had to proceed in small increments, spread over a year's time, and at various locations as they were made available.

Concrete Systems Compared

According to the project architect and engineer, while economical, durable concrete was the logical choice for the structural material, the type of concrete and its reinforcement was subject to a comparative analysis. Precast and cast-in-place concrete were both considered — the latter reinforced with either post-tensioned strand, or conventional steel bar reinforcement.

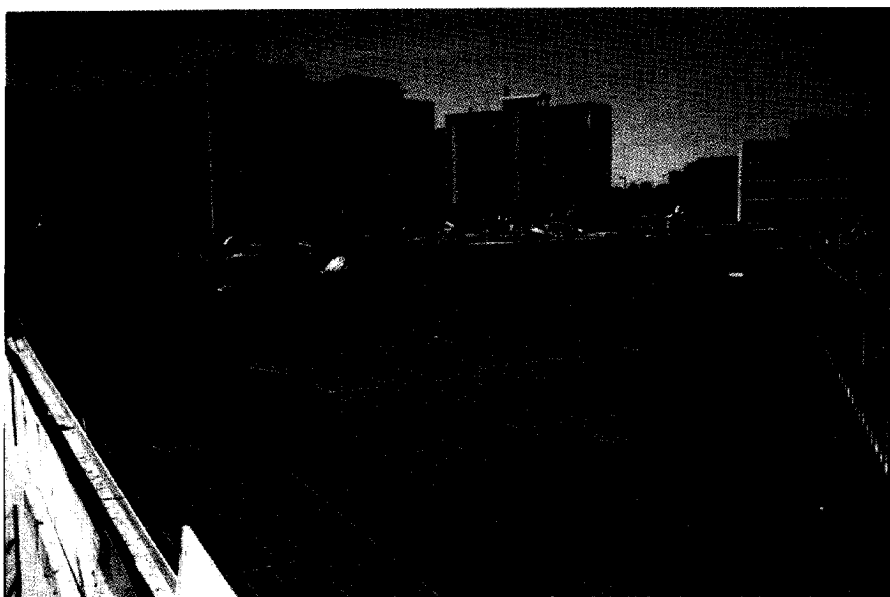
New Standard

An evaluation of the advantages and disadvantages of these three alternatives was particularly important on the Fairview project since, it was among the first in Canada designed in accordance with the proposed standard, CAN/CSA S-413-M, "PARKING STRUCTURES." Portions of this



▲ Reinforcement, formwork and concrete had to be "hop-scotched" around the site.

publication which most influenced the type of concrete used stipulates that: drains would be provided for every 400 m² of surface area; individual drainage areas would be sloped a minimum of 2% in the longest direction to their drains.



◀ Cast-in-place concrete provided an economical solution to the requirements of the new design standard.

Alternatives Unacceptable

Precast double T's were not favoured for this application due to: the complexity of the layout; the structural and economic demands of the new drainage standards, (a sloped topping and/or a sloped frame); and the probability of last minute adjustments in design and construction schedules. When suppliers quoted uncertain delivery dates, the combination of all factors indicated this to be the most expensive and unreliably timed method.

A post-tensioned alternative was similarly turned down because the complexity of the project placed it at a structural and economic disadvantage. Additionally, the owner and the designers were concerned about possible major problems with unbonded post-tensioned strands when exposed to a road-salt corrosive environment typically found in all parking garages.

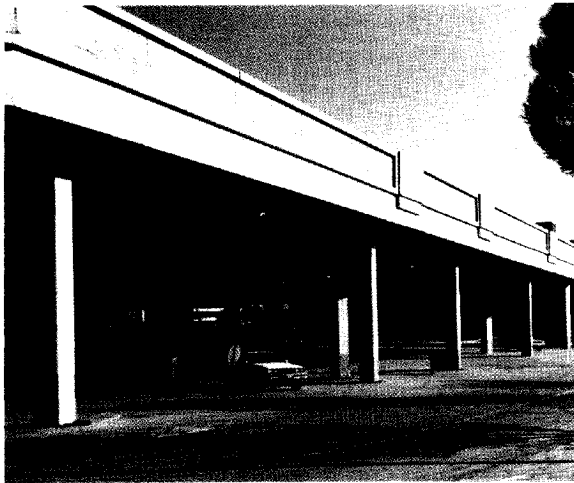
Epoxy Coated Rebar Used

Areas particularly vulnerable to corrosive salts, such as parapet walls, ramp beams, ramps, curbs and expansion joints are reinforced with protective epoxy-coated rebar. The ramps are kept ice-free with an electric heating system. The deck surface is protected with a multi coat 100% urethane waterproofing membrane, its top coat containing abrasion-resistant aggregates.



A self-supporting parapet wall forms a barrier around the perimeter.

Epoxy coated rebar was used in areas vulnerable to corrosive salts.



Workable & Affordable

By contrast, the inherent flexibility of cast-in-place, conventionally reinforced concrete, provided workable and affordable solutions to problems thwarting the other two systems.

It allowed the designer to provide the sloped deck slab as called for in the standard at an acceptable cost. This slab was 7 inches thick, two-way reinforced and supported by a concrete frame. A self-supporting parapet wall provides the necessary barrier around the perimeter of the deck. Downturned beams, with contiguous expansion joints, support the tops of the ramps leading to the parking lot.

