

ON PARKING GARAGES

Hoshi & Don

STRENGTH I was always amazed by the strength of building materials and how they could resist stress. That's one thing that got me interested in engineering when I was growing up. I was around a lot of construction with my uncle who would buy properties for development of residential buildings. When I wasn't in school, I was helping him.

Hoshi Engineer, P.E., SE, Principal and Regional Chief Structural Engineer for Walker Parking Consultants' Engineering Resources Group in Denver. Hoshi oversees production of structural design, and is responsible for proactive structural design support, project planning, training of engineers and development of engineering design aids and standards.

Donald R. Monahan, P.E., Vice President, Walker Parking Consultants in Denver. With more than 26 years experience and 500+ multi-level parking structures to his credit, Don has chaired the Parking Consultants Council and currently sits on the Board of Directors for the National Parking Association.

PLANNING You always look out for the best interest of the client. That means not over-building unnecessary parking spaces. For instance, for a garage serving an office building, we tabulate peak occupancy rates through observations and surveys. Then we compare that to the square footage of the particular building to come up with the ratio of spaces per 1,000 square feet of flooring. But for a hospital, the parking ratio isn't based on square footage – it's based on the number of beds they have. Although outpatient parking – like an office – is linked to square footage to determine need.

PROCESS We find that designing a structure is as enjoyable as seeing the end results. But that depends on whom you talk to because it's different for everyone.

WEATHER A parking structure should not corrode or crack because both will cause expensive maintenance problems. Slab cracking is always an issue of concern. In Colorado, the snow and road salt tracked into garages by cars can cause considerable damage to concrete and steel. Water leaching through cracks in slabs can drip down on cars parked below. This salt-contaminated water can damage paint on cars.

DURABILITY Steel frames can be a very competitive system for parking garages. We just finished a steel parking structure for employee parking at the Northern Colorado Medical Center (NCMC). In the past, some owners didn't want steel because it was painted with a single-coat system and the eventual maintenance was not desirable – repainting would eventually be required. The advantage for steel now is that members can be galvanized at the end of the mill run or painted with a high-performance coating system. For the NCMC, the members were hot-dipped galvanized in an 80-foot cauldron. As a result, we were able to give the owner a steel parking structure that will effectively resist corrosion with a 125-year service life.

TIME We went through an exercise to evaluate various structural system costs for the NCMC parking structure. The study covered pre-cast concrete, cast-in-place post-tensioned concrete and a steel frame with a post-tensioned floor. All were roughly the same cost, but the steel-framed parking structure saved two months in construction time – we went from a 10-month schedule down to eight months – primarily due to the speed of erection even through the winter.

COST Using steel shortens construction time, which reduces overhead expense for the contractor. At the NCMC, the original scope of work was to design a 600-car parking structure, but after project estimates came in under budget, the owner decided to add another level to gain an additional 120 spaces.

EXPANSION A couple of years before we built the steel parking structure at the NCMC, Walker Parking Consultants did a feasibility study to determine their current and future needs based on planned growth. The old employee parking area was on grade and is now the site of the new medical towers currently under construction. A parking structure takes advantage of vertical space and allows for expansion on an already crowded campus.

CAPACITY The owner received a variance change to the city ordinance that gave the NCMC site a setback requirement of 10 feet instead of the original 25 feet. City ordinances also set a height limitation of 30 feet. We maximized both limits and designed a structure that gave them 720 spaces. The relative shallowness of the steel beams allows us to have an open structure with adequate headroom.

STEEL The parking structure we built at NCMC is for the employees. Shifts start and end at different times throughout the day because hospitals are 24-hour facilities. Security was a major issue to address. With steel, the columns are smaller in size than concrete – and less obtrusive. You can see around the columns and be confident no one is hiding behind them. The shallow profile of the floor beams provides more openness, which makes the space much easier to illuminate – another security advantage. In this respect, steel provides a user-friendly design approach for parking structures.



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