



What would parking industry consultants tell designers and fabricators if they had the chance? MSC talked to parking expert James J. Graveel, executive vice president of Walker Parking Consultants, to learn more about what's new in parking—and how the steel industry can get in gear.

Q: What are some trends in transportation to keep in mind when we think about new parking structures?

A: Parking demand continues to increase as the number of cars and drivers increases. The most recent National Personal Transportation Survey issued by the U.S. Department of Transportation's Federal Highway Administration (FHA) says that there is now approaching one car per licensed driver in the United States. The average daily vehicle trips per household grew 12 percent between 1990 and 1995, and for every trip you need a parking spot on each end. Also, the average annual person trips per household using mass transit systems has dropped from 2.6 percent in the 1970s to about 1.8 percent in 1995. Since then, it has stayed relatively constant, but the main mode of transportation is by car, which has lead to the increase in the demand for

parking. To see more statistics from the FHA survey, visit:

www-cta.ornl.gov/npts/

Q: How does the increasing cost of land in many areas affect the design of new parking structures?

A: In areas that traditionally have been relatively less expensive, like rural and suburban areas, land costs have increased in recent years. Surface parking requires more land, so many owners now prefer to build upwards with a parking structure and leave additional land available for other uses.

There is also an element of convenience with parking structures rather than a large surface parking lot—you have a shorter walking distance. There is a limit to how far people will walk. Some surface lots have excessively long walking distances. People want protection from cold weather, rain, snow and extreme summer heat. In some cases, it makes more sense to move up rather than out.

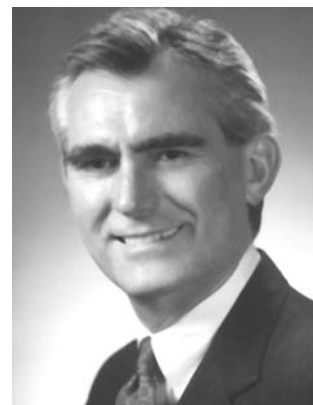
Q: How does cost affect decisions about structural systems?

A: There is a definite awareness of cost—most owners would rather spend more money on a building than on its parking structure. They usually look at three points: 1) How ef-

ficiently is the structure laid out, in terms of the number of square feet per parking space, 2) The cost of the structural system itself, which usually makes up 60-70 percent of the cost of the overall structure, and 3) The speed of construction—how quickly you can get the parking structure up.

Q: How does steel work with these three issues?

A: Steel is competitive in all three respects. Both steel and other systems can be designed efficiently for parking structures, and the cost of a



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Steel Parking Garages without Spray-Applied Fire Protection

Not all parking structures require spray-on fire protection. In fact, most building codes do not require fire protection coatings in open parking structures up to eight tiers high, as long as certain opening requirements are satisfied to ensure natural ventilation. Open parking structures with natural ventilation present a reduced fire hazard because smoke and heat can escape from the structure, while the spread of fire from one car to another in these conditions has been proven (by tests and real incidents) to be not possible or very slow. The tables below summarize the building code requirements for unprotected steel, both in limited- and unlimited-area open parking structures. The

limited area requirements usually apply to parking structures enclosed on one or more sides by walls or other structures; and the unlimited area provisions usually apply to parking structures that are open on all sides. IBC refers to the International Building Code, NBC refers to the National Building Code, SBC refers to the Southern Building Code, and UBC refers to the Universal Building Code. In addition, the National Fire Protection Association's (NFPA) minimum opening requirements for unprotected steel in parking structures can be found in the 2003 Building Construction and Safety Code NFPA 5000, item 30.8.1.3.

Unlimited Area Open Parking Garages

Code	Height of Parking Structure	% openings	Max. Distance to Opening (from any given point)
IBC	75'	50% all sides	200'
NBC	75'	50% all sides	200'
SBC	see below		
UBC	75'	50% all sides	200'

Open Parking Garage Allowable Areas

Type IIB (unprotected steel)

Code	Area per Tier	Max. Height of Tiers for Structures with Ramp Access	Max. Height of Tiers for Structures with Mechanical Access and No Sprinklers	Max. Height of Tiers for Structures with Mechanical Access and Sprinklers	Openings
IBC	50000 sq. ft	8	8	12	2 sides, open 20% of entire perimeter
NBC	50000 sq. ft	8			2 sides, open 40% of entire perimeter
SBC	40000 sq. ft	8			2 sides, open 50% of entire perimeter
UBC	30000 sq. ft	8	8	12	2 sides, open 20% of entire perimeter

structural steel system can be competitive with other systems. In terms of speed, both a steel frame with cast-in-place concrete slab and a mixed system that uses a steel frame with supporting double tees are faster to construct than a cast-in-place concrete system.

Q: What do designers and fabricators in the steel industry need to work on?

A: One of the big issues with steel is fire rating. When it comes down to pricing, it can add a big cost. Once some structures reach a certain

size, they need at least a one-hour fire rating. The durability of the fire protection coating is also an issue because parking structures are open, and people and the elements can access and damage fire protection on exposed steel. This sometimes takes away the low-cost advantage you might find with steel systems (see above sidebar on building code requirements that permit steel to be unprotected in parking structures).

Q: Do personal security concerns factor into design criteria for parking structures?

A: There has been a lot more consideration in design for elements of security, such as openness in structure, visibility and lighting. A key element is visibility. The idea is to create security through environmental design: to design an environment that is non-conducive to criminal activity, so you don't have to rely totally on surveillance equipment. Steel is strong in this area compared to some other structural systems because it provides great sight lines. You can have cross bracings rather than a shearwall for lateral load resistance.

Also, people want to feel a sense of arrival when they reach the parking structure, not just when they eventually walk into a building. New parking structures have more comfortable, user-friendly features. Some architectural elements are painted ceilings that make the structure white and bright; stair/elevator towers that are finished spaces; and bridges that take you right into a shopping center.

Q: What about external appearance?

A: Twenty years ago, parking structures were pretty utilitarian—few cared how they looked. Now

appearance is driven by the structure's owners. Some businesses use structures as an amenity. Often if you are going to build in certain areas of a city, you will have to go before a review board, and face much concern about exterior appearance. The structure might require some landscaping. Also you might have to consider how to aesthetically handle [ventilation] grills in the structure, if the structure requires a mechanically ventilated system.

The other big thing is a trend towards the mixed use of parking facilities. You might find coffee shops and dry cleaners at grade level. There could be a parking office, security stations, re-

tail space, bookstores—I've even seen bowling alleys in a parking structure. Also, some structures are built above detention ponds that hold storm water, to make double use of the land.

Q: Why is it important for designers in the steel industry to pay attention to these trends?

A: The steel industry needs to be aware of the size of the parking structure market and new dimensions in aesthetics. The element of steel is desirable and architects are interested in looking for an attractive structure. ★