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# PARKING EFFICIENCY AND COST EFFECTIVENESS GO HAND-IN-HAND

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**It seems like everything has gotten more expensive in recent years. Dramatic increases in energy and raw materials costs have led to across-the-board inflation and, as a result, Americans are being forced to economize in both their personal and professional budgeting.**

**Perhaps no one has felt the sting of this more than the development and construction community. It is estimated that construction costs are raising by about ten percent each year, with no relief in sight. Of course, parking is not immune to these cost pressures. Many developers and parking owners are looking for creative ways to minimize the cost of developing new parking facilities.**

**The good news is that there are a number of design strategies that can actually help reduce construction costs. And in many cases, these strategies also lead to better, more user-friendly parking facilities.**

## Size and Shape of Site

The first consideration in creating cost-effective parking is the size and shape of the site on which the facility is being developed. This is important to both the efficiency and layout of parking. For example, short sites or irregular sites which are not 90 degree corners creating angled sides may not be conducive to efficient parking. The more efficient sites start out at approximately 200 to 300 feet with a reasonable minimum width between 110 to 120 feet depending on the angle of parking. Within this configuration there is sufficient room to create two end aisles with parking off of these aisles in the short dimension.

As the sites become longer, the same two end aisles are diluted over a larger floor area, giving more efficiency to the layout. Within the 200 to 300 feet the designer has a choice of sloping one or both long dimensions. If only one is sloped, it is generally a 90 degree parking scheme allowing two-way traffic in the aisles. In order to lay this out in angle parking, both sides would have to be sloped, creating what is referred to today as a scissor-type garage with a cross-over in the center for the one-way traffic dictated by angle parking to cross-over from upbound to downbound. This type of garage can be laid out in more than the two modules for wider sites.

Minimum dimensions for a site would be a 90 degree parked, two-way traffic, sloped floor garage with both sides sloping of approximately 155 feet of length. This type of layout would have no parking off the end aisles and would be very inefficient and costly per car space. If this minimum scheme were extended to allow parking off the end aisles, they could contribute approximately 16 cars per floor with very little added area to improve on the efficiency and therefore cost.

## Layout on Site

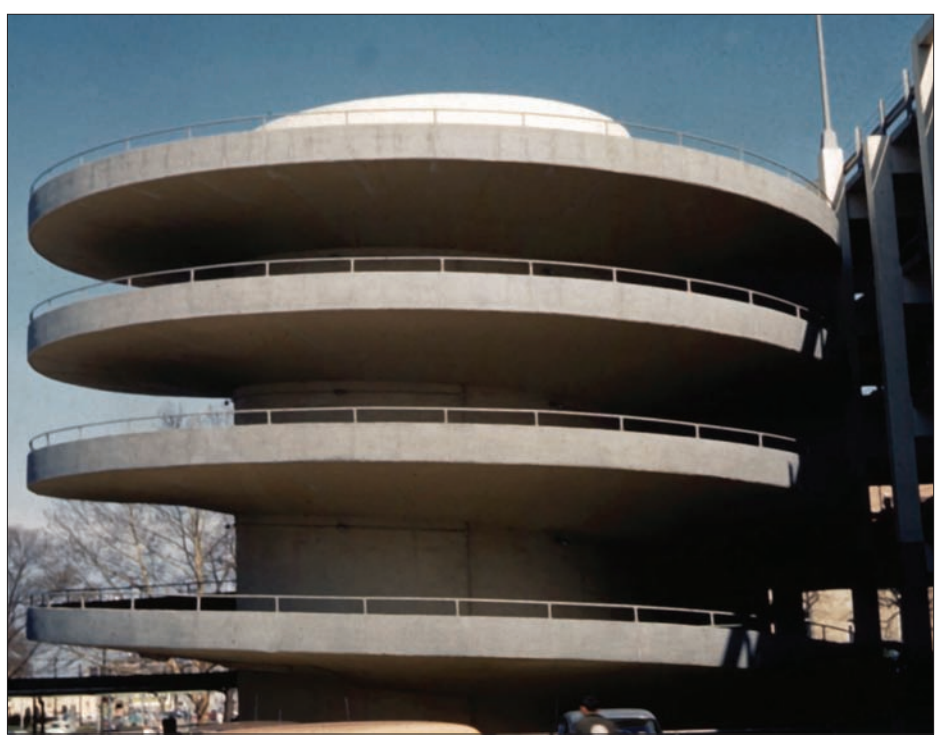
In general, the most efficient parking schemes are developed on rectangular sites with the parking aisle parallel to the longest dimension. For instance, during a recent value engineering session on a 2,000 space 10-story parking structure with a combination of slopes and flat floor areas, taking advantage of the entire site saved considerable money.

After reviewing the design documents, it was apparent that although the garage was relatively square, the site was longer in one dimension by approximately 30 feet. This was being used as a set-back not required by code. Turning the garage 90 degrees to run the aisles parallel to the long dimension added six car spaces per module in this four module garage. This created capacity for an additional 24 cars per floor, giving the designers the opportunity to take one floor off the structure and still achieve the desired capacity. The increased efficiency, as well as the reduction of one whole parking level floor, resulted in a considerable savings. This reduction also eliminated the need for the structure's three elevators to serve an additional floor, and eliminated one floor on each of the four stair towers.

**"...the most efficient layout given the proper length of site is a sloped floor system..."**

The layout of any parking structure starts with the choice of ramping systems. In most cases, if the garage capacity is between 1,000 to 1,200 cars, the most efficient layout given the proper length of site is a sloped floor system, where every square foot of area can be parked on the floors. As the capacity requirements exceed those above, other ramping systems or layouts would have to be considered to maintain proper function.

The choices would be straight run ramp, semi-express ramp, or spiral ramp. The use of a straight run ramp would cost square footage within the building, reducing the efficiency and generally adding a cost per square foot to compound the dollar effect. Spiral ramps, to be used efficiently, would generally need to be an appendage to a



TOP: The first consideration in creating cost-effective parking is the size and shape of the site on which the facility is being developed, which impacts both the efficiency and layout of parking. ABOVE: Although spirals are efficient in handling the capacity, spiral ramps are generally very expensive to build.

> **"...parking designers have numerous design approaches at their disposal which, if properly implemented, can lead to dramatic cost savings during construction..."**

rectangular or square site for the most efficiency. Trying to incorporate the spiral within the structure also reduces the efficiency. Although spirals are efficient in handling the capacity, spiral ramps are generally very expensive to build.

## Construction Costs

Designers have different strategies at their disposal for cutting construction costs, depending on whether they are creating precast or cast-in-place facilities. Each type of structure presents unique challenges and opportunities.

Precast Structures: The most efficient precast structures essentially have two spans – one for end parking (if there is end parking) and one repetitive span the entire length of the building. The more repetition you can give to this span, the more economic this building is going to be. For example, if 12-foot tees are available, the ideal bay spacing is in multiples of 36 foot span. If 10-foot tees are only available, then the spacings should be in multiples of 20 to 30 foot spans; or in the case of 9-foot tees one could still achieve 36 feet. In most precast structures it is more efficient to locate the elevator towers on the outside of the building rectangle, along with the stairs. These can be carried up as separate structures in precast, which means the rest of the building can be erected without special conditions.

Cast-in-Place Concrete: As with precast, economy can again be obtained through repetitious spans. The dimension of these spans between the columns and beams will be dictated by the depth of the slab and the maximum length these slabs can span. In most cast-in-place structures elevators and stairs located within the rectangular structure are relatively easy to frame and can be incorporated without additional premium to the structure.

There are numerous pricing challenges facing parking designers today. Reducing costs has become the all important facet of any parking garage project. Fortunately, parking designers have numerous design approaches at their disposal which, if properly implemented, can lead to dramatic cost savings during construction. ■

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