

Fact Sheet FS011

Precast Parking Structures and Applications

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Cover

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Precast concrete parking structure applications offer numerous advantages and project versatility from a design standpoint. Structural and aesthetic parking applications can be used in combination to enhance project options and design. Because precast concrete is extremely flexible as a building component, it has unlimited design potential and can be integrated into any parking structure project type to define architectural expression and provide inherent quality and strength.

Durability

One of the major benefits of precast concrete is the durability, strength, and resistance properties it can provide. Precast concrete fabrication, including batching, placing, and curing under a strict set of stringent quality control guidelines, ensures the highest standard of production and consistent quality fabrication. Under these guidelines, the products meet the exact standards required by the Precast/Prestressed Concrete Institute tolerances.

Precast products offer extreme durability and can be tailored to meet specific project specifications. The use of a more impermeable concrete creates significantly more corrosion resistance. The precast is made more impermeable with a lower water/cement ratio that creates higher exhibited strength, while reducing drying shrinkage related cracking. In nearly all the precast products, drying shrinkage occurs in product storage when the components are unrestrained and allowed to naturally shrink during the curing process.



The use of precast also allows for controlled design of cover over the steel reinforcement. ACI requires the concrete cover in CIP structures to be nearly 2 times that required for precast/prestressed components. This reduction demonstrates a significant advantage of plant cast components. Typically the clear cover in precast/prestressed components are placed at depths similar to CIP, thus enhancing the clear cover benefit even further. This enhanced cover provides a higher degree of protection to the steel elements, and protection from corrosion that can occur due to freeze/thaw weather and chemical deicing components.

Another predictor of precast concrete's inherent durability is the consistency in the concrete curing process. EnCon's precast/prestressed components are all moist-heat cured and limited to maximum concrete temperatures. This curing process ensures enough moisture for proper cement paste hydration at both the surface of the concrete, as well as internally. Proper hydration generates consistent density and maximizes corrosion protection over embedded steel reinforcement and components.



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Nearly all precast concrete mixes have water/cement (W/C) ratios less than 0.4. This lower water to concrete ratio creates greater strength, and a more impermeable and durable product.

Precast components typically have positive bending moments, reducing the likelihood of flexural cracking on the top surface. It is surface cracking that allows moisture to migrate in to the member. In addition to freeze/thaw cycles created by this free water, the moisture can also carry chlorides, or salts, that attack both the concrete at the chemical level, as well as any reinforcement. If the reinforcement comes in contact with these chlorides, along with moisture and air, the steel begins to rust and expand. It's this expansion that causes large concrete spalls and cracking, only to further allow the infiltration of moisture and chemicals.

Also, the higher compressive strength of the concrete typically used in precast members provides greater crack resistance, as tensile capacity is proportional to compressive strength. A greater compressive strength of concrete creates a more durable finished parking structure. These higher strength mixes are harder to achieve and maintain in the field during cast-in-place or tilt-up projects. Factory fabrication of precast/prestressed concrete typically specifies strengths of 5000 psi to 6500 psi in 28 days, while 28 day compressive strength test for these same concretes will achieve actual strengths in excess of 7000 psi.

Another durability component of precast is low project maintenance due to the resiliency of precast to withstand weather related elements and acts of nature. One of the integral characteristics of precast is the fire resistance it provides, reducing the need for additional fireproofing. The low project maintenance requirements also provide a low life cycle cost by reducing the need for constant improvements.

Versatility

The use of precast concrete in today's parking structures allows for visual elements and architectural designs to enhance these durable and efficient precast components used. As a material, precast prestressed concrete is extremely flexible and can be adapted to function in both aesthetic and structural roles. The speed of project construction and the durability of the systems are easily incorporated into the design of precast parking structures.



Design options with precast are virtually unlimited. Precast concrete can be fabricated in colors, with molds and form liners, textures, finishes, shaping, and reveal and detail work that create a truly unique parking structure project. Using precast creates a highly durable structure that can easily showcase visual design elements to meet design objectives, while obtaining optimum strength and structure characteristics.

As a design material, precast is extremely flexible and can be easily tailored to a specific project. Various design techniques, product innovations, and capabilities allow for the incorporation of precast into even the most detailed building designs. This superior product will meet detailed architectural design requirements, fulfill a wide range of design styles and techniques, and provide the durability, exceptional quality, and performance for which precast is known.

Efficiency

Precast concrete parking structures meet installation requirements in congested urban areas. Small building sites, infill sites and zero lot line conditions are commonplace and require the ability to erect a structure with minimal disruption to the surrounding area. Since precast is fabricated in a plant, rather than at the construction site, job site impact is greatly reduced. This creates fewer site access problems, limits traffic congestion, and often allows erection in hard to reach spaces where other construction methods may not be feasible.



Precast parking structures also offer efficiency through speed of construction. This much greater speed of project erection is often a major deciding factor in the use of precast in a parking structure project. The fabrication process allows the project components to be constructed before, or concurrently, with work at the project site. Since fabrication is not halted or delayed for weather conditions, the fabrication process is very systematic and predictable. This reduction in schedule risk results in elimination of many site delays, increased project site safety, reduced need for onsite trade coordination, and cost savings due to the quicker erection process and schedule.



Precast Parking Structure Products

Precast parking systems provide the proven benefits of speed of erection, long life expectancy, high quality finish, material consistency, design flexibility, and aesthetic options while meeting precise industry specifications. These cost-effective structures are highly durable and provide the performance characteristics required by the building industry. Precast components can function in both aesthetic and structural roles, providing a versatile and high strength parking structure.

EnCon's Parking Structures and Applications

EnCon provides precast parking products in numerous shapes, sizes and architectural finishes. Precast parking applications include double tees, wall panels, columns, spandrels, light walls, and stairs. Our systems can be designed to meet both structural and aesthetic project needs. When adding durability, versatility and efficiency to the proven precast benefits of speed of erection, high quality and strength components, material consistency, design flexibility, and aesthetic options, precast parking applications are an ideal project solution.

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