



Precast Meets Challenges Of Mixed-Use Projects

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*A precast concrete tower incorporates conventional masonry and glass, plus custom exterior finishes and touches.
Photo: Tindall Corp.*

Accentuated headroom and long, clear spans bring vertical displays to view from long distances in this Dick's Sporting Goods and parking structure in Virginia Beach, Va. Precast double tees created a large, central atrium that invites customers to upper floors. Photo: Tindall Corp.

Precast concrete makes a strong choice for a variety of mixed-use projects

Mixed-use structures challenge architects with specific constraints and diverse requirements that are unique to these complex buildings. Fortunately for designers, precast concrete has emerged as an effective, economical answer to meeting these structures' varied needs.

The need to maximize occupancy rates means architectural-style restrictions must be overcome with high curb appeal. The demand for revenue-generating retail space on the lower levels requires a configuration that allows for expansive free spans and high headroom while still supporting heavy loads overhead. These buildings also typically must support the loads imposed by integrated parking, which has become a key ingredient for attracting visitors, tenants and owners.

The need to ensure fast construction to begin generating revenue creates a compressed schedule. Owners also demand that the design minimize operating costs and maintenance by incorporating structure durability, energy efficiency and healthy indoor environments. Other special needs also arise, including the need for quiet interiors isolated from noise and vibration, erection on constricted sites, wind and seismic load-resistance capability, blast-resistant exteriors and fire separation between areas and adjacent structures. Precast's ability to help meet this multiplex of requirements has helped it to become the favored medium among many architects involved with mixed-use structures.

Architectural Curb Appeal

Matching historic and modern surroundings can be difficult, but architectural precast concrete handles complex designs with an ease that results in high curb appeal. Precasters are enjoying considerable success among architectural review boards and in satisfying the demanding requirements for historical districts. Whether projects are located in urban, historic or high-tech suburban environments, precast concrete components can promote high occupancy rates, both initial and long term.

Precast can replicate an existing appearance or establish a fresh look. The rich palette of exterior architectural finishes and embellishments allows for shaping and sculpting distinctive designs. Surfaces can be freely designed with colored pigments, aggregates, thin-set brick, brick or stone inlays, exposed aggregate, acid etching, sandblasting, notches, setbacks and form liners that impart exterior surface texture. Shapes or geometries can be incorporated in a structure by means of curved or acute corners, porticoes, entries, sculptural shapes, bullnoses, reveals,



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returns and fiber-reinforced composite structures. Precast can also interface smoothly with glass and other modern materials.

Additionally, precast can combine building structure with exterior and even interior finishes in one component. The economy of repetitive units allows embellishments and custom touches to be included in the budget.

Longer Spans

Precast components can be used to produce spectacular merchandising areas. With unique structural solutions, precast can offer multilevel atriums and high headroom for breathtaking retail areas. To open up floor-plan options, precast can incorporate long-span, open bays and exterior shear walls coupled with nonload bearing interior walls.

New precast techniques can be used to accommodate the ever-longer spans and various loadings required for mixed-use projects. Precasters have become skilled at developing creative structural solutions for unusual wear conditions, heavy loadings and restricted land sites. For example, spans up to 140 feet can be configured to support 250 psf live loadings.

Other loading solutions for integrated parking include using four different-sized double-tee sections to accommodate various loadings throughout a structure. Or designers incorporate unique beam structures with continuous bottom flanges and field-spliced web sections into a structure. They also use two rows of horizontal litewalls over columns to form inter-ramp parking deck walls. To accommodate loadings without columns, spandrels can be cantilevered past two interior walls, uniting in a corner with no columns. In those cases, the mounted stairways bear on the spandrels.

Precast technology promotes quiet interiors with outstanding sound attenuation (both floor-to-floor and outside-to-inside), a natural dampening effect on lateral vibrations and vibration isolation from rooftop mechanical systems.

Additionally, precast technology supports healthy interiors. Precast can attain high LEED certification — up to 21 points in five of the six LEED sections. Precast also prevents growth of mold because exterior panels with cast-in insulation have no dead spaces or cavities where condensation and mold growth can occur.

Shorter Schedules

With precast concrete components, the time to occupancy can be as much as 30 percent less, generating revenues more quickly, which minimizes interim financing costs. These benefits are possible due to the shortened construction time offered by precast — as much as 4 to 10 months.

Many reasons factor into the compressed schedule, including reduced detail design time and less masonry material, scaffolding, labor, insurance and job site waste. Other factors include less job site congestion, because the product can remain off site until needed. Once it arrives at the job site, the product is quickly erected. Concentrated responsibility also benefits the schedule because with precast, multiple building components come from a single supply source.

Precast also requires fewer on-site trades throughout the project, due to simpler exterior and interior finish requirements, cast-in electrical and mechanical

Kroger's roof parking highlights a trend in southeastern urban areas, such as Atlanta, where expensive land and its limited availability have led designers to vertically integrate parking and retail spaces. The structure's precast concrete framing system economically spans more than 50 feet with substantial dead and live loadings. They include a thick-watertight topping slab, HVAC equipment and ample parking capacity. Photo: Tindall Corp.



The architectural precast concrete wall panels on this parking/retail/office structure in downtown Charleston, S.C., feature a sandblast finish and inlaid brick to help it blend with a neighboring historical high school and the modern Medical University of South Carolina hospital. The 2-foot-thick shear walls also met the high seismic design requirements for the 700-vehicle facility. Photo: Tindall Corp.

components, chases and pass-throughs. Plus, construction sequences are less hindered by weather conditions, decreasing the impact of weather delays.

Reduced Operating Costs

The durability of precast provides owners with reduced costs after construction is complete. Precast framing and shear walls have a high structural integrity, as well as galvanized and stainless steel embedded materials, so there is minimal wear over time and little maintenance required. Exterior walls are also low maintenance, normally requiring only cleaning, which further reduces operating costs. The owner can further reduce energy costs by as much as 50 percent when insulation is cast within precast wall panels.

Precast can meet wind, seismic, blast and fire standards required for most mixed-use structures. It has high lateral load resistance capability under IBC standards. Precast also meets the most recent guidelines for blast resistance. Additionally, mixed-use precast structures, with parking above or below the adjoining use group, can meet the two-hour fire-separation ratings required by code. Precast structures have an inherent fire separation from adjacent areas and neighboring structures, which reduces insurance rates and accommodates contemporary security concerns.

Aesthetics, structural solutions, "green," quiet interior environments, cost efficiency, compressed schedule and reduced operating costs — from any angle, precast has what it takes for architects to make their mark in mixed-use buildings. ■