



# COLORADO REAL ESTATE JOURNAL

THE COMMUNICATION CHANNEL OF THE COMMERCIAL REAL ESTATE COMMUNITY

JULY 15, 2015 – AUGUST 4, 2015

## Precast applications for the multifamily market

Colorado's current real estate market conditions, decreasing vacancy rates and increasing rental needs are pushing the demand for multifamily housing to quickly meet the needs of the housing influx. "Precast concrete structures offer unsurpassed benefits for meeting the growing multifamily market segment by fortifying the demand for high-quality products with quick-build schedules," said Jason Lien, executive vice president of EnCon United.

Precast concrete is a high-performance product and system used to meet the needs of this growing market segment. Precast concrete consists of a specialized concrete mix, which is cast into project-specific, customized panels at an off-site plant. The concrete is placed into a mold or form, and cured before being removed from the form. The precast components are then transported to the project site for erection. The prefabrication process allows all pieces to be cast in a controlled environment and erected on site, creating one of the quickest and most efficient building systems available. This allows owners and builders to effectively meet housing schedule demands, while minimizing site and project delays, and reduces overall costs. Precast product advantages can include long life span, continuous insulation, fire resistance, vibration control, corrosion resistance, acoustical control, speed of construction, greater quality control and finish consistency with in-plant production. Plant production also reduces on-site labor and lowers the job site safety risk.

Multifamily precast components generally require elevated floors, high-load capacities,



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open spans and large bays in the parking facilities. Typical precast components used in the multifamily market segment include podium slabs, double tees, hollow core, stair cores and wall panels. Precast members also meet demands as load-bearing elements, providing high-load capacities and enabling integration of structural, architectural and insulated precast products into one cohesive building system. "Precast products are a viable multifamily solution because they serve as structural components, provide fire resistance and vibration control, and can be integrated into architectural precast components as well," said Lien.

Many residential complexes feature multiple stories of wood frame or light-gauge steel construction over an elevated concrete deck. The podium projects allow for the development of high-density projects, while reducing space and construction costs. Podium slabs typically act as a structural foundation floor and as a transfer slab for the framed construction above, thereby transferring loads directly into the foundation walls. The podium slabs typically are situated above parking levels, creating partitions and compartmentalization, and require up to four-hour fire ratings for safety and compliance. A precast podium design provides a cost-effective

solution offering increased speed of construction and limited environmental impacts. Other podium advantages include reduced job site congestion, gravity and lateral load restraint, and vibration and acoustic control.

Precast prestressed hollow-core floor members are another option for multifamily projects. Hollow core is a prestressed concrete slab with continuous hollow voids running the full length of the product. The long spans provide more open interior space with less obstruction from structural depth and columns. Benefits of this precast solution include vibration resistance, a two-hour fire rating, easy floor penetrations and up to 40-foot-long spans, which increase interior space.

The hollow-core members offer a distinct advantage over other traditional slab building materials because of the speed of production and installation. No shoring is required for the slabs, allowing for 4,000 to 10,000 square feet of installation daily. Hollow core can be used as a lateral load diaphragm to support multiple floor and wall loads and, because it requires less concrete and steel reinforcement, it results in less job site congestion than normal building methods. Structurally, a hollow-core system provides high-load capacity for floors, open clear spans, high-vibration resistance, finished ceilings and floors, and reduced floor-to-floor heights.

Unique wrap structures feature multiple levels of parking, which are surrounded by multifamily housing units. The structures are intended to incorporate spacious interior areas and blend into surrounding structures. In this type of project, the parking

garage system is the first stage completed. Living quarters are then erected around the parking structure. Precast often is selected for wrap projects to meet installation requirements and enhance construction efficiency on limited area construction sites.

In an effort to reduce construction and trade overlap, precast parking structures are available with a pretopped option. The high-quality concrete required for topping is installed in the plant concurrently with the floor member as one monolithic piece. This reduces topping required in the field, which reduces the weather's impact during topping placement and the detrimental effects of a poor cast-in-place job.

Precast framing components for wrap projects include double tees, beams, columns, spandrels, T-beams and wall panels. Structural and load-bearing exterior panels are designed as a structural load-bearing architectural envelope, reducing the need for additional framing members. The precast components used in wrap structures provide lateral restraint and gravity load support, while meeting fire separation code requirements between living units and parking.

As Colorado's housing market continues to proliferate, prefabricated precast products will continue to offer a viable solution to expedite the building process. Precast inherently provides efficiency, resiliency, versatility, durability and aesthetic advantages needed to meet structural and architectural requirements of this ever-growing market segment.▲