



TROLLEY SQUARE WHOLE FOODS STORE & PARKING STRUCTURE

CS
2

CASE STUDY



GROUNDING IN STRENGTH.

Forterra Structural & Specialty Products

Thin Brick Precast Walls Copy the Look of Century-Old Trolley Barns

Project Description

Preserving the look and feeling of an old town trolley station, designers of the new Whole Foods store and parking structure at Trolley Square in Salt Lake City, Utah, envisioned a building exterior that would complement the iconic architecture of the century-old brick trolley barns and support buildings. To achieve this look, the new building was constructed with brick-inlay precast panels from Forterra Structural & Specialty Products that were carefully crafted to match the hand-laid bricks used on the original structures.



Trolley Square is a mixed-use, specialty retail project in downtown Salt Lake City. Originally a trolley barn in the early 1900s, Trolley Square is now an upscale marketplace with more than 60 shops, restaurants, and entertainment venues situated in four historic buildings.

The property was first converted into a shopping mall in 1971. A food court was later added, followed by additional renovation work in the late 1990s. Blake Hunt Ventures purchased the property in 2006. A multi-phase reconstruction was begun by Okland Construction in 2008. This included seismic, mechanical and cosmetic upgrades of the main retail building; removal of an existing parking structure on the west side and replacement with a two-level below-grade garage topped by retail space; and removal and relocation of an historic Sand House building that stood on the site.

The new Whole Foods store occupies 44,000 square feet on the northeast corner of the property, with an additional 16,000 square feet set aside for small speciality retailers within the same structure. On top of the Whole Foods building is one covered level and one open level of parking.

Historic looking on the outside, the combination store and topside parking structure is highly engineered on the inside and utilized cutting edge construction materials and methods, according to Jim McGuire, sales manager for Forterra's Mountain Region.

Whole Foods required a building with an open floor plan measuring 163 feet by 300 feet and a minimum clear height of 22 feet. The original design called for cast-in-place framing.

Project Type:	Commercial
Location:	Salt Lake City, UT
Owner:	ScanlanKemperBard (SKB) Companies
Architect:	G2Mullvanny, Portland, OR
Structural Engineer:	kpff Consulting Engineers, Seattle, WA
General Contractor:	Okland Construction Co Inc., Salt Lake City, UT
Precaster:	Forterra Structural & Specialty Products, Mountain Region, Salt Lake City Facility
Precast Products:	Double-tees, columns, radius walls and flat wall panels

This was converted to precast construction with Forterra awarded the design and production of the precast components.

“Primary reason for the conversion,” says Roger Arnell, business developer for Forterra, “was our speed of erection. We were able to show that we could complete the building substantially faster than with conventional construction. There were some contractual problems that had delayed construction to a point that it made more sense and was more economical to convert to precast concrete. Okland Construction had been awarded the construction, so we approached them to make the conversion.”

Forterra components included in the project are prestressed double tees with spans of 60 feet, precast columns, radius wall panels and flat wall panels. In all, Forterra precast components include 169 wall panels with thin brick cast into the face of the walls, 228 double tees 63 columns and 78 beams. Typical wall panels measure 45 feet tall and 10 feet, 8 inches wide.

Creating a battered brick look

To fit the building in its historic context, designers selected a battered thin brick which could be cast into the outer face of specialized precast wall panels.

“The individual bricks were laid out on the formwork in a special plastic grid,” explains McGuire. “The grid held them in place at the proper spacing, and the plastic between each thin brick formed a concave grout joint when the panels were poured. Once cast, the panels were stripped out of the forms and the plastic sheet was removed. The bricks, which had been coated with a thin layer of wax for protection, were then hot-water washed to reveal the beautiful character of the brick facing and exposed concrete work.” Alternating scalloped arches were integrally cast into the precast with the brick. “This,” says McGuire, “put the Trolley Square signature on the architecture.”

In all, 210,000 pieces of thin brick were incorporated into the panels. Some of the panels were cast as radius walls to form the curvature of the building. After casting, the individual panels were shipped in construction order to the jobsite and stood up on footings.



Historic looking on the outside, the combination store and topside parking structure is highly engineered on the inside and utilized cutting edge construction materials and methods.

In addition to providing aesthetics, the thin brick-clad panels had to carry significant structural loads. Designers needed stout, load-bearing exterior walls as well as shear walls. Shear walls, located on the perimeter of the building, were sized once load paths were determined. The balance of the framing was then designed and the complex shear wall connections were finished.

The back-up mix for the concrete panels was a high strength 6,500 psi concrete and was heavily reinforced to do its job. In some locations, specially designed connectors were used to “stitch” together several wall panels to act as a single shear wall. The forces were very high and the loads were transferred into the footings with welded connections and grouted dowels. The stair and elevator towers were also designed as dual load bearing and shear walls.

Wet joints were cast onsite in such a way that they would not be exposed to the building exterior. Creative detailing allowed the exterior brick finish to remain intact while the wet joint connection was completed behind it.

Precast cuts construction time

The schedule was an extremely important element in the decision to use this specialized construction method. All the precast structural elements were manufactured off site under controlled conditions at Forterra’s Salt Lake City facility. This left the jobsite unencumbered until footings were poured. The precast system was erected many times faster than an equivalent system could be cast in place. The overall project schedule was again positively impacted by the teams’ decision to incorporate load-bearing, precast wall panels with thin brick as they were erected faster than typical on-site masonry construction.

“Forterra met the aggressive schedule and brought the project in on budget,” adds McGuire. “The skillful coordination provided by the general contractor’s superintendent and project manager allowed us to take advantage of the time-saving qualities of the precast members. The ability of precast concrete to be cast and erected in all kinds of weather aided the entire construction team.”

In this structure it was economical to take advantage of the inherent strength of precast shear walls and provide the masonry cladding element in the same load-bearing members. For the architect the most significant advantage of architectural precast concrete was its tremendous flexibility and unlimited design capabilities. The Whole Foods design was able to use a combination of exposed concrete surfaces with a seamless transition to the brick face. Color and detailing of the precast members successfully complement the adjacent historical structures. In this way precast provided a cost-effective method to realize the architectural vision.

The high level of expertise and craftsmanship, and state-of-the-art manufacturing facility available from Forterra Structural & Specialty Products, allowed the contractor and owner to take advantage of the precast concrete manufacturing process itself.

The right choice

Precast concrete also helped the team meet sustainability requirements. The durability, strength and inherent weather resistance of precast concrete represents a tremendous advantage over alternative construction methods.

The material stands up well in the harsh environmental conditions of Salt Lake City. Other sustainable features of the project include an on-site, storm-water management system, native plants that require less irrigation and additional scooter and bike parking.

According to McGuire, precast concrete construction reduced construction time of the main structure by 6 months. Additional time was saved with the use of the brick-inlaid precast architectural exterior versus on-site masonry construction. It's estimated that the use of precast concrete versus cast-in-place construction resulted in a cost savings of 15%.

