APA CASE STUDY

Going for Bold: Window into Affordability

Long Beach looks to an inclusive future with Las Ventanas development

To help address the local homelessness crisis, Long Beach, California, enacted the "Everyone Home Long Beach" plan—an initiative that encouraged innovative, low-income housing solutions for the community. This plan sparked the bold vision for the development of a modern, affordable housing complex dubbed Las Ventanas, which means "the windows," a fitting name for a project that provides new windows of opportunity to low-income residents looking for housing options.

With a modest $28 million budget, it was vital for the designers and contractors to provide creative and strategic planning and construction of the affordable housing complex. Three local companies brought their unique expertise to tackle the project: AMCAL General Contractors, of Agoura Hills; CORE Structure Inc., with locations in Laguna Hills and the Bay Area; and William Hezmalhalch Architects (WHA), with offices in Orange County, Los Angeles and the Bay Area. These firms came equipped with decades-long histories of providing creative and cost-efficient multifamily construction solutions.

The striking bright red, four-story apartment complex was designed by WHA and CORE Structure Inc., though AMCAL was involved during the early design stage and provided regular feedback to the design team.

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PROJECT SPOTLIGHT

Project Name: Las Ventanas

Location:
1795 Long Beach Boulevard,
Long Beach, California

Completed: Spring 2021

Type: Multi-family/Mixed Use

Size: 148,000 total square feet

Architect:
William Hezmalhalch Architects

Structural Engineer:
CORE Structure Inc.

Contractor:
AMCAL General Contractors

RENDERING COURTESY OF WILLIAM HEZMALHALCH ARCHITECTS

Las Ventanas received unanimous approval from the City of Long Beach Planning Commission in December of 2017. "It was vital that all the window openings remained true to the original design presented to the community, so determining shear wall locations and minimizing hold-downs was my primary coordination with CORE Structure," said Bernard Ines, Architect for WHA. "I remember reviewing the framing plans and was pleasantly surprised that no windows were jeopardized."

Set on just over an acre off the Pacific Coast Highway in Long Beach, directly adjacent to the Metro A Line (Blue), the complex features 102 residential units with an additional 3,962 square feet of retail space and a semi-subterranean podium parking garage. True to the name "Las Ventanas," the apartments will offer naturally lit, open floor plans with patios or balconies. On-site amenities include a children's play area, outdoor seating with grilling space, locked bicycle storage, computer lab, community room, media center and more. The project broke ground in July 2019 and is scheduled for completion in spring 2021.

Las Ventanas integrates traditional wood framing with engineered wood products from APA members Norbord, Tolko, Boise Cascade, Pacific Woodtech and Rosboro. Oriented strand board (OSB) and plywood continuous sheathing on the walls, floors and roof served as an integral part of the structure's lateral force-resisting system. Glued-laminated beams (glulam) and laminated veneer lumber (LVL) were used as headers, and LVL was used widely as rim joists throughout the structure.

LVL beams helped achieve an all-wood floor system within the allotted ceiling depth.

When a challenge arose with the plan, the designers found a cost-effective solution using engineered wood framing. Due to the sloped site, the top of the post-tensioned concrete podium was intentionally elevated at the retail spaces on the uphill side, so the floor on the third level includes areas of both concrete and wood construction. The wood shear walls above did not align with the concrete walls below, presenting a unique challenge. The design team's innovative solution to the alignment problem was specifying glulam and LVL floor beams to transfer the load from levels above and providing a seismic gap at the concrete/wood floor interface.

"The engineered wood beams allowed us to simplify the connection design while maintaining the ceiling height we needed," said Hooman Tavallali, Vice President of Production at CORE Structure. "Steel is also more expensive, so we were able to save them a lot of money."

Heavily loaded areas also incorporated glulam beams.

"The engineered wood beams allowed us to simplify the connection design while maintaining the ceiling height we needed."

— Hooman Tavallali,
Vice President of Production at CORE Structure

This decision kept the budget for Las Ventanas in bounds for reasons beyond material costs; choosing engineered wood over steel also improved construction efficiency. Using engineered wood products allowed the team to eliminate the need to hire additional laborers for the erection, fireproofing and inspection of steel.

"The elimination of steel beams was a big advantage with regard to both cost and construction time," said Dan Balistreri, Superintendent of AMCAL General Contractors. "The engineered wood products were easily used by the framer and inspected with the rest of the framing. The need for an extra trade to erect steel beams and columns was eliminated, which resulted in a faster and smoother construction process."

Glulam beams and headers helped simplify connections.

Force Transfer Around Openings

Wood structural panel sheathed shear walls are the primary lateral-load-resisting elements in wood-frame construction. As wood-frame construction is continuously evolving, designers in many parts of the U.S. are optimizing design solutions that require the understanding of force transfer between elements in the lateral load-resisting system. Engineers are facing design challenges as it is becoming more common for buildings to incorporate larger and more numerous door and window openings. The increased openings present a challenge for designers because they reduce the area available for lateral resistance throughout the structure.

The Force Transfer Around Opening (FTAO) method of shear wall analysis meets this challenge by providing more design flexibility, because it allows for narrower wall segments to be used to meet required height-to-width ratios. Traditional segmented shear wall design ignores any sheathing used above or below a window opening. When continuously sheathing a building, FTAO deflection equations account for the additional stiffness provided by wood structural panels below the openings, thereby reducing the calculated building drift. FTAO can also reduce the number of hold-downs required, reducing material costs.

APA Force Transfer Around Openings Technical Note and FTAO Calculator

APA Technical Note: Design for Force Transfer Around Openings presents a rational analysis for applying FTAO to walls with asymmetric piers and walls with multiple openings. It is based upon APA modeling and testing and uses methodology that assists the design professional in solving for the required sheathing, nailing, hold-downs, straps and maximum deflection.

The FTAO calculator is an Excel-based tool for professional designers that uses FTAO methodology to calculate maximum hold-down force for uplift resistance, the required horizontal strap force for the tension straps above and below openings, the maximum shear force to determine sheathing attachment and the maximum deflection of the wall system. The calculator includes worksheets for shear walls with one, two and three openings and a design example.

Get the technical note and calculator and learn more about FTAO at www.apawood.org/ftao.

Pictured: By adding horizontal strapping around the shear wall openings on the interior of Las Ventanas, the engineer was able to eliminate vertical strapping and hold-downs at either side of the openings while streamlining construction.

The window geometry of the walls at the inner courtyard above the concrete podium allowed the use of FTAO at most exterior walls.

Panelized walls were delivered to the jobsite, which further optimized construction time.

Working within the budget, the design team saw that they could take advantage of the continuously sheathed exterior walls by designing the shear walls for force transfer around openings (FTAO). With FTAO, the design team was able to reduce the number of hold-downs and material costs while maximizing window openings—an apt goal for a building named "Las Ventanas"—adding to the bold and budget-friendly design.

"We tried to make it as affordable as possible," said Tavallali. "We were able to reduce the number of hold-downs by 30–40%. We also used straps instead of the typical tie-down rods to transfer tension from floor to floor, which made labor and construction easier."

A clear vision and a strong plan saw the team through its challenges. AMCAL projects that it is on track to hit the $28 million budget, and Las Ventanas is scheduled to finish just in time for its scheduled open date in March 2021. "The project was pretty smooth," said Balistreri. "And it's on schedule as a result of extensive coordination prior to the start of construction."

The team's vision combined strategic design, creative construction techniques and cost-effective engineered wood products to create a space that opens up new vistas for low-income Long Beach residents and local businesses alike.

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