Stanley D. Lindsey and Associates Uses Bentley Software to Modify Design Prototype for 17 Locations

Bentley's Structural Design Software Helps Stanley D. Lindsey and Associates Decrease Construction Time for Each Building by 12 Weeks

Project Summary

Organization:
Stanley D. Lindsey and Associates, Ltd.

Solution:
Structures

Location:
Multiple locations in the United States

Project Objective:
- Provide profitable, economical housing and retail space with reduced development, design, and construction costs by using a standardized building design at multiple locations.

Products used:
RAM Structural System
RAM Concept

Fast Facts

- Stanley D. Lindsey and Associates (SDL) has performed structural design and analysis for 17 apartment buildings that are completed, in design, or under construction.

- Bentley's integrated structural design software, RAM Structural System and RAM Concept, enables SDL to quickly modify the foundation system, check for conformance to code, and analyze for site-specific loads.

- Lowered project costs resulting from using the same design in multiple locations allows the developers to offer affordable housing to the communities.

ROI

- RAM Structural System allowed the project team to standardize the design and then make minor modifications to the prototype at each location, reducing costs and time savings in development and construction

- The efficient use of a standardized building design for SkyHouse Apartments results in 12 weeks less building time per project, and 25 percent lower construction costs than comparable projects.

Designing with a Prototype

SkyHouse Apartments were created by Novare Group and Batson-Cook Development to provide luxury housing at affordable prices. The developers are building the USD 45-75 million apartment complexes throughout the United States, including projects in 17 locations in 10 cities. The prototypical design is a 23-25 story, 320- to 354-unit complex with street-level retail space. The development group tasked Stanley D. Lindsey and Associates (SDL), a full-service structural engineering firm, to modify the design for each location based on local building codes and site conditions.

The ability to reuse the 3D model for multiple locations helps to roll out projects within tight deadlines. Bentley's RAM® Structural System and RAM Concept software ensure a safe, efficient, and functional design by allowing SDL to make changes quickly and provide updated designs to the developers, architect, and contractor. This approach saves an estimated 12 weeks of construction time per building and lowers construction costs by approximately 25 percent relative to comparable projects.

Adapting to Site Conditions

The goal for the developers of the high-rise apartment complexes is to keep design and construction costs low by

Stanley D. Lindsey and Associates reuse a 3D design model for multiple locations throughout the U.S., saving construction time and costs.

using a standardized building design created by the architect, Smallwood, Reynolds, Stewart, and Stewart. Therefore, despite changes dictated by the local conditions for each site, SDL preserves the architectural design and layout of the SkyHouse Apartments prototype.

SDL provides structural analysis and design modifications to accommodate three distinct challenges. First, the foundation systems must be modified to accommodate differing soil conditions at each site. Second, the designs have to comply with building codes that differ from location to location. Third, varying environmental loads such as wind and seismic forces require structural analysis and design adjustments.

Using RAM to Make Rapid Changes

SDL uses Bentley's RAM Structural System (RAM Steel®, RAM Frame®, RAM Concrete, RAM Foundation), and RAM Concept to model, design, and analyze the entire structure for construction at each site. Bentley's structural design software enables SDL to address the specific issues that arise in each location.

To modify the foundation systems, SDL uses RAM Foundation to design spread footings and isolated pile caps, and RAM Concept to design the mat foundations. RAM Frame and RAM Concrete are used to analyze some of the drilled pier conditions. RAM Structural System Suite and RAM Concept incorporate the new codes as they are adopted, allowing the project team to easily access the effects of changes in the codes. RAM Frame enables the project team to calculate the wind and seismic loads, modify affected parameters, and analyze the structure to meet the local code requirements.

Optimizing Materials

The ability to reuse the 3D model at each new location allows SDL to model, analyze, and design the structure in less time, which helps the team to rollout multiple projects within tight deadlines. Updated designs are delivered to the developers, architect, and contractor much more quickly than if original designs had to be produced for each project.

SDL also uses RAM to optimize the designs for efficient use of materials while maintaining a safe and functional design.

For example, the mostly cast-in-place concrete structure incorporates a 7-inch, two-way post-tensioned concrete slab, concrete shear walls, and foundations (spread footings, drilled piers, rock bearings) that are a function of geotechnical conditions at each site. Reducing the slab thicknesses has resulted in the use of 7 percent less concrete per building. These types of savings contribute to construction costs that are approximately 25 percent lower than for comparable projects.

Prototypical Savings

The SkyHouse Apartments design demonstrates a scalable approach to housing that requires a one-time investment in full architectural design, engineering, and construction planning services. Once the building design is standardized, then minor modifications are made to the prototype as necessary. This technique allows each building to be designed and detailed at a fraction of the cost, compared to creating new designs for each project. The developers realize cost savings in design, as well as time savings in site development and construction.

Using the same team of contractors also saves time spent on startup and troubleshooting at each location. In addition to the architects and structural engineers, the SkyHouse Apartments project team includes Jordan & Skala Engineers, and General Contractor Batson-Cook Construction. Issues are resolved more quickly based on lessons learned at previous locations. The cumulative knowledge about how to construct the building design also helps to reduce the risks and problems at each subsequent site. Overall, this collaborative approach shortens the construction schedule for each building by about 12 weeks.

The prototypical design is a 23-25 story complex with retail space, providing the community with luxury housing at affordable prices.

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