VIP Treatment

BY DAVE ROWE, SE

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THE UNIVERSITY OF NEVADA LAS VEGAS' William F. Harrah College of Hospitality is consistently ranked among the top five hospitality programs in the world—rather fitting for its location mere blocks from the famed Las Vegas Strip.

And now its 2,300 students have a brand new, state-of-the-art home. The four-story, 93,500-sq.-ft steel-framed architectural showpiece, located at the heart of UNLV's campus, houses classrooms, meeting and office spaces, a PGA golf management learning center, a student café and a high-tech kitchen. Open-air balconies shaded by cantilevered roof and floor elements appear to float in the air and provide sweeping views of the city. A natural wood-clad grand staircase leads upward from the sunlit first-floor lobby, creating an environment akin to the high-end hotels and casinos where the students hope to one day work.

To fit the desired architectural program and interior configuration, a structural system comprised of composite roof and floor decks on a frame of ASTM A992 50-ksi steel beams and columns was selected (the project uses 740 tons of structural steel in

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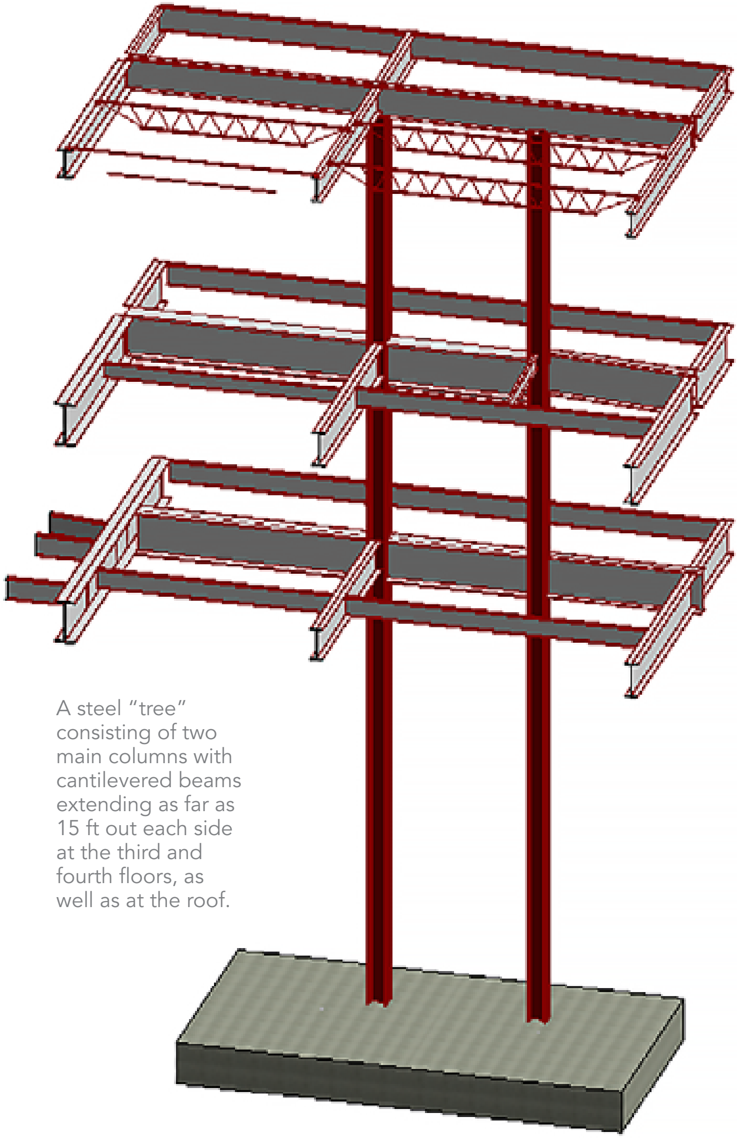
Steel framing plays the gracious host at UNLV's new hospitality school in the entertainment capital of the world.

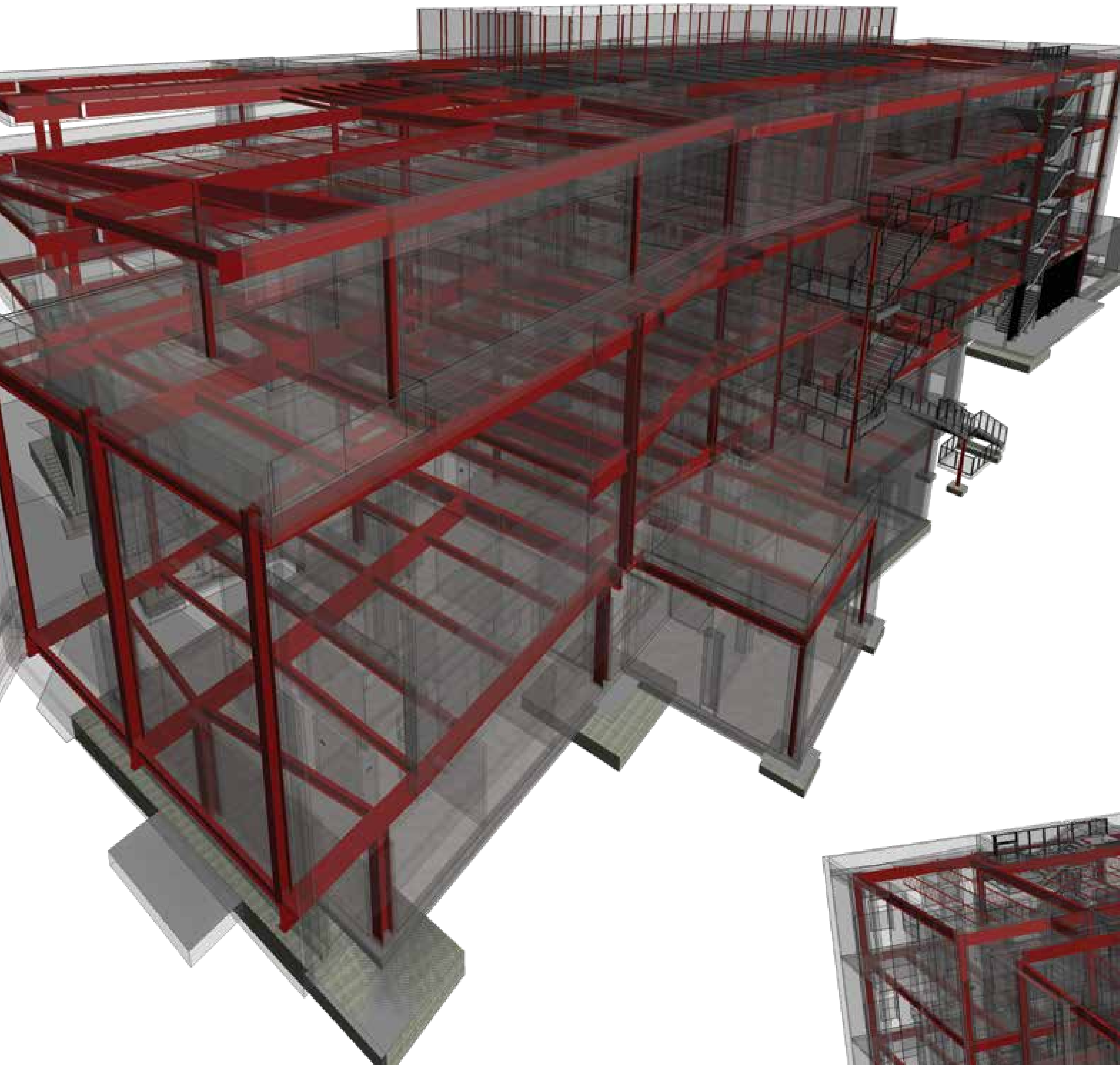


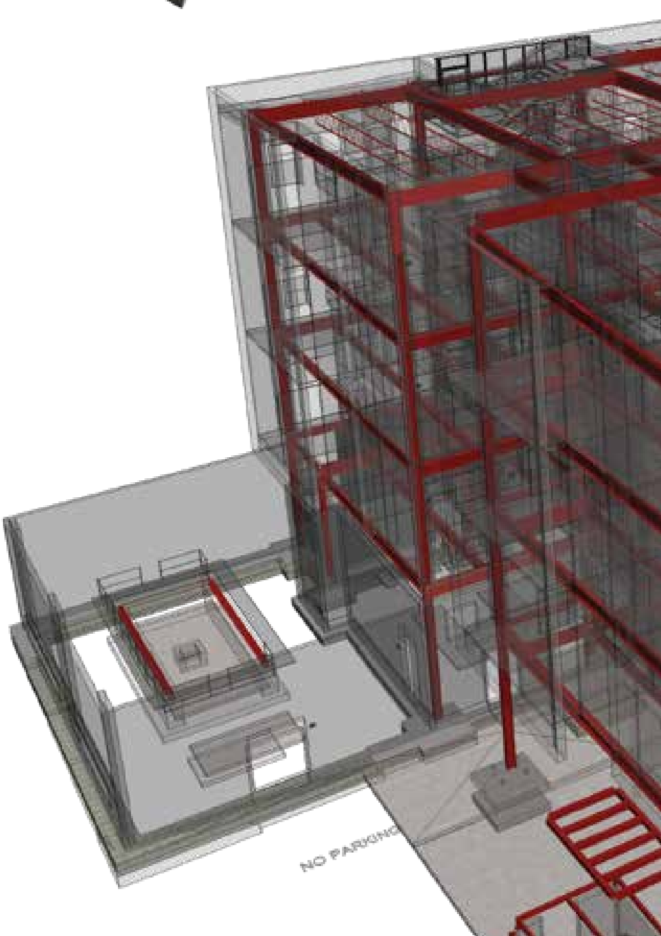
A steel "tree" consisting of two main columns with cantilevered beams extending as far as 15 ft out each side at the third and fourth floors, as well as at the roof.

all). In order to accommodate architecturally important column placements, columns supporting offset cantilevered roof beams bear atop floor beams, which in turn are supported by girders or columns bearing on other cantilevered beams. Because of these discontinuous load paths, structural engineer Wright Engineers put special emphasis in the design and model on addressing the effects of the cumulative deflection of all the supporting elements below in. At the second-level auditorium, for example, two-story-high columns support the fourth floor and roof. These columns then bear at the cantilevered ends of the major floor beams that comprise the sloping floor of the two-level space.

The two-story glass exterior wall at the entry atrium area is hung from the third-floor framing, with no exterior columns at the perimeter of the space. To accomplish this, the third and fourth floors above cantilever out over the main lobby area and are supported by a steel "tree"—two main columns with cantilevered beams extending as much as 15 ft out each side at the third and fourth floors, as well as the roof. One side of the tree supports a clear span of 70 ft at each of the upper levels to ensure the atrium remained aesthetically open and free of columns. Due to the non-symmetrical cantilevers of the tree, erection and sequencing of the steel frame and steel deck was monitored and corrective measures were taken as required to ensure deflections and movement were appropriate for continued serviceability.

While delegated connection design is common for projects in Las Vegas, the complexity of this project led to Wright Engineers performing the work themselves. These scopes included the steel connection and steel stair design, and a variety of unique connec-

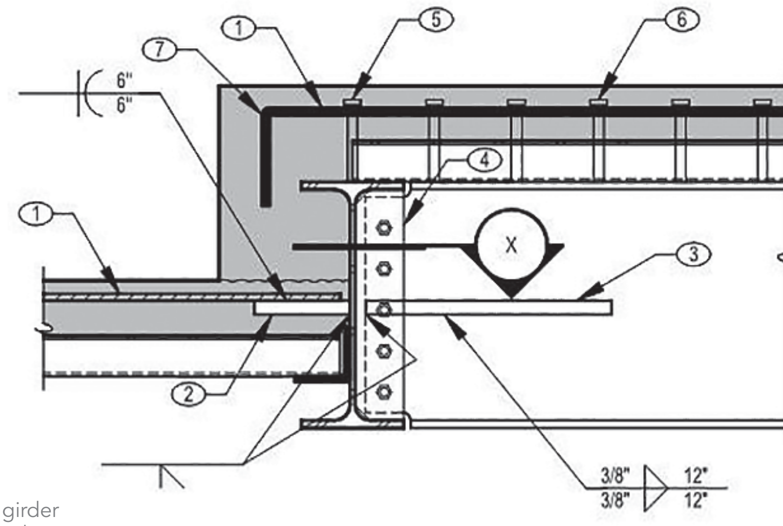


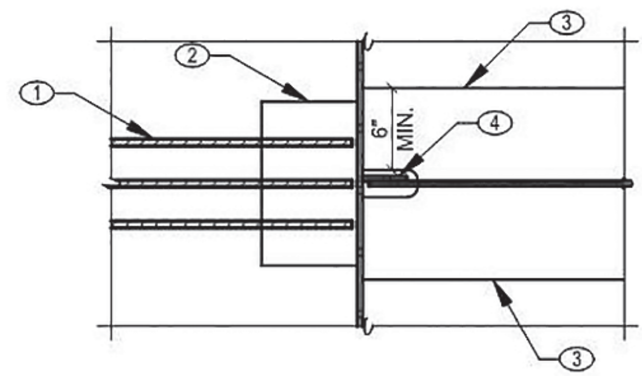


The structural system is comprised of composite roof and floor decks on a frame of ASTM A992 50-ksi steel beams and columns.

tion designs were used to meet the architectural intent. Many were standard shear plate bolted connections, but the supported columns and associated large reactions at the transfer beams required the transfer beams to bear on a column seat. The connection points for the suspended glass wall at the atrium also required significant coordination as well as field adjustments to ensure proper fitting of the glass wall. Because of the complexity of the structure and the unique connections involved, performing the connection and stair design in-house simplified the design process as well as shop drawing development and review time.

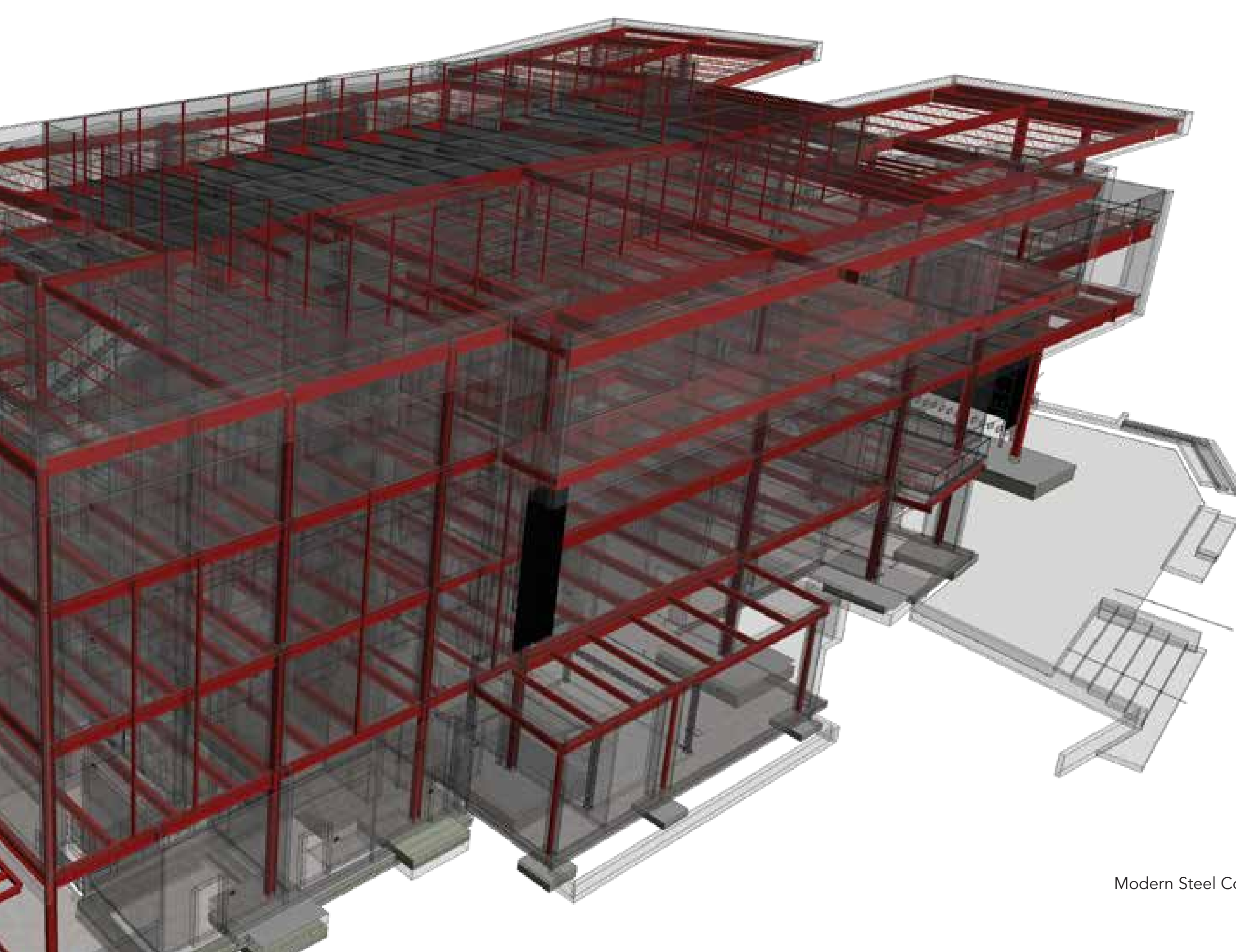
The floors at the exterior balconies at the third and fourth levels are covered with concrete pavers over an elevated pedestal system. This pedestal system allows for the exterior finish floor to match the interior finish floor without the need to slope the finished floor surface for drainage. This required a 17-in. vertical offset between interior and exterior structural floor levels and necessitated the use of unique drag and chord details at the steps in the diaphragm. Drag and chord forces





Details of girder beams at columns.

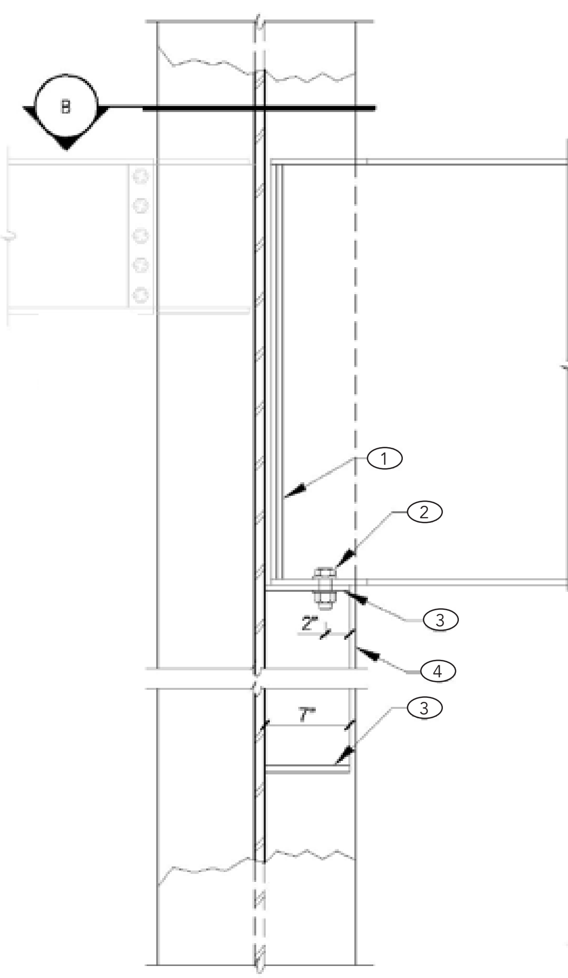
1. Drag bars per plan.
2. 1-in. x 12 x 7 plate.
3. 1-in. x 7 x 18 plate cope at bolt interference.
4. Connection per typical shear plate connection schedule.
5. Studs per plan.
6. ¾-in.-diameter x 6-in. studs at 6 in. o.c., full length of beam.
7. Provide standard hook at end of drag bars.

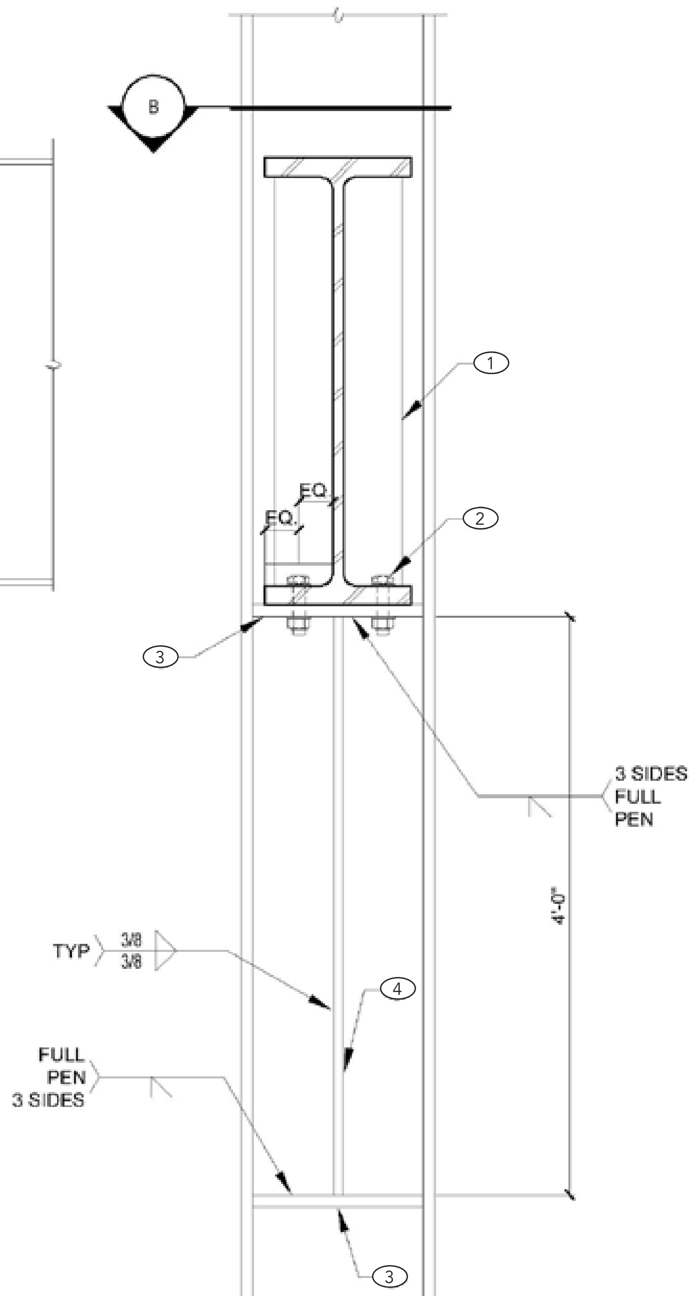


The four-story, 93,500-sq.-ft steel-framed project, under construction.

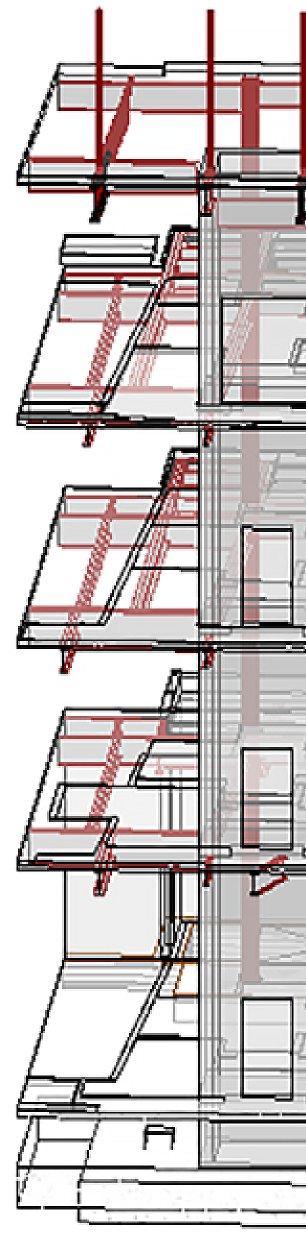
in the lower-level diaphragm are transferred through this step into the upper-level diaphragm by anchoring reinforcing in the lower-level slab to structural steel beams that support the upper-level and then transferring the load from the steel beams through welded studs to the upper-level slab. In addition, the second and fourth floors have large, irregular openings. Because of these openings, the two wings on the west side, and the overall irregular shape of the floor diaphragm, chord and drag reinforcing was carefully dimensioned and detailed on the plans to ensure proper fit within the confined space.

These irregular shapes necessitated using a semi-rigid definition of the diaphragms in the modeling software. The model showed that torsion was a concern due to the large triple elevator core at the





Details of girder beams at columns.
1. ¾-in. stiffener plate each side.
2. (2) 1-in.-diameter A325 bolts.
3. 1-in. plate top and bottom.
4. ¾-in. plate.



west side of the building and the small single elevator core at the east side. Based on ASCE 7 requirements, the structure had an extreme torsional irregularity, resulting in the torsional forces needing to be increased with a torsional amplification factor per ASCE 7. The semi-rigid diaphragm also allowed the diaphragm deflection and story drift limits to be accurately modeled and kept within code limits.

Because of the complicated framing and discontinuous load paths necessary to accomplish the architectural vision for the building, structural steel framing proved to be the ideal structural solution, both in terms of flexibility to accommodate design conditions and construction cost. The result is a landmark building on UNLV campus that is worthy of the world-class program it houses.

Owner
The University of Nevada Las Vegas

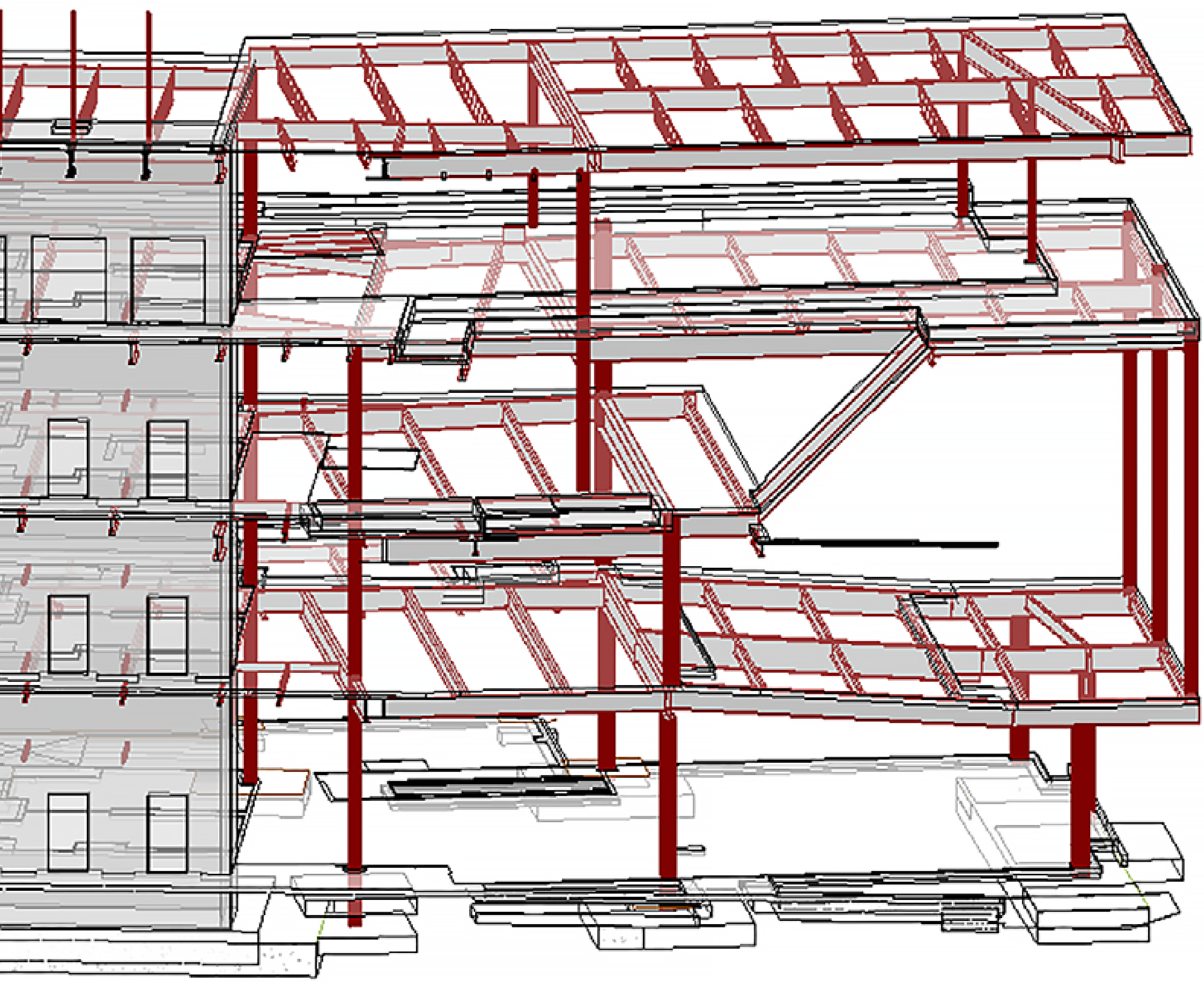
General Contractor
McCarthy Building Companies, Las Vegas

Architect
Carpenter Sellers Del Gatto Architects, Las Vegas

Structural Engineer
Wright Engineers, Las Vegas

Specialty Foundation Contractor
Berkel & Company Contractors

Steel Fabricator
Beck Steel, Lubbock, Texas



The project uses 740 tons of structural steel in all.