Village Life

BY CRAIG CARROLL, P.E.

Shaw Construction

Colorado's Vail Village gets a new addition that blends in with its old-world style.

ANYONE THAT HAS BEEN TO VAIL, COLO. has likely noticed the charming, Bavarian look of the main Vail Village. However, until recently one particular section of the village clashed with the rest. The Lionshead portion of the village, built more than three decades ago, had no clear architectural vision. Its buildings generally emulated the "mod" look of the early 1970s, which most people would put in the same category as satin shirts and disco music.

To bring Lionshead into step with the the rest of Vail Village, Denver-based 4240 Architecture developed a new look for the dated development, relying on trips to Prague, Czech Republic and Salzburg, Austria to come up with a European-style structure that looks like it has evolved over a period of centuries. This design feature created a unique challenge of customization in that no two building elevations are the same; there are roughly 33 exterior façade elements using cast and cut stone, stucco, ornamental railings, and wood trim.

The new structure, called Arrabelle at Vail Square, replaces the demolished Lionshead core and incorporates two levels of below-grade parking, a five-star hotel with an entry porte cochere, a world-class spa and rooftop swimming pool, a ballroom, restaurants, retail shopping, a plaza with an ice rink, and an 85-ft pedestrian bridge connecting the east and west areas.

Multiple Elevations

The site is surrounded by existing structures on three sides and the Vail Ski Resort on the fourth side. The sloping site and integration with existing streets and ski facilities created more than 25 different floor elevations in a nine-story structure; the plaza level alone has nine different floor elevations.

Structural steel was chosen as the framing system for the superstructure, due in part to its flexibility in dealing with multiple architectural requirements such as structure weight, minimal column sizes, and several column transfers. The typical floor-to-floor distance of 11 ft 4 in. was very tight for typical composite construction, but it allowed the required number of floors to be achieved while keeping within the strict building height requirements for Vail. Structural steel was also the only viable option for roof framing with complicated geometric shapes and angles and fully vaulted ceilings that would allow an optimal view of the surrounding mountains; it was also used to support the exterior stone in the many arched locations throughout the plaza.

Making it Work

It didn't take long for structural engineering firm Monroe and Newell Engineers to realize that the lower level steel transfer beams were going to exceed the maximum sizes rolled in the United States at the time. However, staying committed to domestic steel was achieved by using U.S.-supplied steel beams and reinforcing them as necessary with steel plating. At many locations the largest size of W40×431 was used with top and bottom cover plating added to achieve the desired structural strength—e.g., the

4240 Architecture

An 85-ft pedestrian bridge connects the east and west areas of the Arrabelle development. The entire project had more than 500 steel beam penetrations.

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The completed pedestrian bridge, ready for skiers.

large-clear span ballroom required a double steel transfer beam with plating to keep the depths acceptable.

Where the largest rolled plated sections were insufficient Monroe and Newell used 60-in. built -up steel plate girders. These were used above the loading dock where column spacing is quite large to accommodate semi-truck maneuvering. The low floor-to-floor depth of the level above the loading dock required the plate girders be located at the plaza level, and the floor located between the loading dock and plaza level was then hung from the plate girders. This unusual construction technique required shoring of one level while the level above was completed. The towers are connected by an 85-ft clear span pedestrian bridge using trusses created from large steel rods and clevises with the bearing end conditions detailed to allow horizontal movement. The plaza level incorporates the loading of an ice rink and two elevators serving the plaza through the seventh level.

Keeping the Customer Satisfied

High ceilings were critical to the marketability of the residential units, each valued at over $2,000 per sq. ft. Steel beam depths were carefully selected and coordinated with the mechanical and lighting requirements of each unit. Additionally, the location of each exterior wall penetration was carefully located for aesthetic purposes. As a result of these factors and the tight floor-to-floor layout, the project had more than 500 steel beam penetrations, many of which required extensive reinforcing. Each of the residential units was unique in floor layout, requiring column locations to vary from floor to floor.

The plaza level required a unique column layout to allow for fully functional retail space, restaurants, a top-level spa, and a hotel lobby. However, the plaza level column layout conflicted with the parking layout on the garage levels and a 2,500-sq.-ft column-free ballroom below. This proved not to be an issue, as the steel framing for the structure consists of more than 3,000 column transfer beams, resulting in no columns running from the roof directly to the foundation.

Monroe and Newell used RAM Steel to model the entire steel building frame. The model was divided to reduce the size of each part and to allow multiple users access to the steel model at the same time. While the steel detailing for the project was performed by Acuña Y Asociados S.A.—in Santiago Chile—the long-distance communication was handled by e-mail and a quick RFI turnaround process, along with the drawings being digitally transferred and locally plotted (several visits to Chile by Monroe and Newell also helped the process). The steel for the project consisted of more than 3,500 tons and 12,000 pieces. The hotel opened in time for Christmas 2007. MSC

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Steel Detailer
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