

# Winning Big

BY GREG MITTENDORF

Taking a BIM approach,  
a recent expansion to a Michigan casino ended up not being a gamble.



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**THE DRIVE ALONG** the busy I-94 expressway between Detroit and Chicago is about four hours but can sometimes seem even longer. FireKeepers Casino Hotel in Battle Creek, Mich., about halfway between the two cities, hopes to serve as a brief stopping point along the way—and maybe more.

Thanks to a recent expansion, the owners are banking on the idea that the casino will attract visitors from outside of the immediate area by upgrading from a locally focused casino to a true destination resort. The addition includes a 242-room hotel, a bingo hall, a warehouse and more than 20,000 sq. ft of flexible event space. It transforms the casino into an instant landmark along the I-94 expressway; the 50-ft-tall sign with 86,000 lights is hard to miss.

## **BIM, Inside and Out**

The steel-framed expansion was fabricated by Douglas Steel Fabricating Corporation in Lansing, Mich. Douglas hired Nucor Vulcraft Group to model, manufacture and deliver the open-web steel joists and metal decking for the project. A building information modeling (BIM) approach was used to ensure that all joists and deck were manufactured to fit precisely, which minimized change orders upon



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▲ FireKeepers Casino Hotel, as seen from the front...

delivery. Vulcraft supplied its model to Douglas Steel to incorporate into their own model, which included all the details required by the HVAC contractor to ensure the ductwork could be precisely prefabricated and routed with no interference. This clash-detection aspect of BIM also helped the team avoid a potential field issue between the joist bridging and structural hangers supports for the movable room partitions in the event center. Given the potential difficulty to manufacture these elements, incorporating an accurate model into the process was crucial and ended up saving valuable time and more than \$60,000.

On the exterior, the expansion added an instantly recognizable structure, also using Vulcraft deck: the “bird’s beak” entry. Guests are welcomed into the casino via this steel porte cochere constructed of curved members, all



John Gilroy Photography

▲ ...from the air...

▼ ...and via a SDS/2 model.





Douglas Steel



◀ The "bird's beak," under construction (top) and completed (bottom).



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modeled in SDS/2 so that the structure could first be built virtually before being built physically.

The bird's beak is fabricated from HSS20×12×½ rolled to a 116-ft, 5-in. radius on the perimeter, with HSS16×8×½ rolled to a 99-ft, 9-in. radius for the top chord and a 99-ft, 2-in. radius for the bottom chord of the center truss. The center truss is tied with intermediate trusses to the perimeter HSS members. The intermediate trusses are fabricated from HSS8×4×¼ top chords and HSS4×4×¼ bottom chords with HSS round members in the webs.

While the hotel portion was framed with concrete, the screen wall is structural steel that serves as a decorative sign rolled to a 2,210-ft, 6.5-in. radius, complementing the style of the entire structure. The exhibit hall was framed with HSS columns and wide-flange beams with the long-span joists completing the roof framing.

The total weight for the expansion's steel package—including joists, deck and bridging—was more than 400 tons. Long-span joists—there were 55 spanning 120 ft long and ranging in depth from 88 in. to 120 in.—were used for the event center, which will be used for concerts and entertainment as well as other large gatherings. These long-span joists were shipped to the site in two pieces and spliced in



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- ▶ Curved HSS and Vulcraft decking frame the bird's beak.

the field prior to erection. The expansion opened this past December.

As designers look to add distinctive components to their projects—which will likely include special profile joists and girders, if not “bird’s beak” structures—as with the FireKeepers expansion, BIM will become an increasingly valuable tool.

“An added benefit of BIM is being able to see the layers of construction, making a daunting expansion simpler to visualize,” said Lawrence Kruth, vice president of engineering, technology and safety of Douglas Steel and chair of the AISC Safety Committee. “Not only was the Vulcraft team able to help us take the owner’s vision and bring it to life, but we also saved time and money.”

MSC

#### Owner

FireKeepers Casino Hotel, Battle Creek, Mich.

#### Construction Manager

Clark Construction Company, Lansing, Mich.

#### Architect

Thalden Boyd Emery Architects, St. Louis

#### Structural Engineer

KJWW Engineering Consultants, St. Louis

#### Steel Team

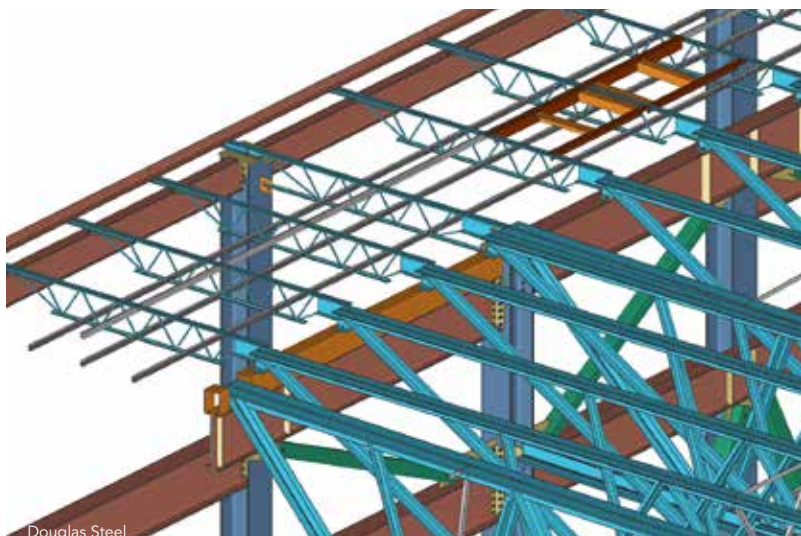
##### Fabricator, Erector and Detailer

Douglas Steel Fabricating Corporation, Lansing, Mich.  
(AISC Member/AISC Certified Fabricator and Erector)



Douglas Steel

- ▼ The clash-detection aspect of BIM helped the team avoid a potential field issue between the joist bridging and structural hangers supports for in the event center.



Douglas Steel