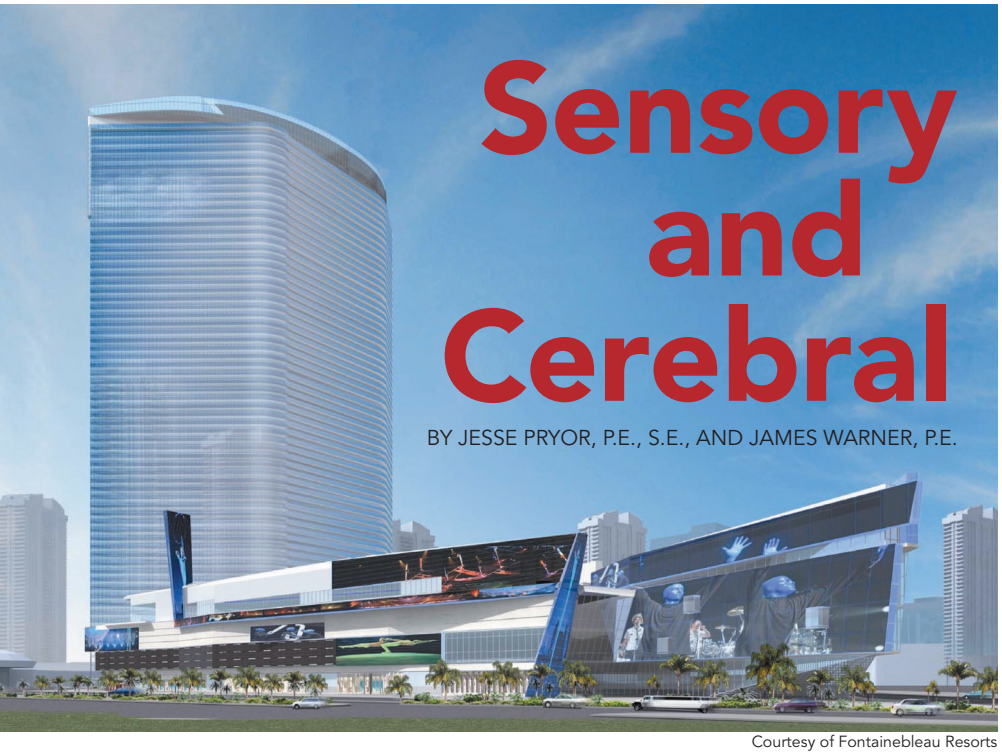
James Warner

# Sensory and Cerebral

BY JESSE PRYOR, P.E., S.E., AND JAMES WARNER, P.E.



Courtesy of Fontainebleau Resorts

**A quick look at two innovative Las Vegas projects with two very different goals—from a detailer's perspective.**

**LAS VEGAS IS WIDELY REGARDED AS A PLAYGROUND FOR VACATIONERS AND THE WEALTHY, NOT TO MENTION EVERYONE INVOLVED WITH THE FOOD AND ENTERTAINMENT INDUSTRY.** But what might not be as readily apparent is that it's also serving as a playground for architects and engineers.

Things are possible on a grander scale, and with seemingly limitless budgets, here. Architects can design structures of enormous scale in an atmosphere of "pushing boundaries," giving structural engineers and the rest of the steel industry the opportunity to put together massive, complex framing systems that aren't as likely to come to fruition elsewhere.

It's been an exciting city to do work in for Connected Structural Group (CSG), a small detailing firm that also happens to be run by structural engineers (and therefore, also provides full-service structural engineering work). The company's rare mix of employees and experience allows it to communicate and adjust to project changes in a manner that is unique among detailing firms.

## Hi-Tech Luxury

One of CSG's recent Las Vegas projects is Fontainebleau, a 63-story, 3,800-room luxury resort designed by John A. Martin and Associates. Scheduled to open next fall, the modern, curvilinear design is a 21st-century take on the original Fontainebleau Hotel in Miami, which opened more than a half-century ago. This new version will include an iMac in every guestroom, a 60,000-sq-ft luxury spa, and a 3,200-seat theater. CSG provided the entire podium steel model and fully detailed approximately 20% of the podium.

The project uses 70,000 tons of structural steel. Its enormous rooftop pool, along with the seismic criteria for Las Vegas, dictated column designs weighing more than 1,300 plf, plate girders approaching 900 plf, and built-up braces at 230 plf. The lateral design elements were a mixture of concrete shear walls, reduced-beam-section moment frames, and concentrically and eccentrically braced frames. The podium area consists of more than 15,000 main members; an additional 15,000 members are used throughout the rest of the project.

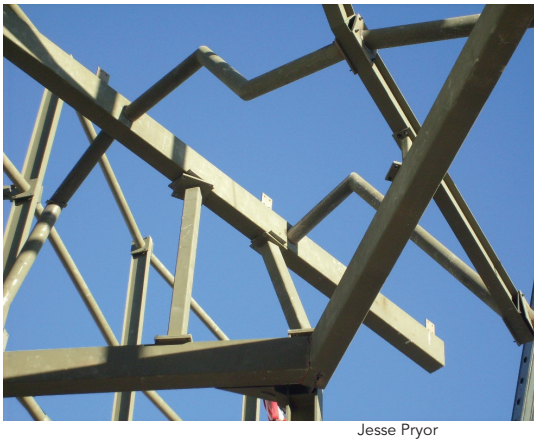
The entire podium was modeled using Design Data's SDS/2 software, which was also used for ordering steel, sequencing, and detailing the podium. Due to the sheer size of the steel model, it was separated and detailed into specific areas and worked on by multiple detailers.

Jesse Pryor

**Left (top and bottom):** Fontainebleau will use 70,000 tons of structural steel—and will feature an iMac in every guest room.

**Center:** CSG provided field connection and erection views to assist in putting together the steel framing system for the Lou Ruvo Brain Institute.

**Below:** In typical Gehry fasion, the visually striking elements of the Lou Ruvo Brain Institute were supported by complex steelwork.



Jesse Pryor

## A More Cerebral Approach

While Fontainebleau continues the Vegas trend of sensory stimulation, another project detailed (this one entirely) by CSG focuses more directly on the mind. Located in an undeveloped parcel of land adjacent to downtown Las Vegas, the Lou Ruvo Brain Institute, designed by Frank Gehry, will become a national center for the most current research on the treatment of Alzheimer's, Parkinson's, and Huntington's diseases. (The Institute is just one of several projects planned for the area, called Union Park.)

This project, which is scheduled to open at the end of this year, consists of a four-story, 400-ton structural steel building with a very complex exterior trellis protruding from the front. The intricate structure contains radiused pipes, building columns stepping in at every level, and complicated exterior edge plates, which combine to create the unusual geometry typical of most Gehry projects.

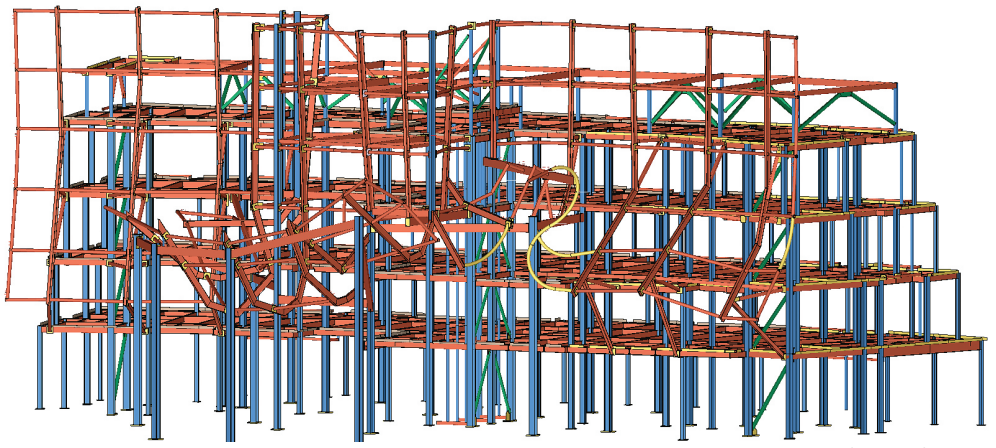
CSG worked closely with Gehry Partners from the start to obtain the most accurate building model possible. The original layout of the building was exported out of Gehry's CATIA software into a format that could be imported by Design Data's SDS/2 software, providing CSG with a preliminary layout for the structure. This was completed for the primary building first, then later with the complicated trellis. All connections were completed and modeled by CSG, and upon submittal of shop drawings a 3D DXF file was sent to the engineer and architect to overlay with the CATIA model to identify any clashes. In addition, the engineer and the contractor on the project were able to use an SDS/2 Global Review Station, allowing them to review the model and make comments. This aided the engineer in checking the approval drawings, especially in the trellis where the geometry was difficult to describe on 2D drawings. It was also helpful in terms of field questions, as the general contractor could open the model and see what the connections and members were supposed to look like.

After the initial building was complete, CSG incorporated the trellis takeover points—the locations where the curtain wall system is to attach to the primary trellis structure. The takeover points included several framing types given by the engineer:

- Holes drilled into the primary trellis structure
- Shear tabs welded onto the trellis
- Tubes projecting from the primary structure, with end plates containing four holes.

CSG imported the locations where the holes were supposed to occur from the architect, and either added plates and tubes as required to the trellis steel or punched holes directly into the trellis members. Once this was completed, the team exported the trellis model as a 3D DXF file so the architects could verify that all of the takeover points were in the correct location, and were notified of any discrepancies.

With all of the complex framing conditions, the fabrication of this project was, not surprisingly, difficult and time-consuming. The most difficult items were the pipes on the trellis. The pipes were sloped, coming in at angles to each other,



Connected Structural Group

A structural model of the Lou Ruvo Brain Institute.

cutting on different planes on each side of a member, and even radiused in some locations. Using its detailing software, CSG was able to produce unfolded templates for many of these pieces, which were printed out to scale by the fabricator and wrapped around the pipes to ensure they would be cut on the correct plan. In addition to the complexity of shop fabrication, field erection was another major hurdle. CSG provided a number of field connection and erection views to assist field personnel in putting together the steel framing system. MSC

*Jesse Pryor and James Warner are both principals with Connected Structural Group. Jesse Pryor provided detailing work on the Lou Ruvo Brain Institute, while James Warner provided engineering and detailing work on Fontainebleau.*

## Fontainebleau

**Architects**
Bergman Walls and Associates, Las Vegas
Carlos Zapata Studio, New York
Steelman Partners, Las Vegas

**Structural Engineer**
John A. Martin and Associates, Las Vegas
Lochsa Engineering, Las Vegas

**Steel Fabricator**
W & W Steel/AFCO Steel, Oklahoma City (AISC Member)

**Steel Detailers**
Connected Structural Group, Las Vegas (AISC Member)
W & W Steel, LLC, Oklahoma City (AISC Member)

**Steel Erector**
Derr and Gruenewald Construction, Henderson, Colo. (AISC Member)

## Lou Ruvo Brain Institute

**Architect**
Gehry Partners, Santa Monica, Calif.

**Structural Engineer**
WSP Cantor Seinuk, Los Angeles

**Steel Detailer**
Connected Structural Group, Las Vegas (AISC Member)