

**Cleveland Clinic Lou Ruvo Center for Brain Health: a construction journey of 3 years, 3 months, and 13 days with architect Frank Gehry**

“Walking into this building took my breath away. I can’t remember the last time that happened... somewhere over the rainbow.” —Frank Gehry during his March 17, 2010 visit as the building neared completion

“What does the building mean? It symbolizes hope.” —Frank Gehry

“A unique building creates a sense of pride. People are happy to go to work. It’s engaging, not just blah blah blah. And, if done right, the building is a good neighbor and contributes to the city. People still get on a plane to go see the Parthenon, Chartres Cathedral, the Sydney Opera House. If you deliver that, most of the world is interested because the rest of the world is bland. Also, it creates value because the rest of the city’s economy is stimulated.” —Frank Gehry

**In the project plan for the Lou Ruvo Center for Brain Health, Gehry Partners wrote:**

The research facilities, clinical facilities, and offices are located within a four-story block that has been articulated as a series of offset rectangular shapes in white plaster and glass. While not in the immediate view of the project from the corner of the site, this is the actual front of the building serving as employee, patient and public entrance.

The more public building uses are detached from the medical facilities across a dramatic covered trellis courtyard near the corner of the site. These program functions are entered via an exterior breezeway through the medical office building. The Keep Memory Alive Event Center is contained within an expressive metal and glass form that is articulated as a curvilinear metal façade and roof with punched-window/skylight openings. Public functions held in the Event Center serve to generate revenue for Keep Memory Alive, Cleveland Clinic Lou Ruvo Center for Brain Health and the campus medical mission as a whole. The Event Center is flanked by the simple blocks of the kitchen and community space, which are ancillary functions of the Event Center.

**By the numbers: Keep Memory Alive Event Center**

- 145,000 shop drawing sheets guided the fabrication of the steel
- 65,000 hours of engineering
- 30,000 steel bolts
- 18,000 stainless steel shingles, each cut to unique measurements
- 875.5 total tons of steel
- 544 individual fabricated steel elements, each weighing 2,000 -10,000 pounds
- 199 windows, none of which are alike
- 2.2 acre lot size

- 61,000 total square feet of interior space in the entire complex: 39,400 in the medical facility; 21,600 non-medical
- 4,000 square feet of community programming space
- 9,800 square foot Event Center with capacity for 325 seated; 700 standing
- 3,000 square foot Wolfgang Puck-designed kitchen with equipment donated by Culinary Design & Fixture
- \$2,100 per square foot for the construction of the Event Center
- 90 foot lift needed to clean the windows on the interior of the Event Center
- 75 foot high ceiling. 15 feet is the height to which the interior of the Event Center is climatized
- 60 foot lift needed to change the light bulbs in the Event Center
- 30 lifts were used simultaneously during the busiest moments of construction
- \$80 million cost of construction
- 2 continents, 1 body of water and 1 desert: distance covered during transportation by building's components, which were fabricated in China and shipped to Las Vegas
- 3 years, 3 months and 13 days: length of time from groundbreaking (February 9, 2007) through official opening day (May 1, 2010)
- 0 major injuries during construction
- 0 traditional ceiling-mounted smoke detectors in the Event Center. Rather, infrared beams have been installed on the interior of the canopy that serve as "high-tech" smoke detectors

#### **Glossary:**

- **"Canopy"** refers to the stainless steel wall/roof and 199 windows and the corresponding all-white interior surface that covers the Center's Event Center
- **"Trellis"** refers to the stainless steel lattice structure with rectangular openings that shades the courtyard area between the medical facility and the Event Center
- **"Trees"** refer to the four vertical structures that conduct HVAC, water and electricity to the higher elevations in the Event Center

#### **Complexity:**

- Ours is the most complex Gehry design to date due to the curvatures of the steel, which constitute a self-supporting structure despite the window-like openings incorporated in its design—openings that are inherently a source of weakness in what would typically be a solid structure shaped by support beams. This is a marked contrast with conventional orthogonal structures in which the support structure remains orthogonal and any curved movement resides only cosmetically in the façade or non-supportive areas of the building

**Precision:** The building was designed by Frank Gehry in his Los Angeles studio, engineered in Germany, manufactured in China, and constructed in Las Vegas

- No room for error: Each piece of steel contains 60 to 100 bolts that lock the pieces of steel into one another. This is significant in that the more points of connection, the less tolerance for error. In fact, the pieces of the latticed trellis needed to fit within 1/16" of each other. Any errors would have resulted in the final piece not fitting, causing a complete tear-down and rebuild of 544 pieces of steel and 30,000 steel bolts.
- Barcode Tracking:
  - During fabrication in China, unique barcode identification tags provided by the German engineering team were affixed to each piece of steel

- With the installation of each module in Las Vegas, surveyors came onsite to scan the barcodes, whose information was transmitted back to the engineering team in Germany for verification. This system allowed the engineers to examine an individual piece, consider its relationship to adjacent pieces and account for any settling into the ground, and determine if any adjustments were needed
- Stainless steel shingles:
  - Prior to fabrication, sheets of stainless steel were laid out on the exterior surface of the building, which had been marked with white gridlines similar to graph paper
  - The steel was then measured, fabricated, and its edges bent to overlap or interlock one behind the other when installed
  - The final step of fabrication involved hand-scouring an “angel hair” finish to reduce the glare of untreated stainless steel. While this finish reduces the glare, it does not reduce the temperature, which on a typical Las Vegas summer day would most certainly be sufficient to fry the proverbial egg
- Building acoustics:
  - Due to the uniqueness and complexity of the canopy, acoustics could not be modeled in a test environment. Rather, testing was conducted onsite with acoustic technicians making adjustments while a live band played as directed.
  - BASWaphon, a pumice-type coating that absorbs sound, was installed over fiberglass, which in turn was placed over dry wall. BASWaphon is not only very costly, it’s also very soft. Attention must be paid not to touch it, as the smallest finger indent would not only ruin the building’s acoustics but also require significant refinishing of a large portion of the canopy’s surface. Moreover, the BASWaphon surface can’t be touched up with paint, as the paint would clog the pores, causing the surface to no longer function acoustically as it should.
- Windows:
  - The size, shape and plane differ in each of the 199 windows, creating challenges for shading and maintenance
  - Surrounding each window is a narrow space that allows for air circulation, thus keeping the temperature of the structure even and minimizing expansion/contraction

### **Practical details:**

- Window Washing System
  - Accessing the windows is challenging given that they are set on various planes in a canopy with myriad curves
  - Rig points and a cabling system were installed on the building’s exterior for use by cleaners in scaling the building
  - The stainless steel canopy needs to be cleaned each time the windows are cleaned. The entire process lasts 3 weeks and costs \$25,000
    - The cleaning solution consists of water that has been processed via reverse osmosis (thus eliminating spots during the drying process)
- Waterproofing:
  - A layer of black rubber was installed to encase the building and keep it watertight. However, rivets were subsequently drilled to hang the clips, which in turn attach the stainless steel shingles from behind so that no nails or obvious attachments are visible from the exterior surface of the shingles

- Having punctured the waterproofing, each of these rivets became an opportunity for a leak. Given the undulations of the canopy, if one were to find a puddle of water on the floor of the Event Center, it would be impossible to know where the leak had originated. Therefore, during the construction process, scrupulous water testing was conducted section-by-section in an attempt to identify and repair leaks prior to the installation of the shingles. The \$135,000 spent on this water testing was a small up-front cost that will prevent costly water damage during the building's life
- HVAC: To keep the room as quiet as possible, engineers employed larger ductwork and lower-velocity blowers than commonly used for heating/air conditioning in a space of this size.

### **Longevity & Sustainability:**

The building has been designed for posterity, utilizing features that will aid it in withstanding the harsh desert climate.

- There is no exposed concrete in the footing of the building, all of which has been waterproofed and covered with steel
- Throughout the building, areas not covered by steel or glass have been covered by 3-4 layers of stucco. Although the first 2 layers consist of stucco made of conventional cement, the final layers comprise synthetic, waterproof coatings
- The “curtain wall” or north-facing glass and aluminum entrance to the Event Center is 63 feet tall at its highest point. Due to the temperature extremes in Las Vegas, spacers have been installed in the aluminum support system to allow for its expansion of 2 ¼ inches over the 60 vertical feet

Although we have not pursued LEED certification, the building has many environmentally-sensitive features including:

- Motion sensors on all lights switches in the medical building
- Climate control only on the lower (occupied) 15 feet of the Event Center.
- Each of the windows within the stainless steel canopy structure is equipped with a custom-fit computerized MechoShade. A light-sensor calculates the BTU load on the glass, and opens and closes the shades throughout the day as needed to conserve on heat/air conditioning
- The windows are energy efficient, comprising 3 to 4 layers of glass with “frit” (a semi-opaque composite) and a shatterproof material sandwiched in between

### **Two Partners, One Mission:**

This Frank Gehry-designed building is home to the Cleveland Clinic Lou Ruvo Center for Brain Health and Keep Memory Alive. Cleveland Clinic is perennially ranked among the nation's top hospitals by *U.S. News & World Report*.

Keep Memory Alive (KMA) was founded in 1996 by Larry Ruvo to raise awareness and funds for improved treatment and a cure for neurocognitive disorders. In 2007, Ruvo selected Gehry as the architect for his brain center.

In 2009, KMA and Cleveland Clinic partnered to form Cleveland Clinic Lou Ruvo Center for Brain Health, providing continuing care for patients with cognitive disorders and for their family members. Together, the center and KMA are committed to prolonging healthy, vital aging in people at risk for dementia and other memory impairments.

**To schedule an appointment:**

702.483.6000

**Fellowship and fundraising:**

Keep Memory Alive operates space dedicated to creating memories for individuals who host and attend events in the Frank Gehry-designed Event Center. Revenues benefit KMA's commitment to preserving memory and eradicating neurocognitive disorders. For information on space availability, contact Keep Memory Alive at 702.263.9797 or [eventcenter@keepmemoryalive.org](mailto:eventcenter@keepmemoryalive.org).

**For more information on the building or on the activities therein, contact:**

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