

Los Angeles Forum Achieves a Turnaround

By T.R. Witcher

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To promote the reopening of the Forum, a 404 ft diameter “record,” comprising 250,000 sq ft of printed vinyl, was installed temporarily on the roof. The center label spins at 17 mph. The Forum Presented by Chase

Following years of disuse the venerable Los Angeles Forum has been given a new life with an upgraded roof structure and refinished interior. Its reopening was celebrated with a giant working turntable on its roof.

February 25, 2014—Built in 1967, the Forum in Los Angeles was famous as much for its innovative structural roof system as for the many unforgettable performers who dazzled the Los Angelinos beneath it. The “Showtime Lakers” of Magic Johnson won five NBA titles there during the 1980s, and legendary acts from Led Zeppelin to the Jackson 5 to Elvis Presley worked its stage.

“There’s no question, the building is iconic,” says Murray Beynon, a partner of BBB Architects in Toronto. “As we talked to people in L.A., it has almost a mythical status. They think it’s a great building from a visual point of view and many have very special memories there.”

When the Lakers and the Los Angeles Kings hockey club left the Forum in 1999 and moved to the new Staples Center arena downtown, the Forum was purchased by the Faithful Central Bible Church, which occasionally rented out the venue for concerts.

But its heyday was certainly gone—that is, until 2012, when the church sold the site to Madison Square Garden Company (MSG). Now, a \$100-million renovation, completed last month, has begun a new chapter in the Forum’s life, transforming the venue from an all-purpose arena into what Beynon, whose firm designed the renovation, says is “the largest indoor spectator facility in America dedicated to music and entertainment.”

Despite the building’s age, now officially known as the Forum Presented by Chase, was in pretty good shape, thanks in large part to the climate. Its location in Inglewood is far enough from the ocean that there were no corrosive effects on the concrete, and the climate is dry enough and mild enough to prevent the deterioration effects you’d see from a wetter or freeze-thaw kind of climate.

Still, all was not perfect. The concrete exterior columns and the building’s canopy, along with metal siding, had seen significant water damage because of the waterproofing materials on the top of the building had degraded over time.



After an extensive renovation, the Forum, in Inglewood, California, is reopening as a music and entertainment venue. The exterior was restored to its original sunset red color.

Rebecca Taylor/MSG Photos

The canopy was rehabilitated to prevent water intake, and the columns, which had seen a lot of spalling and paint deterioration, were recoated and refinished to let the concrete breathe yet still resist future water penetration. The metal siding was cleaned to remove the rust and then recoated. The building was repainted from blue to its original sunset red. The parking lot was also stripped down and repaved.

But bringing the roof up to spec was a more involved process. The Forum is a cable-suspended structure—not unlike a suspension bridge. According to the architects who built it, Charles Luckman Associates, the building featured “precast, posttensioned concrete arches which formed the 70 foot high compression ring”—this enables a clear span across the building’s interior. At the time the Forum utilized the largest compression ring in the country.

The innovative roof was “why it’s lasted quite a long time with regards to its ability handle event loading,” says Beynon. “Other buildings, even after 15 to 20 years, have had to augment their roof structures because they weren’t able to carry today’s increased concert loads. This is a very resilient structural roof design.”

But music acts today are bringing in heavier and heavier gear—video boards, lighting, rigging—and they want to suspend it all from the ceiling rather than build their own structures.

Cawsie Jijina, P.E., SECB, a principal of Severud Associates, the Forum project’s structural engineers, says the typical demands for increased loading capacity when you retrofit a building are on the order of 20 or perhaps even 50 percent—but MSG wanted to increase the load capacity of the roof by around 300 percent.

“There are 40 columns and cables strung from the columns to a central tension roof,” Jijina explains. “The entire roof structure sits on the cables. So 100 percent of the heavy lifting is done by the cables, and the cables just did not have that level of reserve capacity.”

The capacity MSG needed could not be obtained with conventional reinforcement. Jijina says his team though, “We’ve gotta come up with something totally off the wall to do this. But what?” Jijina turned for inspiration to the giant cathedrals of ancient Europe. They are all domes, which always have a compression ring at the top, in the form of an oculus. They also have a tension ring around the perimeter to resist the dome’s natural tendency to flatten out.

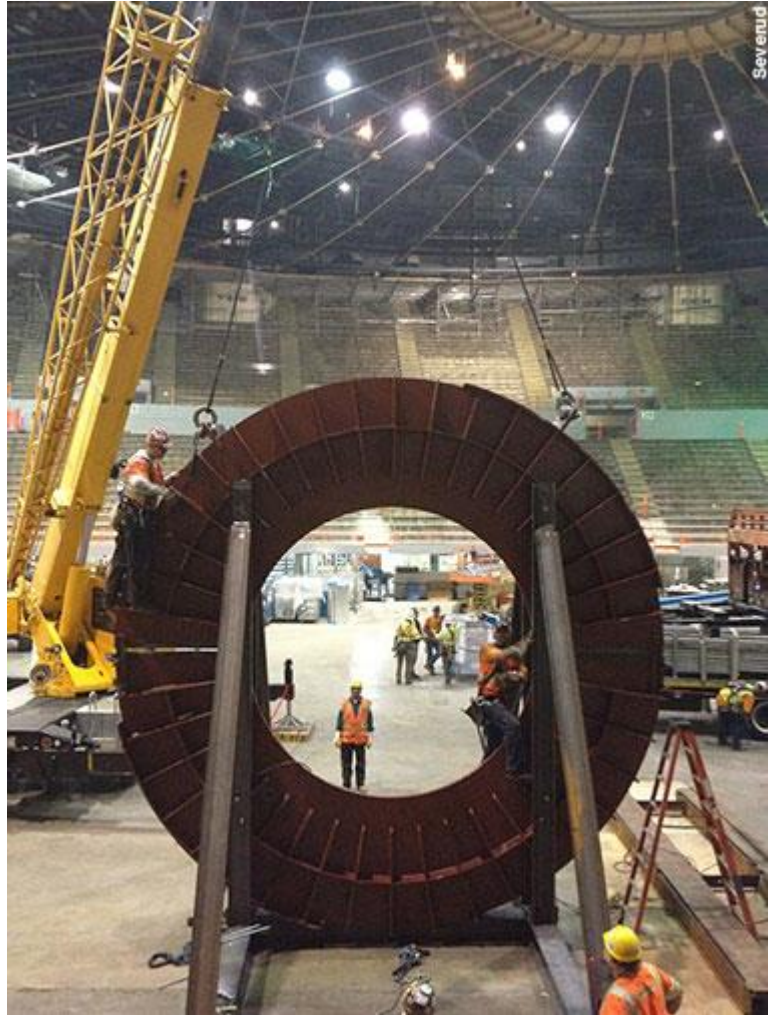
At the Forum, the roles were reversed. The compression ring was on the perimeter, and the tension ring was at the center, at a slightly lower elevation. “In our arena it’s backward,” says Jijina. “We are not a compression structure, but we are a tension structure. The ring outside was actually being pulled inwards. Our logic was to now create a modern-day version of a dome. You would actually relieve the forces on the existing outside ring, and we’d make the new dome give us the extra capacity that the Garden wished to have.”

So the engineers created a new structure within the volume of the existing roof and merged it with the existing structure in the same plane, taking advantage of the subtle curve of the roof (used for drainage). And then they introduced a compression ring, “like an oculus in a cathedral,” Jijina says, “except this is made out of steel to bring the entire compression structure together. We tied the new ring to the existing ring directly below and we were in business.”

The new structure in combination with the existing structure now does all the heaving lifting. The cables can continue to support the roof as well as take up any unbalanced rigging loads.

Of course, getting the new compression ring into position required careful planning. More than 20 ft in diameter and fabricated from 2.5 in. thick steel plates, the ring was so heavy that no crane that could just lift it up above the perimeter of the roof, reach more than 240 ft from the edge of the roof to the center, then gently lower it down.

Instead the contractors, from the West Coast offices of Clark Construction, decided to raise it up to the roof from the arena floor. That meant redesigning the new compression ring so it could slide up through the opening of the existing tension ring to its final top-chord position. Falsework was erected, synchronized jacks were placed, and the new ring was raised into position. The two structural systems were then integrated by tying them together, creating what Jijani calls “the Forum on steroids.”



Workers prepare to raise a new steel compression ring, more than 20 ft in diameter, to the ceiling of the Forum. Severud

Severud also had to make sure throughout the renovation that the building’s center of mass stayed the same, and that the total mass did not increase beyond a set percentage. If an element was added or removed, it had to be balanced out with a similar operation on the other side, though Jijinja explains that it didn’t have to be an exact one-to-one match. Adding or removing a 100 lb element 10 ft from the center could be balanced on the other side by adding or removing a 10 lb element 100 ft from the center, for example.

The slab system for the roof was a very lightweight, 2.5 in. thick form board with a gypsum fill, a product used extensively in that era because it was inexpensive, Jijina notes, but which “has no redeeming structural qualities whatsoever.” Consequently, it couldn’t be used in a conventional diaphragm to distribute the forces—meaning that the new system would have to do all the work.

As if that weren’t enough, Pop2Life Creative Marketing, a promotion and events company with offices in Los Angeles, was tasked with developing a publicity stunt to promote the building’s opening. The company’s chief executive officer, Eric Murphy, was viewing the Forum’s new website and saw a press photo that looked up at the building; a plane flew overhead. He realized the Forum was on the flight path into Los Angeles International Airport.

He thought, how cool would it be to do something on the roof? Then the idea hit him: turn the roof into a spinning record that would be seen by the passengers aboard more than 1,500 planes landing each day.

The temporary record project came together quickly—just 45 days from pitch to the venue’s reopening last month. But it required the work of dozens of contractors and engineers.

First, the 404 ft diameter record required 250,000 sq ft of printed vinyl, which even included grooves and shadows at its perimeter to more closely resemble a real record. The letters on the center label of the record—The Eagles’ Hotel California, commemorating the famous Los Angeles band that would play at the Forum’s reopening—were as tall as the Hollywood sign. Printing the vinyl record required eight days, nonstop.



Then there was the roof structure to put it on. This comprised preengineered aluminum box trusses, what Daniel Clark, P.E., a principal of Cincinnati-based Clark Reder, the entertainment engineering firm that designed it, calls the erector set of the entertainment world. The truss materials were easy to install and light, a crucial faactor given that the project required a mile of them. The 120 ft center label of the record was placed on top of a 40 ft diameter turntable, a radial truss structure with bracing to provide torsional stiffness and to prevent the edges of the record from lagging behind the center as it turned. The turntable, which sits 6 ft off the surface of the roof, could spin at 17 mph and was wind resistant to 80 mph.

The Forum’s 17,500 seats were replaced with new seating—the project’s architect likened the experience to stepping into an arena-sized opera hall. Rebecca Taylor/MSG Photos

In all the roof promotion meant 70,000 lb of additional structure on top of the 140,000 lb of stage setting that The Eagles brought to town. (The new roof structure can now support about

500,000 lb). Clark notes that there weren’t major structural concerns. They were, however, reminded many times about how new and nice the new roof covering was, and how bad it would be to damage it. Clark jokes that “the concern was more, ‘This is a brand new car, dude, don’t wreck it.’”

Inside, the Forum was redesigned to feel more like a theater than an arena. Hard flooring was carpeted, lights were lowered, and subtler wayfinding graphics were installed. Sleek bars and concession areas were added. “The original architecture already had a nightclub feel that just had to be updated and celebrated,” say Beynon.

The 17,500 seats were replaced with new red seats with black background and gold accents. It’s not unlike stepping into an arena-sized opera hall. Lastly, display boards and TV boards were removed, and a “starry nights” light-emitting diode display system was installed in the roof. The dressing rooms were redesigned—a graffiti artist even painted the doors—and musicians now have access to a new lounge, workout room and game room.

“It’s a space meant for musicians and people who love music and concerts,” says Beynon.