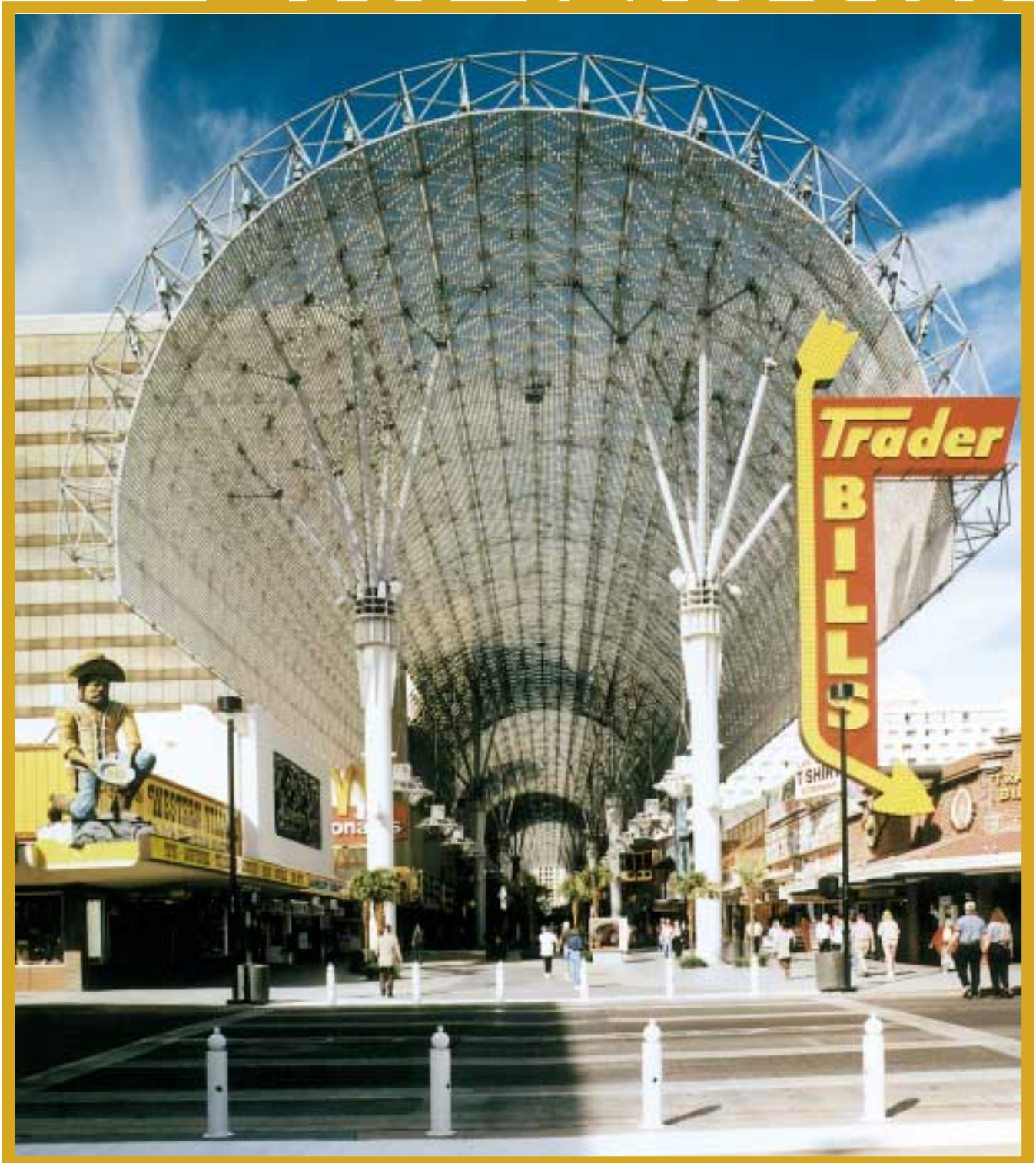


# HSS: DESIGNS FOR THE 21<sup>st</sup> CENTURY



*"The Fremont Street Experience," Las Vegas, Nevada*

# A CANOPY OF SOUND, LIGHT AND MOTION FOR VEGAS'S FAMED 'GLITTER GULCH'



Las Vegas's famed Fremont Street downtown casino district has a new "entryway," a spectacular, four-block-long space frame of steel Hollow Structural Sections (HSS) that wraps the historic street in a canopy of sound, light and motion.

"Big" is the operative word for the \$70-million project that's become known as the "Fremont Street Experience," a linear urban theater for pedestrians designed by The Jerde Partnership International of Venice, California.

The HSS space frame, utilizing some 800 tons of steel tubing, is about 1,400 feet long, 100 feet across and 90 feet high. By day, more than 46,000 tubular struts form a steel grid that, coupled with aluminum latticework attached to the bottom chords, screens out 60% of the bright, desert sunlight. By night, it comes alive with nearly 2.1 million lights and a 540,000-watt sound system that create the world's largest computer-driven light show.

## HSS SPACE FRAME TOPS PEDESTRIAN BOULEVARD

The HSS steel space frame covers an attractive pedestrian boulevard for visitors to the downtown casinos and hotels. The computer-generated animation and symphonic-quality sound create an ambiance unique to "Glitter Gulch."

Like other downtown areas across the country, Fremont Street—the city's historic "heart" and a backdrop for many memorable films—had not grown old gracefully. So a public-private partnership commissioned The Jerde Partnership to revitalize the district.

"The bright lights lining the existing Fremont Street casino district were unquestionably its most prominent design feature," says David Rogers, AIA, Project Designer for The Jerde Partnership. "We concluded the best thing we could do was to build on that image by adding light above the street and on the street itself. We



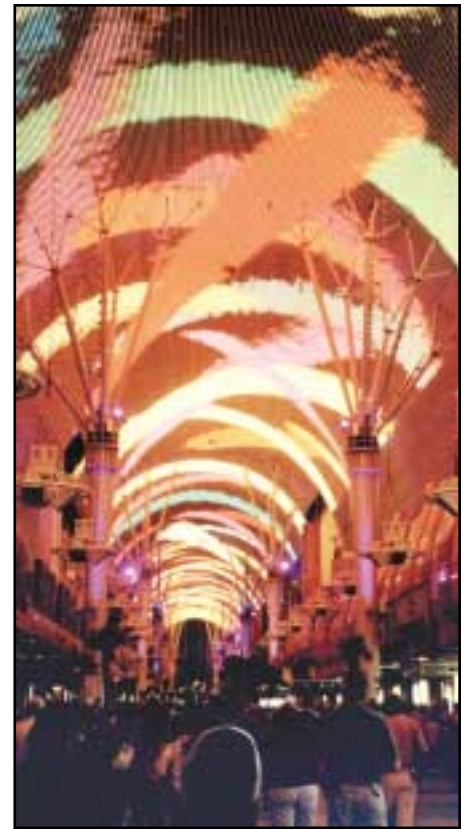
wanted to create a single, continuous tube of light that would serve as the foyer for the nine casinos lining the street and capture the synergies they generate.”

Early on, Jerde was attracted by the possibilities offered by an HSS steel space frame.

### Strength of HSS Allows Fewer Support Columns

“We wanted a feeling of height, a special ambiance, not just at night but during the day as well,” Rogers says. “The tricky thing was to build something light and airy that would still carry the theme of bright lights and complement the existing architecture along the street, which was considered sacred.

The need to create maximum visibility for the light show to pedestrian traffic made a minimum number of support columns a



necessity. That made a compelling case for a space frame formed by HSS.

“Hollow structural steel tubing (HSS) gave us the most efficient system; it was as simple as that,” Rogers says. “Aluminum or other lighter materials such as reinforced plastics simply weren’t up to the task.” Equally important was the ready and reliable supply system available, since the project had very tight budget and time requirements. No other alternate could meet them.

Jerde selected Peter Pearce, a recognized leader in HSS steel space frame technology, to handle the design. Pearce chose a design with a triangulated grid, rather than a more conventional orthogonal grid, on the vaulted structure’s outer chords.

### Triangulated Grid Gives Frame Added Strength

“The triangulated grid—with struts arranged in equilateral or nearly-equilateral triangles—is much more rigid than a square-grid frame,” Pearce says. That was important because of the weight of the frame and sound/light equipment over spans of 180 or 200 feet, and strong winds often present in that part of the country,



Supporting the HSS space frame are 16 columns 46 feet high. Extending from them are hierarchical, tree-like systems of hollow structural sections. The first “branches” are 12-3/4” OD HSS in lengths up to 30’. In most cases, six such tubes extend from a column capital.

Then come sets of four smaller round struts, 4-1/2” OD and up to 8’ in length. The inner and outer chords of the semi-circular space frame, and the triangular web of struts connecting them, are composed of round HSS. Virtually all are 3” OD in three lengths: 80”, 87.9” and 101.13.”

### Joining System Is Simple and Effective

End caps were factory-welded to each section, along with a series of flanges for a multi-hinge joining system previously developed by Pearce. “In the multi-hinge connection system, flanges are welded to the strut ends,” he says. “There’s no separate connection hub or joint; it’s completely integral to the ends of the struts. At the site, then, a pin or bolt can be inserted into the paired flanges to join them simply and effectively.”



Finished tubular strut components were packaged and shipped to the project site ready to assemble. The individual struts were bolted together at the site to form large sub-assemblies 10-to-12 tons in weight.

Other principal participants in “The Fremont Street Experience” included Hannibal Industries, the HSS manufacturer, and Prefab Erectors, the prime contractor for fabrication and erection of the space frame.



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