

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



*“Drive-through space trusses” at Goose Creek Golf Club*

# HSS PROVIDES 'DRIVE-THROUGH SPACE TRUSSES' AT A NEW SOUTHERN CALIFORNIA GOLF COURSE



## Tubular Design Makes Bridges Attractive And Cost-Effective

Like many courses in the Southwest, the demanding, new, 6,520-yard Goose Creek Golf Club in Riverside County, California, comes with a natural hazard—a wide wash that’s dry most of the year but becomes a swift torrent in the rainy season.

Overcoming that hazard, which roughly cuts the course in half, meant that course designers had to incorporate a pair of bridges into their layout.

Steel Hollow Structural Sections (HSS) were selected for the bridges. The principal reasons: their high strength-to-weight ratio, which made the structures



extremely cost-effective, and their attractive appearance, which made them not only functional, but an appealing part of the course.

A local steel fabricator was commissioned to design, fabricate and install the bridges. It engaged a structural engineering firm to

provide the structural engineering services.

The structural engineering firm describes the bridges as “drive-through space trusses.” One bridge is 125’ long and 10’ wide; the other is 100’ long and 9’ wide. Both are designed to carry golf carts as well as a variety of trucks, mowers and other maintenance equipment.

The upper and lower chords of each bridge truss are formed from 8” square HSS. Vertical and diagonal bracing of the trusses is formed by 4” square HSS, and the cross-members which connect the trusses and support the bridges’ wooden decks are 8” x 4” rectangular HSS. All of the structurals have walls just 3/16” thick.

## Clean Lines of HSS Helps Drive Choice

One principal design goal was to develop architecturally pleasing structures that would work well in an attractive setting. Photos were taken of a variety of bridges spanning dry washes at other Southern California courses and shown to the owner, who expressed a strong preference for the clean lines of HSS. Another choice that contributed to the bridges' appearance, as well as low maintenance costs, was the use of weathering steel for the HSS.

From a structural point of view, HSS works more effectively, pound-for-pound. Its high strength-to-weight ratio allowed the firm to design bridges a good bit lighter than would have been possible with other structurals.

Weight was an important consideration, too. The two bridges were assembled at the fabricator's shop. That provided a significant cost savings, but it also meant they had to be light enough to be moved to the site and hoisted onto their concrete foundations easily.



The bridges were moved by flatbed trucks for the trip to the course, near Mira Loma. The shorter bridge was lifted into position by crane, and the longer bridge by large fork-lifts.

## Fabricator Finds HSS Easy to Work With

The fabrication of the Goose Creek bridges involved butt-welding



sections of HSS to form the chords and fillet-welding of vertical and diagonal braces for the chords and the stringers connecting the trusses. Hooks were welded to the top chords for use in lifting the bridges and anchor plates to the bottom chords so they could be bolted to the concrete abutments.

The exceptional strength of HSS provided another big advantage — the use of relatively small size and thin walls. In fact, the bridges' steel structures are lighter than their wooden decks. The larger of the two spans weighs between 16,000 and 17,000 pounds, the smaller about 15,000 pounds.

Goose Creek is a privately-owned, daily-fee course that's been built to standards equal

to most country clubs. Designed by Brian Curley, the par 70 course provides challenges to players of all skill levels, with four sets of tees. It also offers one of the largest practice facilities in Southern California and a separate, 4,545-yard course for children.

