Historic Iowa Church Reborn with Components, SBCA Member

Originally built in 1908, the church's Byzantine-style design was unique to the Midwest. A pair of Boston architects loosely based the design on St. Mark's Basilica in Venice, Italy. All Saints has been named an historic landmark by the National Register of Historic Places.

by Libby Maurer

After All Saint's Church burned in 1995, it wasn't clear whether the structure located in Stuart, IA would ever be rebuilt, let alone rebuilt with building components. But almost 14 years later, the historic southwest Iowa church has risen again, thanks in part to wood and steel structural elements and an SBCA member.

When an arsonist set fire to it, parishioners of All Saint's and citizens of Stuart quickly formed Project Restore, determined to raise funds and rebuild the historic landmark. Over the course of several years, the group collected donations from private citizens and businesses. Additional funding was secured with a grant from a state tourism program and a bond referendum approved by Stuart voters. Then in 2007, a project team was established to start organizing the near-$2.5 million restoration project. This is how Lumber Specialties in Dyersville and Story City, IA, got involved.

The project team, comprised of architects, engineers, contractors and the Restoration Committee, started working on the large-scale renovation in November 2007. The architect, HLKB in Des Moines; contractor Koester Construction in Grimes; and the Committee met weekly to coordinate plans and hash through details.

Lumber Specialties' primary business model is two-step: selling components wholesale to lumberyards. One of the company's customers is Beisser Lumber Co., a retail building material dealer; it was ultimately this relationship that led to its involvement in restoring All Saint's. Beisser Lumber Co., as it turns out, supplies building materials to Koester Construction; Beisser recommended Lumber Specialties to supply the complicated structural components for the church.

at a glance

- Historic All Saint's Church in Stuart, IA burned in 1995, and was rebuilt with building components in 2008.
- The project team included SBCA member Lumber Specialties, who designed and built an intricate roof truss system for the main dome of the church.
- To properly transfer loads, the trusses tied into custom steel compression and tension rings placed in the center of the dome.

Designing the Dome

All Saint's tallest tower burned in the fire, so Lumber Specialties' challenge was to design and build the roof components for this key element of the restoration. All Saint's may have been stick framed originally, but Lumber Specialties and the project team were adamant about trussing the steeply vaulted roof this time around. The challenge was how to frame a dome measuring 34' in diameter that would rest on a base or "drum." (See photo above.) Salesman Dick Weise said cost, safety, quality and weather were factors in the decision. "The main dome is some 60' in the air. They didn't want to 'stick' it because of the crane cost, and the time involved," he said. Having workers more than 60' in the air for an extended amount of time wasn't a safety risk anyone was eager to take. Not to mention the very real possibility that the framing phase may well take place during the brutally cold Iowa winter. "They were considering the winter weather conditions (it was fall 2008 at that point) and quality control—maintaining good quality high in the air would be difficult," said Weise.

Weise said his company had a lot of freedom in terms of how to design the dome. Since the masonry walls were the only portion of church left standing after the fire, the Restoration Committee had already decided to keep the façade. "There were some mammoth steel beams deemed to have structural integrity that remained after the fire. So one option was to incorporate them in some way," he said.

That's when Steve Kennedy, E.I. of Lumber Specialties took over. He said the design took several days to complete, and included two unconventional elements to resist gravity and wind loads. According to Kennedy, the biggest challenge was to match the geometry of the trusses to the dimensions of the dome. "We had to use AutoCAD to draw several circles and arcs [representing the curve of the dome] and then design the trusses to fit inside of them," he said.

Additionally, Kennedy came up with the concept to use steel compression and tension rings to tie the trusses into, and worked with a local engineer to design them. "There's a ring located at the top and bottom chord connections to handle both gravity and wind loads," he said. A local certified welder custom made the rings. (See photo at left.)

Resurrection of All Saint's

Construction on All Saint's began in March 2008. Special ground accommodations had to be made on the jobsite to assemble the drum and dome. First, Koester staged a platform assembly area on the jobsite. The drum of the tower was reconstructed on this platform with a combination of wood and steel materials. Weighing in at 12 tons (and measuring 22' high and 33' in diameter), it was lifted by crane in October.

Then, using measurements of the diameter of the dome, the framing crew constructed the base of the 33-foot dome out of engineered wood and steel. (See photo at right.) The trusses—64

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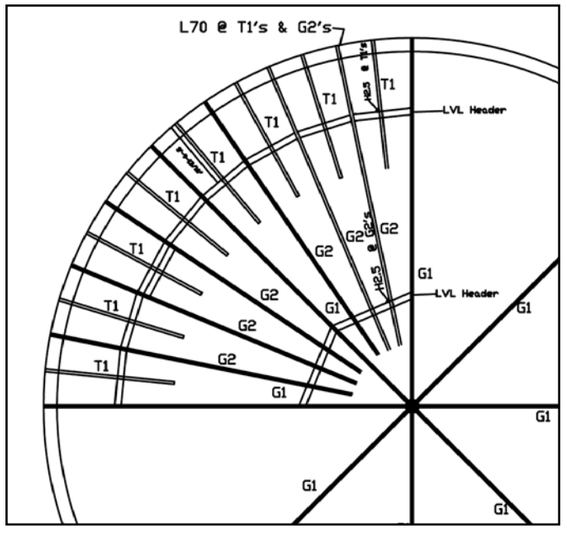

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in all—and steel rings were shipped loose to the jobsite in addition to detailed drawings of how the structure should be assembled, Kennedy said.

Next, eight 16' wide by 10' tall one-ply girder trusses (designated G1 in drawing above) were raised and bolted to each of the center rings. The rings were necessary to safely transfer

loads throughout the dome. Once secured to the rings, the G1 trusses cut the dome into eight congruent sections. In each section, three girder trusses (labeled G2 in drawing above) were set. These trusses are the same slope as the G1 trusses, but do not tie into the steel rings. Together, the G1 and G2 girders form the dome's rounded shape. Finally, 32 smaller trusses (7-ft. tall) were set between each G2 girder. As shown in the pictures above, sections of LVL blocking (secured with hangers) connected the G2 and G1 trusses in two places.

"[The rings] were essential to the project, so this was the only way you could do something like this from the air and get all the connections so the loads wouldn't collapse it," said Weise. After the inside of the dome was complete, it was sheathed with three layers of ¼" plywood. (See photos above.)

Hoisting the Drum

The 13-foot high dome was hoisted onto the drum on December 29, 2008 with a 160-foot crane. "They'd been waiting around for a nice calm day [to lift it]," Weise said. Numerous meetings were held to plan the event. The last step was for workers to cover the dome with sheets of solid copper.

Construction on All Saint's continues as of this writing. In addition to the roof system, Lumber Specialties also supplied trusses for one smaller dome, a floor system and various types of engineered wood for the project. When asked to reveal the secret of carrying out a successful design like this, Kennedy said, "Ingenuity and the willingness to tackle the more difficult projects." **SBC**

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