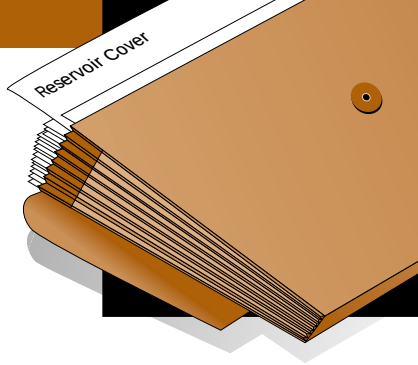

Santa Maria Water Reservoir Cover

Glulam Surfaces as the Clear Choice

Project Summary

PROJECT
Santa Maria Water Reservoir
Santa Maria, CA

OWNER
City of Santa Maria
Department of Public Works

ENGINEER
Montgomery Watson Harza
Pasadena, CA

GENERAL CONTRACTOR
Cushman Contracting Corporation
Goleta, CA

GLULAM MANUFACTURER
American Laminators
Drain, OR

GLULAM SUPPLIER
Hayden Bridge Forest Products
Eugene, OR

GLULAM INSTALLER
Cushman Contracting Corporation
Goleta, CA

COMPLETED
August 2001

Like many other cities in California, the City of Santa Maria is growing rapidly. In fact, population nearly doubled between 1970 and 1990. Located north of Santa Barbara, Santa Maria's economy is based largely on agriculture, oil and manufacturing. Vandenberg Air Force Base is nearby.

Water is an essential service that must be delivered cost-effectively and with consistent quality.

So when the city added a third water reservoir to serve the growing community, they covered the seven million gallon storage reservoir with a glulam wood roof structure that was value engineered to save both time and money and protect the quality of the city's water.

While the city initially wanted to match the open web truss design of its older reservoirs, several design challenges directed them to a glulam solution:

- Humid conditions found in the interior of a water reservoir restrict the use of a steel structure. In fact, steel connectors in the new structure had to be galvanized.
- Roof structures in the existing reservoirs contained treated lumber. Under current environmental constraints, pressure-treated lumber is no longer desirable for this type of application over drinking water. The heartwood of Alaska Yellow Cedar, with its natural resistance to decay, was a clear choice for the framing members.
- The site is exposed to the wind, so uplift was an issue.
- Santa Maria's location in an area with high seismic risk made engineered wood a smart choice to protect the community's water supply.

PHOTOS BY DAVID LLOYD

A glulam system allowed the City of Santa Maria to gain three feet of additional water storage capacity in the reservoir.

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According to Tom Starr, president of glulam supplier Hayden Bridge Forest Products, the 57,600-square-foot structure contained 162,000 board feet of Alaska Yellow Cedar glulam members using 20F-V12 and 20F-V13 layups. The members consisted of:

- 1-1/2 inch x 9 inch rafters
- 2-1/2 inch and 3-1/8 inch purlins
- 6-3/4 inch x 22-1/2 to 31-1/2 inch deep beams
- 8-1/4 inch x 25-1/2 inch beams

The longest beam was 62-1/2 feet with a maximum span of 56 feet.

"Heartwood cedar was a natural choice for decay resistance and longevity," said Starr. "Plus, Alaska Yellow Cedar glued laminated beams are approved under APA's ICBO ES Report 5714."

From a construction standpoint, glulam offered another benefit – time savings. "If the project had been constructed with open web trusses that use dimension lumber for the chords, the lead time to source materials in the size needed would have stretched out for months," said Lee Cushman, owner of Cushman Contracting. "Glulam provided an environmentally friendly alternative, since wood from smaller diameter trees could be laminated to form our framing members."

Devin Light, Cushman's project manager, pointed out another advantage afforded by the glulam system. "The open web trusses used in the older reservoirs carried their load using a top chord bearing

The Alaska Yellow Cedar glulam roof structure was value engineered to save time and money.

This project is the third of four planned reservoirs providing water to the Santa Maria, CA community.

detail, which means they hang down into the reservoir itself. Because the glulam system is supported as a bottom-bearing member, the reservoir's interior storage capacity was increased. In fact, the city gained an extra three feet of water capacity. That alone was a huge selling point for glulam."

There were tradeoffs. Concrete columns were cast in place, and column sizes had to be enlarged to accommodate the extra weight of the glulam structure. But in turn, the cost of larger column sizes was offset by the extra benefits realized in the lower uplift forces, which resulted from the use of the heavier glulam system.

Victor Pearson is chief engineer for American Laminators, the glulam manufacturer. "The region was rated Exposure C, subject to 80 mph winds, and of course, there were seismic concerns because the reservoir was deemed a 'critical facility' for the region," he said. "Glulam answered both needs while meeting the city's construction schedule requirements. Plus, it was a beautiful project. It really was a shame to put a roof cover over those beams!"

Installation went smoothly. Beams were staged in the 36 bays between column supports, and then lifted into place in panels. Plus, glulam beams could be easily field cut, which provided flexibility for on-site modifications. A standing seam metal roof was extruded from top to bottom – from peak to eave – and then nailed to the glulam members to keep animals and airborne pollutants out of the water supply.

Cushman is quick to credit project engineers at Montgomery Watson Harza for their willingness to consider the switch from an open web truss system to glulam. "They quickly identified additional advantages of the switch and helped the City of Santa Maria realize even more benefits," he said. "For example, the city also saved money with the glulam system, realizing a net savings of $50,000 out of a $4 million project budget. The project was completed on time and everyone was happy."

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(253) 620-7400
E-mail Address: help@apawood.org

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