

Project Profile: Nevada's First "Green" School – Jacob E. Manch Elementary

Structural Insulated Panels (SIPs) Help Las Vegas School District Save Construction Labor Costs and Time, Reduce Energy Bills

School districts across the United States are increasingly under pressure to manage capital construction and operating costs. When new or remodel construction is needed, many face numerous hurdles, including rapid student population growth requiring larger facilities, and limited funding from local tax levies to pay for building development, along with energy costs to provide a conducive learning environment.

When Clark County School District (Las Vegas, Nevada) began to plan a new elementary school with a tight budget and construction schedule, project architects SSA Architecture of Las Vegas recommended incorporating structural insulated panels (SIPs) in all exterior walls and roofs for a more efficient and systematic approach to the building's structure.

Compared to alternative construction materials typical for schools, such as concrete masonry units (CMUs) and tilt-up concrete panels, the SIPs provided a number of benefits:

- Saved approximately one million dollars in direct construction costs
- Reduced the framing schedule from a typical 118 – 220 days to 45 days (a nearly 80 percent time savings)
- Reduced HVAC requirements by approximately half, providing both initial capital savings and lower annual heating and cooling bills
- Decreased construction materials waste and resulting disposal fees and environmental impacts
- Reduced interior noise coming from nearby Nellis Air Force Base

In addition, SIPs are an advanced framing technology that provides long-term durability, estimated for a life in the school application between 50 – 100 years under nominal maintenance.

Project Overview

The Jacob E. Manch Elementary School is a replacement for an existing building originally constructed in 1963 to serve the children from Nellis Air Force Base. It is designed to support 900 students in a year-around multi-track schedule.

For the replacement facility, the Clark County School District decided to develop a "school-within-a-school" concept, utilizing individual buildings, or "houses," for various grade levels, with each connected to a common building used for shared activities.

After the school district awarded the project to SSA Architecture in 2004, market conditions increased the estimated construction costs (approximately 1.5 percent per month in the then booming Las Vegas construction market). During the programming and preliminary design stages, the architects determined that materials customarily used in the district – primarily concrete masonry units (CMUs) and tilt-up concrete panels – would not be cost feasible within the approved budget.

In addition, with rapidly rising energy costs, the school district was looking for a solution that would reduce heating and cooling demands. CMUs and concrete walls typically do not perform well thermally in the extreme heat and cold of the Las Vegas desert. During extended periods of the year, they absorb heat under daytime temperatures that often reach 110 degrees Fahrenheit or greater, without the opportunity to cool down at night. The result is a high burden on cooling systems.

The school site is also regularly impacted by jet aircraft noise from the nearby air force base. The roar of military jet engines creates intense bursts of sound that distract student learning.

Adding further complexity to these challenges, the school district needed the replacement school completed as rapidly as feasible to minimize disruptions to students and teachers still using the existing adjacent school.

Selection of Structural Insulated Panels (SIPs)

To meet the various program and construction challenges, the architects specified structural insulated panels (SIPs) for all exterior load-bearing walls and roofs. Structural insulated panels (SIPs) are an easy-to-use and environmentally friendly advanced framing alternative to traditional construction. Composed of two sheets of oriented strand board (OSB) structurally laminated and pressure-cured to a rigid core of expanded polystyrene (EPS) foam insulation, SIPs are strong, straight and predictable, and provide superior insulation.

SIPs have been used in a range of commercial, institutional and residential buildings for decades, and have become more prevalent in recent years as architects, contractors and building owners learn more about their benefits. They are approved for used by every model building code in the U.S.

The architects report that in terms of interior thermal conditions, SIPs make the building perform like "a big refrigerator box." This drops HVAC costs substantially. SIPs also typically have a far reduced sound transmission, allow more flexibility in locating skylights, and install far faster than any of the other technologies typically used for schools.

Similar projects using concrete materials typically require about 118 to 220 days to be "dried in," ready for interior finishing work. With SIPs, the time was reduced to 45 days – up to approximately 80 percent less time.

"Not only did the SIPs install faster, saving on structural building time, they reduced labor time for the electrical work," adds Gary Radzat, President of Shell Building Systems (Sebastopol, California), the SIPs design and installation consultant for the Manch School. "The panels have electrical chases built inside them so electricians don't have to drill or modify faming. Instead, they can easily pull wires through the chases. The general contractor was shocked at how fast the panels installed – he said he'd never seen that size of schedule reduction."

The SIPs used for the Manch School were manufactured by Premier Building Systems (Fife, Washington and Phoenix, Arizona) to include 1" vertical chases at 16" on-center, and horizontal chases at the exact elevations needed for the electrical outlets.

In addition to offering fast and easy installation, the Premier SIPs provide superior insulation. The foam core serves as an insulating layer, and compared to stud framing, the large one-piece panels have fewer gaps needing to be filled and sealed. "Using SIPs cuts down on energy-related costs two ways," says

Radzat. "There's less demand for heating and cooling, so HVAC systems can be substantially smaller, saving on equipment costs. Plus, the ongoing costs to run the equipment are much less." Radzat estimates that the SIPs used in the Manch School reduced the HVAC load requirements by approximately half. He adds, "the energy consultants told us that the cycling of the air conditioning units will be reduced substantially, thereby increasing the life of the equipment by about 75 percent."

While the school district was initially reluctant to use a building approach it had not incorporated in its previous schools, after the installation of the SIPs, they were pleased with the enhanced performance. Radzat reports that they are now recommending SIPs for other new schools in the Las Vegas area.

Project Summary

Project: Jacob E. Manch Elementary School

Size: 70,000 square feet, designed for 900 students

Scheduled Completion: Spring 2009

Owner: Clark County School District, Las Vegas, Nevada

Architect: SSA Architecture, Las Vegas, Nevada

General Contractor: Martin Harris Construction, Las Vegas, Nevada

Structural Insulated Panel (SIP) Consultant: Shell Building Systems, Sebastopol, California

SIP Manufacturer: Premier Building Systems, Fife, Washington

Number of SIPs: 2,250 panels, 118,000 square feet total in walls and roofs

About Premier Building Systems
Premier Building Systems leads the construction industry in the research, development and manufacturing of high-performance, energy-efficient structural insulated panels and innovative construction framing materials. Headquartered in Fife, Washington, Premier operates manufacturing facilities in Fife and Phoenix, Arizona. For more information about the products and services offered by Premier, call (800) 275-7086 or visit www.pbssips.com

About Shell Building Systems
Shell Building Systems, LLC, is the largest and most experienced SIP company in the Western U.S. The company's SIP experience is the longest in the industry – over 30 years. No one has installed more SIPs than Shell Building Systems (over 5,000 projects), and Shell has been involved with every major aspect of SIP testing and code approvals since 1971. They have successfully used SIPs in residential, commercial and multi-family projects throughout the West, Hawaii and internationally as a partner with the World Bank in Russia and the Ukraine through one of its founders and principles.
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