

# Structural Glued Laminated Timber in Religious Structures



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**AMERICAN INSTITUTE OF TIMBER CONSTRUCTION**

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# Structural Glued Laminated Timbers: Beauty, Inspiration, Economy and Strength

Construction of religious buildings is booming as America enters a new century. Structural glued laminated timbers are being specified for many religious structures because they provide extra strength for long spans, and create dramatic interiors at a competitive cost.

Church, temple and synagogue designers find that a dramatic, high-ceiling nave or chapel provides an uplifting environment for spiritual meditation and worship. They report a growing preference for wood's strength, ease of construction, inspiration and natural aesthetic beauty.

Glued laminated wood arches, beams and trusses are a renewable resource because U. S. foresters plant 5 million trees each day to insure a future supply of wood.

## **St. Mary Catholic Community**

The church pictured on the cover of this brochure is St. Mary Parish of DePere, in DePere, WI. The photo shows four intersecting 120 ft clear span trusses of 18 ft 7 in. height with top and bottom chords, web members and lateral bracing of laminated timber.

A central core was first erected on scaffolding using four 24 ft long truss components. Then, two 50 ft long truss components were pin-connected to this central core from each of the four directions.

Four diagonal trusses at the building corners taper from a 16 ft 9 in. height from main trusses to approximately 6 ft high at the outside end. Clerestory framing is above the trusses to a 52 ft elevation, and then a central tower rises 60 ft above the floor elevation.

Laminated beam rafters from truss top chords to side masonry walls complete the framing.

Architect is Birschbach & Associates, Ltd. of Appleton, WI and the contractor is Miron Co. of Menasha, WI.

**The following pages showcase other outstanding religious buildings with laminated timber framing.**

# Our Lady Queen of Peace Madison, Wisconsin



Built in 1954, this church was remodeled in 1996 to increase seating capacity from 700 to 1,100. Similar to many other churches with substantial investments at their present site, the members decided to expand the structure rather than move to a new location at a greater cost and longer travel for the membership.

The 43 year old structure had a tapered floor plan with three-hinged arches 16 ft on centers with a 50 ft span at the altar end, and spans increasing to 110 ft at the seating end.

A 90 ft long ridge beam was supported by a 36 ft high curved column at the

wide end of the structure. Half-span arches were connected to the center ridge beam, not at right angles but at about 60 degrees slanted toward that column end of the ridge beam. The altar was moved to the opposite end and the seating turned to face in the opposite direction.

To obtain more seating near the new altar location, the legs of 90 ft, 100 ft and 110 ft span arches were removed and all that remained of the arches were rafter lengths attached to the ridge beam. These rafters would subsequently be supported by a pair of new half arches at the entrance to new wings at opposite sides. Moment con-

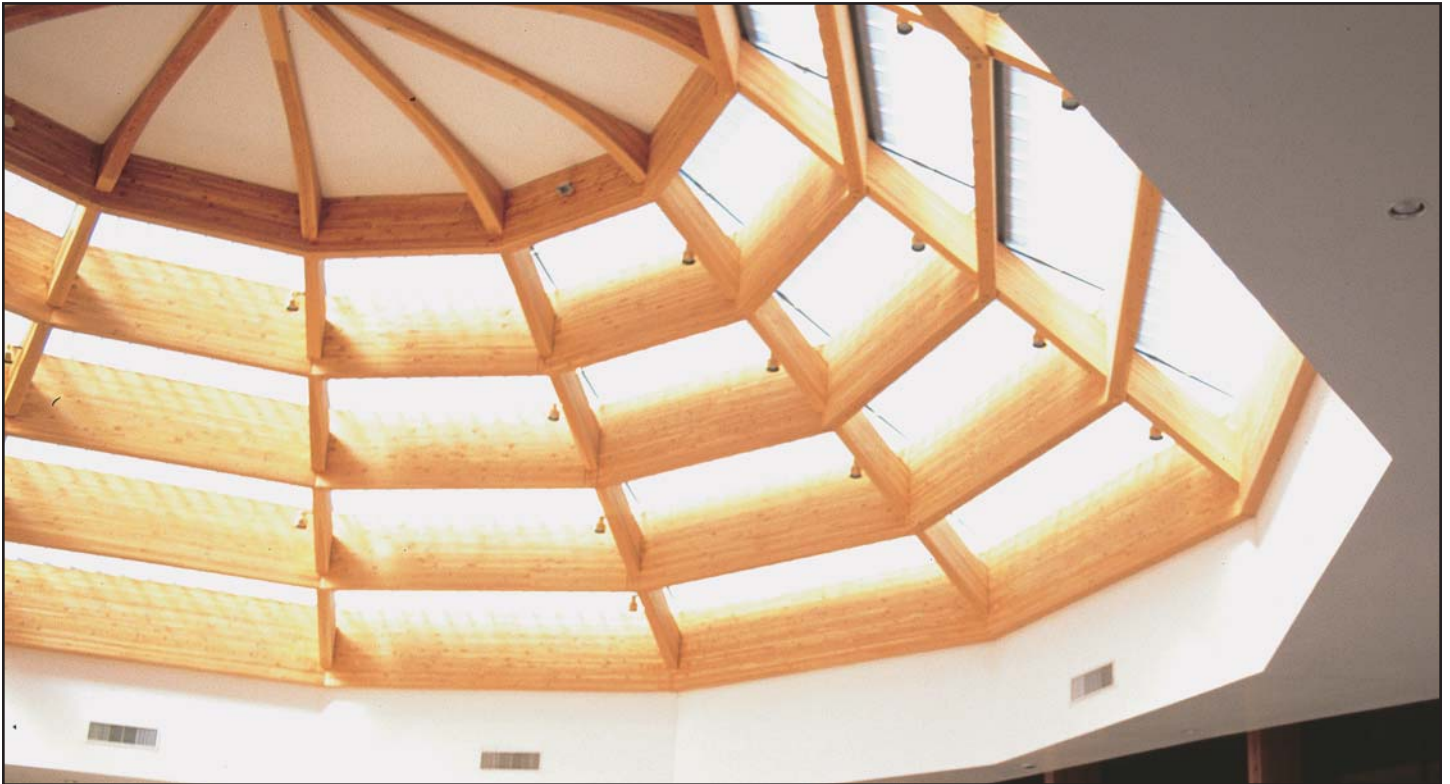
nections were added at the top of these new half-span arches, to the wing ridge beam and the rafter remaining. Changes were also made at the original ridge beam connection to complete the revision.

Cedar decking was placed over the two new side wing arches. Deck and arches were stained to match the original.

Architect: Flad and Associates,  
Madison, WI

Contractor: Joe Daniels Construction,  
Madison, WI

# John XXIII Albuquerque, NM



This spectacular wood church dome was fabricated on the ground and lifted into place, becoming an architectural and religious landmark in Albuquerque.

The 60 ft glued laminated timber dome is being called the “crown” of the John XXIII Catholic Church. It is 38 ft high.

The dome weighs 30 tons. Because of precise planning and craftsmanship, it fit into place perfectly on supporting steel trusses with a tolerance of 1/2 in.

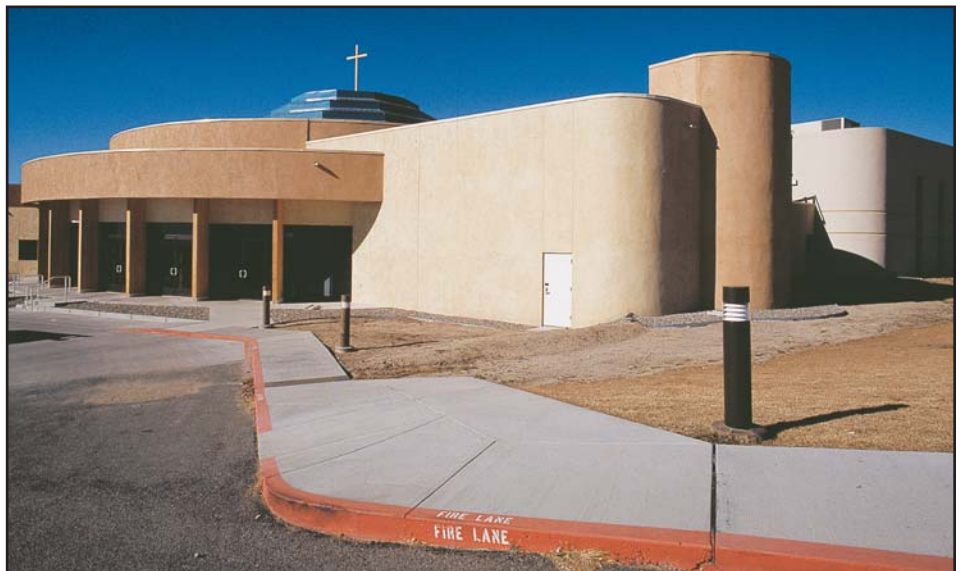
Twelve arched glued laminated rib members extended on radials from the center provide the primary structural support. Circling ring members span rib-to-rib to support continuous skylights and sub-framing. The stability of this configuration and the superior performance of wood under short duration loading meant that no secondary bracing systems were needed to

deal with unbalanced snow, wind or seismic loadings. The dome was spun by hand until properly aligned, and then lowered into place.

Architect David Callahan said the laminated wood dome provides a warm, attractive interior, is less expensive than steel, and safer because it was assembled on the ground.

“The exposed wood acts as a “mood changer,” to bring the parishioners more serenity and provide a warm, quiet contemplative mood when they attend mass,” Callahan adds.

Architect: The Sierra Architects, Albuquerque, NM  
Contractor: Klinger Constructors, Albuquerque, NM



# Great Buddha Hall, Carmel, NY

A dramatic series of glued laminated arches provide a unique setting for this striking hall in Carmel, NY. The temple holds the second largest indoor statue of Buddha in the world. The statue is 37 ft tall, and sits atop an 8 ft lotus-leaf pedestal in the \$6 million Great Buddha Hall.

Two massive sets of arches are the focus of the creative wood-framed interior. The main arches support another series of arches, reaching a total height of 79 ft.

Architect Edward Valeri says, "The structure needed a sense of large scale at a competitive cost. The laminated beams were the only materials that provide the graceful aesthetics and strength for the long spans and the heights we wanted to achieve. They provided a warm but neutral backdrop for the white Buddha statue."



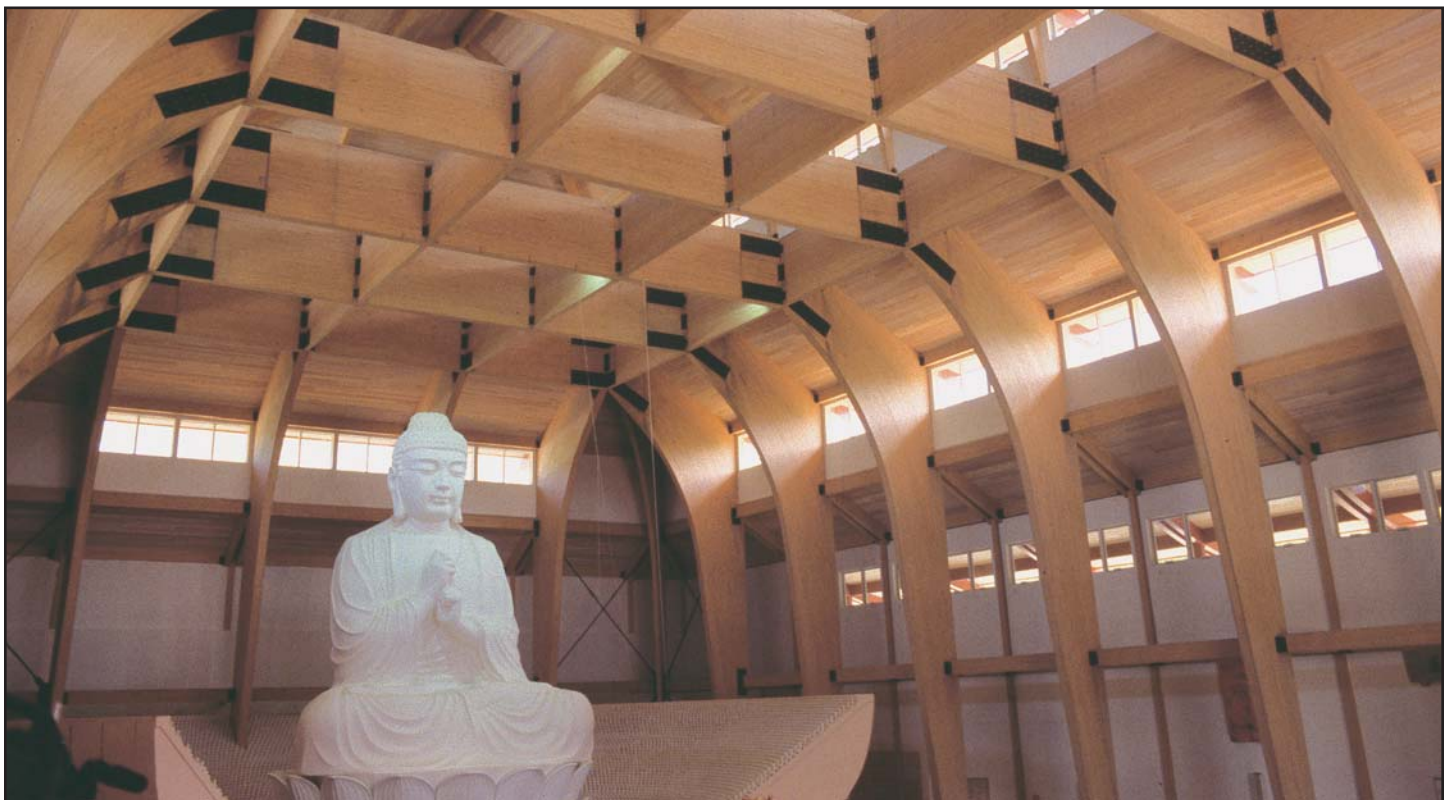
The glued laminated wood arched hip roof system covers a floor area of 80 ft x 128 ft with arches spanning 80 ft at 16 ft o. c. The main arches have vertical legs 48 ft high and rise to a maximum height of 57 ft above the floor.

The roof has four levels with curved overhangs, producing oriental elliptical curved hip lines at all four corners of the roof. The two lower tiered eyebrow type roof areas extend outside the

main arches about 28 ft around the main floor.

Round poles were placed outside the center section to carry the curved roof beams and support the walkway around the outside.

Architect: Edward A. Valeri,  
East Northport, NY  
Structural Engineer: Enterprise  
Engineering Consultants, Ltd.,  
Peshtigo, WI



# Omaha Church and Synagogue Symbolize Timber Design Excellence

## St. Gerald's Catholic Church

An imposing wood roof system in this Catholic Church provides a warm, inspirational space, according to the architect.

Huge 82 ft glued laminated timber trusses provide a dramatic setting overhead. Architects Zenon Beringer Mabrey Partners in Omaha, NE chose the glued laminated timber system (shown at right) primarily because of aesthetics and economy. According to firm partner David Beringer, the open wood trusses allow the interior space height to be maximized, while minimizing the height and cost of exterior walls. "The added interior volume provides an inspirational character for the space, while enhancing the acoustical quality," Beringer says.

The architects note that the lighting systems, which are mounted on the lower members of each cross truss, provide both down-lighting and up-lighting to add to the mystic, warm feel of the church, and the range of environments that can be created.



The main glued laminated structural trusses support other laminated beams connecting at various angles with special fabricated connections. Top and bottom chords of the two main trusses have double 6-3/4 in. x 30 in. members to add visual interest.

Architects: Zenon Beringer Mabrey Partners, Omaha, NE  
Structural Engineer: Nielsen Baumert Engineering, Omaha, NE  
Contractor: Lund-Ross Constructors, Omaha, NE

## Beth El Synagogue

Synagogues have been built of wood for centuries. In Omaha, the Beth El Temple (below) is a unique example of the timeless grace that can be achieved with exposed glued laminated timber framing.

A series of eight double laminated wood arches converge into a center compression ring at a height of 35 ft. The arches span over 80 ft with 3-1/8 in. x 18 in. beams and 6-3/4 in. x 16 in. purlins.

The synagogue has a seating capacity of 1,000.

Wood was the ideal material for the structure because of its warmth and economy. Wood also comes from a renewable resource, in contrast to finite, depletable resources such as steel.

Architect: Finegold & Associates, Boston, MA  
Contractor: Hawkins Construction, Omaha, NE



# Laminated Timbers Preferred for Churches in All Price Ranges



*St. Paul American Methodist Episcopal Church, Dallas, TX*

*Architect: Jack Hubbell, AIA*

*Contractor: Hangar Contractors*

The competitive cost of glued laminated beams, arches and trusses helps complete church construction on time and on budget.

Many of these religious structures are 5,000 to 7,000 square ft in size, seating 200 to 300 parishioners. The exposed glued laminated roof framing not only assures an uplifting spiritual atmosphere, but also provides strength and economy.

Architects and contractors of churches shown on this page report that laminated beams offer the advantages of economy,

aesthetic appeal and long-span capability. The wood systems provide faster construction than welded steel framing.

“Laminated beams are well accepted, and are allowed in Type II construction of the Uniform Building Code, in combination with non-combustible materials,” according to one prominent church architect.

Designers specify glued laminated straight beams, single tapered, double tapered, or pitch and tapered curved beams because of their visual impact.



*Luther Manor-Northland Village, Marinette, WI*

*Architect: Irion, Reinke & Associates, Oskosh, WI*

*Contractor: Contractors Service & Supply, Madison, WI*



*McFarland Lutheran Church, McFarland, WI*

*Architect: Strang Partners, Inc., Madison, WI*

*Contractor: Anthony Grignano Co., Madison, WI*

# Quality Control and Inspection

Architects, designers and engineers have professional responsibility for their clients to ensure that the structural glued laminated timber used is of consistent and dependable quality. The best way to accomplish this is to specify quality inspected materials.

As a service to the construction industry, The American Institute of Timber Construction provides a quality control and inspection system based on American National Standard *ANSI/AITC A190.1-1992-Standard Glued Laminated Timber*, AITC standards and *AITC 200-Inspection Manual*.

The AITC program consists of three elements:

1. **Licensing Manufacturers.** AITC licenses qualified laminators whose personnel, procedures and facilities have complied with the requirement of *ANSI/AITC A190.1-1992*.
2. **Quality Control Maintenance.** Each licensee agrees to accept responsibility for maintaining a quality control system which is in compliance with *ANSI/AITC A190.1-1992*, AITC standards and *AITC 200-Inspection Manual*.



THE **SYMBOL OF QUALITY**  
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3. **Periodic Plant Inspection.** AITC's Inspection Bureau, a nationwide team of qualified inspectors, conducts frequent, unannounced inspections and verification checks of laminators' in-plant quality control system, procedures and production.

## Design Aids

AITC provides assistance to designers, specifiers and users of glued laminated timber systems. Questions can be directed to the AITC technical staff.

AITC has developed a number of design aids, including the comprehensive *Timber Construction Manual*, to assist in the proper design of glued laminated timber structures. A list of AITC publications is available.

## Disclaimer

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## AITC

Since 1952, the American Institute of Timber Construction has been establishing the criteria for structural glued laminated timber. Today's industry Standard, *ANSI/AITC A190.1-1992*, was developed by AITC and its members. AITC's certification and quality assurance programs are the most respected in the industry. AITC standards and quality marks are recognized and accepted by all major building codes, and the design community nationwide. The AITC stamp is the Symbol of Quality in Engineered Timber.