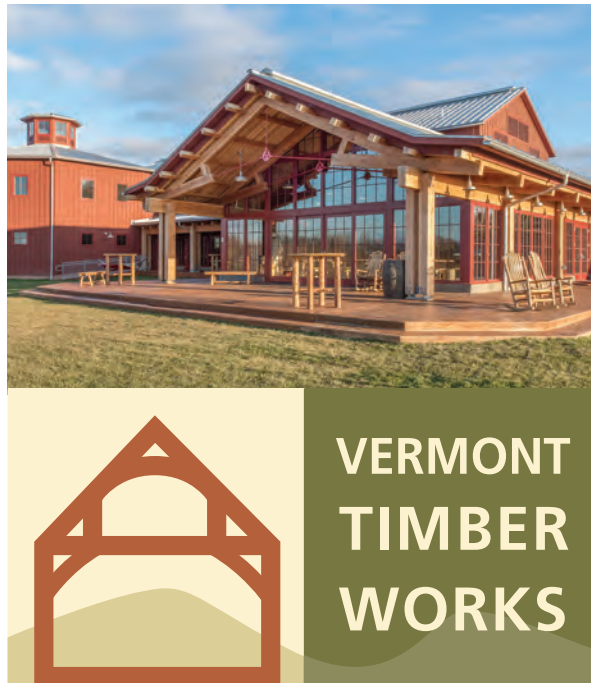


THE ART & ENGINEERING OF BUILDING WITH TIMBERS



HOMES BARNs CHURCHES CHAPELS PUBLIC BUILDINGS CUSTOM FRAMING

By Douglas Friant

TIMBER FRAMES

Timber frames are intriguing because they are both the working structural components of buildings and the interior finish carpentry. They are strong and beautiful, built to be both form and function using traditional joinery methods that are centuries old. This book highlights the many different ways to build with timber, from simple barns to complex architectural designs like the frame pictured to the right. Beams can be formed to make churches, homes, pavilions and hotels.

In 1987, we started working with timbers as Friant & Kelleher Builders. We built beautiful custom homes with conventional stick framing as well as timber frames enclosed with super insulating structural panels. Eventually we specialized in building with timber, then to building just timber frames.

In 2015, we installed a solar array that supplies all of our electricity so now we cut our frames with power from the sun. We have honed our craft like we hone our chisels, to be sharp, elegant and effective. Every project featured in this book, as well as everything we build, is handmade by skilled craftspeople and engineered to the highest standards, designed for snow loads in New England to hurricane winds in Louisiana.



Photography by Nathalie Belleau
Graphic Design by Dan O'Donnell
With contributions from Dan Kelleher and
the Crew at Vermont Timber Works.

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HOME

Night Pasture Farm, Vermont

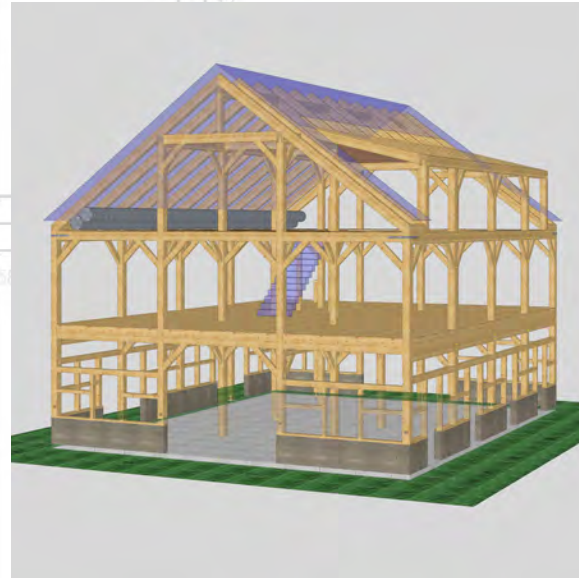
Stone, timber, iron and geometry give this home its warmth and beauty. The architects vision for this timber frame was an array of shapes and angles that elegantly come together at a central fireplace made of Vermont stone. Canted posts make up the porch framing and cherry keys with iron straps hold the main carrying beams together.



HOME

Lake Winnepesaukee, New Hampshire

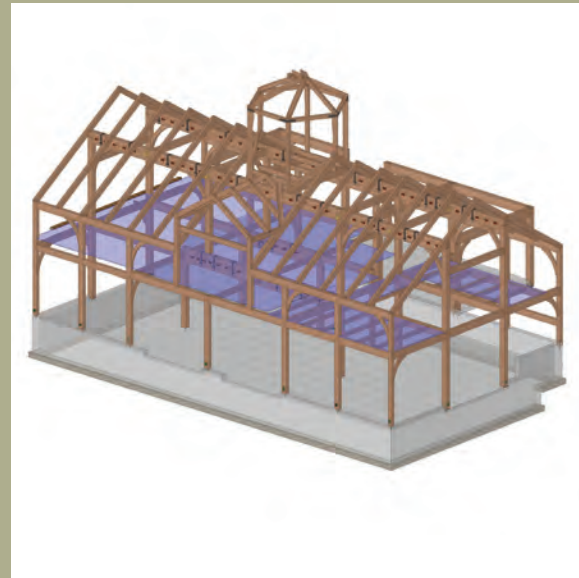
Wide open spaces are central to the rustic hemlock timbers in this lake house. A massive rough sawn Douglas fir beam carries the roof load over the great room. A second-floor balcony surrounds the open space below and faces toward windows overlooking the lake. Under the living area, the owner wanted extra room for stables or equipment storage.



HOME

Sandwich, New Hampshire

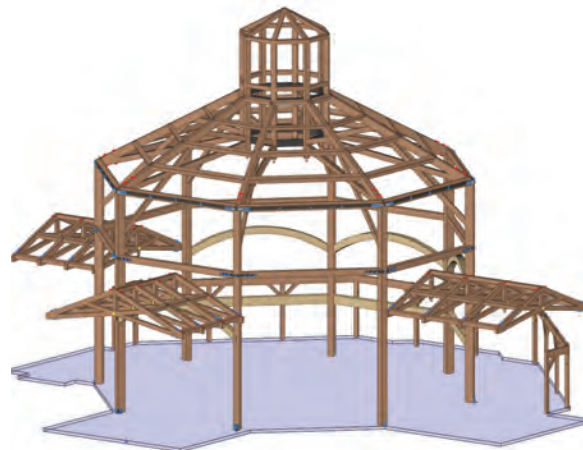
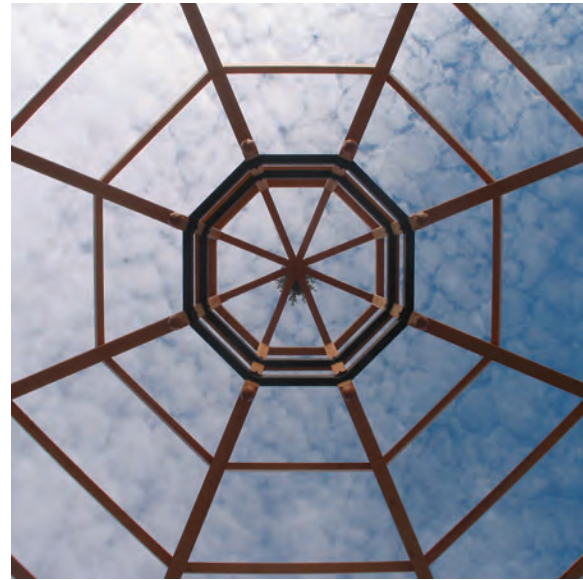
Lighting is fun in timber frame homes. Up-lighting highlights the details; window walls and skylights bring the outside in; great iron chandeliers can be hung from the beams. Spaces are created and defined through visual cues. The main carrying beams outline the kitchen, dining and living areas while keeping the house open and inviting. The timber frame made with Douglas fir, custom wrought iron straps and cherry keys.



CHAPEL

Cromwell, Connecticut

The Chapel for the Holy Apostles is for a college and seminary. It is an octagon design spanning sixty feet and is over sixty feet tall. To accomplish the open space, we used a classic "tension ring - compression ring" system. A hidden structural steel band wraps the perimeter, and the timber trusses press against the compression ring at the cupola. It is an elegant system that allows for wide open spaces.



CHURCH

Redding, Connecticut

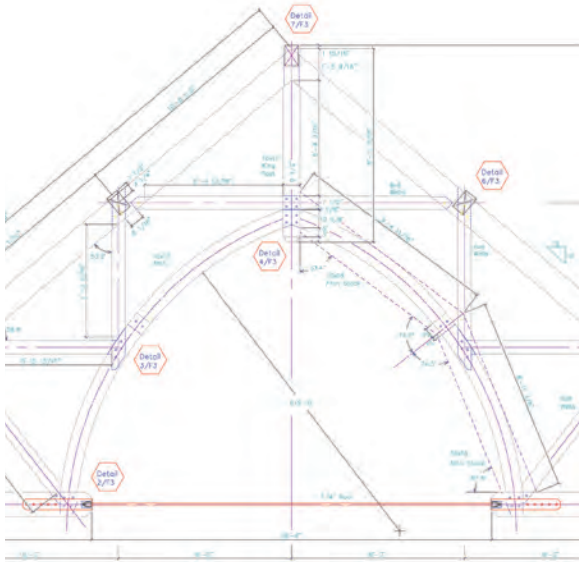
Saint Patrick Church features a double hammer beam design with gunstock posts. Hammer beams are interesting because the upper braces are in tension (and in this case reinforced with hidden steel rods) while the lower braces go into compression. All the forces are resolved in the truss itself. In old churches, where the spans were great, buttresses and flying buttresses were added to resist outward thrusts that were beyond a wood truss's structural capacity.



CHURCH

Nashua, New Hampshire

The Immaculate Conception Church uses a beautiful gothic arch and a steel tension rod to span forty-eight feet. All the curves are cut from natural Douglas fir timber. The frame is connected with traditional joinery and hidden steel reinforcing the critical points. The result is a light airy frame that reflects strength and integrity in design.



SKI LODGE

Stowe, Vermont

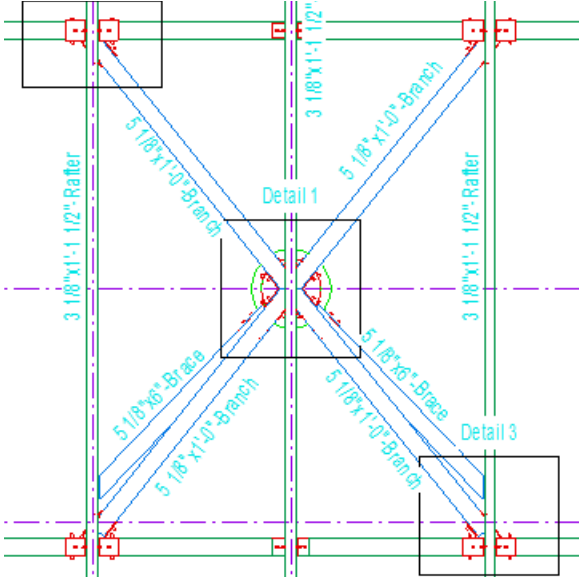
The Spruce Camp Ski Lodge is at the base of the Stowe Mountain ski area, which gets an average annual snowfall of 244 inches. The ground snow load is 120 pounds per square foot. Our challenge was to build a timber frame that would span eighty feet without interior columns, support the snow and be terrific to look at. We used a tension ring – compression ring model and double chorded girder trusses reinforced with steel plates. The result is amazing.



SKI LODGE

Farmington, Pennsylvania

The architect for Nemaocolin Woodlands Ski Lodge had a vision of branches stemming from tree trunks for the frame, which is fabricated with Douglas fir glulam timbers, log columns and galvanized steel plates. The building, with its warm frame and expansive windows, is a perfect place to retreat from the cold while still feeling close to nature.



DINING HALL

Middlebury, Vermont

The Grille at Middlebury College offers one of the school's dining venues for students. Vermont Timber Works constructed a two-story timber frame inside an existing building. Originally, the frame was made for pool tables but it is now used for cafeteria seating. The McCullough Student Center also has a serving area and two rough sawn hemlock pergolas. Blackened steel plates and Douglas fir timbers were selected for the architectural elements.



DINING HALL

Killingworth, Connecticut

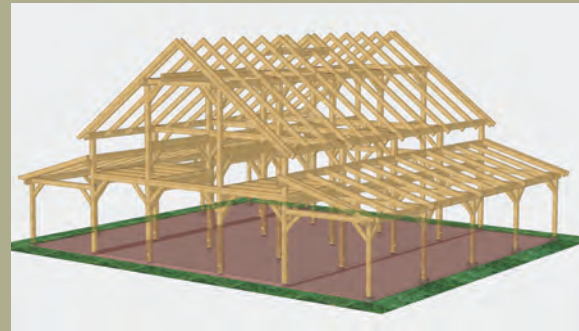
The Deer Lake Dining Hall was built for the scouts' Connecticut Yankee Council and is enjoyed by boys and girls of all ages. It overlooks the lake with a great wrap around porch. There are wide open spaces inside for campers to have their meals. A stone fireplace fits the building perfectly. The timber frame is constructed using traditional joinery and features rustic wood ceiling beams.



BARN

Beaufort, South Carolina

The Carolina horse barn is a beautiful timber frame. It was constructed using rough sawn hemlock timbers traditionally joined with mortise and tenon cuts. The covered loafing sheds, cupola, and tall center aisle are three things to love about the Carolina barn design. Black iron stall hardware, brick floor and old style lighting finish the look.



BARN

Guilford, Vermont

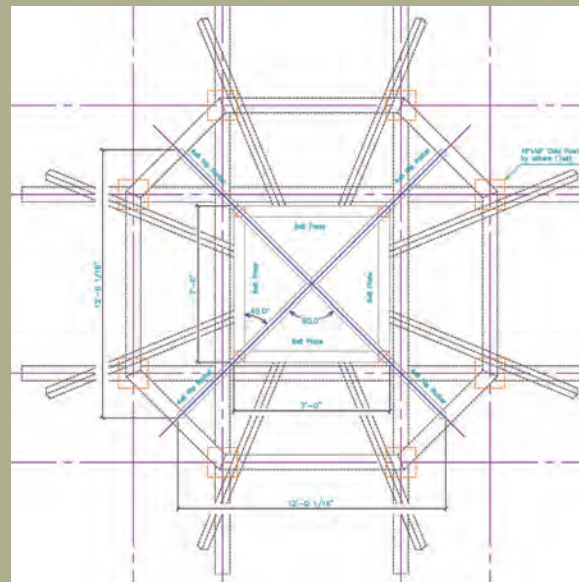
The Southern Vermont Welcome Center is just past the Massachusetts border on Interstate 91 North. Vermont Timber Works built a custom timber frame in an old Vermont style with traditional pegged joinery. The big beams are hand hewn while the smaller members, like the knee braces, are sawn as would have been done a hundred years ago. We also framed two outbuildings: a corn crib information center and a picnic pavilion, both made of native white oak.



PARK

Barrington, Illinois

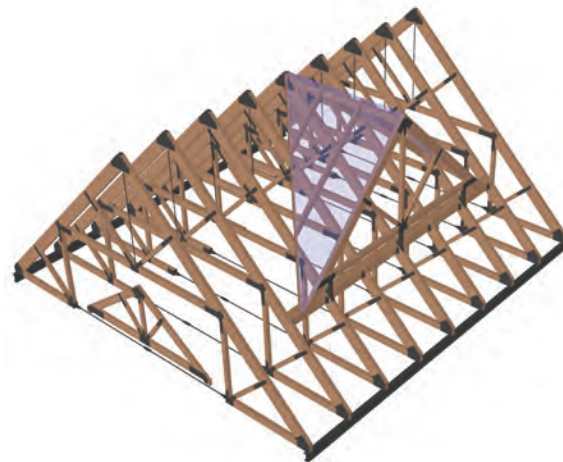
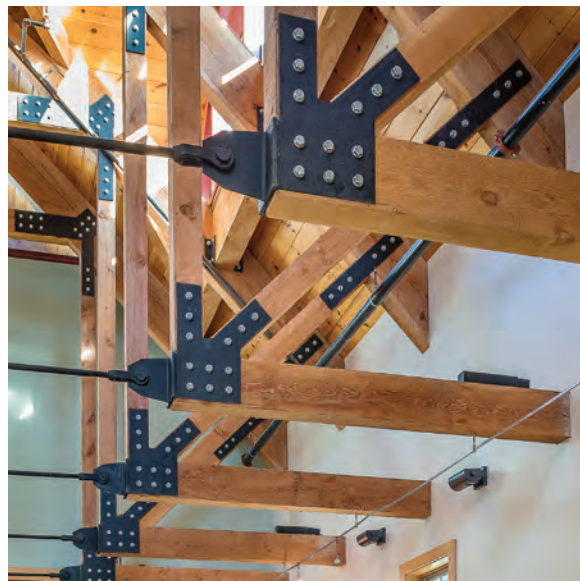
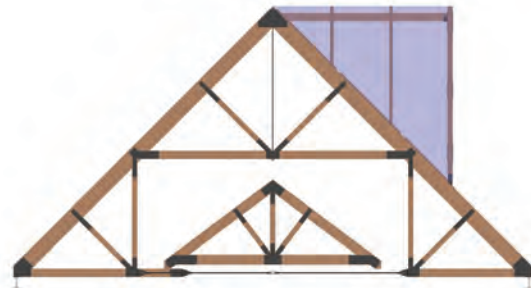
Citizen's Park is just outside of Chicago. It features a timber framed gazebo, shelters, pavilions, an amphitheater and a warming shelter. We used Douglas fir timber and a mix of traditional and hidden steel joinery. The architect highlighted the timbers with stone piers and foundations. The main pavilion is pictured to the right and features a wide open gathering space.



PARK

Campton, New Hampshire

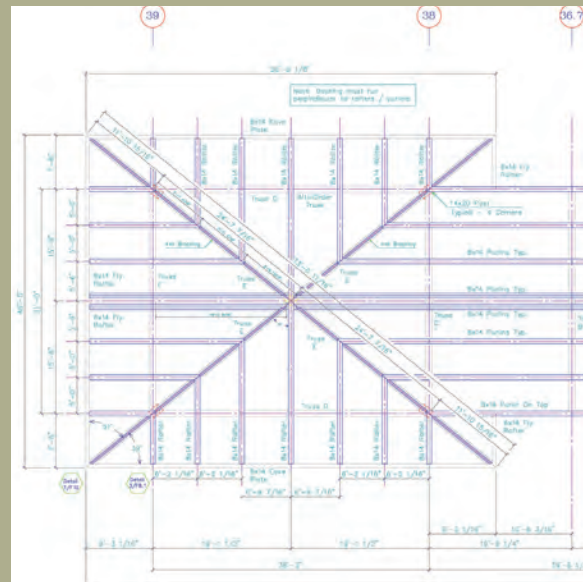
The White Mountain National Forest Administration Complex was opened in 2009. It is a campus-style facility, home to the Forest Supervisor's Office and the Pemigewasset Ranger District Offices. It features rough sawn Douglas fir timbers and black steel gusset plates with tension rods. The Visitors Center is a lofty, open design which fills with natural light entering from crossing gable dormers.



HOTEL

Tarrytown, New York

If you look closely at the Doubletree Hotel lobby frame, you will notice that the purlins are on top of the truss top chords allowing for the sprinkler system to be partially hidden. It also allows for lighting and shadows to make the frame more interesting visually. The structural challenge of this frame was designing for seismic loads and isolating the truss system from the rest of the building. The Porte Cochère has crossing trusses supported by four timber columns that are 38 feet apart. It features an intricate hip valley design with curved braces and solid wood arches.



TASTING ROOM

Walden, New York

Located in upstate New York, this frame was fabricated using Douglas fir timbers. It has very cool joinery with mortise and tenon cuts that are reinforced with bolts. Steel rods resolve the tension forces, while the timbers take the compression. Beautifully designed with both indoor and outdoor seating, it invites visitors to spend a few hours sipping cider and taking in the view.



CIDERY

Walden, New York

The cask room for the cidery is a 60' clear span octagon with a viewing platform on six sides. Structurally, it uses a classic tension ring perimeter with a steel compression ring at the peak of the roof. The viewing platform is hung from the roof trusses with steel rods and allows visitors to view the cask room while cider is being produced. A big fan keeps everything cool.



SCHOOL

Tarrytown, New York

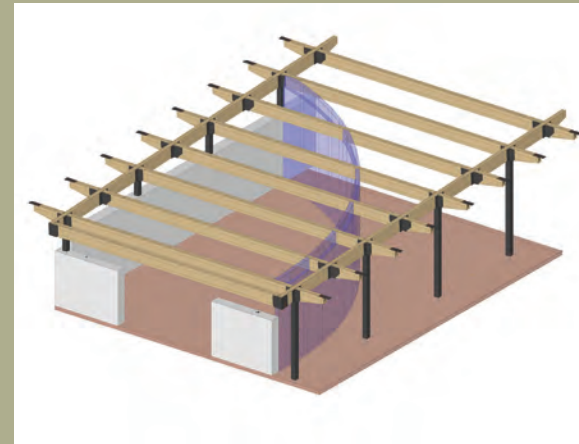
The Hackley School has a timber framed cedar walkway on the exterior that connects school buildings through a courtyard, keeping the students dry as they move around campus. Inside, Douglas fir king post trusses create a lofty space and add elegance to the hall.



SCHOOL

Middlesex, Connecticut

This contemporary student center for Middlesex Community College features large glulam beams spanning forty-four feet inside and out. It uses galvanized steel joinery and Douglas fir decking with modern lighting. The design is simple with straight beams on a slope intersected by a curved glass wall. The result is an elegant convergence of timber and glass.



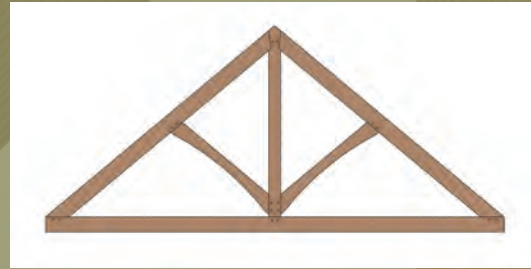
POOL HOUSES

Whether enclosing indoor pools or accenting outdoor pools, pool houses are open opportunities for creative design. Their whim, devoted to the pure pleasure of recreation, invites wide open spaces and intimate retreats. They are some of the most fun buildings to work on. Four different styles are featured on this page.

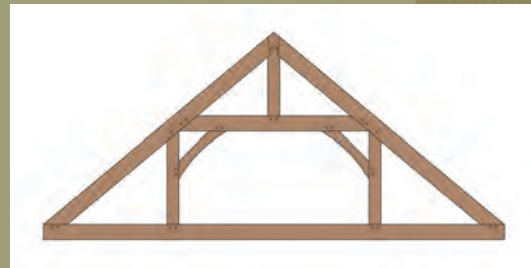


TRUSSES

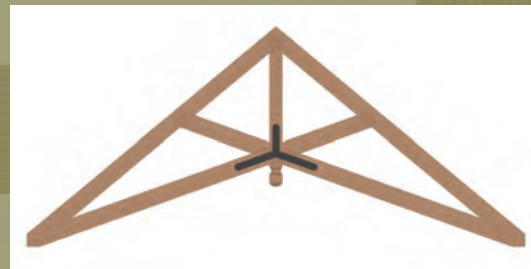
Timber trusses are perfect to dress up buildings. They are also economical solutions for hotels, restaurants and businesses that want a high-end look to their buildings. A few of the most common styles are shown on this page, although trusses can be custom designed for large or very small rooms or for a specific client's needs. King post and queen post trusses are simple, elegant and economical. The arched kingpost truss uses a glulam bottom chord or sawn timber arches. The church truss and scissor truss are timeless designs. While timber trusses look decorative, most are structural and are designed to carry heavy roof loads. We use traditional mortise and tenon joinery held with hardwood pegs as well as decorative structural steel connections with heavy bolts.



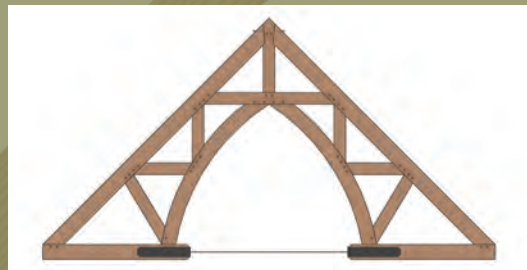
KING POST TRUSS



QUEEN POST TRUSS



SCISSOR TRUSS



CHURCH TRUSS



ARCHED KING POST TRUSS

JOINERY

Traditional and Steel

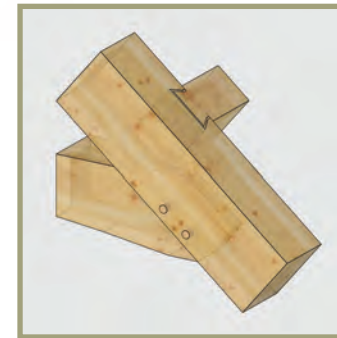
Traditional joinery is the classic way to connect timbers in post & beam and timber frame structures. It is an elegant and beautiful style of construction. Members are cut to have mortises, tenons and dovetails, which are secured with hardwood pegs. The joints are designed to carry compression forces, although some tension can also be held. Structures with traditional joinery have endured the test of time, lasting for hundreds of years.

Steel connector plates give a timber frame a look reminiscent of old factories and mill buildings. Steel can support a tremendous amount of structural load, allowing heavy timber to span great distances. Often, the steel gussets are painted black and held to the timbers with inch bolts. Sometimes the steel plates are galvanized, powder coated or painted in a variety of colors. Gusset plate connections are custom designed and engineered to fit the individual requirements of each project.

Steel tie rods solve the age-old problem of roof construction; they hold the walls from bending out as the roof is loaded with wind or snow. In old timber frame buildings, like the gothic cathedrals of the middle ages, enormous stone buttresses stabilized the outside walls – allowing for graceful arched beams to create a beautiful timber ceiling.



King Post at Ridge



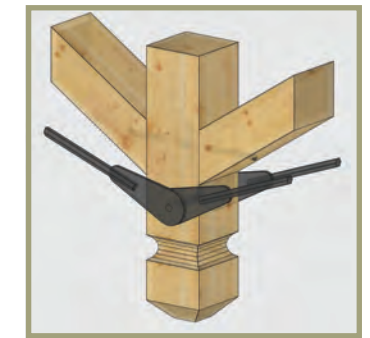
Dovetail Purlin and Rafter



Steel Gusset Plate



Traditional Joinery



Wood and Steel Joinery

TIMBER FINISHES

The color of the timber starts with the species of wood. As the name suggests, white pine is naturally very blond in color and can take almost any color stain from a natural to a very dark walnut. Native hemlock is also light in color whereas Douglas fir ranges from a light yellow sapwood to a dark red heartwood. Oak can also range in color from red to white. Wood often looks at its most beautiful with a natural oil or spar urethane applied as the finish to bring out its unique texture. Some clients like a darker stain – reminiscent of old churches or mill buildings.

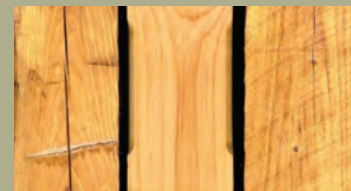
Timber can be rough sawn, just as it comes from the mill for rustic buildings, or planed smooth for a more finished look found in fine homes and chapels. Another choice is to hand hew the beams to make them look like they are antique. We use the same tools to do the hewing that were used two hundred years ago: adzes and slicks. Dark colored stains on hand hewn timber bring out the grain of the wood as well as the texture of the hewing for a beautiful rustic result.



DOUGLAS FIR



HEMLOCK



WHITE PINE



GLUELAM



CEDAR



OAK

FRAMING PROCESS FROM DESIGN TO RAISING

The process begins with a 3d computer aided design where a client's dream starts to become reality. An engineer reviews the design, an estimator figures the materials from the computer output and a proposal with 3d renderings is sent to the client for approval.

Once approved, the real work begins. We produce detailed shop drawings, order the material and start handcrafting the timber the old-fashioned way because, simply put, it is the best way. First, each beam is measured and marked with all the cuts, angles, mortises and tenons drawn in pencil. Then the piece is sent to a timber framer who double checks the layout and cuts the timber with super sharp saws, chisels and mortising machines. It then goes to the finishing area where it is sanded and sealed on all sides with the wood finish chosen by the client.

Next, the timbers are packaged, any steel components that were custom designed and fabricated are boxed, and the complete kit is shipped to the building site. The parts are unloaded and assembled on the ground, ready for a crane and skilled craftspeople to put them in place. Finally, a tree is nailed to the highest timber and we celebrate.



Bent Elevation at Grid Line 3

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