

Kathy Steffen

SCHEDULE OF PRESENTATIONS PALOMAR COLLEGE TIMBER FRAMING COURSE

Following is a tentative outline of what we will cover during the timber framing course. Besides actually laying out, cutting and erecting the structure, we will have one hour presentations each morning and afternoon throughout the course to start and end the day.

Each morning, first thing, we will go over the new joinery for the day and determine necessary dimensions and peg layouts. That way everyone can see how joinery decisions are made and how to design them. It's important that you are there on time. Alternately, these morning presentations will include some interesting layout demonstrations and engineering and structures problem solving.

At the end of each afternoon after cleaning up, we will show videos or slides of various projects which will show you the breadth of modern and historic timber framing.

Depending on the weather and our progress on the frame this is all subject to change....

Clean up + quit 3:45

WEEK 1

Thurs
Fri
Sat
MONDAY: Introductions to people, the frame drawings and timber framing in general;
Introduce first layout of joinery
Video: "The Barn at Hampshire College" - a brief gem from England

TUESDAY: Continue joinery layout and cutting (throughout course)

Slide show: "10 factors which influence timber frame design"

WEDNESDAY: Video: "The Timber Frame Video" - a good overview of the craft

THURSDAY: Slide show: "The Cabildo Project" - Dave's rebuilding of a historic structure in New Orleans using the French Scribe technique.

FRIDAY: Video: "Timber Frame Gazebo" - Guild/French Scribe project in Canada

SATURDAY: No show scheduled.

WEEK 2

MONDAY: Slide show: "Will's projects" - dozens of 'em including many with the Guild

TUESDAY: Video: "Medieval Siege" - fifty timber framers recreate the fourteenth century version of the atom bomb

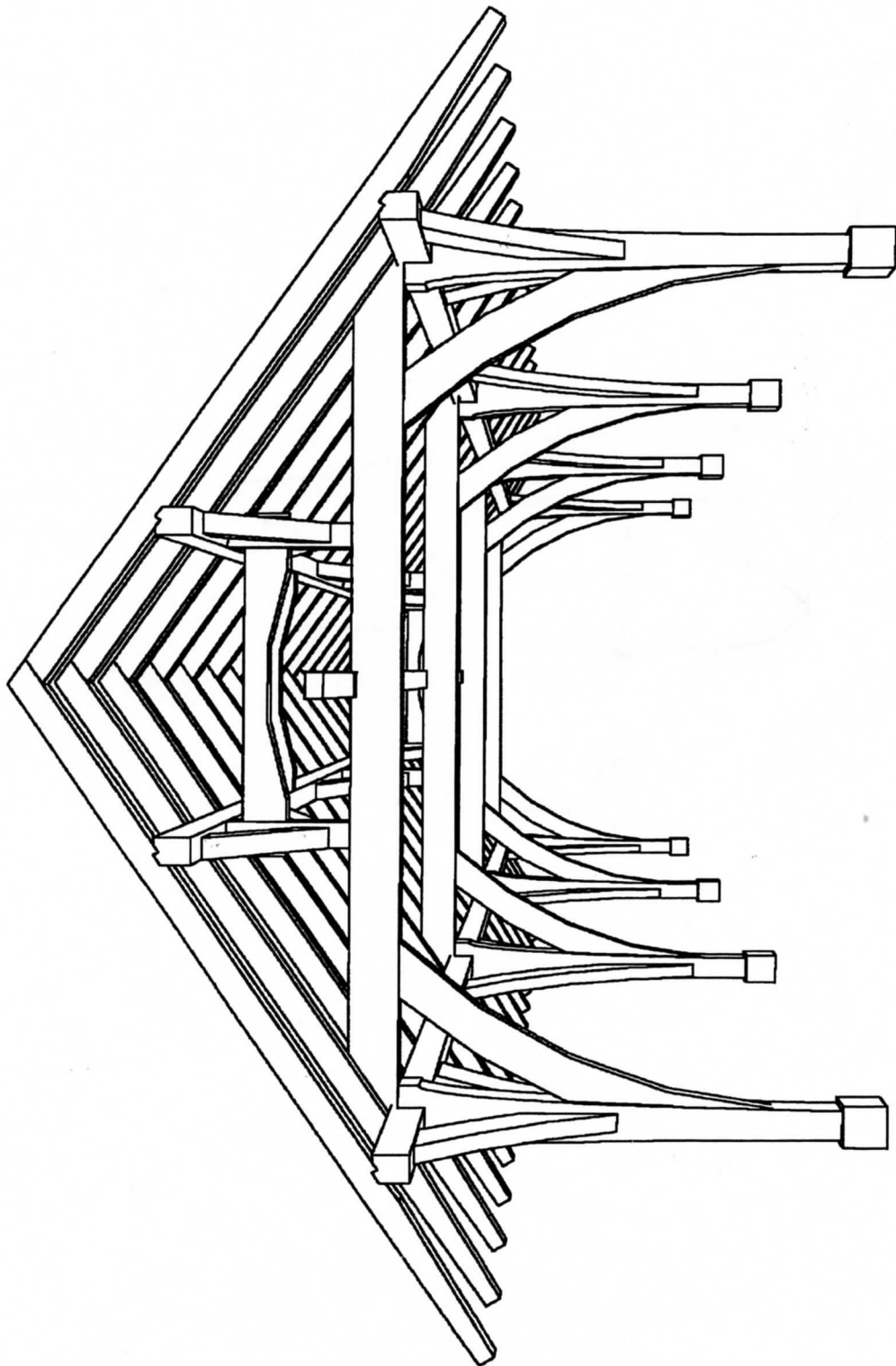
WEDNESDAY: Slide show: "Dave's projects" - more from the Great White North; bring your own popcorn

THURSDAY: Video: "Covered Bridge" - 400 framers build a bridge in Ontario; the Guild's biggest project

FRIDAY: Raising Day!

Chalk
Framing 17-18
1000 rods or pencils
1000s of nails

Isometric - Front View



545 - our lumber is
surfaced 4 sides

Palomar 2000- Mill Building Timber List		Inch	Inch	ft		
Member	Number	Width	Height	Length	BF	Joints
Posts	8	10 ^{9/12}	18 ^{17/12}	12	1440	72
Plates	2	8	10	30	400	32
Plates	4	8	10	26	693	52
Tiebeams	4	8	14	24	896	52
Purlin Plate Posts	8	8	8	4	170.7	40
Purlin Plate Post Ties	4	6	12	10	240	8
Purlin Plates	2	8	10	30	400	30
Purlin Plates	4	8	10	26	693	56
Purlin Plt Spreaders	3	6	12	8	144	6
Bay I & III Ties	2	8	10	28	373	4
Rafters	40	6	8	18.5	2960	120
Braces (tiebeam + longwall)	20	6	12	10	1200	40
Braces gable plate overhang	4	6	12	6	144	8
Braces @ purlin plates	12	6	10	8	480	24
Braces @ purlin plate gable	4	6	10	6	120	8
					10355	552
Douglas fir -- 34lbs/ cuft air dry (~3lbs/ bf)						
Weight of green frame (@4lbs/ bf):		41420lbs		(does not include roofing)		
Weight on each interior post:	6904lbs	x4	27616			
Weight on each gable post:	3452lbs	x4	13808			
			41424			

1. Project to develop a new product to be marketed in the U.S. and Canada and Europe and Japan and Australia and South America and the Middle East and the Soviet Union and the U.S.S.R. and the U.K. and France and Germany and Italy and Spain and Sweden and Norway and Denmark and Finland and Ireland and Greece and Portugal and Belgium and Holland and Switzerland and Austria and Poland and Czech Republic and Slovak Republic and Yugoslavia and Croatia and Slovenia and Hungary and Romania and Bulgaria and Serbia and Montenegro and Albania and Macedonia and Bosnia and Herzegovina and Ukraine and Belarus and Lithuania and Latvia and Estonia and Armenia and Georgia and Abkhazia and South Ossetia and Transnistria and Crimea and Donbas and Ukraine and Belarus and Lithuania and Latvia and Estonia and Armenia and Georgia and Abkhazia and South Ossetia and Transnistria and Crimea and Donbas and Ukraine and Belarus and Lithuania and Latvia and Estonia and Armenia and Georgia and Abkhazia and South Ossetia and Transnistria and Crimea and Donbas and Ukraine and Belarus and Lithuania and Latvia and Estonia and Armenia and Georgia and Abkhazia and South Ossetia and Transnistria and Crimea and Donbas and Ukraine and Belarus and Lithuania and Latvia and Estonia and Armenia and Georgia and Abkhazia and South Ossetia and Transnistria and Crimea and Donbas and Ukraine and Belarus and Lithuania and Latvia and Estonia and Armenia and Georgia and Abkhazia and South Ossetia and Transnistria and Crimea and Donbas and Ukraine and Belarus and Lithuania and Latvia and Estonia and Armenia and Georgia and Abkhazia and South Ossetia and Transnistria and Crimea and Donbas and Ukraine and Belarus and Lithuania and Latvia and Estonia and Armenia and Georgia and Abkhazia and South Ossetia and Transnistria and Crimea and Donbas and Ukraine and Belarus and Lithuania and Latvia and Estonia and Armenia and Georgia and Abkhazia and South Ossetia and Transnistria and Crimea and Donbas and Ukraine and Belarus and Lithuania and Latvia and Estonia and Armenia and Georgia and Abkhazia and South Ossetia and Transnistria and Crimea and Donbas and Ukraine and Belarus and Lithuania and Latvia and Estonia and Armenia and Georgia and Abkhazia and South Ossetia and Transnistria and Crimea and Donbas and Ukraine and Belarus and Lithuania and Latvia and Estonia and Armenia and Georgia and Abkhazia and South Ossetia and Transnistria and Crimea and Donbas and Ukraine and Belarus and Lithuania and Latvia and Estonia and Armenia and Georgia and Abkhazia and South Ossetia and Transnistria and Crimea and Donbas and Ukraine and Belarus and Lithuania and Latvia and Estonia and Armenia and Georgia and Abkhazia and South Ossetia and Transnistria and Crimea and Donbas and Ukraine and Belarus and Lithuania and Latvia and Estonia and Armenia and Georgia and Abkhazia and South Ossetia and Transnistria and Crimea and Donbas and Ukraine and Belarus and Lithuania and Latvia and Estonia and Armenia and Georgia and Abkhazia and South Ossetia and Transnistria and Crimea and Donbas and Ukraine and Belarus and Lithuania and Latvia and Estonia and Armenia and Georgia and Abkhazia and South Ossetia and Transnistria and Crimea and Donbas and Ukraine and Belarus and Lithuania and Latvia and Estonia and Armenia and Georgia and Abkhazia and South Ossetia

Crown up

1.
Layout
face
measure center of post
Out side of post (not inside edge)

17'8" New length
measure w/ Top of raft up

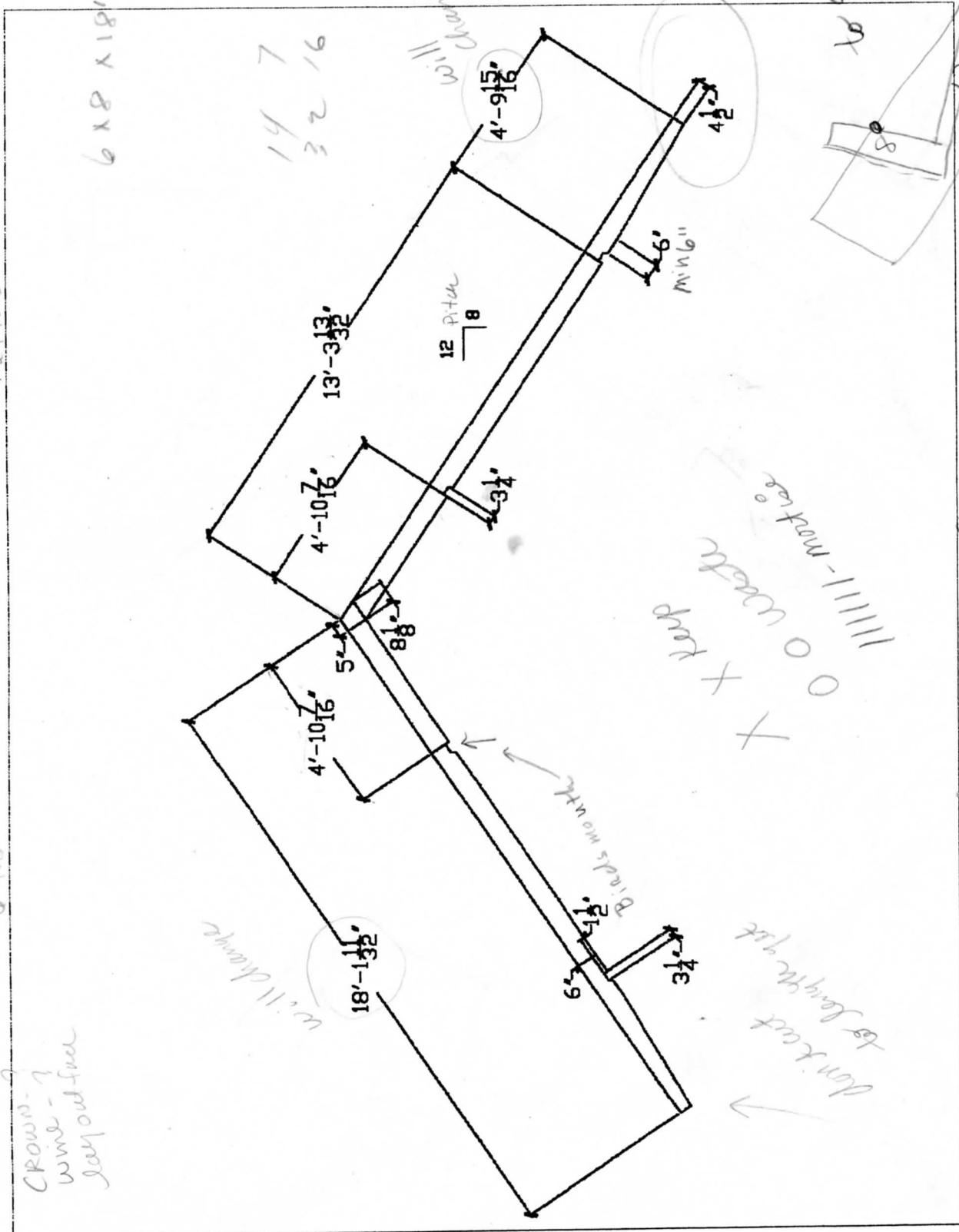
Rafters

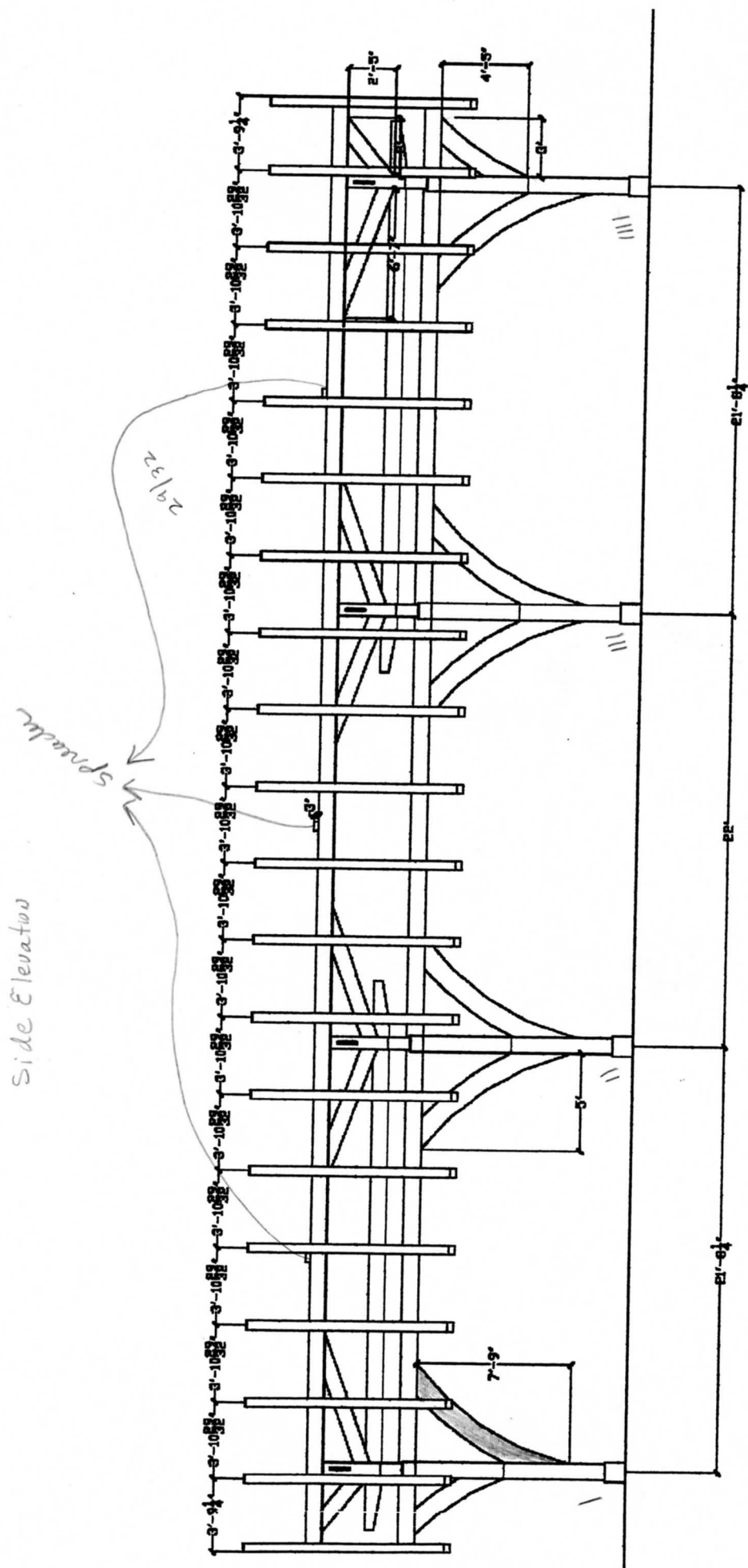
6 x 8 x 18'

14 7
32 16

will change

at best planing line

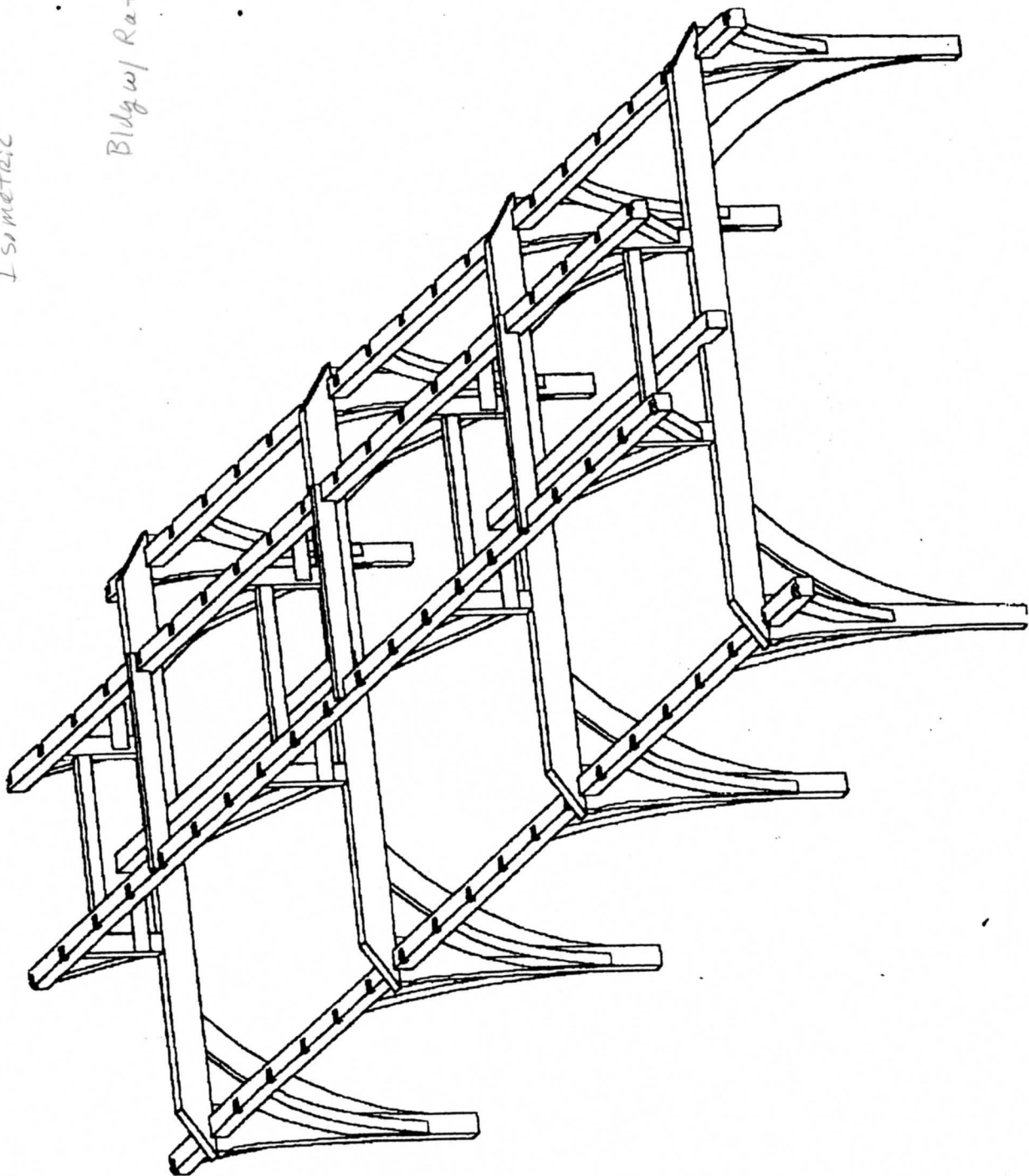




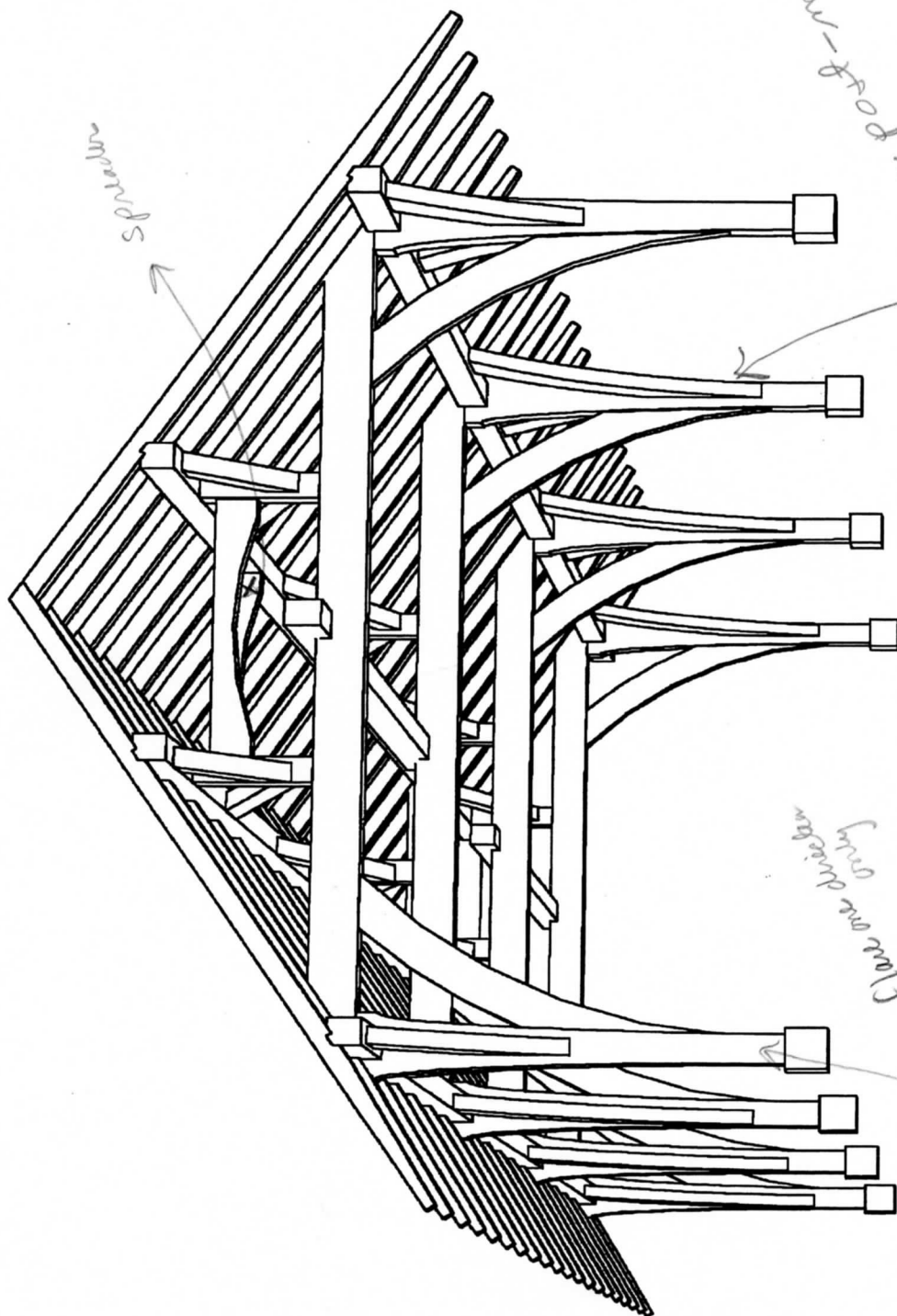
walls up + where the Beam

Isometric

Bldg w/ Rafters off



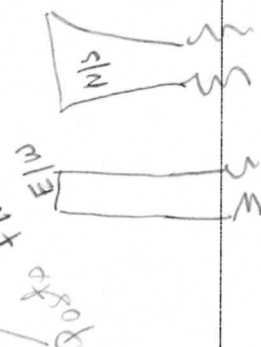
Isometric



posts on post-max for one side

springs

posts have one direction



I	II	III	IIII	V	VI	VII	VIII	IX
X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII
XIX	XX	XXI	XXII	XXIII	XXIV	XXV	XXVI	XXVII
XXVIII	XXIX	XXX	XXXI	XXXII	XXXIII	XXXIV	XXXV	XXXVI
XXXVII	XXXVIII	XXXIX	XL	XLI	XLII	XLIII	XLIV	XLV
XLVI	XLVII	XLVIII	XLIX	L	LI	LII	LIII	LIV
LV	LVI	LVII	LVIII	LIX	LX	LXI	LXII	LXIII
LXIV	LXV	LXVI	LXVII	LXVIII	LXIX	LXX	LXXI	LXXII
LXXIII	LXXIV	LXXV	LXXVI	LXXVII	LXXVIII	LXXIX	LXXX	LXXXI
LXXXII	LXXXIII	LXXXIV	LXXXV	LXXXVI	LXXXVII	LXXXVIII	LXXXIX	XLXXX
CL	CL I	CL II	CL III	CL IV	CL V	CL VI	CL VII	CL VIII
CL IX	CL X	CL XI	CL XII	CL XIII	CL XIV	CL XV	CL XVI	CL XVII
CL XVIII	CL XIX	CL XX	CL XXI	CL XXII	CL XXIII	CL XXIV	CL XXV	CL XXVI
CL XXVII	CL XXVIII	CL XXIX	CL XXX	CL XXXI	CL XXXII	CL XXXIII	CL XXXIV	CL XXXV
CL XXXVI	CL XXXVII	CL XXXVIII	CL XXXIX	CL XL	CL XLI	CL XLII	CL XLIII	CL XLIV
CL XLV	CL XLVI	CL XLVII	CL XLVIII	CL XLIX	CL L	CL LI	CL LII	CL LIII
CL LIV	CL LV	CL LVI	CL LVII	CL LVIII	CL LIX	CL LX	CL LXI	CL LXII
CL LXIII	CL LXIV	CL LXV	CL LXVI	CL LXVII	CL LXVIII	CL LXIX	CL LXX	CL LXXI
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Un franc	Deux franc.	Un contre-marque Deux d'ite	Un double contre-marque	Un crochet Deux crochets	Un Double crochet	Un crochet contre-marque	Un Double crochet contre-marque
Un crochet double contre-marque	Un franc Un monté	Un monté contre-marque	Un monté double contre-marque	Un monté double contre-marque	Un monté double crochet contre-marque	Double contre- marque crochet Un monté	Un Passe-d'
Un, Pous-ite contre-marque.	Un Passe-d'ite Crochet	Double crochet Passe-d'ite contre-marque.	Un Passe-d'ite Un monté	Un Passe-d'ite contre-marque Un monté	Un Passe-d'ite Crochet Un monté	Un Passe-d'ite contre-marque crochet double	Un Passe-d'ite double crochet double monté
Un Langue de vipère	Un Langue de vipère contre-marque	Un Langue de vipère double contre-marque	Un Langue de vipère Passe-d'ite	Un Langue de vipère Passe-d'ite contre-marque	Un Langue de vipère, Un monté	Un Langue de vipère Un monté contre-marque	Un Langue de vipère passe-d'ite double monté
Un Langue de vipère, contre- marque & monté.	Un Langue de vipère Un crochet.	Un Langue de vipère crochet contre-marque	Un Langue de vipère crochet passe-d'ite	Un Langue de vipère crochet passe-d'ite contre-marque	Un crochet Un monté	Double crochet Deux monté	Un crochet à la croix
Un contre- marque à la croix	Un Crochet à la croix	Un Passe-d'ite à la croix	Un Langue de vipère à la croix	Quatre contre-marque Un monté	Cinq contre-marque	Six Crochet	Sept. Un monté
Un contre-marque Deux monté	Neuf Double contre-marque	Deux Un Crochet contre-marque	Neuf à la croix	Un contre-marque à la croix	Un Crochet au B	Un Passe-d'ite au B	Un Langue de vipère au B
Un contre-marque Deux monté	Neuf Double contre-marque	Deux Un Crochet contre-marque	Neuf à la croix	Un contre-marque à la croix	Un Crochet au B	Un Passe-d'ite au B	Un Langue de vipère au B
Un contre-marque Deux monté	Neuf Double contre-marque	Deux Un Crochet contre-marque	Neuf à la croix	Un contre-marque à la croix	Un Crochet au B	Un Passe-d'ite au B	Un Langue de vipère au B
Un contre-marque Deux monté	Neuf Double contre-marque	Deux Un Crochet contre-marque	Neuf à la croix	Un contre-marque à la croix	Un Crochet au B	Un Passe-d'ite au B	Un Langue de vipère au B
Un contre-marque Deux monté	Neuf Double contre-marque	Deux Un Crochet contre-marque	Neuf à la croix	Un contre-marque à la croix	Un Crochet au B	Un Passe-d'ite au B	Un Langue de vipère au B
Un contre-marque Deux monté	Neuf Double contre-marque	Deux Un Crochet contre-marque	Neuf à la croix	Un contre-marque à la croix	Un Crochet au B	Un Passe-d'ite au B	Un Langue de vipère au B
Un contre-marque Deux monté	Neuf Double contre-marque	Deux Un Crochet contre-marque	Neuf à la croix	Un contre-marque à la croix	Un Crochet au B	Un Passe-d'ite au B	Un Langue de vipère au B
Un contre-marque Deux monté	Neuf Double contre-marque	Deux Un Crochet contre-marque	Neuf à la croix	Un contre-marque à la croix	Un Crochet au B	Un Passe-d'ite au B	Un Langue de vipère au B
Un contre-marque Deux monté	Neuf Double contre-marque	Deux Un Crochet contre-marque	Neuf à la croix	Un contre-marque à la croix	Un Crochet au B	Un Passe-d'ite au B	Un Langue de vipère au B

1 11 etc

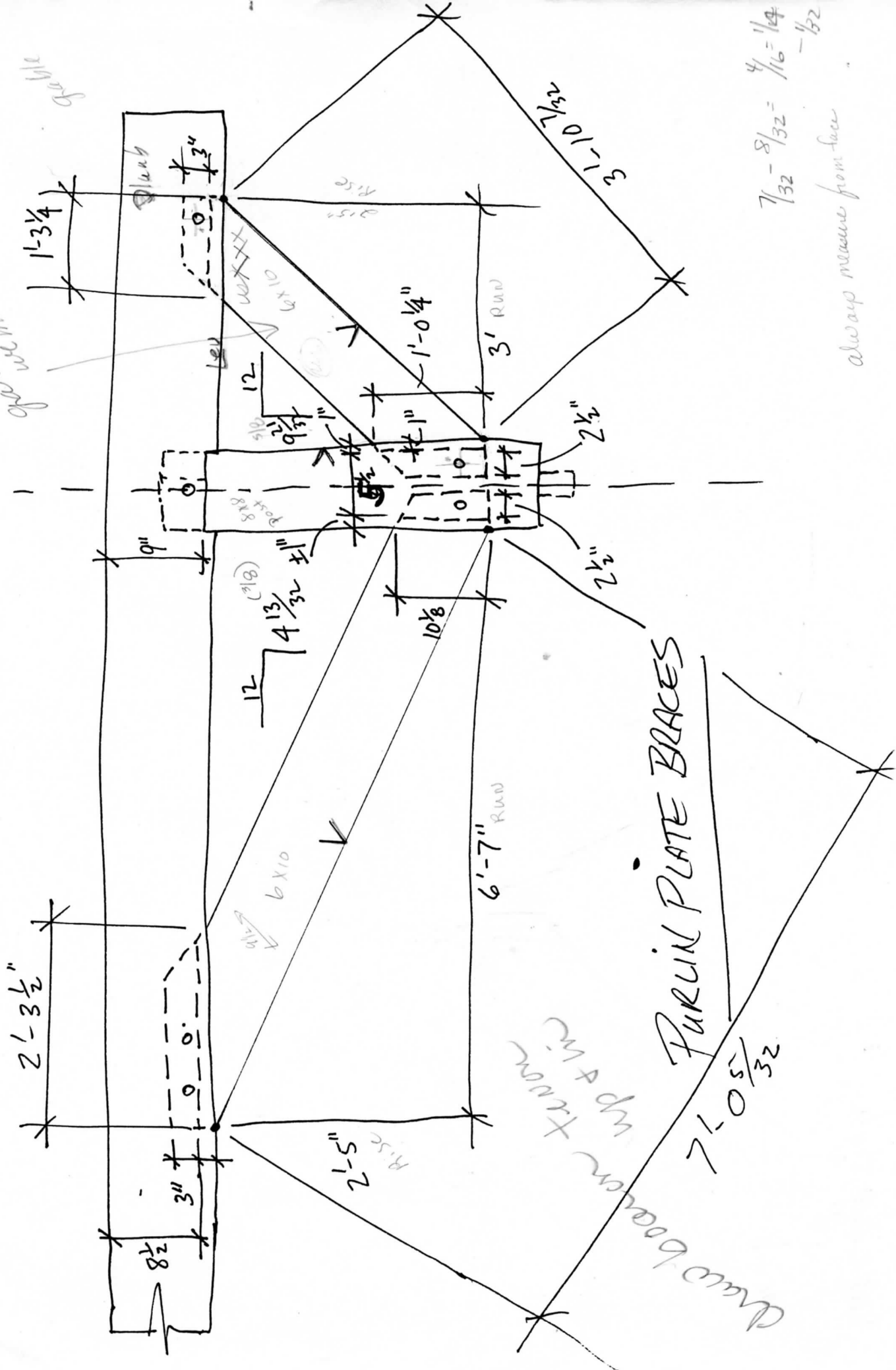
h. h. etc.

mark BTM of Brases

Start at left corner + work right for numbering

If not straight wood
Snap a chalk line to get plumb & level line

over the middle
bleeding a, sets
back.


$$71 - 8/32 = 4/16 = 1/4$$

always measure from face

JOINERY LAYOUT SCRIPT

1. Decide which timber in the frame you are going to work on and note it's size. Name it using a convenient labeling system.
2. Determine shoulder-to-shoulder length from drawings; add tenon lengths (if any) to find overall length needed.
3. Chose appropriate piece from timber inventory, keeping in mind it's eventual location in the frame and appearance requirements.
4. With timber on horses, identify crowned surfaces (if any) - on horizontal members crown should usually be up to resist loading; vertical members in a plane should all have crown the same way, either in or out. Check for "wind", or twist.
5. Check actual vs. nominal dimensions. Identify the two adjacent surfaces which will be the layout faces (must be square to each other). Layout faces are dimensional benchmarks - on horizontal members the top surface is usually a layout face (floor level, roof surface, etc.). Outside faces are also usually layout faces. A corner post, for example, must have it's two outside faces as the layout faces. For timbers where this top or outside face guideline is not applicable, chose some other notation to keep track; we traditionally use the North and/or West faces.

*width first
depth 2nd*

Using layout faces (instead of centerlines) from which to measure joinery assures that all timbers on the outside of the building will have flush surfaces for the application of sheathing. This exercise also helps you visualize your "castle in the air"; it's critical you always know what your timber will look like in the finished frame in order to avoid mistakes. Once the layout faces are identified, you should be able to visualize which end of the timber is which. Keep appearance in mind when selecting layout faces, they are often hidden, so the best looking faces are often not layout faces.

6. Lay tape along the edge common to both layout faces and locate joinery; adjust tape back and forth (assuming you have extra length) to avoid knots and other defects.
7. Mark initial joinery positions as determined from drawings; layout individual joints, always keeping square on layout faces.
8. Make sure your layout is thoroughly checked by a MATURE, SOBER AND RESPONSIBLE PERSON WHO SEEMS TO KNOW WHAT THEY'RE DOING before you begin cutting.
9. Cut your most difficult joint first, so if you make a mistake you can perhaps move up or down the timber. Alternatively, cut one end and move along the timber, leaving the other end 'til last. Drill all mortises on one face at the same time while you have the boring machine handy, then you and your partner can finish them together. Have fun!

JOINERY CUTTING SCRIPT

In the layout phase, you've hopefully located your joinery to avoid most knots and other defects. This will make cutting much easier as you work the clear and predictable grain. The proper sequence of saw and chisel work generally involves severing the long wood fibers to a certain depth (cross-cutting) which then allows you to easily split out (rip) parallel to the grain thus removing a large hunk of wood to that depth. This technique is similar for both mortises and tenons:

1. Cross-cut one end of the timber. If this is the end of a tenon, this cut does not have to be perfect. All tenon lengths are cut $1/8$ " under nominal to be sure they don't bottom out in the mortise. Work your way down the timber using the following methods:

2. For tenons, cross-cut the shoulder line using a saw (perfect is good enough). Use this kerf to lay out the brace mortise (if there is one supporting that joint). Once the shoulder cuts have been made, split out the block to the tenon line by either:

- using an axe to kerf and rip;
- using your chisel to split out sections (take a corner off as a test cut first to see

if the grain is diving or rising);

- using a rip saw, especially if there are knots or wild grain.

3. When within $1/8$ " of the tenon's side lines (those running parallel to the grain) pare a bevel on the edges down to the line. Using these as a guide (and being careful not to cut them off) pare the face of the tenon down (using plane, slick or chisel) until square to these edges and layout face(s).

Reduce the end of the timber down, if required, to the size required to enter its housing using the same techniques as in Step #2. Using squares and/or calipers, check for proper size and dimensions from layout faces. Then taper tenon $1/8$ " (except for bearing surfaces) for $1-1/2$ " at its end, and lightly chamfer the edges where it enters the mortise.

- *Most beginners tend to leave their tenons too "fat", making assembly difficult* •

4. For mortises, remember "Saw it, score it, and bore it". Carefully cross-cut the housing lines and score (with a chisel or knife) the sides of the mortise. This prevents any tear-out from the boring machine crossing onto a visible surface. Set up the boring machine, making sure your boring square to your layout faces. Sometimes this requires shimming the machine if you're on a non-layout face. Bore the end holes of the mortise first, setting the depth stop after the bit first starts to cut at full diameter. Bore holes in between, leaving at least $1/4$ " of wood between holes (don't overlap holes as this could bend or even break the bit). Remove remaining wood with your chisel, always severing the grain by cross-cutting before paring parallel to the grain. Be careful to keep the bearing surfaces of the mortise and housing square to the surface; other sides of the mortise can taper away a bit (no more than $1/8$ "). Check this (and the depth) with your combination square, and use the appropriate leg of a framing square for width. When the mortise is completely done, then chisel the housing to its finished depth.

5. Drill peg hole, draw-boring the tenon but not the mortise. All peg holes should be laid out and bored from the layout face.

GLOSSARY OF TIMBER FRAMING TERMS

ADZE. An axelike tool with its blade at right angles to its handle, used to shape or dress timbers.

ANCHOR BEAM. Major tying beam. Joined to post with shouldered through-tenon, wedged from the opposite side.

ARRIS. The edge at which two surfaces meet.

AUGER. A tool for boring holes in wood.

BAREFACED. A timber joint with only one shoulder.

BAY. Space between two bents. The area between structural crossframes.

BEAM. A main horizontal member in a building's frame.

BEETLE. A large wooden mallet typically weighing fifteen to twenty pounds. A maul.

BENT. An assemblage of timber-frame components that can be put together lying flat and then reared up into position. Usually they are crossframes but occasionally they are longitudinal wall frames.

BEST EDGE. The secondary reference face that is adjacent to the best face.

BEST FACE. The primary reference face that will typically receive flooring and wall and roof sheathing.

BEVEL. An angle through the thickness of the material.

BIRD'S MOUTH. A V-shaped notch that resembles a bird's open beak. It is cut into the base of a rafter and received by the plate.

BORING MACHINE. A hand-operated device with gears that drive an auger bit for boring large holes.

BOW. A slight curve in a member after sawing or seasoning.

BRACE. A diagonal timber or a temporary piece of lumber that prevents distortion in a frame.

BRACED FRAME. Timber frame.

BROADAXE. A type of axe that has an unusually wide blade beveled only on one side, with an offset handle. Used to hew timbers from logs. A side axe.

BUCKLING. Bending of a timber as a result of a compressive force along its axis.

CANTILEVER BEAM. A projecting timber that supports an overhang.

CARRYING STICKS. Sticks placed under a timber to provide an easy hand hold for carrying. Typically, two carrying sticks and four people are needed to carry a timber in this way.

CHAMFER. A simple bevel done for embellishment of a timber.

CHECKS. Separation of wood fibers following the direction of the rays. Caused by the tension of uneven drying.

CHORD. The upper or lower timber in a truss.

CIRCULAR SAW. Power saw with circular saw blade.

COLLAR PURLIN. Horizontal longitudinal beam supporting collar ties.

COLLAR TIE. Horizontal connector between a pair of rafters used to reduce sagging or spreading of rafters.

COMBINATION SQUARE. A tool that can be used to layout 45-degree or 90-degree angles. The stop is adjustable along the blade for use as a depth gauge.

COME-ALONG. A hand-operated ratchet winch. Used for pulling joints together, as a safety tie when raising a bent, and for pulling the frame together during the raising.

COMMON RAFTERS. Closely and regularly spaced inclined timbers that support the roof covering. Independent of bent system (see principal rafters).

COMPRESSION. Caused by a pressing or crushing type of force.

CORNER CHISEL. A heavy-duty L-shaped chisel struck with a mallet. Used for cleaning out corners of a mortise.

CROSSCUT SAW. Saw designed to cut across the grain.

CROWN OF TIMBER. A bow in a timber that is placed up in spanning members where the load will tend to straighten it.

CROWN POST. Central vertical post of a roof truss that connects the bent plate or girt to the collar tie or collar purlin.

CRUCK. Primitive truss formed by two main timbers, usually curved, set up as an arch or inverted V. Each half of the cruck is called a blade, and a pair is often cut from the same tree.

CRUSHING. A compressive failure. Permanent deformation resulting from compression.

DEAD LOAD. Weight of building (roof, floors, walls, etc.).

DEPTH. The vertical thickness of a beam.

DIAGONAL GRAIN. Grain that is other than parallel to the length of a timber. This will greatly reduce the strength of a timber.

DIMENSIONAL LUMBER. Planed lumber that is sold according to its nominal size.

DRAGON BEAM. A timber bisecting the angle formed by two wall plates.

DOVETAIL. A tenon that is shaped like a dove's spread tail to fit into a corresponding mortise.

DRAWBORE. To offset the peg hole on the tenon in order to draw the joint tight when it's assembled and pegged.

DRAW KNIFE. A knife blade with handles on both ends so that the knife can be pulled by both hands toward the user.

DRIFT HOOK. Drift pin.

DRIFT PIN. Used to pin joints temporarily when test-assembling a frame.

DROP. Ornamental pendant. The tear-shaped termination to the lower ends of the second-story post of a framed overhang. Also known as a pendill.

EAVE. Overhang at the lower end of a roof's pitch that projects outside a wall.

EXCESSIVE BENDING AND DEFLECTION. Values of allowable bending of timbers within a frame that have been established by building codes. Anything greater than these values is considered excessive.

FASCIA. The board used to trim out the edge of the roof.

FIBER FAILURE. Failure from tension in the lower fibers of a timber.

FRAMING CHISEL. A heavy-duty chisel typically with one-and-one-half- to two-inch-wide blade. Designed to be used with a mallet.

FRAMING SQUARE. Also called a steel square. L-shaped metal tool used for laying out joinery. It has a body twenty-four inches long and two inches in width, and a tongue sixteen inches by one and one-half inches.

FREE TENON. A tenon used as a separate item, both ends being fitted into mortises cut into two timbers to be joined. A spline tenon.

FROE. A tool for cleaving shingles, clapboards, pegs, or sections for furniture.

GABLE ROOF. A double-sloping roof that forms an A-shape.

GAMBREL ROOF. A double-pitched roof with the lower slope steeper than the upper slope.

GIN POLE. A lifting device composed of a single pole, stayed by guy lines, from which a block and tackle can be hung.

GIRDER. Major timber that spans between sills and carries floor joists..

GIRDING BEAM. The large crossbeam carrying the second-floor joists and tying the posts at the second-floor level.

GIRT. Major horizontal timber that connects posts.

GREEN WOOD. Wood freshly cut that is not dried or seasoned.

GUNSTOCK POST. A post wider at the top than the bottom. The wider portion provides more wood for intersecting joinery. Also called a jowled post.

HALF DOVETAIL. A dovetail tapered only on one side.

HALF LAP. A joint in which the two timbers are lapped or let-in to each other.

HALF-TIMBERED FRAME. An ancient building system in which the space between the timbers is filled with brick, plaster, or wattle and daub, so that the timbers are revealed to the exterior and to the interior of the building. The wattle was a framework of woven withes covered by layers of daub consisting of clay, lime, horsehair, and cow dung.

HALVING. The removal of half the depth of two timbers in order that they may cross each other. A half lap.

HAMMER BEAM. A roof bracket projecting from the top of the wall that supports a roof truss. The design creates a large roof span with relatively short timbers.

HARDWOOD. Wood of certain deciduous trees, e.g., oak, maple, ash, etc.

HEARTWOOD. The inner, nonliving part of the tree that is typically the more durable portion.

HEWING. To use a broadaxe to square up a log along its length.

HOOK PIN. Drift pin.

HOUSING. The shallow mortise or cavity for receiving the major part of a timber end. Usually coupled with a smaller deep mortise to receive a tenon for tying the joint.

JOINERY. The art or craft of connecting timbers using woodworking joints.

JOINT. The connection of two or more timbers.

JOISTS. Small, parallel timbers that complete the floor frame.

JUGGLING. Scoring a log at wide intervals and then splitting off the chunks between. It removes bulk

wood prior to broadax work.

KERFING. Either a series of cuts with a circular saw set at a desired depth to remove a section of wood or the hand-sawing along the shoulder of an assembled joint to improve the fit of the joint.

KING POST. A central, vertical post extending from the bent plate or girt to the junction of the rafters.

KNEE BRACE. A small timber that is framed diagonally between a post and a beam.

LAYOUT. The drawing of a joint on a timber before it is cut.

LEAN-TO. A shed section of a building that is framed into the main frame.

LIVE LOAD. Weight due to occupancy of building (people, furnishings, etc.).

LOAD. Weight.

MALLET. A hardwood hammer weighing from one and one-half to two and one-half pounds. Used for driving a chisel.

MARRIAGE MARKS. Marks that determine a timber's placement in the frame.

MAUL. Beetle.

MAXIMUM ALLOWABLE FIBER STRESS IN BENDING. Safe design standard for fiber stress.

MAXIMUM ALLOWABLE HORIZONTAL SHEAR STRESS. Safe design standard for shear stress along the longitudinal axis of a beam.

MITER. An angle across the face of the material.

MODULUS OF ELASTICITY. A measure of stiffness of a material. The ratio of stress (force per area) to strain (deformation).

MOMENT. The product of force times distance from which it acts. This causes a beam to bend.

MOMENT OF INERTIA. A property that reflects the strength of a timber dependent upon the size and shape of its cross section. It's the measurement of resistance which a cross-section of a beam offers to rotation about its neutral axis. (Formula: $I = bd^3/12$)

MORTISE. A groove or slot into which or through which a tenon is inserted.

MORTISE-AND-TENON JOINT. Any joint in which a projection on one end of a timber is inserted into a groove or slot in another timber.

NOMINAL SIZE. Undressed dimension of lumber. For example, lumber with a nominal size of two inches by four inches will have an actual size of about one and one-half inches by three and one-half inches.

OVERALL LENGTH. Total length of timber including length of tenons on either end.

OVERHANG. Projection of second story beyond the first.

PEAVEY. A tool for rolling logs.

PEG. A wooden dowel one to one and one-half inches in diameter, usually of oak or locust.

PIKE POLE. A long pole pointed with a sharpened spike used for raising frames. These tools were known as early as the fifteenth century, when they were called "butters."

PIN. Small peg.

PLATES. The most important longitudinal timber in a frame. It ties the bents together at their tops and stiffens the wall plane where it meets the roof plane. Also called a wall plate. Plates support the base of the rafters.

PLUMB. Vertical.

POST. Vertical or upright timber.

POST-AND-BEAM FRAME. Post and beam: A structural system whereby floor and roof loads are carried on principal timbers that may be merely stacked and fastened with hardware or may utilize timber joinery.

POWER HAND PLANER. A hand-held planer with rotating cutting blades. Used for finishing surfaces of rough-sawn timbers.

PRICK POST. A post of singlestory height.

PRINCIPAL RAFTERS. A pair of inclined timbers that are framed into a bent.

PURLINS. Horizontal timbers that connect rafter trusses.

PURLIN PLATE. A longitudinal continuous timber that supports common rafters near the center of their span.

PYTHAGOREAN THEOREM. For a right triangle, the sum of the squares of the sides is equal to the square of the hypotenuse. $a^2 + b^2 = c^2$. Used in calculating rafter and knee-brace lengths.

QUEEN POST. A pair of vertical posts of a roof truss standing on the bent plate or girt and supporting the rafters or collar tie.

RABBET PLANE. A plane with blade exposed completely across the sole. Used to finish shoulders of tenons.

RACK. The action of straining or winching a frame to bring it into square or plumb.

RAFTER. The timbers spanning from eave to ridge to which the roof sheathing is attached.

RAFTER FEET. The lower ends of the rafters that are framed into the plate.

RAFTER PEAK. The point where the tops of the rafters meet.

RAISING THE FRAME. Erecting the bents and roof trusses and joining and pegging the other timbers to the frame.

REACTION. A force pushing up in response to a load.

REARING THE FRAME. English term. Equivalent to "raising the frame."

RELISH. The narrow bit of wood remaining between a mortise and the end of a timber. Also, the wood between a peg hole and the end of the tenon.

RIDGEPOLE. A horizontal timber at the peak of the roof to which the rafters are attached.

RIP SAW. Saw designed to cut parallel to grain.

RIVE. To split wood along the grain. For example, peg stock is riven.

ROOF PITCH. Inches of rise per foot of run. For example, a 45-degree roof has twelve inches of rise for each foot of run and is therefore called a "twelve pitch" roof.

ROOF TRUSS. A structural network of timbers that form a rigid structure to support the roof.

ROUTER. A power tool with rotating cutting blades used in timber framing for rounding or embellishing edges of timbers.

SCARF. To join two timbers to make a longer beam. Also, the joint used to join the timbers. There are many variations of scarf joints, such as bladed, bridled, and stop splayed.

SCORING. Removing the bulk of the waste wood from a log prior to using the broadax.

SCRIBE. To mark a timber by scratching a line with a sharp instrument; also to cut or shape a timber so that it fits the somewhat irregular surface of another.

SCRIBE RULE. The older, more time-consuming system of layout where each timber is custom mated to its neighbors. The process requires setting out bents in a framing yard or on a floor deck.

SEASONED WOOD. Dried wood.

SHAKES. Separation of wood fibers that follow the curvature of the growth rings. Normally occurs during growth of the tree.

SHEAR FAILURE. Failure from shearing along the fibers of a timber.

SHEARING. A force causing slippage between layers.

SHEATHING. The covering of boards or of waterproof material on the outside wall of a house or on a roof.

SHED ROOF. A roof sloping in one direction.

SHIM. Thin tapered pieces of material such as a shingle. Used for leveling sill timbers.

SHOULDER OF TIMBER. Point of intersection at the joint of two assembled timbers. Refers to timber with tenon.

SHOULDER-TO-SHOULDER LENGTH. Length of timber between the shoulders of the two end joints. (The overall length minus length of end tenons.)

SHRINKAGE. The reduction in size as wood dries.

SILL TIMBERS. Horizontal timbers that rest upon the foundation.

SLICK. A chisel with a blade two and one-half or more inches in width. It is pushed by the hands instead of being struck with a mallet.

SOFFIT. The underside part of a building such as under a roof overhang.

SOFTWOOD. Wood primarily of a conifer or evergreen, e.g., pine, spruce, Douglas fir, etc.

SPAN. The shoulder-to-shoulder distance.

SPIRAL GRAIN When the wood fibers twist like a corkscrew.

SPLITS. Complete separation of wood fibers.

SPOKESHAVE. An enclosed knife with two handles and a slightly curved sole. Used by pushing away from you, it is used for finishing curved surfaces.

SQUARE RULE. A system of layout in which a smaller, perfect timber is envisioned within a rough outer timber; all joints are cut to this inner timber. Many timbers in a Square Rule frame are interchangeable.

SQUARING OFF. The process of drawing and cutting off one end of a timber so that the cut gives a

plane surface perpendicular to the timber's length.

STICKERS. Spacers used between timbers or boards when stacking to provide air circulation. Also use to separate stacked bents for ease of working clamps, ropes, and come-alongs.

STOP. When a chamfer ends, usually just before a joint.

STRESS-SKIN PANEL. A sandwich of materials, containing two skins, one inside and one outside, and a core of insulation.

STRUT. A short timber placed in a structure either diagonally or vertically, designed to act in compression along the direction of its length.

STUB TENON. Tenon that stops within the timber it joins.

SUMMER BEAM. Major timber that spans between girts or plates (rather than posts) and supports joists.

TEMPLATE. A full-size pattern of thin material for laying out and checking joints.

TEMPORARY BRACING. Method of temporarily adding rigidity to a frame during the raising.

TENON. The projecting end of a timber that is inserted into a mortise.

TENSION. A force causing the tendency of extension. In timber framing, captured tension adds rigidity and strength.

THROUGH TENON. A tenon that passes through the timber it joins. It may extend past the mortise and be wedged from the opposite side.

TIE BEAM. A key horizontal timber, often at eave height, that prevents the thrust of the roof from spreading the walls apart.

TIMBER. A large squared or dressed piece of wood ready for fashioning as one member of a structure.

TIMBER FRAME. A frame of large timbers, joined and pegged together, supporting small timbers to which roof, walls, and floors are fastened. Same as braced frame.

TONGUE AND FORK. A type of joint in which one timber has the shape of a two-prong fork and the other a central tongue that fits between the prongs.

TRANSIT. A telescope set on a tripod used for leveling foundation or sill timbers.

TRUNNEL OR TREENAIL. A peg. Sometimes refers to an extra-large peg.

TRUSS. A rigid assembly of timbers relying on triangulation to span distances impractical for a single member.

VERNACULAR ARCHITECTURE. Local building styles that are built using local labor and materials; these styles are directly influenced by regional culture, conditions, and climate.

WALKING BEAMS. Two parallel beams laid on the ground used to assist moving timbers with a pivoting action.

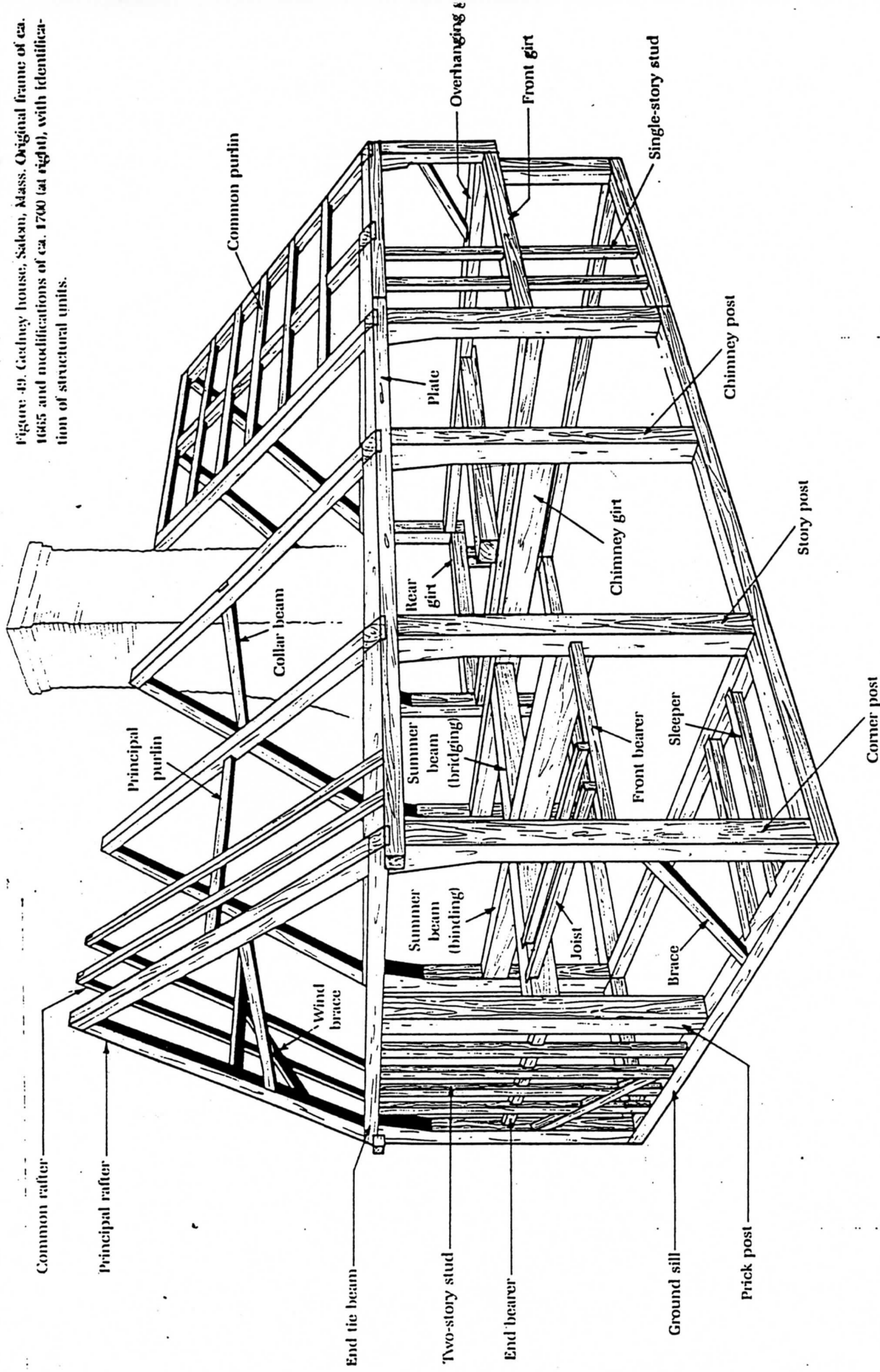
WANE. Nature's chamfer; the rounded edges of a timber squared from an undersized log.

WATER LEVEL. A flexible tube with glass ends, filled with water. Used for leveling foundation or sill timbers. A substitute for a transit.

WIDTH. The horizontal thickness of a beam, or thickness of a post.

WIND BRACE. English term. Equivalent to knee brace.

Figure 49. Godney house, Salem, Mass. Original frame of ca. 1645 and modifications of ca. 1700 (at right), with identification of structural units.



have contract of 1743 in Ipswich which specifies in the original support on the roof beam and in order that the tie beam / he roof might be securely seated, each of the p is in the front

found in early documents. Not invariable are the date made in the front and rear walls may be re-
 the building when support otherwise summer
 beams. It is probably to such a member that In-
 crease Mat refers in his account of a bolt of
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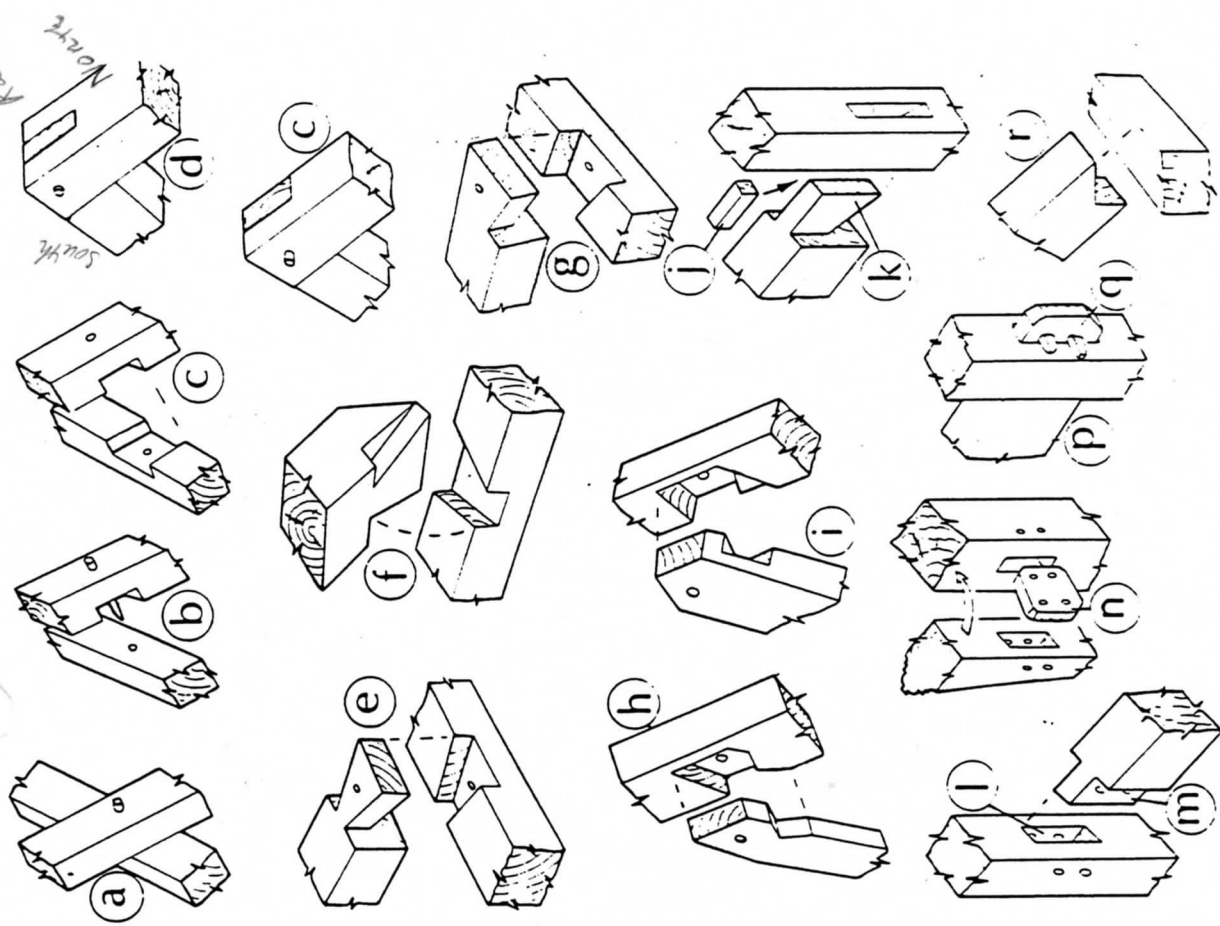


Fig 11 Lap and mortice joints a) Lap joint b) Half-lap joint c*) Half-lap joint d) Bridled joint e) Dovetail f) Lap dovetail g) Bare-faced dovetail h) Notched-lap joint i) Secret notched-lap joint j) Key k) Bare-faced dovetail tenon l) Mortice m) Tenon n) Slip tenon p) Anchor beam q) Through tenon r) Birdmouthed joint

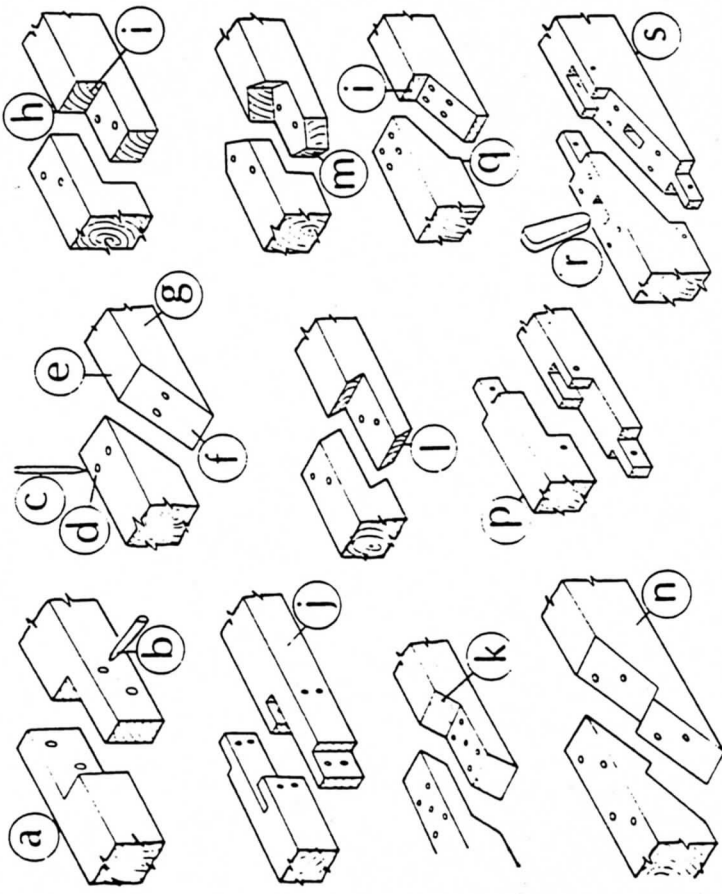


Fig 12 Scarf joints a) Face-halved scarf b) Side-pegging c) Peg d) Face-pegging e) Face f) Splayed scarf g) Side h) Side-halved i*) Vertical butt j) Face-halved and bridled scarf k) Squinted butt l) Undersquinted butt m) Sallied butt n) Splayed and tabled scarf p) Side-halved and bridled scarf q) Stop-splayed scarf r) Key s) Stop-splayed scarf with bridled butts and face key