

Micro-Press.com

You are viewing sample pages from our textbook:

“Illustrated Residential and Commercial Construction”

We apologize for the quality of the images; it is sometimes difficult to achieve an acceptable image quality from page scans.

Pages 8-8 to 8-15 describe the manufacture and layout of prefabricated wood trusses as used in typical residential construction. Specialized details are included, showing details at chimneys , roof overhangs, and heel cuts.

Page 8-16 shows the start of the section on rafters.

The pages you see are typical of the depth of detail and practical information presented in this book. Please see the Contents page for this book on our website at www.micro-press.com/contents_illustrated.

If you require more information about the contents of this book, please contact us directly at: info@micro-press.com

ROOFS



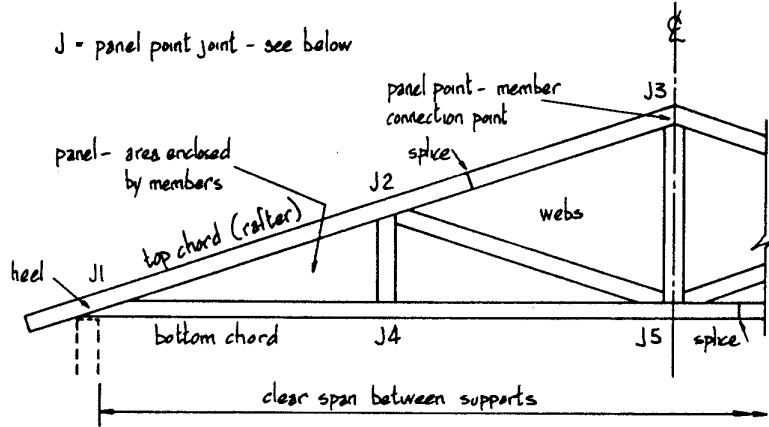
PREFABRICATED WOOD TRUSSES

In many regions the use of prefabricated roof trusses has supplanted the traditional rafter system in most types of residential and commercial construction. Wood trusses have wide design flexibility, with truss size and style limited only by manufacturing capabilities and shipping and handling considerations. Some of the principal advantages are:

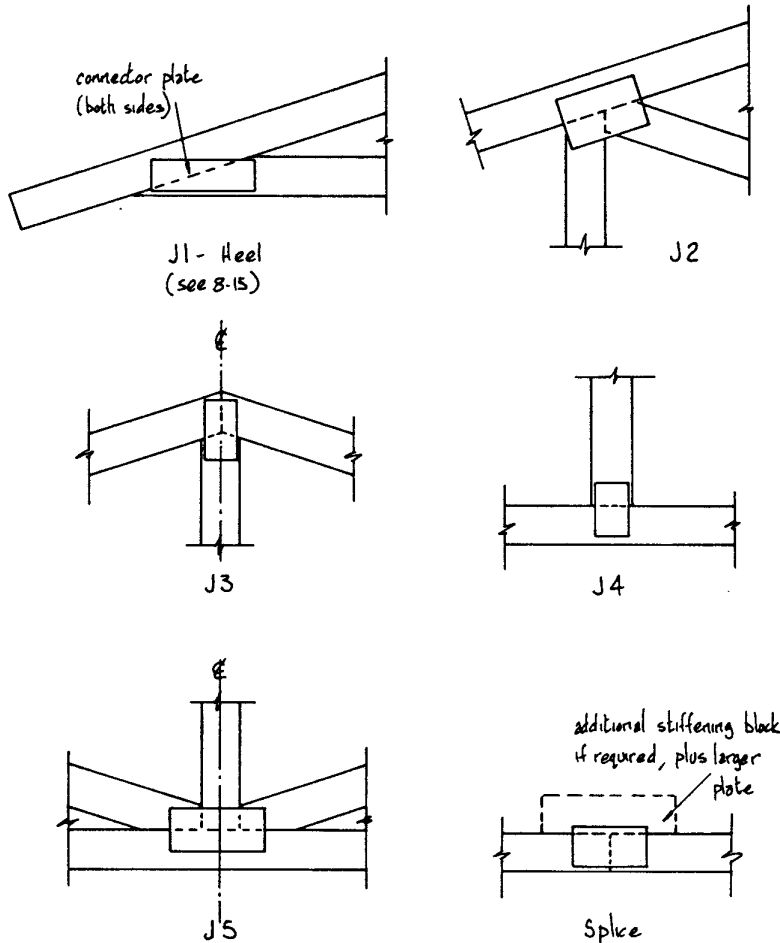
- Most trusses are custom designed and can accommodate almost any roof shape or loading condition.
- Truss members are pre-cut and factory assembled on a jig using galvanized connector plates (see 6-20). This allows fast production and accurate repetition.
- Site erection is very fast and does not require the skilled labor that a rafter system demands.
- The long span capability of trusses eliminates the need for interior load-bearing walls, allowing greater flexibility in floor layouts.
- General economies are received through the reduction of site pilferage, material shortages, and weather delays.

DESIGN AND ERECTION

- Using span and loading information contained on the working drawings, the truss manufacturer will design and fabricate each truss to suit the service conditions. Computer-generated truss design and shop drawings are standard in the industry.
- Copies of the truss design drawings will be supplied to the contractor for submission to local building inspection authorities.
- Careful handling is required in the erection and bracing of trusses. Excessive lateral bending during erection must be avoided or joint damage will result. Temporary and permanent bracing must be installed correctly to avoid instability. Refer to fabricators' instructions for exact erection details.
- In very cold regions a condition called "seasonal truss uplift" may occur. Refer to 10-54 for information.


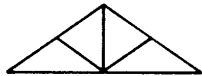

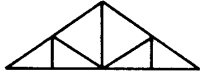




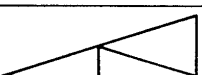







TYPICAL PREFABRICATED TRUSS symmetrical about centerline
connector plates not shown (see 6-20)





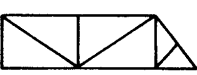

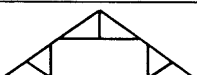
TRUSS TYPES	ROOFS B-E
-------------	---------------------

STANDARD TRUSSES

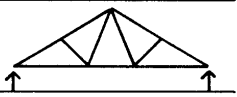
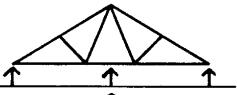


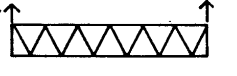
	KING POST short span - all construction types
	QUEEN POST short span - heavy top chord loading
	FINK all construction types up to 40ft (12 m)
	HOWE designed for lower chord support
	FAN heavy top chord loading
	SPECIAL KING POST up to 60ft (18 m) and light bottom loads
	BELGIUM (or DOUBLE FINK) long span applications to 60ft (18 m)
	SCISSOR vaulted ceilings
	2-2 MONO short span single slope
	3-2 MONO heavy top chord loads single slope
	GABLE END gable roof end walls
	HIP or MANSARD see B-10 for hip detail

	PRATT Flat Trusses
	WARREN top chord may have a slight slope in either mono or dual pitch

SPECIAL TRUSSES

BOBTAIL used at chimney openings or in split-level roofs	
DUAL SLOPE provides dual slope roof profile	
SINGLE SLOPE HIP/MANSARD hip or mansard roofs	
DUAL SLOPE ROOF/CEILING provides a combination of roof and ceiling slopes	
ATTIC FRAME provides living or storage space in attic	

TRUSS BEARING POSITIONS

DUAL BEARING	
TRI-BEARING	
SINGLE CANTILEVER	
DOUBLE CANTILEVER	
TOP CHORD BEARING	

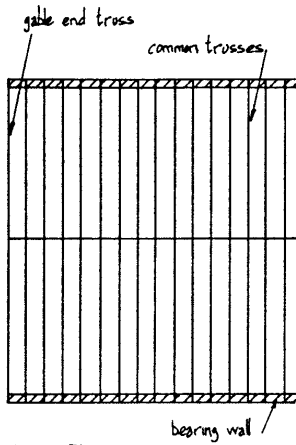
There are five basic truss bearing positions as illustrated here. Each truss must be engineered to suit design conditions.

ROOFS

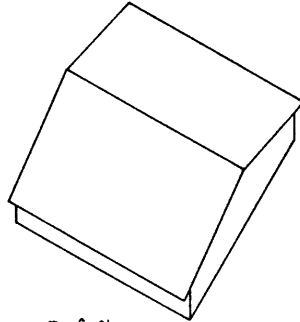
8-10

TRUSS SYSTEMS

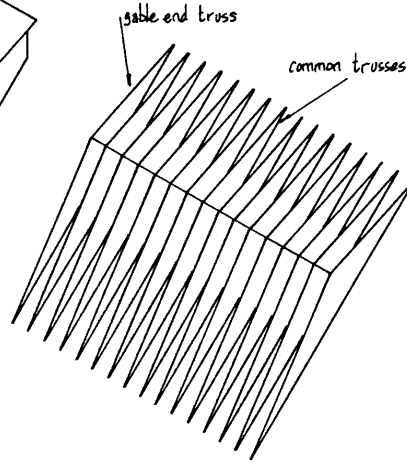
GABLE ROOF



Truss Plan



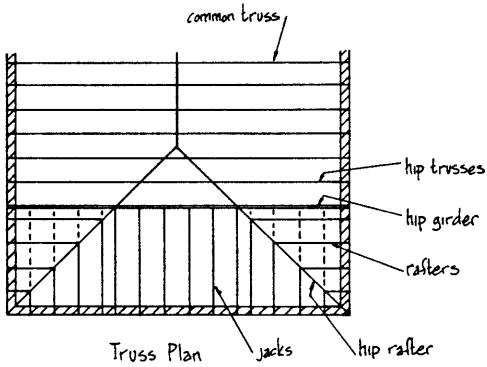
Roof Shape



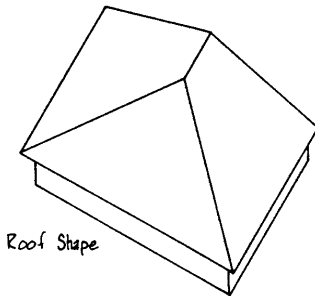
Truss Layout

The truss layouts illustrated on this and the next two pages are typical of those used in most regions.

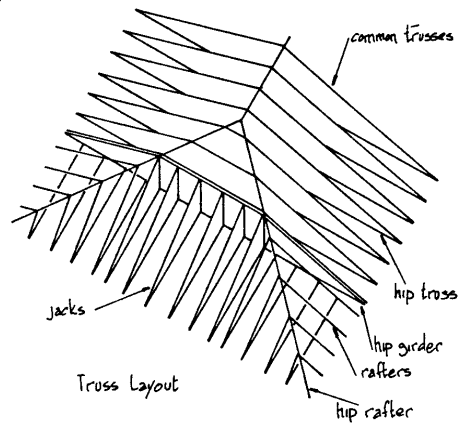
HIP ROOF



Truss Plan



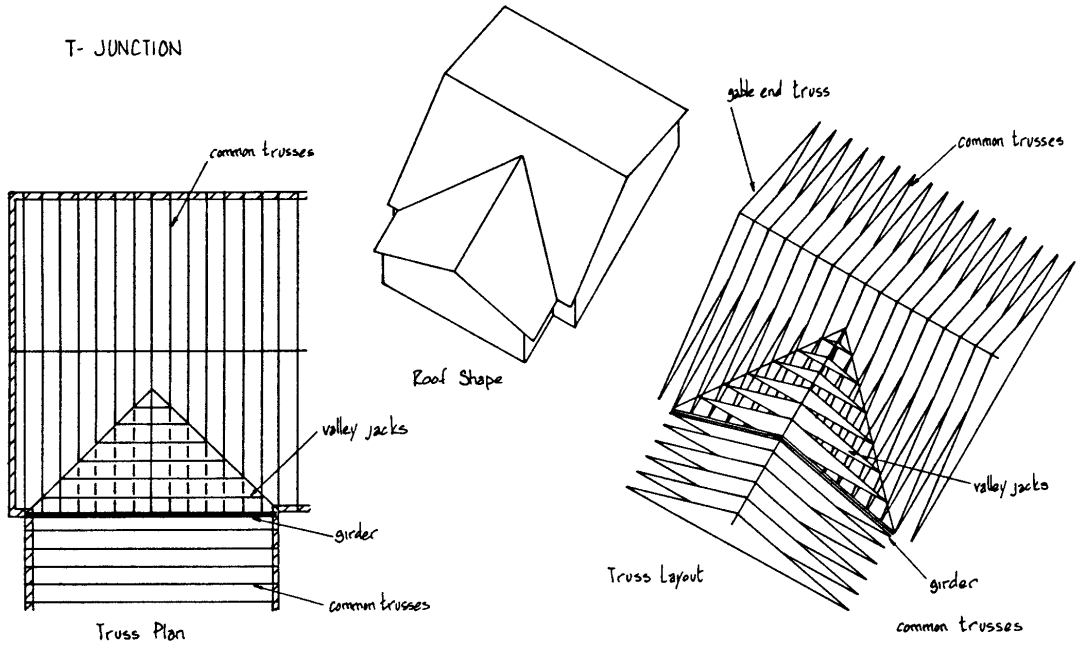
Roof Shape



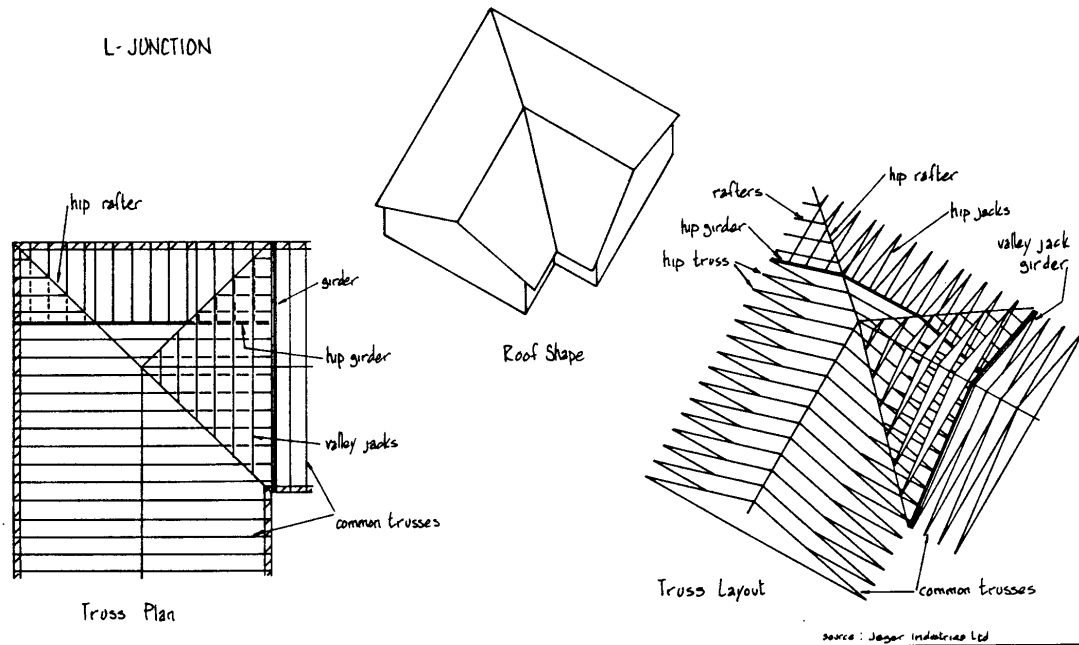
Truss Layout

source: Jager Industries Ltd.

T- JUNCTION



L- JUNCTION



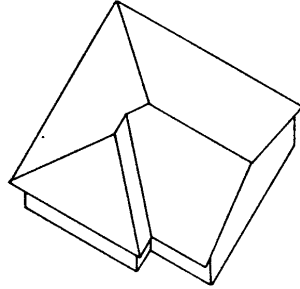
source : Jagan Industries Ltd

ROOFS

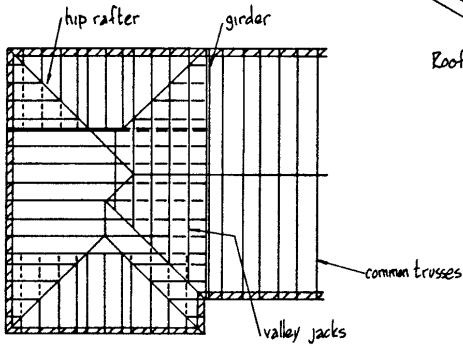
8-12

TRUSS SYSTEMS

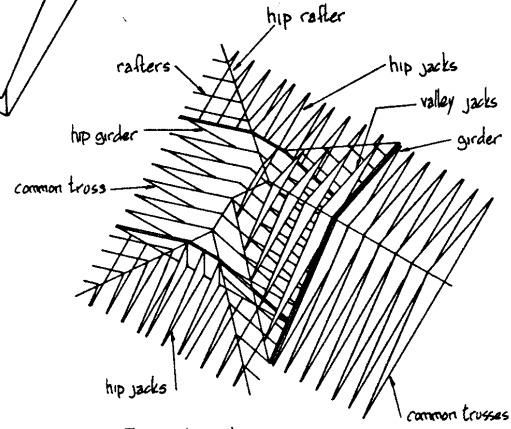
L- JUNCTION
Unequal Roof Heights



Roof Shape

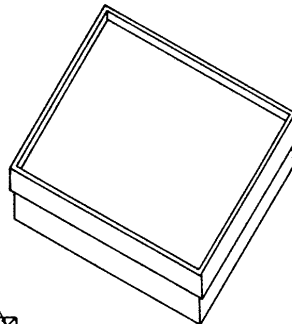


Truss Plan

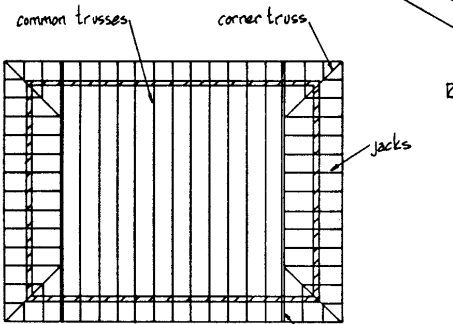


Truss Layout

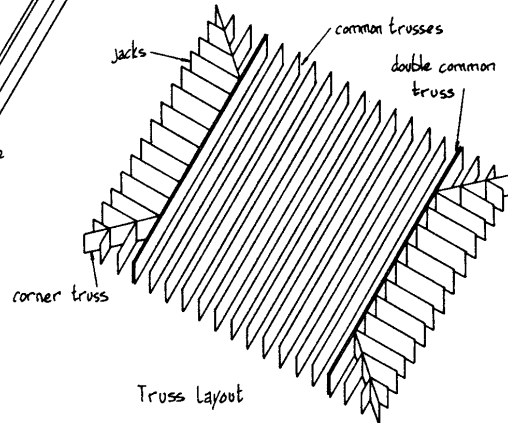
FLAT ROOF



Roof Shape



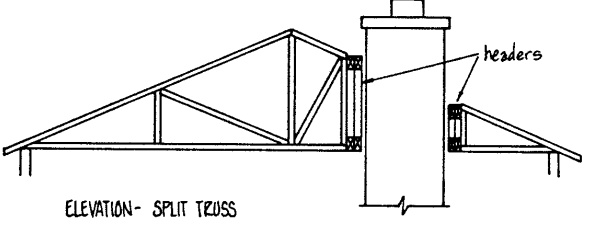
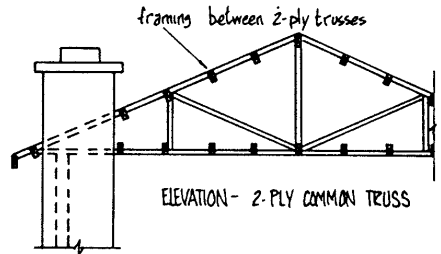
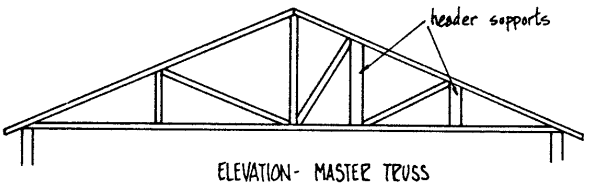
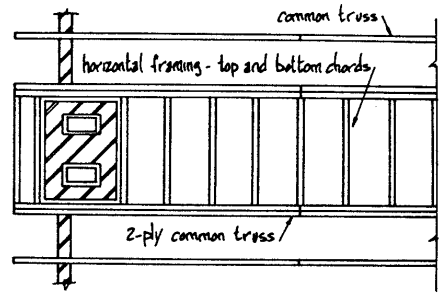
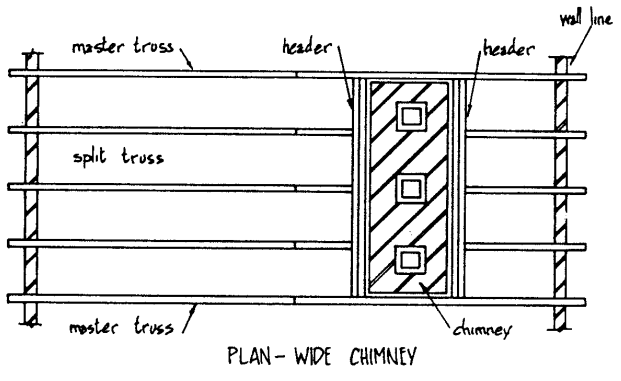
Truss Plan



Truss Layout

source : Jager Industries Ltd

TRUSSES AT CHIMNEYS / SOLID BEAMS	ROOFS 8-13
-----------------------------------	----------------------

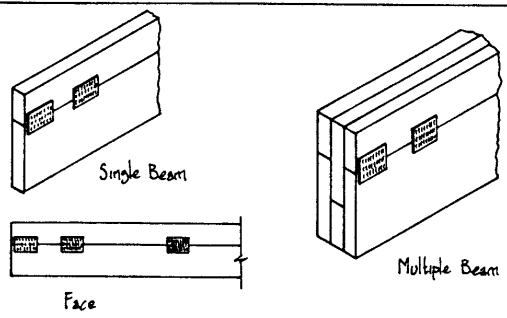


CHIMNEYS
 Where chimneys project through a trussed roof, either inside or outside the building lines, the framing used is determined by the opening size.

- For large chimneys a system of special trusses and headers is available that continues the roof line without interruption. Care must be taken in dimensional accuracy when ordering the special trusses.
- For narrow chimneys, separate framing bridging between-doubled-up standard trusses is used. This eliminates the need for special trusses and simplifies construction.

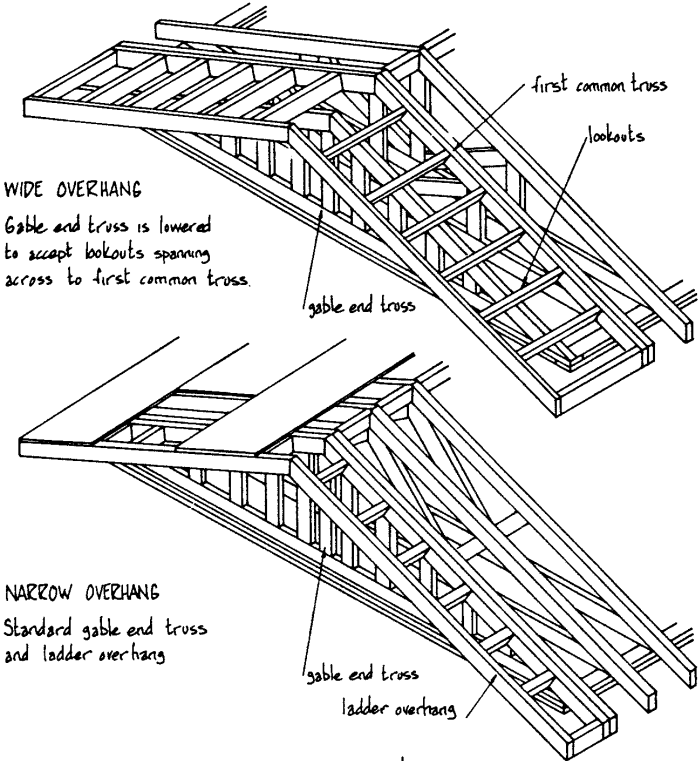
Note
 A 2-in (50) air space is required between the framing and the chimney to meet most fire codes.

BUILT-UP BEAMS
 In addition to trusses, built-up beams are also fabricated using pressure-applied metal connector plates. As illustrated at the right, both single and multiple beams are standard. Beams of this type are generally stronger than single-member beams of equal depth and are particularly economic when a beam depth of over 12 in (300) is required.



ROOFS
8-14

ROOF OVERHANGS



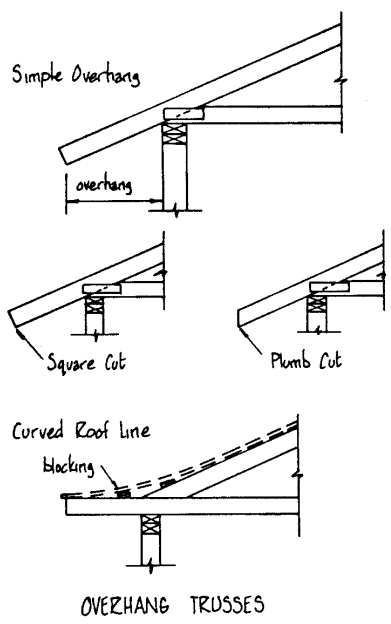
WIDE OVERHANG
 Gable and truss is lowered to accept lookouts spanning across to first common truss.

NARROW OVERHANG
 Standard gable end truss and ladder overhang

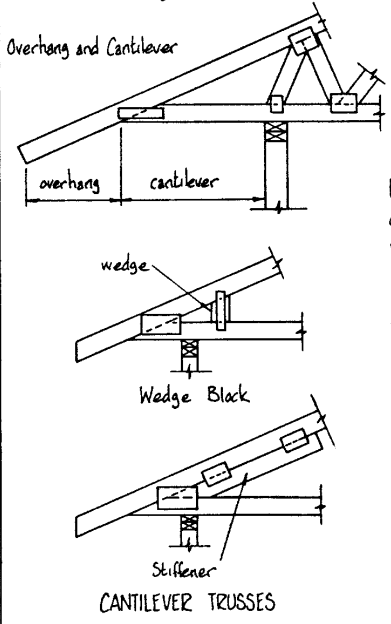
The size of roof overhang over a gable wall generally determines the method of framing.

- For large overhangs, a wide ladder is attached to the first truss inside the wall line and is supported by the gable end truss. To do this the gable end truss must have a lowered top chord to accommodate the lookout depth.
- For smaller overhangs the standard rafter framing method is satisfactory. A frame "ladder," with the same dimensions as the truss top chord, is attached to the gable end truss.

For additional information, see page 7-8.



OVERHANG TRUSSES



CANTILEVER TRUSSES

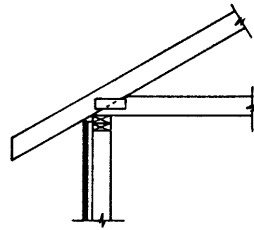
It is important not to confuse overhangs with cantilevers.

- An overhang applies only to the top chord of a truss. The bottom chord does not extend beyond the bearing.
- A cantilevered truss has both top and bottom chords overhanging the bearing. It must be designed so that roof loads are transferred to the bearing as shown in the three examples.

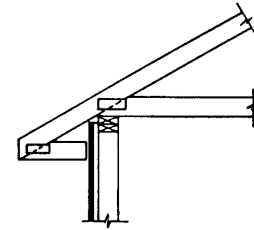
SOFFIT RETURNS / HEEL CUTS

SOFFIT RETURNS

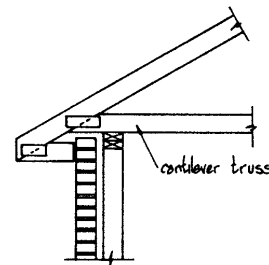
A soffit return added to the overhang of a truss provides framing for a horizontal soffit. The size and design of the return is determined by the wall conditions, as shown in these examples.



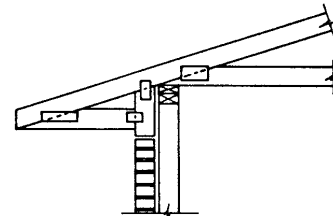
Exposed Top Chord



Boxed Soffit



Soffit Ending at Brick



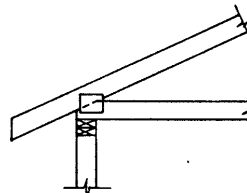
Soffit Extending Beyond Brick

HEEL CUTS

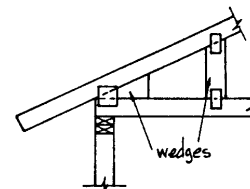
The heel or bearing of standard trusses as shown above are not deep enough to allow the installation of thick insulation over the wall plate and still maintain the required flow of ventilation air into the attic roof space.

There are two ways to solve this problem:

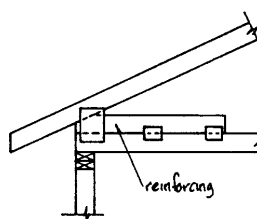
- The heel of the truss can be raised to accommodate varying insulation thicknesses, as shown, or
- Ventilation channels can be tacked to the underside of the roof sheathing to compress the insulation and provide passage for ventilation air. The channels are generally molded plastic or fiber ducts of various shapes. See 10-20 for details of this procedure and suggested vent area sizes.



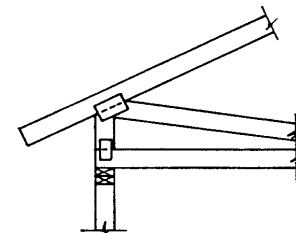
Modified Standard Truss



Modified Standard Truss



Reinforced Bottom Chord



Bobtail Truss

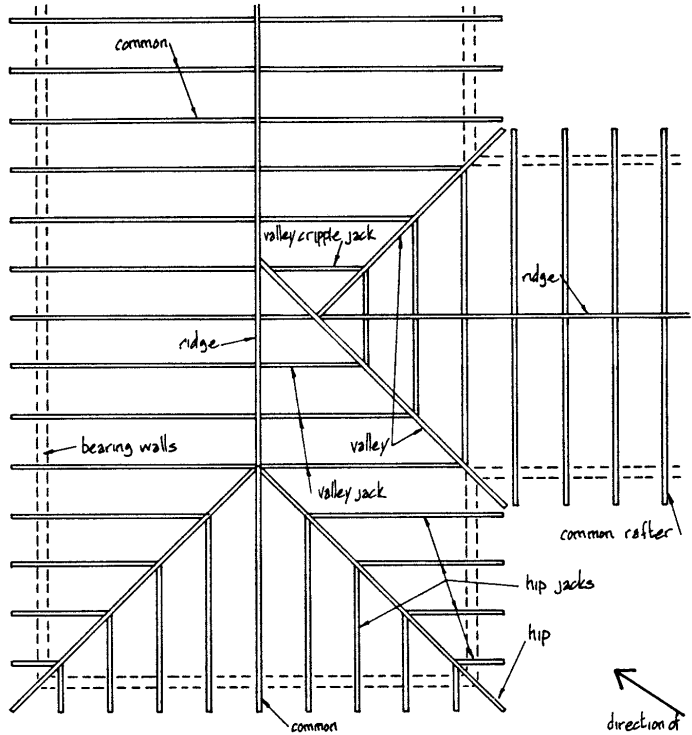
ROOFS
8-16

RAFTER SYSTEMS

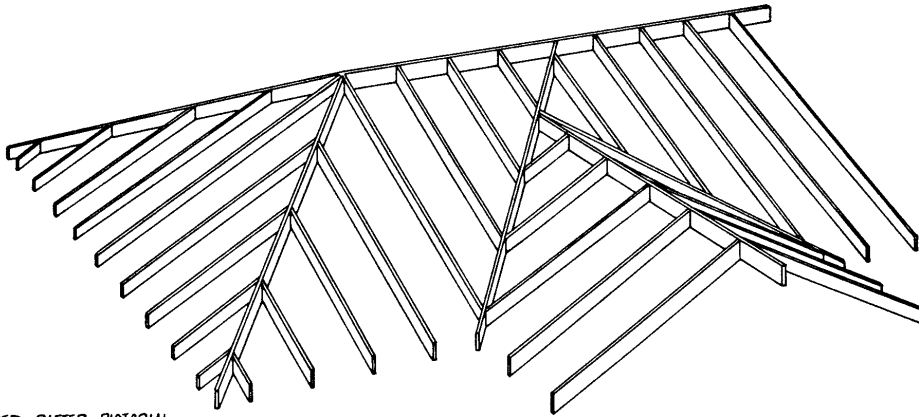
The design of raftered roof systems has been established over a considerable period of time and is generally referred to as "conventional" or "traditional" construction. Although truss systems are in widespread use, rafters are an equally valid choice for many buildings.

- In most roof types, sloping rafters are paired with horizontal ceiling joists to form a rigid roof frame.
- Rafters provide a base for the roofing material and support the roof loads.
- Ceiling joists support the ceiling finishes and act as ties between exterior walls. In some cases they also provide support for roof loads (see 8-24), or act as floors when attic space is used as a living area.
- Rafters are cut on-site and are erected one by one. Skilled carpenters are needed for all but the simplest roof types.
- Rafter and ceiling joist sizes are determined by span tables (see 8-19).

The types of rafters needed for a roof are determined by roof shape and style. The roof framing plan at the right and the matching pictorial drawing below indicate some of the various kinds of rafters and their typical names.



RAFTER LAYOUT - PLAN VIEW
Hip roof, T-intersection, with lower ridge line.



SIMPLIFIED RAFTER PICTORIAL
Ceiling joists and bearing walls omitted for clarity.