Information for Specifiers

What is a Trussed Rafter?

Trussed rafters or roof trusses are now specified for the majority of domestic roofs constructed in the UK and Eire. The trussed rafter is an individually designed component, engineered to provide a structural frame for the support of roof or similar structures.

Pre-fabricated from high quality, stress graded timbers and joined with steel nailplate fasteners, the trussed rafter offers:

A flexible, practical and fully engineered solution to your roofing requirements.

Economy of materials, as trussed rafters can use up to 40% less timber than a traditionally formed roof.

Reduced labour costs on site, due to the amount of pre-fabrications, releasing site joiners for more complex areas.

Quick erection of the roof structure enabling other trades to commence quickly.

Reduction in site waste, loss and pilferage of valuable materials.

Space saving on site, with no need for timber storage or carpentry work areas.

Competitive pricing from a nationwide network of Authorised Trussed Rafter Fabricators.

How to Specify Trussed Rafters

MiTek trussed rafters are available from a nationwide network of Authorised Fabricators. A full list of these companies is available on request from MiTek.

Please note that, unless a specific contract exists to the contrary, the Fabricators liability is limited to the design and supply of the individual trussed rafter components only. The responsibility for the design of the roof structure as a whole lies with the Building Designer (or Roof Designer if one has been appointed). Please refer to section 1.2 on Design Responsibility. There are, however, companies within the network of Authorised Fabricators that have the necessary experience and resources to undertake design responsibility for the roof structure as a whole.

To obtain competitive quotations for the design and supply of trussed rafters, contact one or more of the authorised Fabricators. They will be pleased to assist you in assessing your requirements.

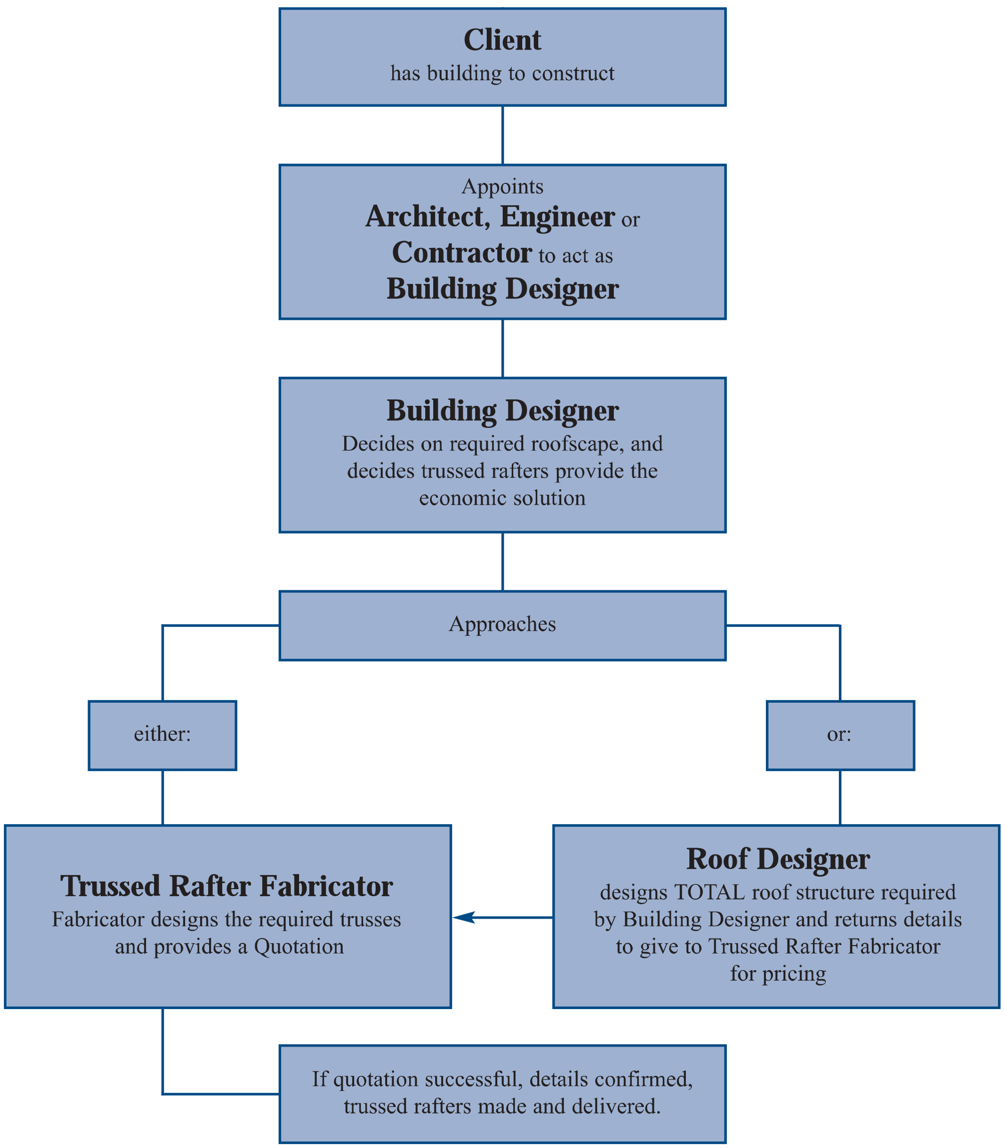
The Fabricator will require sufficient, clear information regarding the roof structure to determine the required trussed rafter profiles, dimensions, spacings, quantities, loadings, methods of support and any special features to be taken into account; together with the requirements for timber treatment, extra items required (eg Builders metalwork), delivery date and delivery address. A check-list of the information required, together with a list of the information to be provided by the Fabricator to you, follows later in section 1.2.

Using the MiTek Design system, the required trusses will be designed for your individual application and the Fabricator will provide you with the details required to support the quotation.

If the quotation is successful, and subject to all dimensions being checked prior to the manufacture of the units, your trussed rafters will be supplied to site ready for speedy erection of the roof support structure.

The Project Steps

To illustrate the line of action for a project where trussed rafters are to be used, the following diagram may be of assistance:



Notes:

On specific projects, the building designer may also encompass the function of Roof designer. This will generally be the case for small projects, where often, the Builder or his Architect will be the only professional people involved.

It is also possible for the roles of the Roof designer and the Trussed Rafter Fabricator to be combined, in the case where, by specific contract, the fabricator takes the responsibilities for the design of the whole or part of the roof structure. This arrangement will however be generally undertaken by the Fabricator on a professional, fee-paying basis.

Information for Specifiers

Design Responsibilities

The areas of Design Responsibility for the roof structure of a building are as follows:-

1. Trussed Rafter Designer

The Trussed Rafter Designer is responsible for the design of trussed rafters as individual components.

He or she must ensure the structural integrity of the trussed rafter units and inform the Roof Designer (or Building Designer where there is no specifically appointed Roof Designer), of any stability requirements needed in the design of the trussed rafters.

2. Roof Designer

If the Building Designer has appointed a Roof Designer, they are responsible for the design of the roof structure as a whole and must inform the Building Designer of all information pertinent to the roof regarding its interaction with the supporting structure and adjacent elements of the building.

If no person is appointed specifically as the Roof Designer it falls upon the Building Designer to undertake the responsibilities of the Roof Designer.

3. Building Designer

On every project it is essential that one person assume overall responsibility as Building Designer.

The Building Designer may be the owner of the building, his appointed Architect, a Structural Engineer appointed by the owner or Architect, or the Contractor or Builder.

The Building Designer is responsible for providing the information listed in Section: 1.3 (and in section 11.1 of BS.5268-3) to the trussed rafter designer and for ensuring adequate provision is made for the stability of the individual trussed rafters.

The Building Designer is responsible for detailing all elements of bracing required in the roof, including that necessary to provide the lateral restraints to truss members required by the Trussed Rafter Designer.

The Building Designer is also responsible for detailing suitable fixings for both the trussed rafters and the wall plates to provide the restraint against uplift required by the Trussed Rafter Designer.

Exchange of Information

Please refer also to BS.5268-3 Section 11

Information to be provided to the Trussed Rafter Designer by the Building Designer

1. The position of roof hatches, chimneys, walkways and other openings.
2. The service use of the building in respect of any unusual environmental conditions and type of preservative treatment if required.
3. The spacing of the trussed rafter and any special timber sizes in particular if matching with an existing construction.
4. The site snow load or basic snow load and site altitude, or OS grid reference for the site.
5. The position, dimensions and shape of any adjacent structures higher than the new roof and closer than 1.5m.
6. Any special requirement for minimum member thickness (eg. For the purposes of fixing ceiling boards or sarking).
7. The height and location of the building with reference to any unusual wind conditions.
8. The profile of the trussed rafter (including any required camber).
9. The span of the trussed rafter (overall wall plates or overall length of ceiling tie or both as appropriate).
10. The pitch or pitches of the roof.
11. The method and position of all supports.
12. The type and weight of roof tiles or covering, including sarking, insulation and ceiling finishes.
13. The size and position of water tanks, or other equipment and plant to be supported by the trussed rafters.
14. The overhangs of the rafters at the eaves or apex if appropriate and details of any special eaves details.

Information to be provided by the Trussed Rafter Designer to the Building Designer

The Trussed Rafter Designer should provide the Building Designer with the following information, on suitably detailed drawings, to enable a check to be made that trussed rafters supplied are suitable for their intended use:-

1.The methods of support for tanks and other equipment, together with the capacity or magnitude of the additional load assumed.
2. The range of reactions to be accommodated at the support positions including those required to resist wind uplift forces.
3. The basis of the design.
4. Details of changes in spacing required to accommodate any opening eg. At a chimney.
5. Any special precautions for handling, storage and erection of the roof trusses, in addition to those covered by BS.5268-3.
6. Finished sizes, species, strength classes of members.
7. The type, sizes and positions of all jointing devices with tolerances or the number of effective teeth or nails (or plate areas) required in each member at each joint.
8. The position and size of all bearings.
9. Loadings and other conditions for which the trusses are designed.
10. The spacing of the trussed rafters.
11. The position, fixings and sizes of any lateral supports necessary to prevent buckling of compression members.

Limits of use for Trussed Rafters

Trussed rafters provide a flexible method of framing many required roof profiles. However, due to the commercial limits of available timber sections, transport limitations for length and height and manufacturing limitations of the pressing machinery, the following section provides some ideas as to the types of truss available in the UK and Eire at present.

Physical Dimensions

Trussed rafters can be manufactured in spans up to approximately 20 metres and heights up to approximately 5 metres, although the more normal range is 15 metres span and 3.5 metres high.

Trusses outside the above ranges may be manufactured in two or more sections and site-assembled to the required profile (see section 3.4 on two-tier construction).

Timber Sections

Trussed rafters up to 11 metres in span will generally be fabricated from minimum 35 mm thick timbers. For trusses over 11 metres and up to 16 metres in span, thicker timber sections up to 47mm wide will be used. Above 16 metres in span trusses will consist of multiple trussed rafters permanently fastened together by the manufacturer in the factory, or a greater width than 47mm may be used.

Profile

Within the above physical limits, many profiles of roof truss are possible, depending on the requirements of the roofscape. The creation of cantilevers over supports, the cutting back of a profile to form a recessed 'bobtail' area, the introduction of a pitched ceiling to form a 'scissor' truss, the creation of hip end and corner framing and many more common and not so common roof shapes are easily achieved by specification of trussed rafters.

It should also be remembered that, to avoid problems with both manufacturing and deflection of the roof structure, the trussed rafter profile should be of sufficient depth overall.

The recommended minimum depth for manufacturing purposes is approximately 600mm.
The recommendation for structural depth is that the span of the trussed rafter divided by its overall depth should not be greater than 6.67. (This is known as the span to depth ratio).

Cantilevered hip ends and corners can create problems due to a pivoting effect if the cantilever distance is very large and will also require special propping arrangements to be made for loose timber hipboards and jack rafters.

Careful geometry checks should be made if a cantilevered area and an area with standard bearing abut each other to avoid any problems with roof alignment.

Basic Design Principles

A trussed rafter is an engineered framework consisting of structural members forming triangles. The framework derives its inherent strength from this triangulation.

The members around the perimeter of the trussed rafter are known as Chords (top and bottom, also called rafters and ceiling ties), and the internal members providing the internal triangles are known as Webs (sometimes also called struts and ties).

A true trussed rafter is formed only when the webs form triangles between the top and bottom chords. Attic frames and Raised-Tie trusses (see section 1.7 and 3.13), do not provide this triangulation and are therefore technically not trussed rafters.

Principles of design

When loading is applied to a trussed rafter (from tiles, ceiling construction, snow etc), forces are generated in the members forming the truss.

The magnitude of the bending moment in a particular chord is largely due to the Panel Length (the distance between the joints at each end of the member, usually measured horizontally, also known as the Bay Length). The general rule is, the longer the panel length the greater the bending moment and hence the larger the section of timber required to safely resist these forces.

Further, BS.5268-3 defines the maximum bay lengths permitted in Table 3 (page 5) a copy of which is given below:

Figure 1

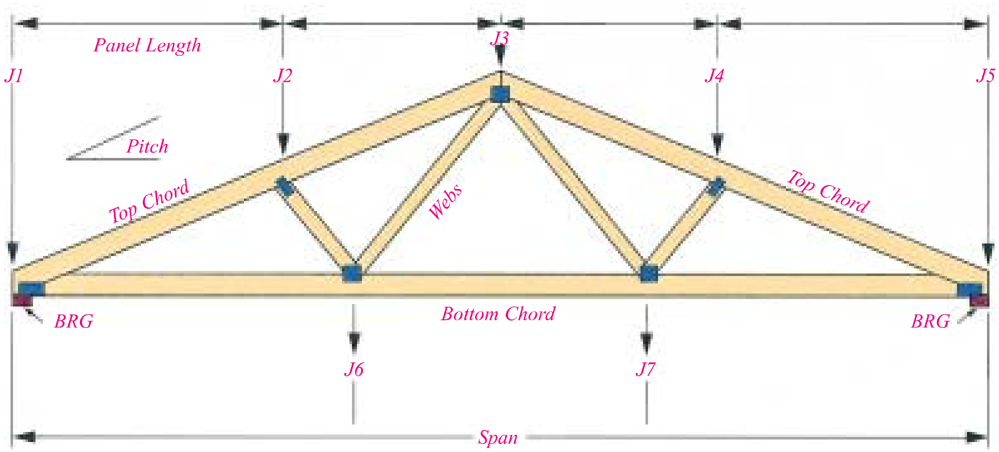


Table 3: Maximum Bay Lengths of Rafters and Ceiling Ties

Depth of member	Maximum length (measured on plan between node points)			
	35mm thick		47mm thick	
	Rafter	Ceiling Tie	Rafter	Ceiling Tie
Mm	m	m	m	m
72	1.9	2.5	3.3	3.3
97	2.3	3.0	3.6	4.3
120	2.6	3.4	3.9	5.0
145	2.8	3.7	4.1	5.3

These lengths are to ensure robustness of the truss during manufacture and handling.
The choice of a different truss type with a smaller panel length (and hence more webs) will usually yield a smaller section of timber required.

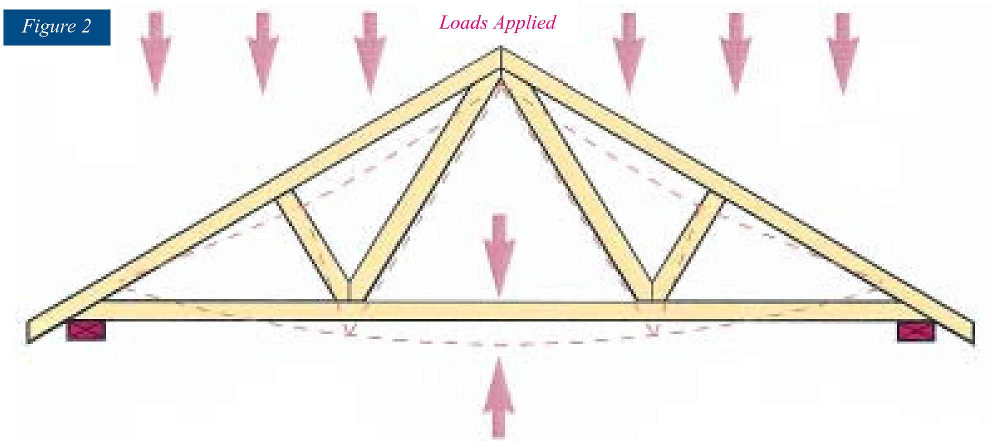
Basic Design Principles

Deflection

Another important criterion in the design of trussed rafters, which must be considered, is the amount of deflection, or movement of the truss when loading is applied to it. BS.5268-3 section 6.5.7 defines the amount of movement permitted under the differing load conditions (also see section 2.4).

Additionally. The Trussed Rafter Designer should be aware of the problems which may arise due to ***DIFFERENTIAL DEFLECTION.***

Figure 2

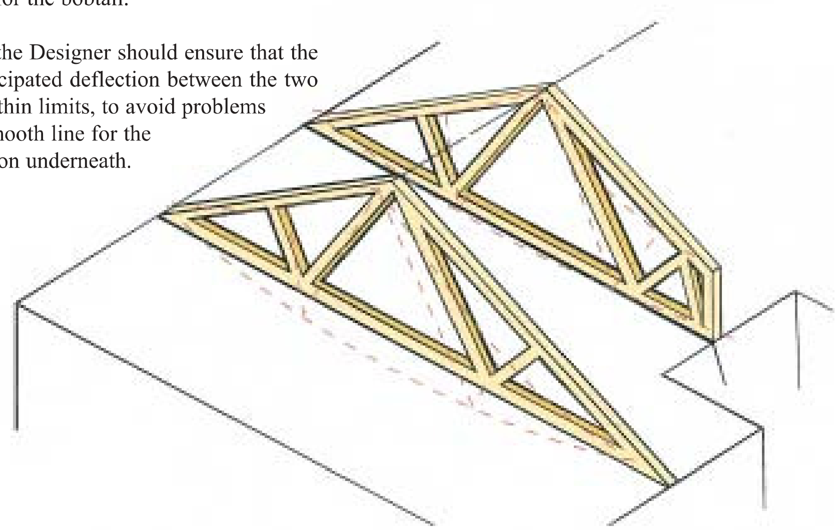


Differential deflection may occur between two adjacent trusses within a roof when either the support conditions or the loading conditions change. For example, in a hip end or corner condition (see sections 2.9 & 3.5), the heavily loaded girder truss may deflect more than the truss immediately behind it in the hip sequence. Or, where a bobtail, (stub) truss is used adjacent to a full span truss, the deflection of the standard truss may be substantially greater than that for the bobtail.

In this situation, the Designer should ensure that the difference in anticipated deflection between the two trusses is kept within limits, to avoid problems in producing a smooth line for the ceiling construction underneath.

This problem of differential deflection between adjacent units is one of the most common causes of site problems and, once the roof is erected, one of the most difficult to rectify. The remedy is for the Designer to be full ware of the potential problem at the design stage.

Figure 3

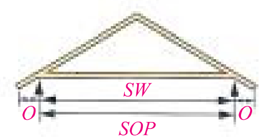
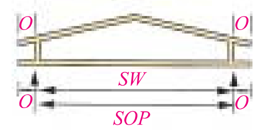
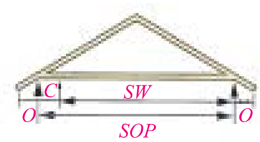
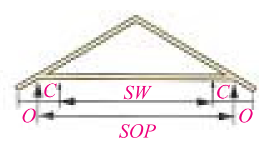
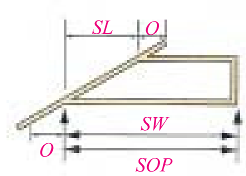
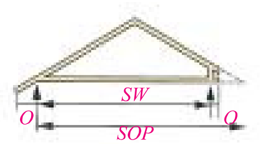
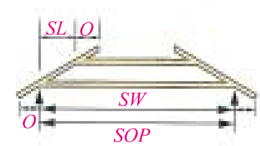
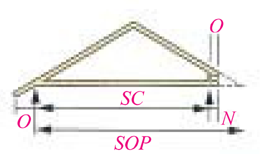
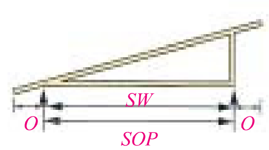
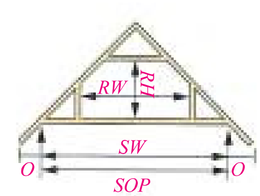
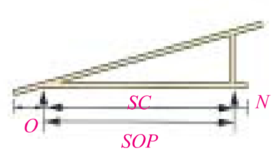
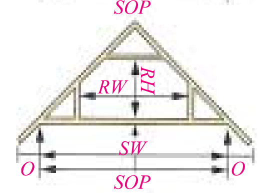
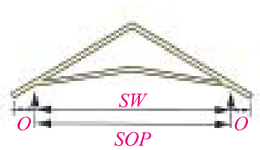
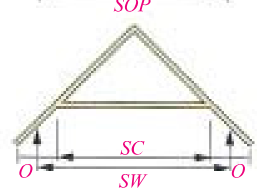


Guide to Setting Out & Dimensioning

As outlined in BS.5268-3, in order to ensure that trussed rafters are correctly designed and fabricated and that they are suitable for their intended purpose it is necessary for them to be accurately specified and for adequate information to be available when required.

At MiTek we have developed a number of standard trussed rafter configurations, as shown in figure 4, to which dimensions can be related, this simplifies the specification for design purposes.

Figure 4

Outside Shape	MiTek Shape Number	Truss Description	Outside Shape	MiTek Shape Number	Truss Description
Triangulated Trusses			*Triangulated Trusses*		
	00-02 (25-27)	Standard Truss or Duopitch (Asymmetric version also possible)		45	Sloping Flat with Apex/Double Bobtail
	05, 10	Single Cantilever Duopitch		40, 46 52, 58 87 ,*	Flat *Additional shapes with modified support positions are available
	11	Double Cantilever Duopitch		59, 63	Half Hip
	14-19	Bobtail Duopitch		64, 68	Hip
	14-19	Bobtail Duopitch with Nib	*Non-Triangulated Trusses*		Attic Truss
	20-21	Monopitch		Various	
	20-21	Monopitch with Nib		Various	Attic Truss (Centre Supper)
	35	Scissors		Various	Extended Rafter (Raised tie) Truss

Key

O	Overhang	SC	Span over ceiling tie	RW	Room width
SOP	Span over setting out points	C	Cantilever	RH	Room height
SW	Span over wallplates	N	Nib	SL	Slope length

N.B. Not all of the MiTek Range Of Trusses Are Indicated above

Guide to Setting Out & Dimensioning

Setting out and Eaves details

Although often employed as the principle truss type in association with appropriate architectural features of a building, the bobtail is most often needed to accommodate re-entrant areas in perimeter walls as shown in figure 5. The horizontal 'A' dimension indicated in figure 6 therefore, is conveniently used to specify the shape for duo-pitch trusses, while double bobtails and bobtailed mono-pitched trusses which more often are principle trusses are more conveniently specified by a vertical 'A' dimension.

Figure 7a shows typical end details when the outer leaf is of masonry, arrangement (b) is best confined to timber frame construction as separate columns of masonry between trusses could be rather unstable. If the end verticals are to be tile clad one of the arrangements figure 7c or d is suitable. In (c) a specially wide timber is used as the end vertical of the truss so that the tile battens clear the outer leaf of the wall; the inside of the end vertical must not be located to the right of the centre-line of the wall plate. In some cases the arrangement is impractical owing to the large width required for the end vertical. In many cases the diagonal in the cantilevered part (figure d) can be omitted if there is little load from the cladding.

A special bobtail can be designed to suit practically any requirement.

Bobtailed trusses must never be formed through do-it-yourself site modifications of standard truss types with which they align.

Figure 5

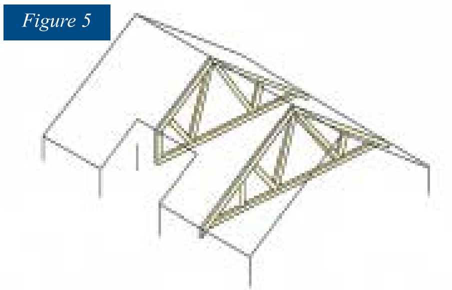


Figure 6

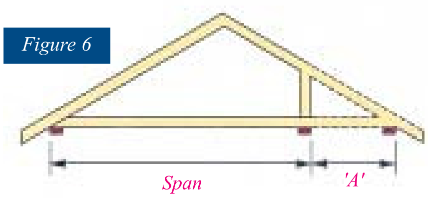


Figure 6a

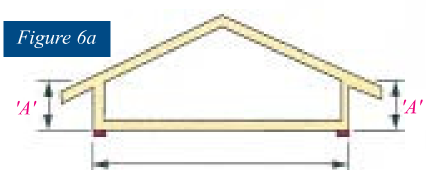


Figure 6b

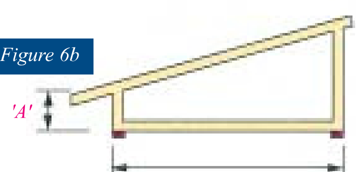
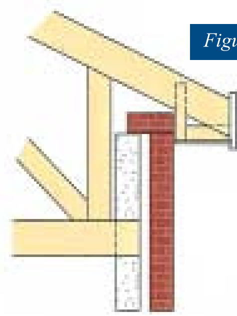
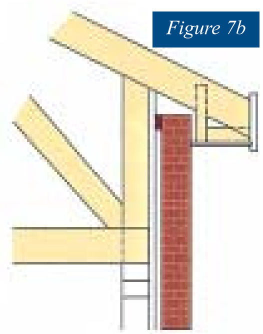


Figure 7a



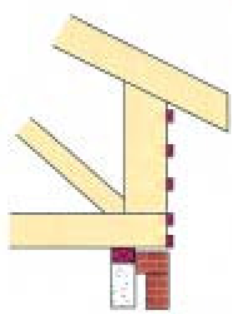
Masonry inner leaf with timber nib

Figure 7b



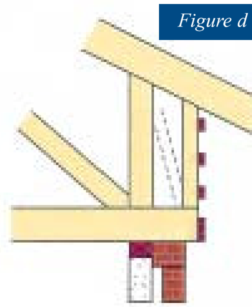
Timber frame

Figure 7c



Tile clad end vertical

Figure d



Tile clad end vertical

Guide to Setting Out & Dimensioning

Support details - Cantilevers

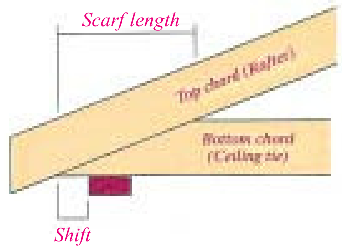
The reaction from the bearing is the greatest load (although upwards) to which a truss is subjected and in order to control excessive bending in the supported chord it is important, except in the smallest trusses, to locate a joint at each bearing. The normal eaves joint illustrated in figure 8a accomplishes this if the “Shift” dimension is less than 50mm, or one-third of the scarf length, whichever is the greater.

If the Shift is greater than the allowed a stress check is required on the short cantilever.

Unfortunately there is usually insufficient space for an additional web so should the check fail, as it often does, it is necessary to increase the size of the bottom chord or alternatively incorporate a relief rafter, (as shown in figure 10b) or a heel wedge. Both of these options can add to the final cost of the truss and therefore it is best to avoid cantilevers in this range.

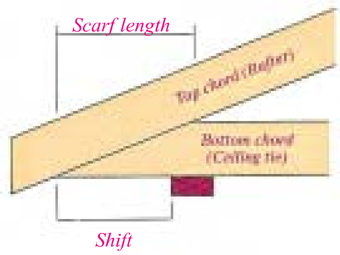
If the “Shift” is greater than two scarf lengths, then a standard cantilever truss as show in figure 10a is employed. The chord sizes are usually no greater than the corresponding non-cantilevered standard truss and the cost is little more. Many variations are possible by adjusting the position of a joint of a non-cantilevered standard truss type so that it is over a bearing. Finally, if required, a non-standard cantilever truss of almost any triangulated configuration can be designed and fabricated. Note that a brace may sometimes be required on the bottom chord which is untypically in compression.

Figure 8a *Standard truss*

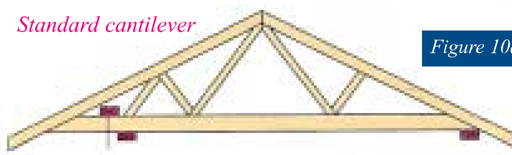


Shift = max x 50mm or 1/3 scarf length whichever is the greatest

Figure 8b *Check bottom chord*

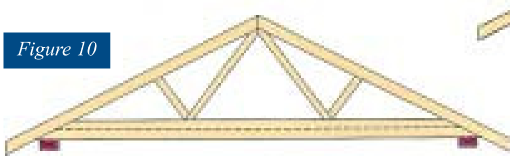


Standard cantilever *Figure 10a*



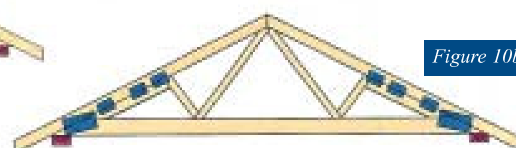
Bottom chord may need brace

Figure 10



Increase bottom chord

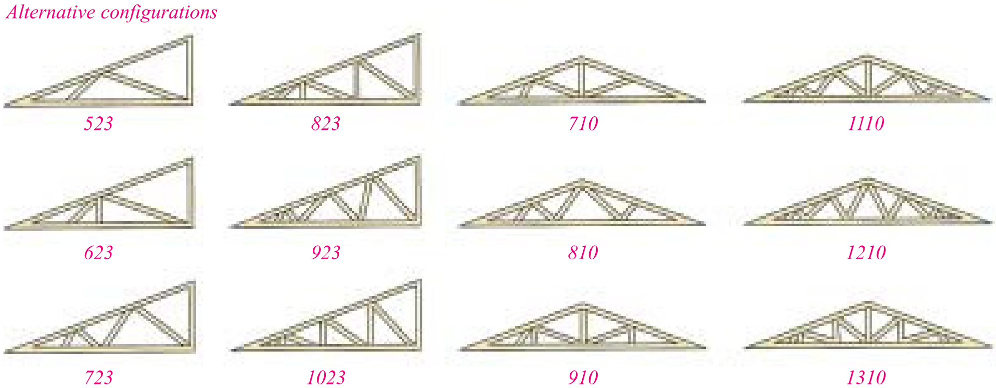
Figure 10b



Incorporate relief rafter or slider

Figure 9

Alternative configurations



Practical Roof Solutions

Hipped Ends

The good performance of MiTek designed hipped ends does not depend on tension in battens, a massive wallplate and horizontal thrust on walls. Indeed, with suitable bracing, walls are provided with the stability called for by the Building Regulations. The most simple and lowest cost form of MiTek hipped end, (shown in figure 11a) consists of a multi-ply girder of standard trusses securely fixed together and supporting loose rafters and ceiling joists. Such constructions are limited to spans generally not exceeding 5m. Sizes of rafters and ties can be found in approved document 'A' of the Building Regulations. Hip boards should be supported off the girder by means of a ledger and the ceiling joists by means of proprietory joist hangers.

The 'step-down' system incorporates flat-top hip trusses of progressively diminished height from the ridge to the girder. The number of step-down trusses is determined by the necessity of maintaining reasonable sizes for the loose ceiling joists and hip board on the hipped corner infill areas, as shown in figure 11b. For these reasons the span of the mono-pitch trusses is not usually greater than 3m in the case of regular hips (where the end pitch is the same as the pitched of the main roof).

Noggings have to be fitted between the flat chords of the step-down hip trusses to support the tiling battens. The web configurations of the various truss types shown (including the mono-pitch) are typical but will be chosen to provide the best structural solutions.

This step-down hip system is no longer very popular as it requires many different truss profiles to be made.

The 'flying rafter' hip system show in figure 11c has the manufacturing advantage of there being only one basic hip truss profile. All of the hip trusses, including those forming the girder are similar, and the mono-pitch trusses supported off the girder usually have the same profile as the sloped part of the hip trusses which speeds up fabrication.

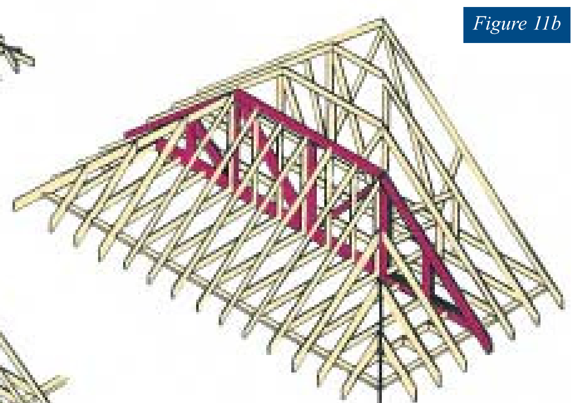
The rafters of the mono-pitched trusses are site cut to sit against the upper hip board and the off-cuts are nailed in position to the rafters of the hip trusses. The flat parts of the top chords of the hip trusses and girder are well braced together to prevent instability.

While the hipped corner infill is shown as prefabricated rafter-joist components (open jacks), it is usually cheaper to site fabricate in these areas. The lower hip board is typically notched and supported off a 50 x 50mm post nailed to the girder truss. The upper hip board can be supported off ledgers and in some cases is propped off the hip trusses underneath.

The system offers the advantage of continuous rafters and consequently easily constructed smooth roof slopes. On long spans it may be necessary to use a second hip girder between the apex and monos.

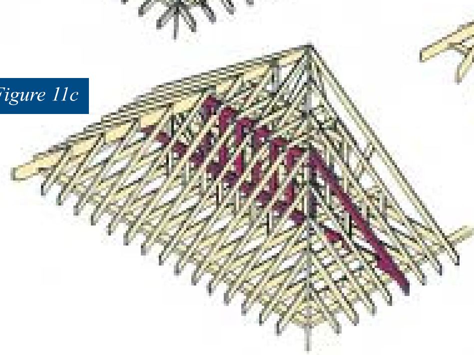
Figure 11a

Figure 11b



Rafter noggings not shown for clarity

Figure 11c



Practical Roof Solutions

T Intersection & Valley Infill

The 'T' is probably the most common kind of roof intersection (as demonstrated in figure 12). The roof truss arrangement at this feature includes a specially designed girder truss (shown in figure 13), usually consisting of two to four individual trusses connected together with nails or bolts, which support the incoming trusses. Support of the incoming trusses is off the bottom chord of the girder through girder truss shoes.

The design of the valley frame infill continues the rafter profiles of the opposing roof slopes to form an intersection, and transfers the tile loading uniformly to the top chords of the underlying trusses.

Figure 13

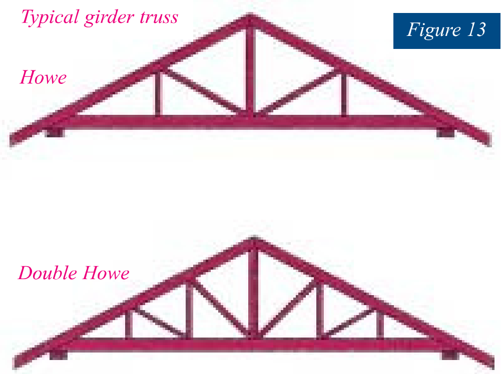
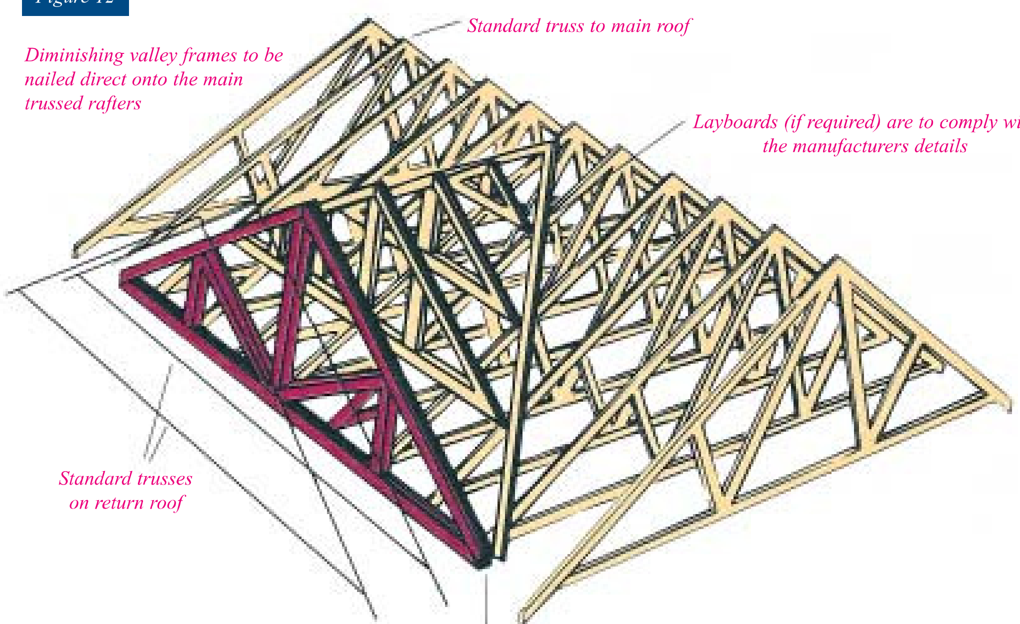


Figure 12



Practical Roof Solutions

Corners

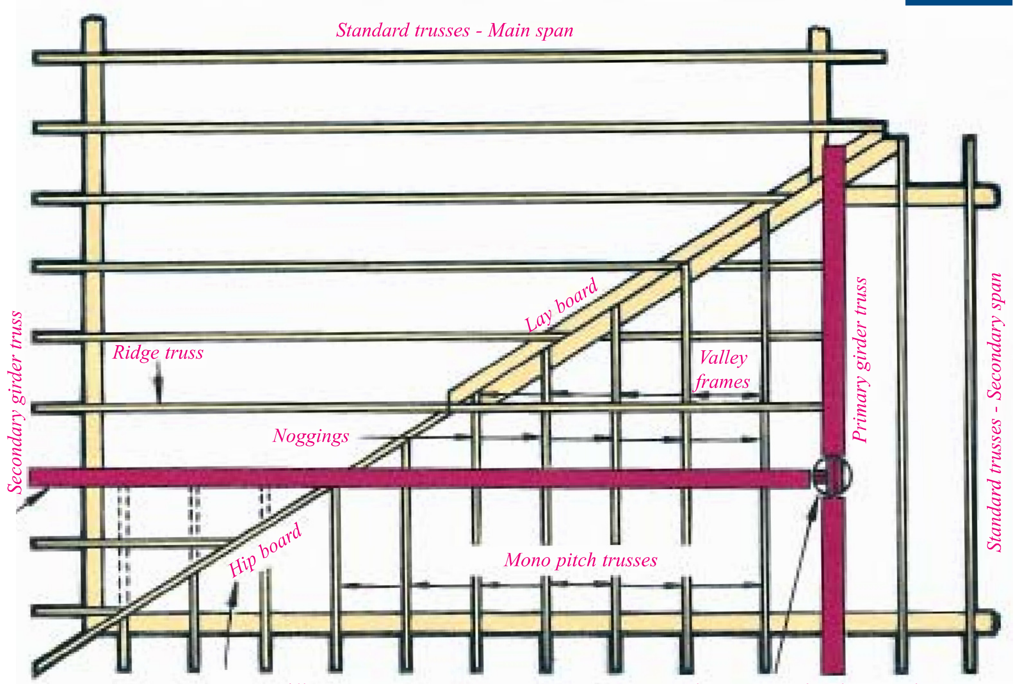
There are two basic methods of forming a corner:

1. Hipped Corner

A hipped corner is formed by the perpendicular intersection of two roofs which may or may not be of the same span.

The principle for the hipped corner construction is the same as for full hips except that the truss profiles are generally sloped on one side only. The support across the junction is again provided by either a girder truss or a wall/beam. When a girder truss is specified provision has to be made for a special hanger to carry the girder truss supporting the hipped end. Mono valley frames are required to complete the framing of the corner.

Figure 14a



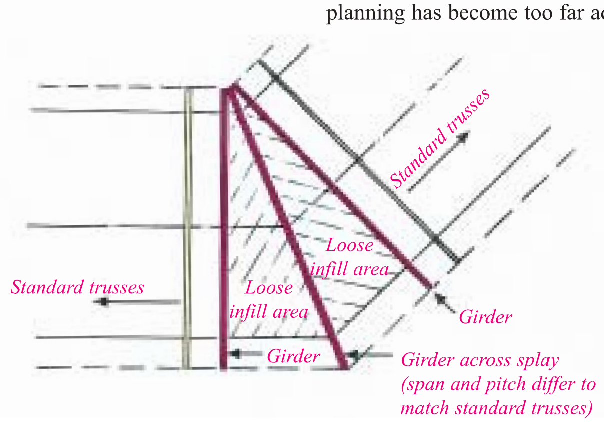
2. Skew Corners or Dog-Legs

A skew corner is formed by the intersection of two roofs at an angle greater than 90 degrees. The corner is generally framed by positioning a girder truss at the extremity of the two straights with an additional girder positioned across the corner as in figure 14b.

The girder units will typically support loose infill on purlins and binders to maintain the roof plane. The feasibility of framing in this manner is dependant solely upon the span of the longest purlin.

It is not recommended to incorporate hipped ends and tee intersections into skew corners unless a feasibility study has been undertaken before planning has become too far advanced.

Figure 14b



Practical Roof Solutions

Extended Rafters and Extended Joists

Extended rafters and extended joists, as shown in figure 15 require special consideration because the trusses are not fully triangulated to the bearings. As a result of the lack of triangulation, the extended member is subject to exceptionally large bending moments. In the example shown in figure 16 the rafter, or the top chord, is subject to a bending moment no less than ten times that which occurs in a conventionally supported truss.

Standard trusses can be adapted and strengthened to withstand the large bending moments and shear force occurring in the extended member at the rafter-tie junction. This may be accomplished by fixing a strengthening piece to each side of the extended member, using bolts or a special nailing arrangement. Another way to strengthen the extended rafter is by using a factory fitted stack chord as shown on the right-hand side of figure 16.

Large rafter extensions will produce outward thrust and movement at the bearings. This is often a critical factor in design and is rigorously controlled by BS.5268-3.

Figure 15

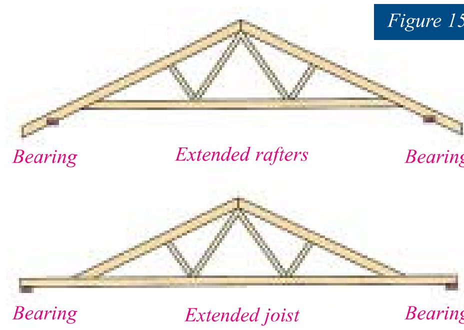
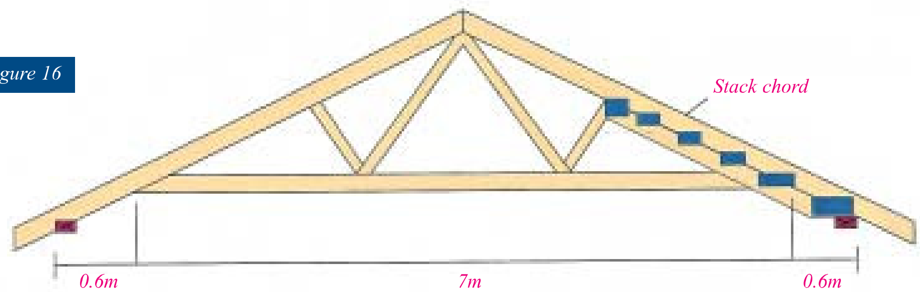


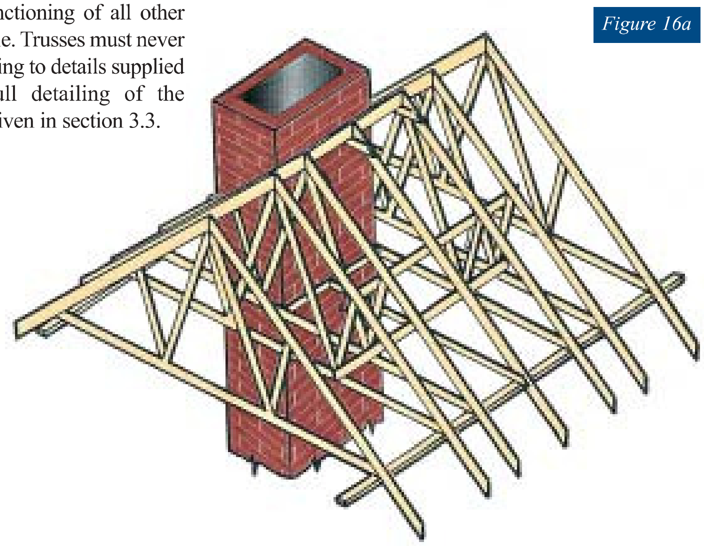
Figure 16



Hatch and Chimney Opening

Where possible, hatches and chimneys should be accommodated in the standard spacing between trusses. Each member and joint in a truss performs an important role essential to the effective functioning of all other parts and the component as a whole. Trusses must never be cut and trimmed except according to details supplied by the truss designer. The full detailing of the construction of these features is given in section 3.3.

Figure 16a



Practical Roof Solutions

Room-in-the Roof: Attic Frames

The special advantage of attic frames is that they enable the upper floor of a building to be totally contained within the roof, increasing the habitable area by 40-50% at little extra cost. The bottom chords become the floor joist of the room, their size having been calculated to cater for increased loads.

Attic Frames can be designed to allow 'clear span' supported at eaves only, (as shown in figure 17a), however for longer spans it may be necessary to incorporate an intermediate support (shown in figure 17b). This will allow either larger internal room dimensions or reduce the timber sections required. Since attic frames are non-triangulated, the timber content will be considerably greater than that required for a comparable trussed rafter.

Where a more complex attic roof layout is being planned, for example where hipped ends, corners or intersections may occur, it is recommended that a truss designer is contacted to prepare a feasibility study at an early stage of the project.

Dormer Window and Stairwell Locations

The same principles that apply to ordinary roof trusses also apply to attic frames. If a truss is severed or weakened at any point the structural integrity of the whole truss is effected. Therefore, if an opening is planned, the roof must be strengthened by additional frames at smaller than standard spacings or girders at each side of the opening. Guidelines to these details are given in section 3.3.

Having acknowledged these principles, there is relative freedom in the methods of framing out the actual openings, however there are sensible economic factors to be considered. Obviously it is of most advantage to locate window openings on different sides of the ridge and directly opposite each other in order that they will lie between the same two trimming trusses. If not, the extent of additional loose infill timber may completely negate the advantages of using prefabricated attic frames. Where possible stairwells should be located parallel to the trusses otherwise, once again, the increase in site infill timber may nullify the benefits of using attic frames.

The following diagram (figure 18) demonstrates the most economic method of incorporating openings to the roof space, whilst figure 19 requires increased loose infill timbers and site work if practical recommendations are not followed.

Figure 17a

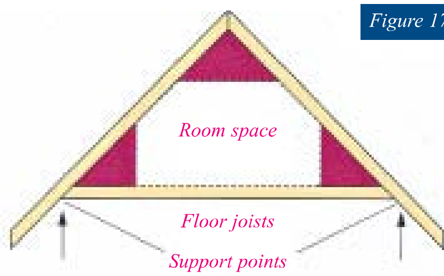


Figure 17b

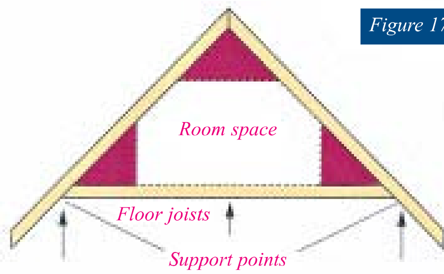


Figure 18

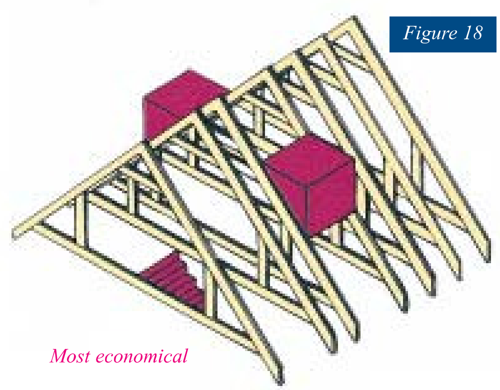
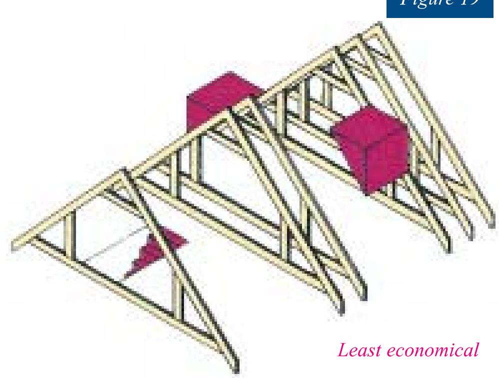


Figure 19



Glossary of Terms used in Trussed Rafter Construction

Apex/Peak
The uppermost point of a truss.

Attic Truss/room-in-the-Roof
A truss which forms the top storey of a dwelling but allows the area to be habitable by leaving it free of internal WEB members. This will be compensated by larger timber sizes elsewhere.

Bargeboard
Board fitted to conceal roof timbers at a GABLE END.

Battens
Small timber members spanning over trusses to support tiles, slates etc.

Bearer
A member designed to distribute loads over a number of trusses.

Binder
A longitudinal member nailed to trusses to restrain and maintain correct spacing.

Birdsmouth
A notch in the underside of a RAFTER to allow a horizontal seating at the point of support (usually used with RAISED TIE TRUSSES).

Blocking
Short timbers fixed between chords to laterally restrain them. They should be at least 70% of the depth of the chords.

Bobtail
A truss type formed by truncating a normal triangular truss.

Bottom Chord
See CEILING TIE.

Bracing
This can be Temporary, Stability or Wind Bracing which are described under these headings.

Building Designer
The person responsible for the structural stability and integrity of the building as a whole.

Camber
An upward vertical displacement built into a truss in order to compensate for deflection which might be caused by the loadings.

Cantilever
The part of a structural member of a TRUSS which extends beyond its bearing.

Ceiling Tie
The lowest member of a truss, usually horizontal which carries the ceiling construction, storage loads and water tank.

Chevron Bracing
Diagonal web bracing nailed to the truss in the plane of the specified webs to add stability.

Connector Plate/fastener
See NAILPLATE.

Cripple Rafter
See JACK RAFTER.

Dead Load
The load produced by the fabric of the building, always long term (see DESIGN LOADS).

Deflection
The deformation caused by the loads.

Design Loads
The loads for which the unit is designed. These consider the duration of the loads long term, medium term, short term and very short term.

Duo/dual Pitch Truss
A truss with two rafters meeting at the APEX but not necessarily having the same PITCH on both sides.

Dwangs
See NOGGINGS.

Eaves
The line between the rafter and support wall.

Eaves Joint
The part of the truss where the rafter and the ceiling tie intersect. This is usually where the truss is supported.

Extended Rafter
See RAISED TIE TRUSS

Fascia
Horizontal board fitted around the perimeter of the building to the edge of the truss overhangs.

Fastener
See NAILPLATE.

Fink Truss
The most common type of truss used for dwellings. It is duo-pitch, the rafter having the same pitch. The webs form a letter W.

Firring Piece
A tapered timber member used to give a fall to flat roof areas.

French Heel
An EAVES joint where the rafter sits on the ceiling tie.

Gable End
The end wall which is parallel to the trusses and which extends upwards vertically to the rafters.

Glossary of Terms used in Trussed Rafter Construction

Hip End
An alternative to a GABLE END where the end wall finishes at the same height as the adjacent walls. The roof inclines from the end wall, usually (but not always) at the same PITCH as the main trusses.

Hip Set
The trusses, girders and loose timbers required to form a hip end.

Horn/nib
An extension of the ceiling tie of a truss (usually monos or bobtailed trusses) which is built into masonry as a bearing.

Imposed Load
The load produced by occupancy and use including storage, inhabitants, moveable partitions and snow but not wind. Can be long, medium or short term.

Internal Member
See Webs.

Intersection
The area where roofs meet.

Jack Rafter
An infill rafter completing the roof surface in areas such as corners of HIP ENDS or around chimneys.

Live Load
Term sometimes used for IMPOSED LOADS.

Longitudinal Bracing
Component of STABILITY BRACING.

Loose Timber
Timbers not part of a truss but added to form the roof in areas where trusses cannot be used.

Mono-Pitch Truss
A truss in the form of a right-angled triangle with a single rafter.

Nailplate
Metal PLATE having integral teeth punched from the plate material. It is used for joining timber in one plane with no overlap. It will have an accreditation certificate and will be manufactured, usually, from galvanised steel. It is also available in stainless steel.

Nib
See HORN

Node
Point on a truss where the members intersect.

Noggings
Timber pieces fitted at right angles between the trussed rafters to form fixing points.

Overhang
The extension of a rafter or ceiling tie of a truss beyond its support or bearing.

Part Profile
See BOBTAIL.

Peak
See APEX.

Permissible Stresses
Design stresses for grades of timber published in BS5268: Part2:

Pitch
The angle of the chords to the horizontal, measured in degrees.

Plate
See NAILPLATE.

Purlins
Timber members spanning over trusses to support cladding or between trusses to support loose timbers.

Quarter Point
The point on a rafter where the web intersects in a FINK TRUSS.

Queen
Internal member (WEB) which connects the APEX to a third point on a FINK TRUSS.

Rafter
The uppermost member of a truss which normally carries the roof covering.

Rafter Diagonal Bracing
Component of STABILITY BRACING.

Raised Tie Truss
A truss which is supported at a point on the rafter which is beyond the point where the rafter meets the ceiling tie.

Reducing Trusses
See VALLEY FRAMES.

Remedial Detail
A modification produced by the TRUSSED RAFTER DESIGNER to overcome a problem with the truss after its manufacture.

Return Span
The span of a truss being supported by a girder.

Ridge
The line formed by the truss apexes.

Ridgeboard
Timber running along a ridge and sandwiched between loose rafters.

Roof Designer
The person responsible for the roof structure as a whole and who takes into account its stability and capability of transmitting wind forces on the roof to suitable load-bearing walls.

Glossary of Terms used in Trussed Rafter Construction

Room-in-the-Roof
See attic truss.

Scab
Additional timber fitted to the sides of a truss to effect a local reinforcement, particularly in raised tie trusses.

Setting Our Point
The point on a truss where the undersides of the rafter and ceiling tie meet.

Skew Nailing
A method of fixing trusses to the wallplate by driving nails at an angle through the truss into the wallplate which is generally not recommended. (See Truss Clip).

Soffit
Board fixed underneath eaves overhang along the length of the building to conceal timbers.

Span
Span over wallplates is the distance between the outside edges of the two supporting wallplates. This is usually the overall length of the ceiling tie.

Spandrel Panel
A timber frame, triangular panel forming the gable wall above the ceiling line.

Splice
A joint between two members in line using a nailplate or glued finger joint.

Spreader Beam
See bearer.

Strap
Metal component designed to fix trusses and wallplates to walls.

Strut
Internal compression member connecting the third point and the quarter point on a Fink truss.

Stub End
See bobtail.

Temporary Bracing
An arrangement of diagonal loose timbers installed for safety during erection. Often incorporated with permanent stability and wind bracing structures.

Third Point
Point on the ceiling tie where the internal webs meet in a fink truss.

Timber Stress Grading
The classification of timber into different structural qualities based on strength (see BS4978: 1996).

Top Chord
See rafter.

TRADA Quality Assurance Scheme
Quality control method in truss manufacture administered by the BM TRADA Certification.

Trimmer
A piece of timber used to frame around openings.

Truss/Trussed Rafter
A lightweight framework, generally but not always triangulated, placed at intervals of 600mm to support the roof. It is typically made from timber members of the same thickness, fastened together in one plane using nailplates or plywood gussets.

Trussed Rafter Designer
The person responsible for the design of the trussed rafter as a component and for specifying the points where bracing is required.

Truss Clip
A metal component designed to provide a safe structural connection of trusses to wallplates. Also to resist wind uplift and to prevent the damage caused by skew nailing.

Truss Shoe
A metal component designed to provide a structural connection and support for a truss to a girder or beam.

Uniformly Distributed Load
A load that is uniformly spread over the full length of the member.

Valley Board
A member raking from incoming ridge to corner in a valley construction.

Valley Frames/Set
Infill frames used to continue the roofline when roofs intersect.

Verge
The line where the trussed rafters meet the gable wall.

Wallplate
A timber member laid along the length of the load bearing walls to provide a level bearing and fixing for the trusses.

Webs
Timber members that connect the rafters and the ceiling tie together forming triangular patterns which transmit the forces between them.

Wind Bracing
An arrangement of additional timbers or other structural elements in the roof space, specially designed to transmit wind forces to suitable load-bearing walls.