

Single Garage Plans

3.1m (10' 2") x 6m (20ft) Shell only



Page 1: Introduction

A garage without a floor? Sure! This garage is designed with cost in mind. It is an ideal project for the person with a limited budget, who does not want to pay the full up-front costs of a completed garage, yet wants something practical and useable in the meantime. This garage can be built and used prior to a concrete floor being laid. Hard ground with a bit of metal thrown on top can be used indefinitely as a garage floor until the time or money can be found to incorporate a concrete slab. Add an iron roof cover and plywood cladding, and this makes for a very cost-effective garage indeed!

Scope of design and limitations

Buideazy asks that you please take note:

THESE PLANS ARE TO BE USED AS A HELPFUL GUIDE ONLY and no warranty or guarantee is offered or entered into.

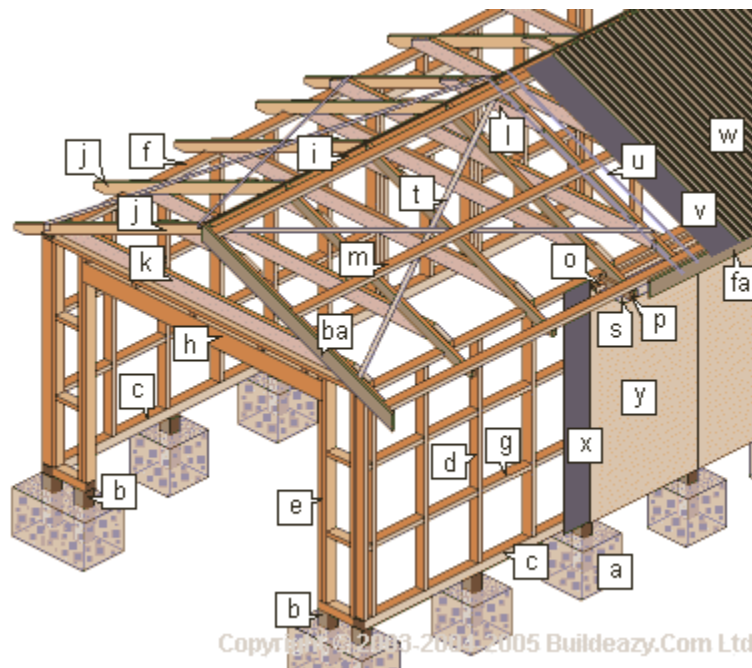
These plans by themselves, can not be used as documentation to apply for a building consent/permit.

TO OBTAIN A BUILDING CONSENT OR PERMIT you will need someone to prepare the necessary plans and documentation. In most cases, a designer, architect, builder or draftsman prepares the plans and sometimes for specific design, an engineer is required. In some cases, for smaller projects, the plans and specifications can be prepared by the applicant.

Authorities vary from place to place in their requirements for submissions to obtain a building consent/permit, so check with your Local Authority, designer, architect, builder or draftsman for requirements in your area. Generally though, submissions for a building consent/permit must usually include two or three sets of full drawings (plans) and specifications. The submission plans must be drawn to scale and include plans and detail for the following: Site; Foundation; Floor/s; Elevation; Roof; Cross-section; Bracing and any other necessary plan or detail that might be required.

This plan set has no allowance for any electrical work or components, plumbing/gutter /down pipes, door/window installation, or any floor.

Page 2: Identifying the Members

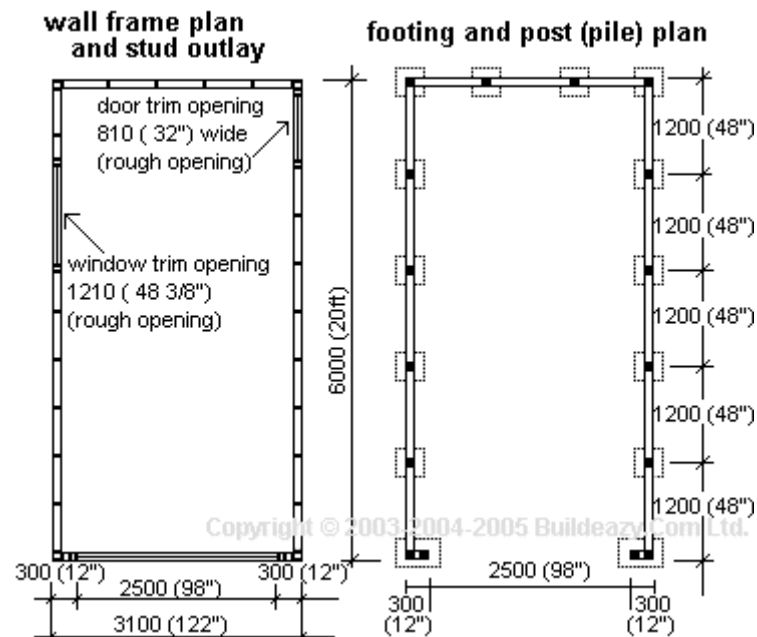


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[a] footing	[i] ridge board	[t] strap bracing
[b] post/pile	[j] rafter	[u] ribbon, wire or similar roof underlay support
[c] bottom plate / wall plate / sole plate	[k] ceiling joist	[v] roof underlay
[d] stud	[l] cleat	[w] roofing iron
[e] trimmer/under stud	[m] purlin	[x] wall cladding underlay
[f] top plate	[o] ribbon plate	[y] wall cladding
[g] dwang/nogging	[p] sprocket	[ba] barge board
[h] header/lintel	[s] soffit	[fa] fascia board

NOTE: see

Page 3: Flat plan



Wall frame plan and stud outlay

This plan shows the placement of the studs from a bird's-eye-view. In this particular plan, the studs are spaced at 600 [2ft] crs or o.c. (which means "at centers" or "on center"). This means the studs are spaced apart 600 (2ft) from the center of one stud to the center of the adjoining stud.

Studs spaced at 600 [2ft] crs/o.c. are also placed appropriately to accommodate standard width 1200 [4ft] cladding or lining, either exterior and interior.

Footing and post (pile) plan

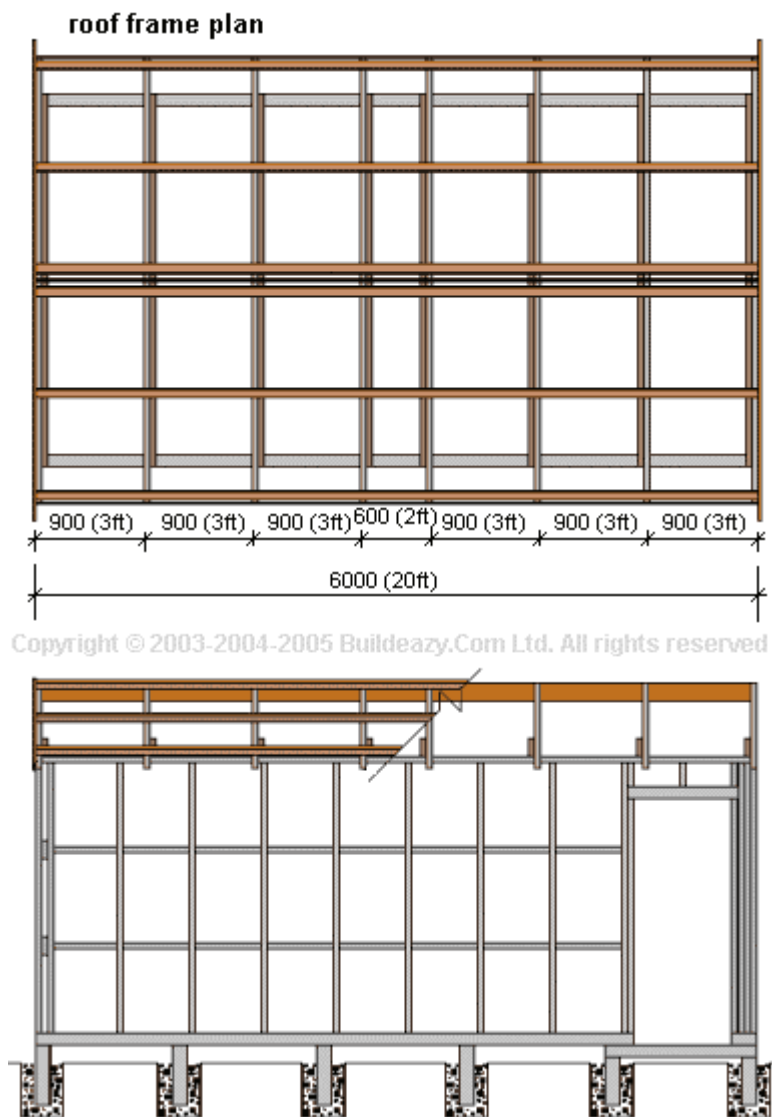
This plan shows the placement of the posts and where the footing holes should be dug, from a bird's-eye-view. The holes should be 300 [1ft] square and 450 [18"] deep.

There should be a thickness of concrete at least 100 [4"] between the underside of the post and the bottom of the hole. The holes should be spaced at max 1200 [4ft] crs/o.c. (at centers/on center).

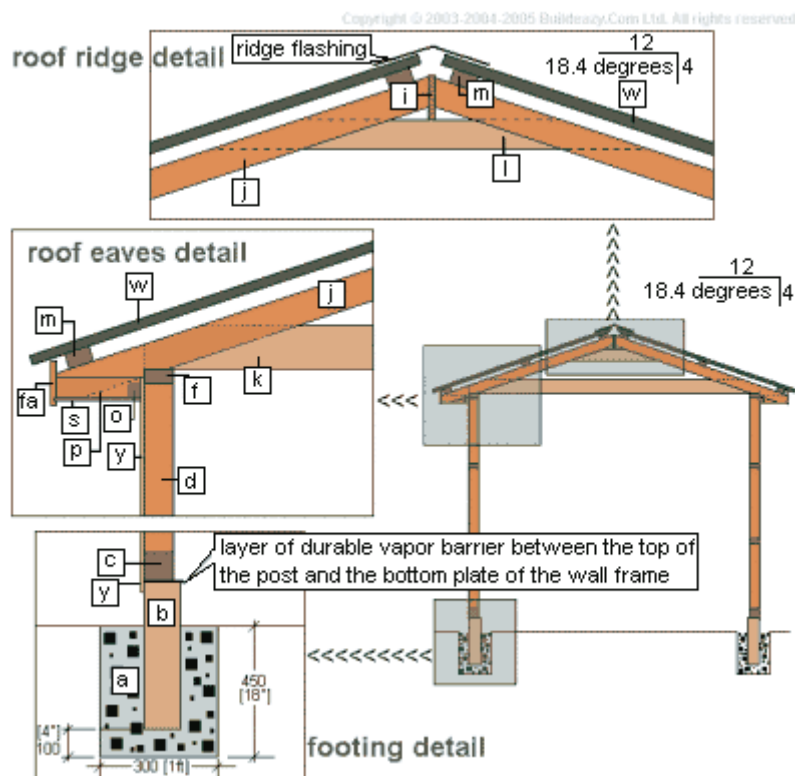
NOTE: The posts should be a minimum of 150 [6"] above ground level, with a layer of durable vapor barrier between the top of the post and the bottom plate of the wall frame (sole plate/bottom plate/wall plate).

Page 4: The wall frames

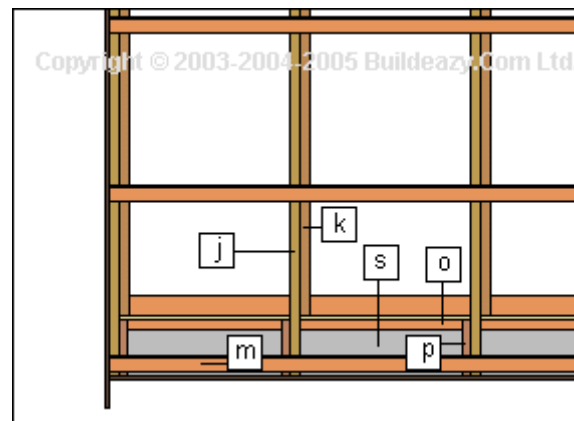




Space the rafters at 900 [3ft] crs/o.c. beginning from the two ends of the garage frame (front and back) and work inwards towards the center.
The spacing between the middle rafters will be less.



[a]	Footing 300 [1ft] square x 450 [18"] deep	[m]	Purlin 75 x 50 [2x3]
[b]	Post/pile can be 100x100 [4x4] or 125x125 [5x5]. Treated for in-ground applications.	[o]	Ribbon plate 50x50 [2x2] fixed against wall frame to take sprockets
[c]	Bottom plate / wall plate / sole plate	[p]	Sprocket 75x40 [1-1/2x3]. Member from wall to fascia to support soffit
[d]	Stud. 100x50 [2x4] upright wall frame member	[s]	Soffit. 4.5 [1/4"] thick under eave cover
[i]	Ridge board 150x25 [1x6]	[w]	Roofing iron
[l]	Rafter 100x50 [2x4]	[y]	Exterior wall cladding
[k]	Ceiling joist 200x50 [2x8] spans the width of the garage and is fixed to the rafters	[fa]	Fascia board 150x25 [1x6]
[l]	Cleat 100x50 [2x4] goes directly under ridge board and fixed to rafters		

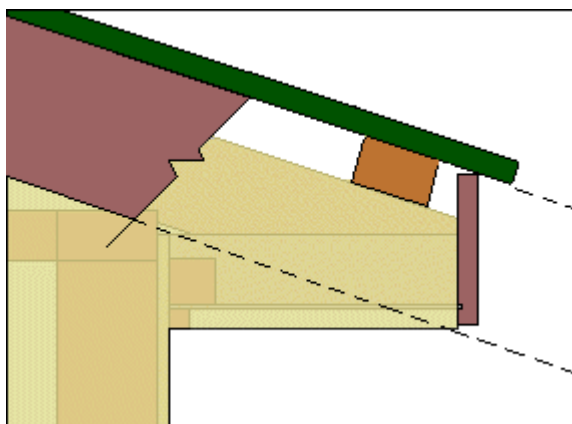


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Technical drawing of a roof truss section. The drawing shows a cross-section of a roof structure with various components labeled with letters in boxes: f, d, o, y, j, m, p, s, fa. Dimensions are provided in feet and inches: 35, 1 3/8", 96, 3 3/4", 300, 12". A dashed line indicates a structural member or path within the truss.

The ribbon plate **[o]** is fixed horizontally to the side walls 96 [3-3/4"] down from the top plate **[f]**. This is called the "drop height".

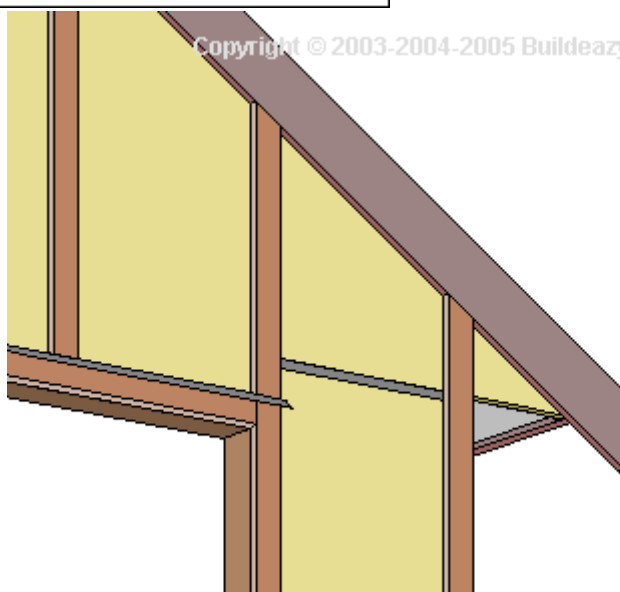
The sprocket **[p]** or "soffit board" is a horizontal member fixed to the end of the rafter and to the ribbon plate. The eaves lining **[s]** is attached to the sprockets and usually also slotted into a groove in the fascia board **[fa]**.



Cladding at the end of the eaves

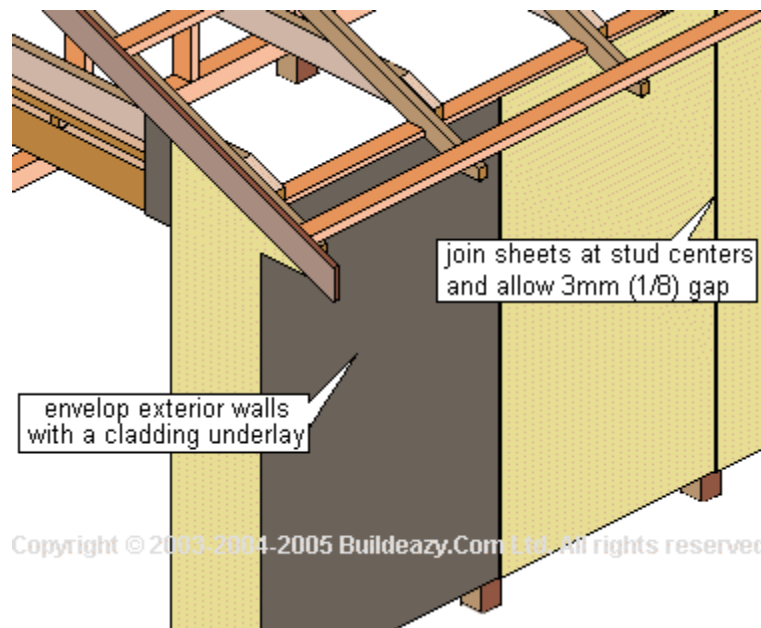
The cladding at the end of the eaves follows the rake of the roof and is cut horizontally flush with the bottom of the fascia board.

The eaves lining or soffit, can then butt up to the cladding.



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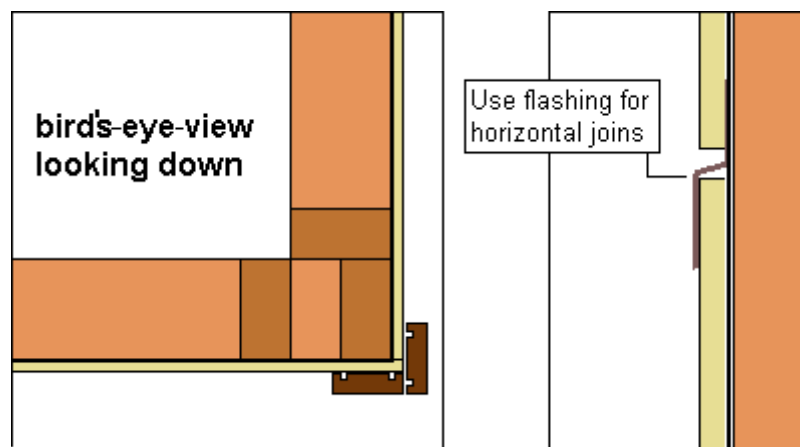
The Exterior Cladding



Cladding underlay

A cladding underlay should envelop the exterior walls prior to the cladding being fixed.

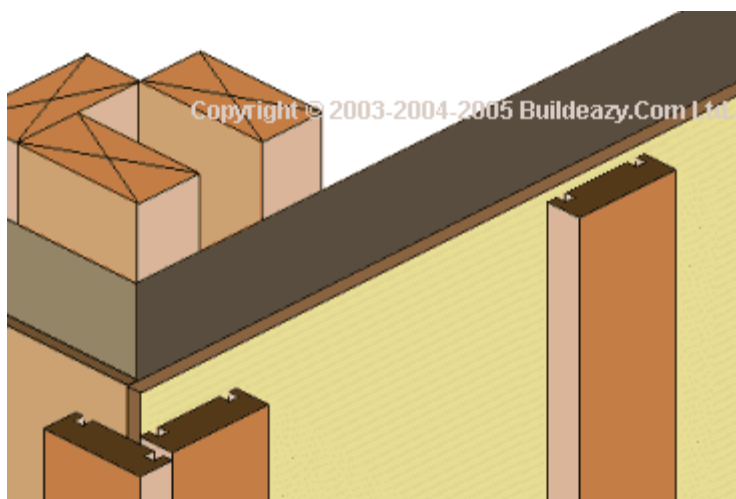
The cladding, 12.5 (1/2") plywood can then be fixed to the studs. All joints should be on a stud and with a gap of 3mm (1/8") between sheets.



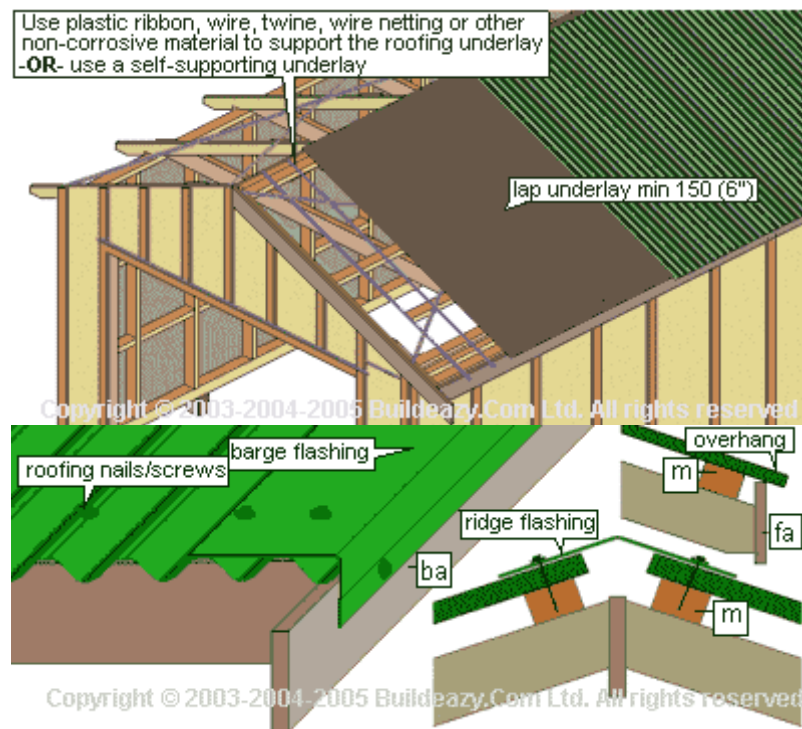
The battens

Timber battens 75x25 (1x3) to go over each joint. The battens should have a groove each side of the joint to stop water being drawn up by capillary action.

Extra battens can also be fixed to intermediate studs. This is for decorative purposes only.

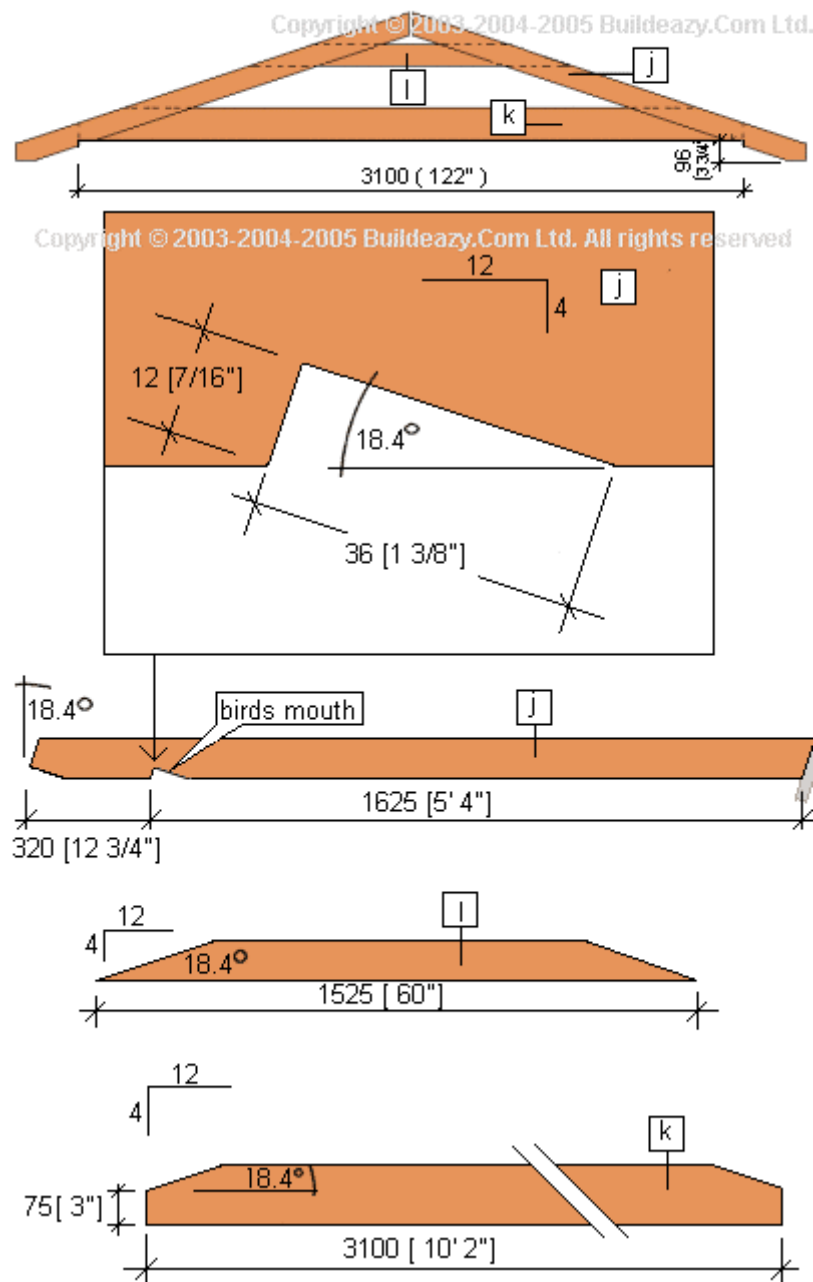


Page 9: The roof cladding



- Roof nailing** Fix the roofing iron to the purlins (**m**) with appropriate roofing nails/screws. Fix to the top and bottom purlins at every second corrugation and fix to the intermediate purlins at every 3rd or 4th corrugation. Fix through the high side of the corrugation.
- Roof overhang** Overhang the roofing approx 65 (2 1/2") past the fascia board (**fa**) or 50 (2") past the back of the gutter.
- Ridge flashing** Usually standard about 130 (5") each side of the apex but can vary and any size can be made to order. Have the ridge flashing in mind when positioning the top purlin. Fix to the purlin at every second corrugation.
- Barge flashing** The barge flashing goes under the ridge flashing at the top. Fix to each purlin (through two corrugations) and also to the barge board (**ba**).

The angle cuts



The roof frame members

These are the only frame members that require angle cuts.
Cut the roof frame members to the dimensions shown.

[j] rafter

100x50 (2x4) stock. Cut to dimensions shown. 16 lengths required.

[k] ceiling joist

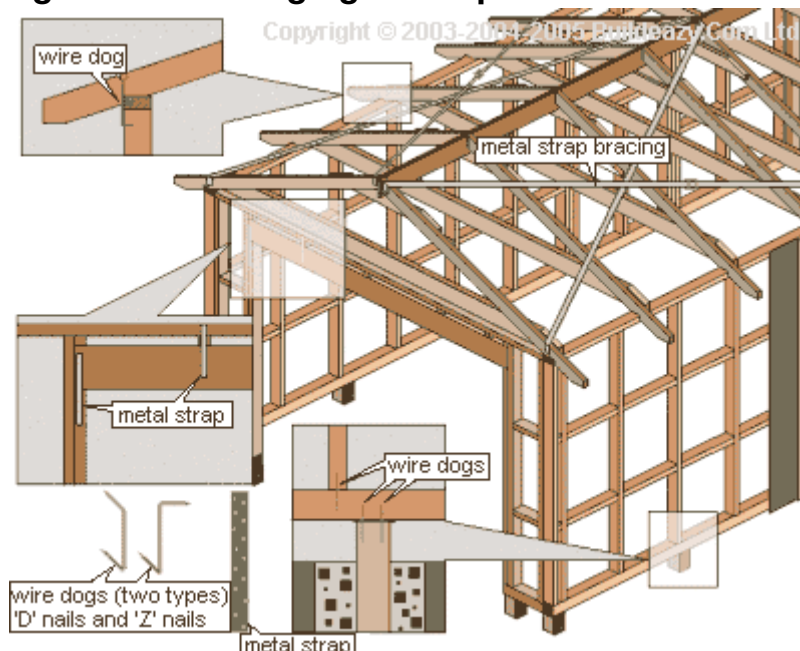
150x50 (2x6) stock. Cut to dimensions shown. 8 lengths required.

[l] cleat

100x50 (2x4) stock. Cut to dimensions shown. 8 lengths required.

NOTE: Cut one set first (2 rafters, 1 cleat and 1 ceiling joist) and try for size and fit, before pre-cutting the entire roof frame.

Bracing and Fastening against uplift



Bracing

WALLS: The plywood cladding (in most cases) will be more than enough wall bracing on its own right, provided each sheet joins on a stud and ample nails are placed around the perimeter of the plywood sheets, i.e. flathead nails 150 (6") apart. The intermediate nailing can be spaced every 300 (1ft). Only the sheets that make up the bracing elements will need to be nailed in this fashion.

ROOF: Use diagonally opposed metal galvanized strap, 25x1 (1/16x1") with tensioners on each plane, as shown in drawing for the roof bracing. Each end of the strap should be folded over and fixed to rafter top and sides.

Fastening against uplift

The garage needs to be fastened against uplift, from the footings to the roof. The posts **[b]** can be fastened to the bottom plate **[c]** with wire dogs, metal strap, galvanized plate bolted to post and bottom plate, or any other approved fastener. The bottom plate **[c]** can be fastened to the stud **[d]** with wire dogs or metal strap and likewise the stud **[d]** to the top plate **[f]**. Only studs over or near the posts need to be fastened this way.

The rafters **[j]** can be fastened to the top plate **[f]** with wire dogs (z nails), two per rafter. The header **[h]** also can be fastened to the trimmer **[e]** and top plate **[f]** with metal strap.

Page 12: Materials list

The Materials List

Amounts have been added on to allow for wastage. Stock sizes are nominal sizes(see glossary)

Excludes flashings and hardware such as nails and other fixing or fastening components.

ID		Size (nominal)	Comments	Quantity
Foundation	Concrete		For footing holes	.6 cubic metre (3/4 cubic yard)
Sub-floor	Posts/Piles	100x100 (4x4) <u>OR</u> 125x125 (5x5)	Natural decay-resistant lumber or treated for in-ground applications.	9m (30ft)
Framing Wall	Bottom Plate	100x100 (4x4)	Natural decay-resistant lumber or treated for in-ground applications.	19m (62ft)
Framing Wall/Roof	Top Plate; Studs; Trimmer Studs; Cripple Studs; Header; Nogging; Rafters; Cleats	100x50 (2x4)		200m (656ft)
Framing Roof	Ridge Board	150x25 (1x6)		6m(20ft)
Framing Wall	Header	200x50 (2x8)		5.4m (18ft)
Framing Ceiling	Ceiling Joists	150x50 (2x6)		26m (85ft)
Framing Roof	Purlins	75x50 (2x3)		38m (125ft)
Framing Eaves	Ribbon Plate	50x50 (2x2)		12m (20ft)
Framing Eaves	Sprockets	75x40 (1-1/2x3)		5m (16ft)
Roof Trim Garage Door Trim	Fascia; Barge Board; Door Trim	150x25 (1x6)		28m (92ft)
Eaves Lining	Fibre-cement Sheet (or other soffit board)	4.5 (3/16") thick		3.6sq m (40sq ft)
Roof Underlay	Roof Underlay			21sq m (226sq ft)
Siding Underlay	Siding/Cladding Underlay			40sq m (430sq ft)
Roofing Iron	Corrugated			21sq m (226sq ft)
Siding/Cladding	Plywood	2400x1200x12 (4ftx8ftx1/2")		14 sheets
Roof Bracing	Strap Brace	25x1 (1/16x1")	Tensioners on each plane (4 of)	25m (80ft)
Exterior Battens	Vertical Joins; Corners.	75x25 (1x3)		90m (300ft)
Exterior Beading	Under Eaves Beading	25x25 (1x1)		12m (40ft)

The Wall Frame & Roof Frame Cutting List

Check cutting list on-site. Actual lumber sizes (finished, dressed size as opposed to the nominal size: [see glossary](#)) vary from place to place and from timber mill to timber mill.

Item	Size (nominal)	Length	Number
Posts/piles	100x100 (4x4) <u>OR</u> 125x125 (5x5)	500 (20")	16
Bottom plate	100x100 (4x4)	6000 (20ft)	2
Bottom plate	100x100 (4x4)	2920 (9'7")	2
Top plate	100x50 (2x4)	6000 (20ft)	2
Top plate	100x50 (2x4)	2920 (9'7")	2
Studs	100x50 (2x4)	2265 (7'7")	34
Trimmer studs for side door and window	100x50 (2x4)	1960 (7'7")	4
Trimmer studs for garage door	100x50 (2x4)	2010 (6'8-1/2")	2
Header garage door	200x50 (2x8)	2590 (8'7-1/2") nail two together	2
Header side door	100x50 (2x4)	900 (35-1/2") nail two together	2
Header window	100x50 (2x4)	1300 (51-7/8") nail two together	2
Nogging, blocking, cripple studs, sill	100x50 (2x4)	37m (120ft) Random. Measure and cut on site.	
Purlins	75x50 (2x3)	6000 (20ft)	6
Ridge board	150x25 (1x6)	6000 (20ft)	1
Rafters	100x50 (2x4)	1625 (5'4") 18.4 degrees or 4:12 angle-cut each end	16
Ceiling joists	150x50 (2x6)	3100 (10'2")	8
Cleats	100x50 (2x4)	1525 (5ft)	8

Page 14: Glossary of terms

Glossary of terms used in this plan

ACTUAL SIZE: The finished (dressed) size as opposed to the nominal size of a piece of wood.

BARGE BOARD: Exterior visible flat trim board that follows the rake of the roof.

BATTENS: Narrow board used to cover cladding joins or used for decorative purposes.

BATTER BOARDS: *Profiles;* Horizontal boards attached level to stakes, used to mark out the boundary of a construction and establish the levels and *building line*.

BEADING: A finishing wood. Fits under the soffit lining and against the cladding.

BEAM: A supporting member.

BIRD'S MOUTH: The notch in a rafter that rests on the top plate of a wall.

BOARD: A piece of sawn, or dressed timber of greater width than thickness. Usually 19 (3/4") to 38 (1 1/2") thick and 75 (3") or more wide.

BOTTOM PLATE: *Wall plate, sole plate;* The bottom horizontal framing member of the wall

BRACE: To make rigid.

BUILDING LINE: The outline of a building.

CEILING JOIST: A horizontal framing member to which ceiling linings are fixed.

CENTERS: Crs; O.C.; *Term used for spacing;* The measurement of spacing for studs, rafters, and joists in a building from the center of one member to the center of the next.

CLADDING UNDERLAY: A building paper that envelopes the exterior walls or roof frame prior to the cladding being fixed. Reduces air movement and helps avoid the risk of water ingress.

CLADDING: The exterior surface of a building.

CLEAT: A short horizontal member that ties opposing rafters together immediately below the ridge board.

CRIPPLE STUD: Short studs placed between the header / lintel and a top plate or between a sill and bottom plate.

CRS: See CENTERS.

DIMENSIONS: Any of the three linear measurements, length, breadth and depth.

DRESSED: *Relating to timber;* Planed; Smooth; even surface; gauged.

DROP HEIGHT: The distance down from the *TOP PLATE* to the soffit board.

DWANG: *Nogging;* A short piece of timber set between two studs, joists, rafters or purlins to keep them rigid.

FALL: *Of roof;* Pitch; The incline angle of a roof surface.

FLASHING: Any piece of material, usually metal or plastic, installed to prevent water from penetrating the structure.

FLUSH: Being even with.

FOOTING: A base (in or on the ground) that will support the structure.

GABLE: The roof ends and walls that form an inverted V.

GALVANIZED: Covered with a protective coating of zinc.

GAUGED: See DRESSED.

HEADER: *Lintel;* A beam placed perpendicular to wall studs above doors, windows or other openings, to carry the weight of structural loads.

LINTEL: *Header;* A beam placed perpendicular to wall studs above doors, windows or other openings to carry the weight of structural loads.

LONGITUDINAL: Running the length of the building.

LUMBER: Any of the framing wood.

MEMBER: Piece of timber that is part of a frame or structure.

METAL STRAP: Short lengths of metal strap 25x1 (1/16x1) used to fix members together to resist uplift.

NAIL PLATE: *Gang nail plate;* Metal plate with rows of sharp points that are hammered into butt-jointed timber to secure the join.

NOGGING: *Dwang;* A short piece of timber set between two studs, joists, rafters or purlins to keep them rigid.

NOMINAL SIZE: The rough-sawn size of a piece of lumber. Before the lumber is planed or dressed. The nominal size is usually greater than the actual dimension. e.g. 100x50 (2 x 4) actually equals 90x45 (1 1/2" x 3 1/2").

O.C.: On center; (See CENTERS)

ON CENTER (O.C.) *Crs, centers.* The term used to define the measured spacing between studs, joists, rafters, etc. O.C. measurements are taken from the center of one member to the center of the adjoining member.

PERIMETER: boundary.

PILE: A column-like member supporting the structure from the ground.

PLANE BRACE: A diagonal brace running along the plane of a roof.

PLATE: The top or bottom horizontal framing member of the wall

PLUMB: Vertical; Upright.

PLYWOOD: A piece of wood made of three or more layers of wood veneer laminated together with glue.

POST: see PILE

PROFILES: *Batter boards;* Horizontal boards attached level to stakes, used to mark out the boundary of a construction and establish the levels and *building line*.

PURLIN: Timber used to support roofing sheets. Usually fixed on top of rafters.

RAFTER: Parallel members of a roof

RECTANGLE: Four-sided figure with four right angles.

RIBBON PLATE: *Ribbon board, soffit board;* A horizontal member fixed to the top of the studs and supporting the sprockets.

RIDGE BOARD: Upper-most horizontal framing member on a roof, to which the tops of the rafters are fixed.

ROOFING IRON: Corrugated metal sheet used to clad roof.

ROOF PLANE BRACE: See plane brace.

ROOFING UNDERLAY: A building paper that covers roof frame prior to the cladding being fixed. Reduces air movement and helps avoid the risk of water ingress.

ROUGH OPENING: *Trim size;* The framed-in opening, slightly larger than the actual window/door, that replaces wall studs to support the structure and accommodate a window/door.

SAWN: *Rough sawn;* Not gauged, planed or dressed.

SIDING: *Cladding;* Exterior wall cladding.

SILL: Framing member that forms the bottom edge of the window opening.

SLAB: *Of concrete;* used for garages, and basement floors.

SLOPE: See fall.

SOFFIT: *Eaves lining;* The underside board of eaves and rakes.

SOFFIT BOARD: *Soffit lining.* Cladding on the underside of the eaves.

SOLE PLATE: *Wall plate, bottom plate;* The bottom horizontal framing member of the wall.

SOLE PLATE: *wall plate, bottom plate;* The bottom horizontal framing member of the wall.

SPIRIT LEVEL: Tool used to ensure surfaces are level or plumb by means of a bubble in a tube of liquid fitted to the level.

SPROCKET: *Eaves bearer, soffit bearer;* A horizontal member fixed to the end of a rafter and to the ribbon plate.

STRINGLINE: A slightly elastic string stretched between two pegs and used as a guide line. Determines the building line.

STRAP BRACING: Metal strap 25x1 (1/16x1) used to brace roof frames. Two straps diagonally opposed on one plane form one brace. The size and length of the roof determines how many braces are required. Each strap is tightened with tensioners.

STUD: A 100x50 (2x4) vertical framing member used to construct walls.

TIMBER PROFILE: See PROFILES.

TOP PLATE: The top horizontal framing member of the wall.

TRIMMER: *Under stud;* Framing member that is cut to fit between the bottom PLATE and the HEADER.

UNDERLAY: A building paper that envelopes the exterior walls or roof frame prior to the cladding being fixed. Reduces air movement and helps avoid the risk of water ingress.

UNDER STUD: *TRIMMER;* Framing member that is cut to fit between the bottom PLATE and the HEADER.

VERTICAL: See PLUMB.

WALL CLADDING: The exterior surface of a wall

EAVES LINING: *Soffit*; The underside board of eaves and rakes.

ELEVATION: Side view of a building.

END RAFTER: Rafter each end of the roof frame.

FASCIA: Exterior horizontal visible flat front trim board that caps the rafter tail ends.

that support battens/purlins and roofing materials.

WALL PLATE: *wall plate, sole plate plate*; The bottom horizontal framing member of the wall.

WIRE DOG: D or Z shaped nails spiked at each end. Used to fix members together to resist uplift.

A guide to building the garage

NOTE 1:

This is not step-by-step instructions on 'how to build a garage' but rather a guide explaining the order of things and helpful references. From time to time the Buildeazy website displays and updates helpfiles in the form of step-by-step instructions relevant to Buildeazy plans. To view a list of current helpfiles, go to <http://www.buildeazy.com/plans/helpfiles.html>

NOTE 2: Regarding dimensions and sizes.

The dimensions are in both metric and standard (ft and ins). All metric references are in millimetres. In all references, the millimetre measurement precedes the standard measurement. The standard measurements are always denoted in parentheses (). For example: "100x50 (2x4)". Here, the 100x50 are millimetres, the (2x4) are inches.

Lumber sizes generally referred to are nominal sizes and not usually actual sizes. The nominal size is the rough-sawn size of a piece of lumber, before the lumber is planed or dressed. The nominal size is usually greater than the actual dimension. e.g. 100x50 (2 x 4) actually equals 90x45 (1 1/2" x 3 1/2"). It is common practice to refer to a piece of 90x45 (1 1/2" x 3 1/2") lumber as 100x50 (2 x 4).

- 1 Building Consent/Permit:** Obtain all necessary Local Authority and Building Code approvals.
- 2 Setting Out:** Determine the position of the garage and "set-out" the *BUILDING LINE* using building *PROFILES*. There is a detailed 'Help File' on erecting *profiles* at: http://www.buildeazy.com/plans/helpfiles_profile.html
- 3 Materials:** Have all materials stacked appropriately on site. All *LUMBER* should be stacked clear of the ground and on an even platform.
- 4 Foundations:** Mark *FOOTINGS* and dig holes. Pour concrete around and under *POSTS/PILES*. The *POSTS/PILES* can be either cut and placed at the correct height during the pouring of concrete, or placed over-height and cut to the correct height after the concrete has hardened. Take note of when inspections are required by your Local Authority. There is usually a *FOOTING* and position inspection required before any concrete can be poured.
- 5 The Frame:** Make the garage frame. First the wall frame and then the roof frame including *PURLINS*. There is a detailed 'Help File' on how to make *WALL FRAMES* at http://www.buildeazy.com/plans/helpfiles_wallframes.html
- 6 Siding/Cladding:** Fix the *SIDING/CLADDING* to the walls (over *UNDERLAY*)
- 7 Barge; Fascia and Eaves:** Nail the *RIBBON PLATE* to the outside top of the wall against the *CLADDING* at *DROP HEIGHT* (see Glossary). Fix the *SPROCKETS* to the *RIBBON PLATE* and *RAFTERS*, fix the *BARGE BOARD* to the *PURLINS* over the *CLADDING* at each *GABBLE* end, fix the *FASCIA BOARD* to the *SPROCKET* Ends and *RAFTER* Ends and then fix the *EAVES LINING* to the underside of the *SPROCKETS* and *RIBBON PLATE*.

8 **The Roof:** Fix the roof (according to manufacturer's instructions) over *UNDERLAY* followed by the barge flashing and the ridge flashing.

9 **Beading and Battens:** Fix the *BEADING* to the underside of the *EAVES* and then fix the vertical *BATTENS* over every *PLYWOOD* join and at every corner. Other *BATTENS* can also be fixed intermediately for decorative purposes. **You now have a Garage Shell!**