

4-6 The Hop Exchange
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Design Co-operative

Fusion Jameen Self Build Co-op

Lowther Hill - House Type A

Building Manual and Schedules

Frames and Joists

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CLIENT	SITE	PLOT NO.			DATE	REVISION	
Fusions Jameen Self Build Co-op	Lowther Hill	A			Jan-92	Jul-92	
MATERIAL	GRADE	FINISH	SIZE			UNIT	QUANTITY
FRAMES							
MAIN COLUMNS	SS	PAR & treated	Ex 75	x	200	3600	2
	SS	PAR & treated	Ex 75	x	200	3900	5
	SS	PAR & treated	Ex 75	x	200	4200	9
	SS	PAR & treated	Ex 75	x	200	4500	4
	SS	PAR & treated	Ex 75	x	200	4800	2
	SS	PAR & treated	Ex 75	x	200	5100	1
GROUND FLOOR BEAMS	SS	PAR	Ex 75	x	225	3900	2
	SS	PAR	Ex 75	x	225	4500	3
	SS	PAR	Ex 75	x	225	4800	2
	SS	PAR	Ex 75	x	225	5400	2
	SS	PAR	Ex 75	x	225	6000	1
	SS	PAR	Ex 75	x	225	6600	2
ROOF BEAM	SS	PAR	Ex 75	x	225	3900	1
	SS	PAR	Ex 75	x	225	4500	2
	SS	PAR	Ex 75	x	225	5100	4
	SS	PAR	Ex 75	x	225	6000	2
	SS	PAR	Ex 75	x	225	6600	1
	SS	PAR	Ex 75	x	225	7200	2
SPLICE BEAMS	SS	PAR	Ex 75	x	225	2700	8
STEEL BOLTS	X - O - X	spun galvanised			M12	160	72
	X - O - X	spun galvanised			M12	230	44
	X - O - X	spun galvanised			M16	160	52
	X - O - X	spun galvanised			M16	230	32
	X - O - X	spun galvanised			M20	170	4
	X - O - X	spun galvanised			M20	240	8
WASHERS		spun galvanised	M12:	36mm dia x 3mm thick		No.	232
		spun galvanised	M16:	48mm dia x 4mm thick		No.	168
		spun galvanised	M20:	55mm dia x 5mm thick		No.	24
TEMPORARY BRACING	s/w	PAR	Ex 50	x	75	4500	15

FRAMING

- 1) Prepare stacking area:- Clear area of rubbish, undergrowth etc. Construct bearers, level and true to each other, scaffolding can be used, but care must be taken to ensure that the stacking area does not introduce bends or twists to the timber.
- 2) Accept delivery of materials from Timber Merchants:-
CHECK: Sizes - stack separately.
 Lengths - ensure you use the right lengths for the job.
 Straightness - send back timber which is too bent to use.
 Splits - small splits are all right, big ones are not.
 Knots - large, loose knots will weaken members, send them back.

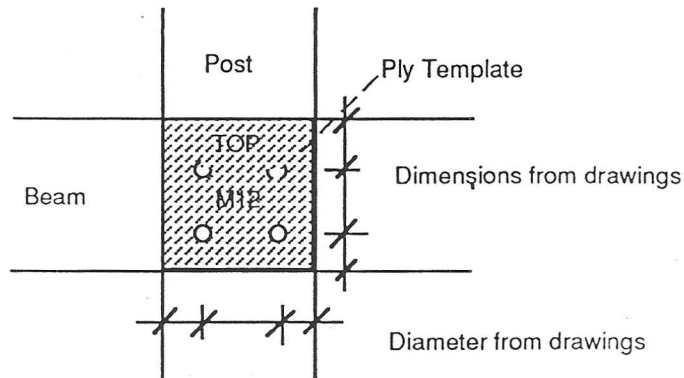
Remember that a degree of splits and knots are permitted within the stress grading rules so only send back timber after you have checked.

Note on delivery ticket all shortages, returns or comments. SIGN - and hand one copy to driver and the second copy to the Contract Manager

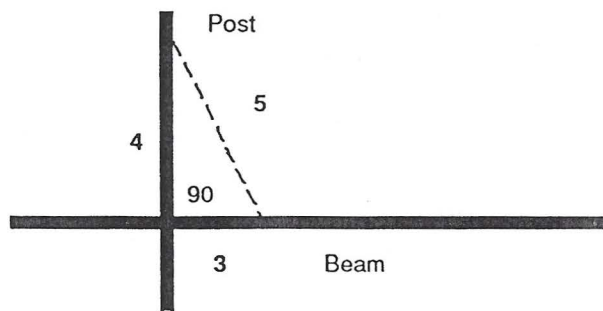
- 3) Sort timber:- use best lengths for each job, designate to a frame and stack carefully, cover till required. If the timber is still damp from the treatment process, stack with half inch sticks between each piece and cover in a way that allows air to circulate.
- 4) Check the order in which you will be erecting the frames. Remember that you will have to leave yourself room to manoeuvre the frames flat into position before standing them up. Start assembling the frames with the last one to be erected.
- 5) Prepare components for one frame:-
 - a) Select correct lengths of timber and check timber for splits in end. Square round one end where sound, mark end to be cut to waste.
 - b) Work out running dimensions.
 - c) Measure out all items, mark carefully, using the running dimensions starting from the sound end of the timber. Measure posts from the bottom using the foundation levels already calculated.
 - d) Square all dimensions round. Marking joists positions can be of great assistance at this stage. Number each column and mark each beam.
 - e) CHECK ALL DIMENSIONS.
 - f) Cut beams & columns to length.

6) Construct frame:-

- a) Prepare jigs for the drilling of the bolt holes to ensure that the spacing of the holes is accurate. [see diagram] It is important to get the holes accurate as a large part of the strength of the building derives from the rigidity of these joints. Either use the jigs made a training sessions or make up simple jigs as described here. Drill holes of the correct diameter, at the correct spacing in a piece of thick ply cut to fit exactly over the position of the joint. (Use long auger bits of exactly the correct diameter for drilling). You will probably require three or four of these to suit the different types of joint in the building. Mark clearly which side is facing the top of the beam on each jig.

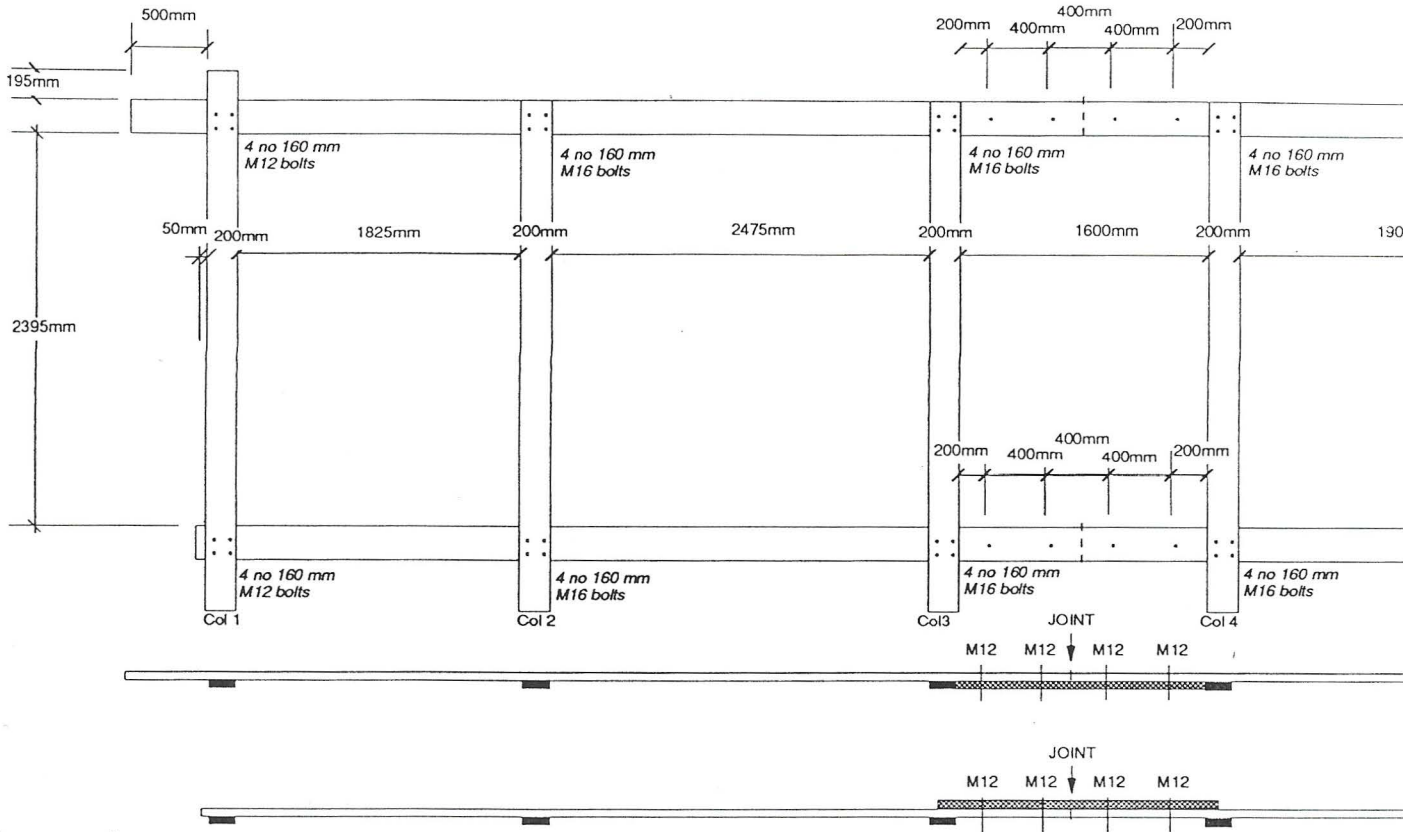


- b) Decide which way up you will be constructing the frame so that it can be erected on site and therefore whether it will be the posts or the beams which will lie on top. The bolt holes should now be drilled in which ever members, posts or beams, will be on the top. Use the jig and clamp an offcut of timber behind the holes to prevent the timber splitting on the back. Make absolutely certain that you have the pattern of bolt holes the right way up. **NOTE: The largest dimension to the timber edge is always on the top edge.**
- c) Set up one beam with one column, square off, using 3:4:5 triangle [see diagram] Clamp firmly, drill one bolt hole through either the column or beam whichever is now on the back and not drilled as yet, treat hole if necessary, insert bolt and, remembering to fit a washer at each end, finger tighten. Take care in knocking through bolts not to split timber away from the back.

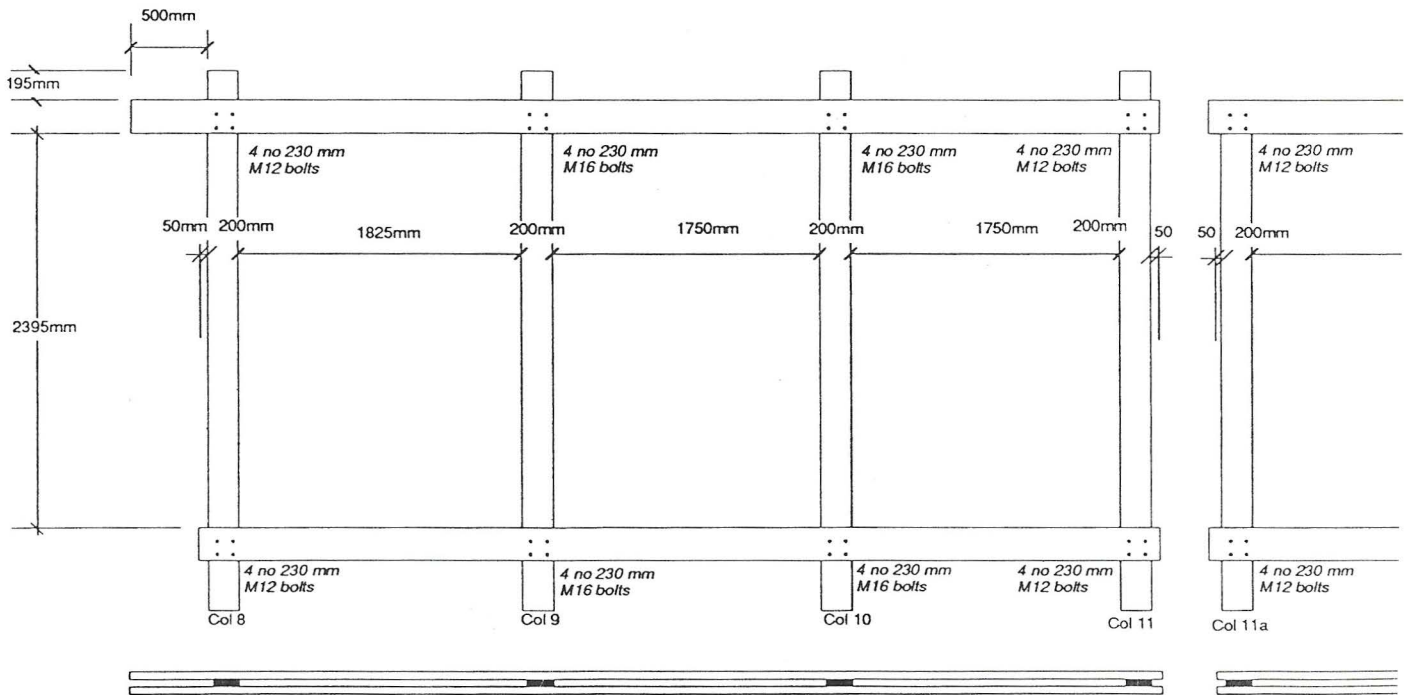


- d) Set up next column to beam, square off as before, check spacing to last column, drill and bolt as before - don't forget to treat holes as you go.

- e) Nail temporary cross braces to all members as you go.
 - h) Proceed drilling one hole in each joint and inserting one bolt until all the beams and posts for the frame are all fixed with one bolt per joint.
 - g) Due to their size some frames have joints in the beams. These are indicated on the frame drawings. In frames with a single beam an extra filler beam is bolted to the rear of the beams, in frames with double beams this is bolted between the two beams. Ensure that the junction is accurately set out and clamped together prior to drilling and bolting. It is important that the top edge of the beams is true and horizontal across the joint.
 - h) Check that the diagonals are equal, adjust and pin firmly with cross bracing, when you are sure all is square and true, drill remainder of holes, treat holes in posts, insert bolts and tighten all round so that the washers are just biting into the timber but no more. Do not overtighten.
- 6) Construct other frames as above remembering to assemble the frames the right way up for erection.

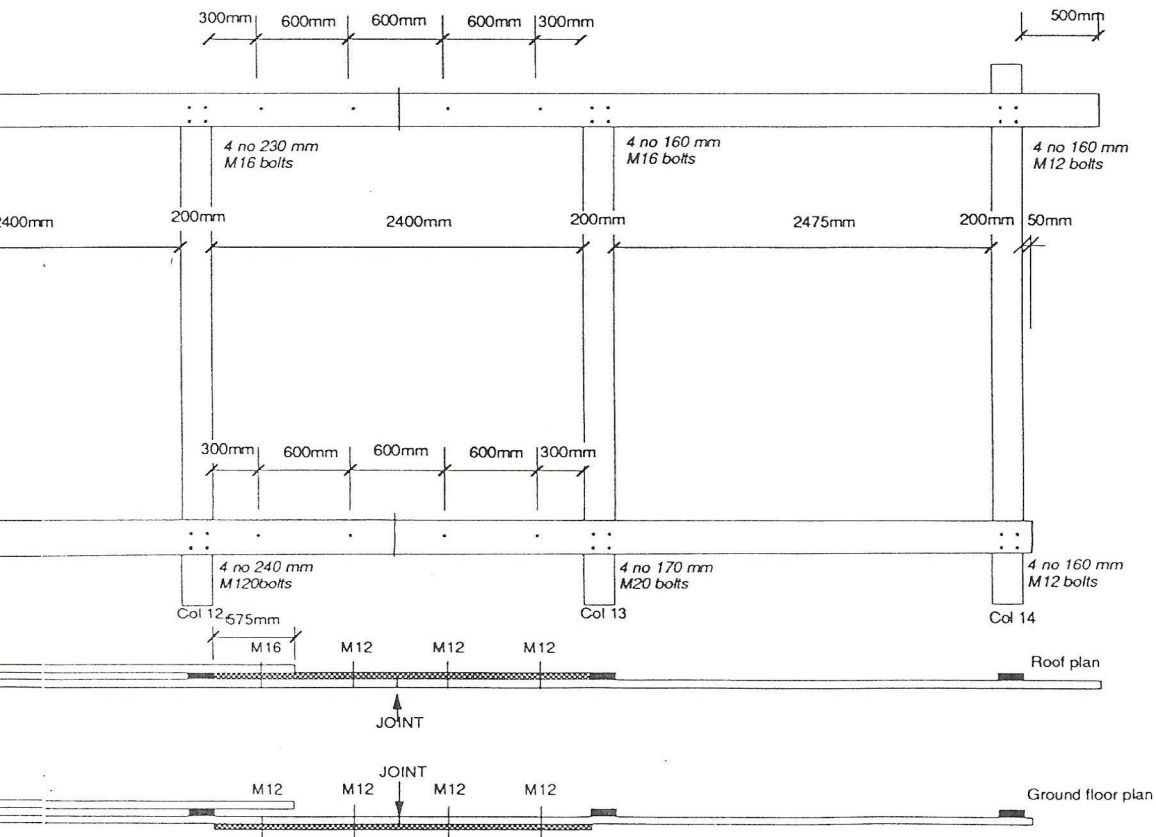
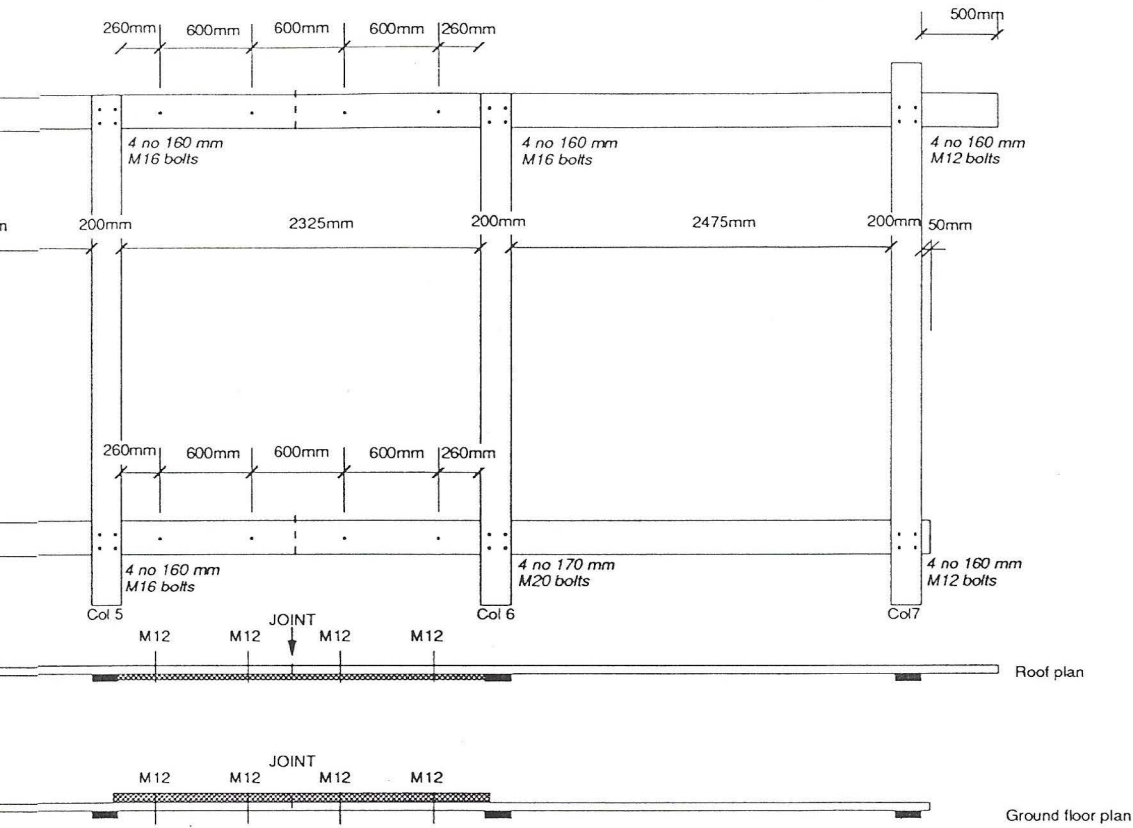


Frame A



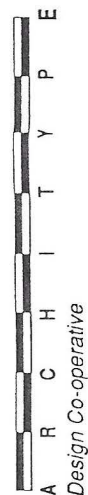
Frame B (i)

Frame B (



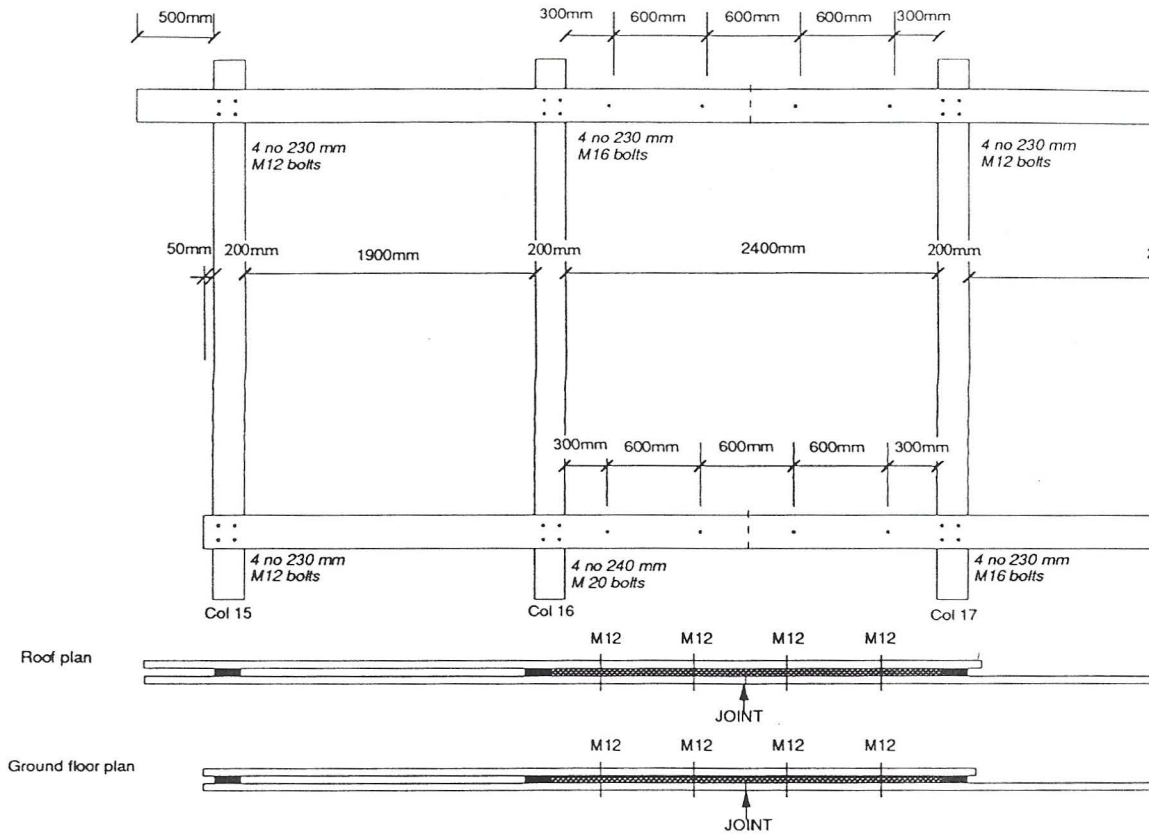
All ground floor are Ex 75 x 225 SS Grade.
 All roof beams are Ex 75 x 225 SS Grade
 All columns are Ex 75 x 200 SS Grade

Scale	1:50
Date	11/91
Title	House type A : Frames A & B
Number	291/Type A/S/6
Job	lowther hill
For	fusions jameen self build / chisel

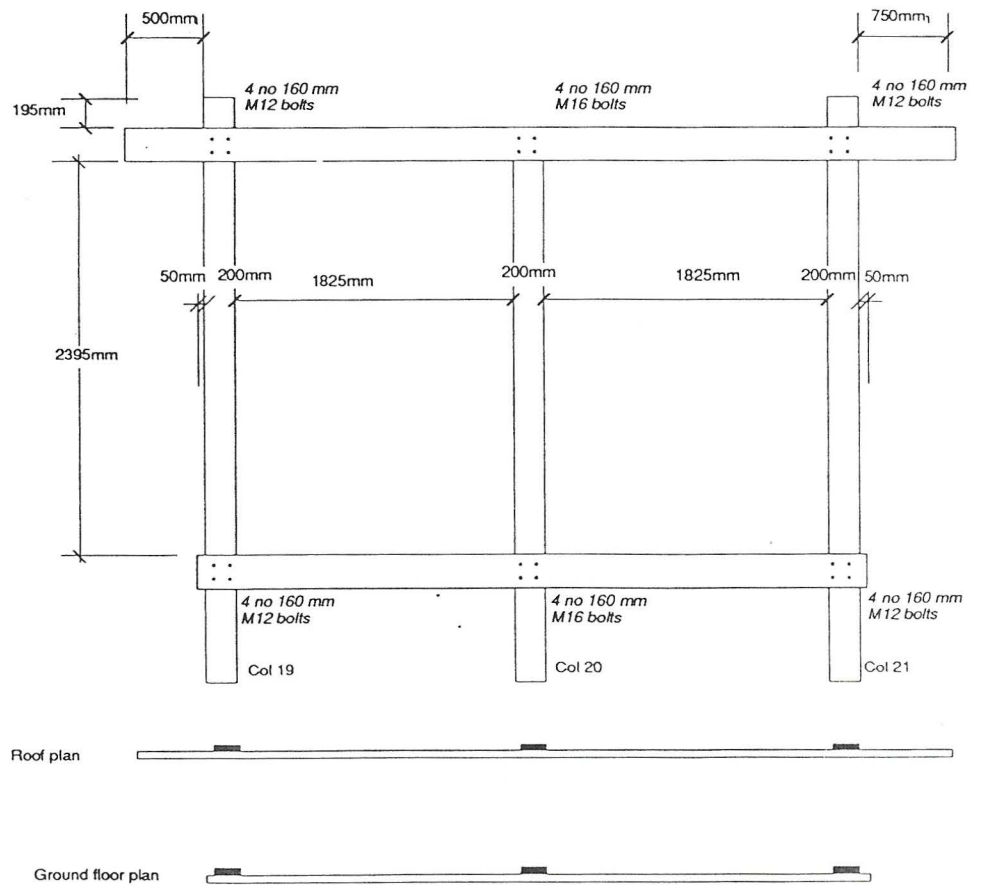


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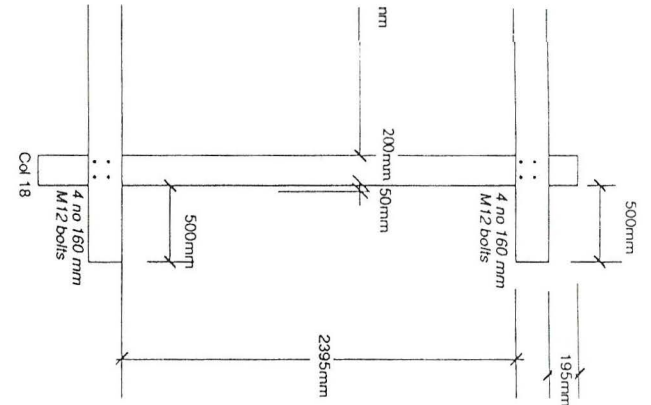
Rev B: 11/92: general amendments



Frame C



Frame D



All ground floor are Ex 75 x 225 SS Grade.
 All roof beams are Ex 75 x 225 SS Grade
 All columns are Ex 75 x 200 SS Grade



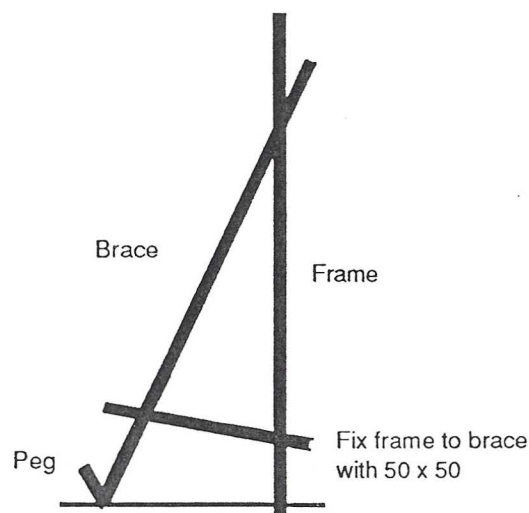
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Job lowther hill	Title House type A : Frames C & D	Scale 1:50
For fusions jameen self build / chisel	Number 291/Type A/S/7	Date 11/91

Rev A: 11/92: bolt dimensions revised

ERECT FRAMES

- 1) Mark the positions of the columns on the foundations.
- 2) Consider order of erection and sort frames out, allow enough room for handling frames.
- 3) Have ready to hand:-
 - a) 75x50 timber to be used later in construction to be used as temporary bracings for the first frame to be erected. 3 no. per house with pegs to be driven into the ground.
 - b) Spacing battens of timber to be used later in the construction accurately marked to the dimension between the columns. 3 no. per pair of columns.
 - c) Temporary cross bracing to extend from ground floor of one frame to roof level of the next. 6 no. per house.
 - d) Spirit levels
 - e) Ladders
 - f) Adequate labour : One person to 'foot' the base of each post, one person per column to raise the frame and two people on long 'pusher' poles; 8 no. in total. One and only one person in charge. Delegate tasks and make sure that everyone knows what they are supposed to be doing.
 - g) Hammers
 - h) Nails
 - i] Tape measures.
- 4) Move first main frame into position, keep other frames away from the area :-
 - a) Fix braces to top of frame with 4" wire nails, laying away from frame so that they can be used as "pushers". Nail in a position that clears beams as the frame goes up.
 - b) Carefully erect into the vertical position:- people on the bottoms of columns will stop the foot of the column slipping. ***Make sure that everyone remains firmly holding onto the frame until it is securely braced.***
 - c) Fix brace to frame, position and drive pegs as required.
 - d) Adjust position until square with foundation lines, stand frame vertically Nail end bracing to pegs.
 - e) Fix foot of frame to braces [see diagram] .
 - f] ***Ensure that the frame is absolutely secure before erecting the next frame.***



5] Erect further main frames:-

- a) Fix pushers by nails as before.
- b) Carefully erect as before.
- c) Fix spacing battens between frames at both floor and roof levels at the post positions ensuring that spacing between frames is correct.
- d) Check vertical and diagonals from first frame.
- e) Fix pushers to bottom of first frame forming a cross brace.

6) Erect porch and verandah frames in similar manner.

FINAL CHECKS

- 7) Check the spacing between each frame.
- 8] Check squareness of whole frame by measuring diagonals. You can move a frame either by lifting it or by carefully knocking the foot of the post with a sledge hammer.
- 9) Check that the frames themselves are exactly in line with a string line. Adjust if necessary.
- 10) Check verticals with plumb line and bob. Adjust if necessary by carefully removing one cross brace at a time. ***Under no circumstances remove more than one brace at a time.***
- 11) ***Check all temporary cross bracings are refixed firmly.***
- 12] Lift each column carefully and insert lead below each post. Trim flush with post with a Stanley knife.

Beams and Bolts Summary

HOUSE A	LOWTHER HILL																					
	ROOF BEAMS							FLOOR BEAMS							M12	M16		M20				
	3900	4500	5100	6000	6600	7200	3900	4500	4800	5400	6000	6600	7200	160	230	160	230	170	240			
A			2			1			1	1			1	32		40						
B	1	1	1				2	1	2				2	16	24	4	24	4	4			
C		1	1	1				1			2			8	20		8		4			
D				1						1				16		8						
	1	2	4	2	1	2	2	3	2	2	1	2	0	72	44	52	32	4	8			

CLIENT	SITE		PLOT NO.			DATE	REVISION
Fusions Jameen Self Build Co-op	Lowther Hill		A			Jan-92	Jul-92
MATERIAL	GRADE	FINISH	SIZE			UNIT	QUANTITY
JOISTS AND BRACING							
GROUND FLOOR JOISTS & NOGGINS	SS	PAR	Ex 50	x	225	2700	14
	SS	PAR	Ex 50	x	225	3600	10
	SS	PAR	Ex 50	x	225	4200	9
	SS	PAR	Ex 50	x	225	5400	2
	SS	PAR	Ex 50	x	225	5700	7
	SS	PAR	Ex 50	x	225	6300	3
ROOF JOISTS	SS	PAR	Ex 50	x	200	4200	9
	SS	PAR	Ex 50	x	200	5100	2
	SS	PAR	Ex 50	x	200	5700	8
	SS	PAR	Ex 50	x	200	6300	10
	SS	PAR	Ex 50	x	200	6900	5
ROOF NOGGINS	SS	PAR	Ex 50	x	200	2700	11
BRACING	SS	PAR	Ex 75	x	125	3900	4
	SS	PAR	Ex 75	x	125	4500	4
	PLY	Douglas fir faced	12 x	1220 x	2440	sheets	3

JOISTS

- 1] You should have marked out the modular spacing of the joists on the beams when you were constructing the frames on the ground. If not complete this operation. Note the different spacings of the joists at the edges of the building. Use running dimensions rather than measuring each space individually to prevent cumulative errors.
- 2] Mark and cut joists.
- 3] Skew nail joists to top of beams with 2no. cut nails [used to reduce splitting] ensuring that the joists are upright and in the correct modular position. [This will reduce the difficulty of fitting the underfloor panels supporting the insulation]. You can use pre-cut noggins to assist you to keep the joists upright and in position.
- 4] Nail trimmer joists around stair opening using hangars. Make sure that the correct square twist nails are used and that all the holes in the hangars are nailed.
- 5] Mark, cut and nail noggins in position.
- 6] Nail noggins in position in the first floor above partitions and doors in the ground floor where they run perpendicular to the joists. Observe the modular dimensions carefully.

NOGGINS: -

Noggins are for edges of the buiding between the ends o fthe joists to support the floor edges.

Check length, mark round and cut to length. Sit in position on top of beams. Fix with skew nails.

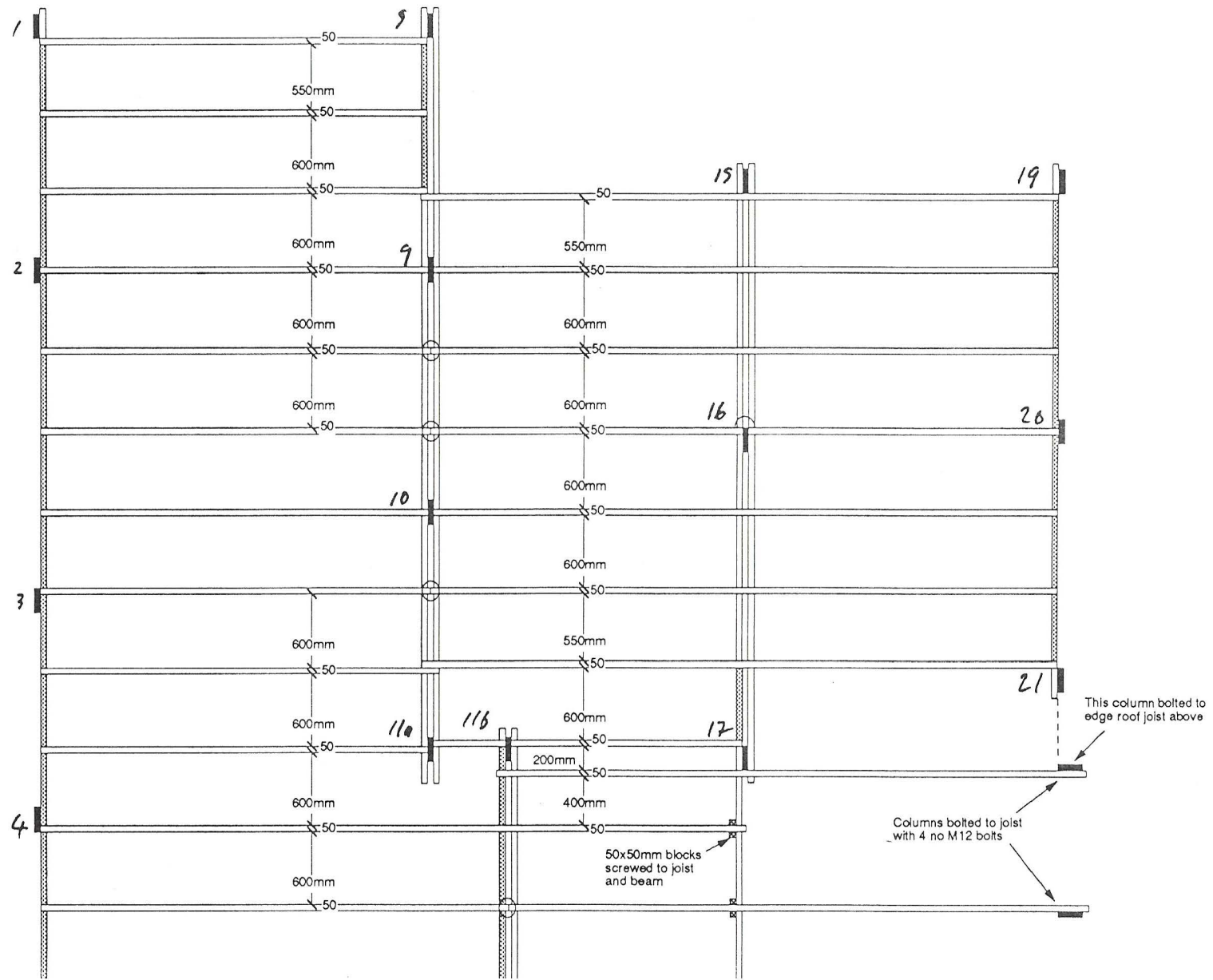
In some cases there are additional noggins which are fixed between joists in positions which are not over beams. These are fixed with joist hangers.

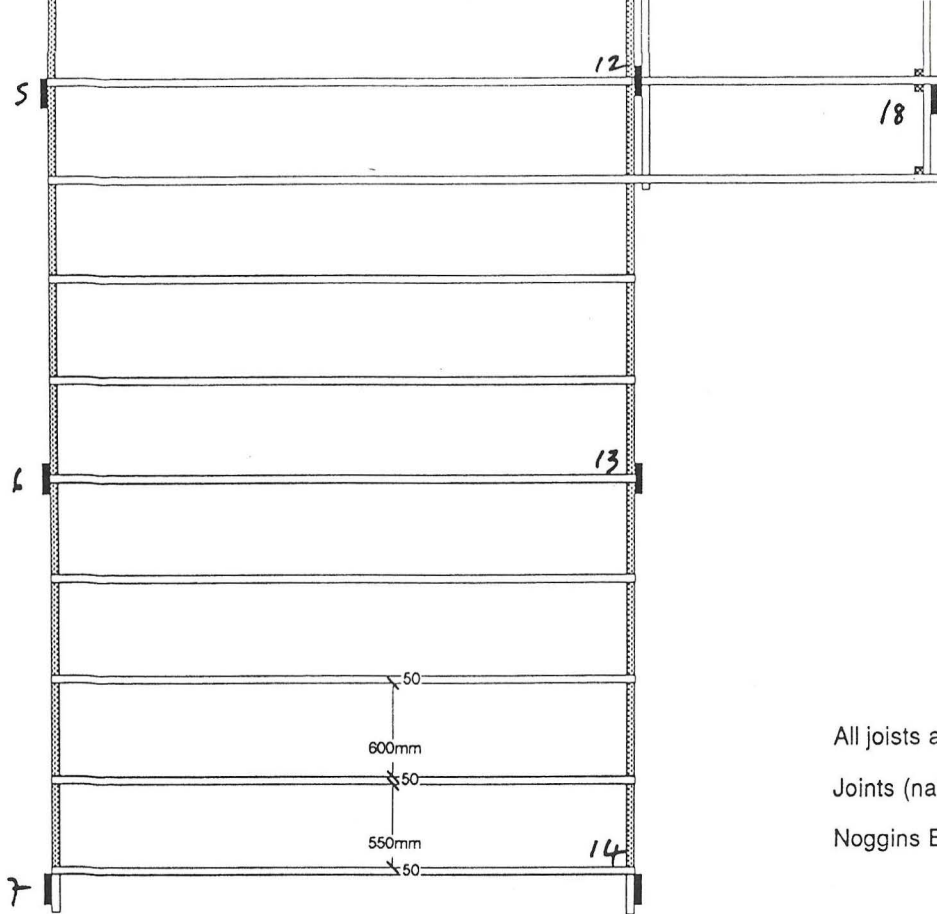
Frame A

Frame B

Frame C


Frame D





All joists are Ex 50 x 225 SS Grade

Joints (nail plate each side of joist) are indicated by: ○

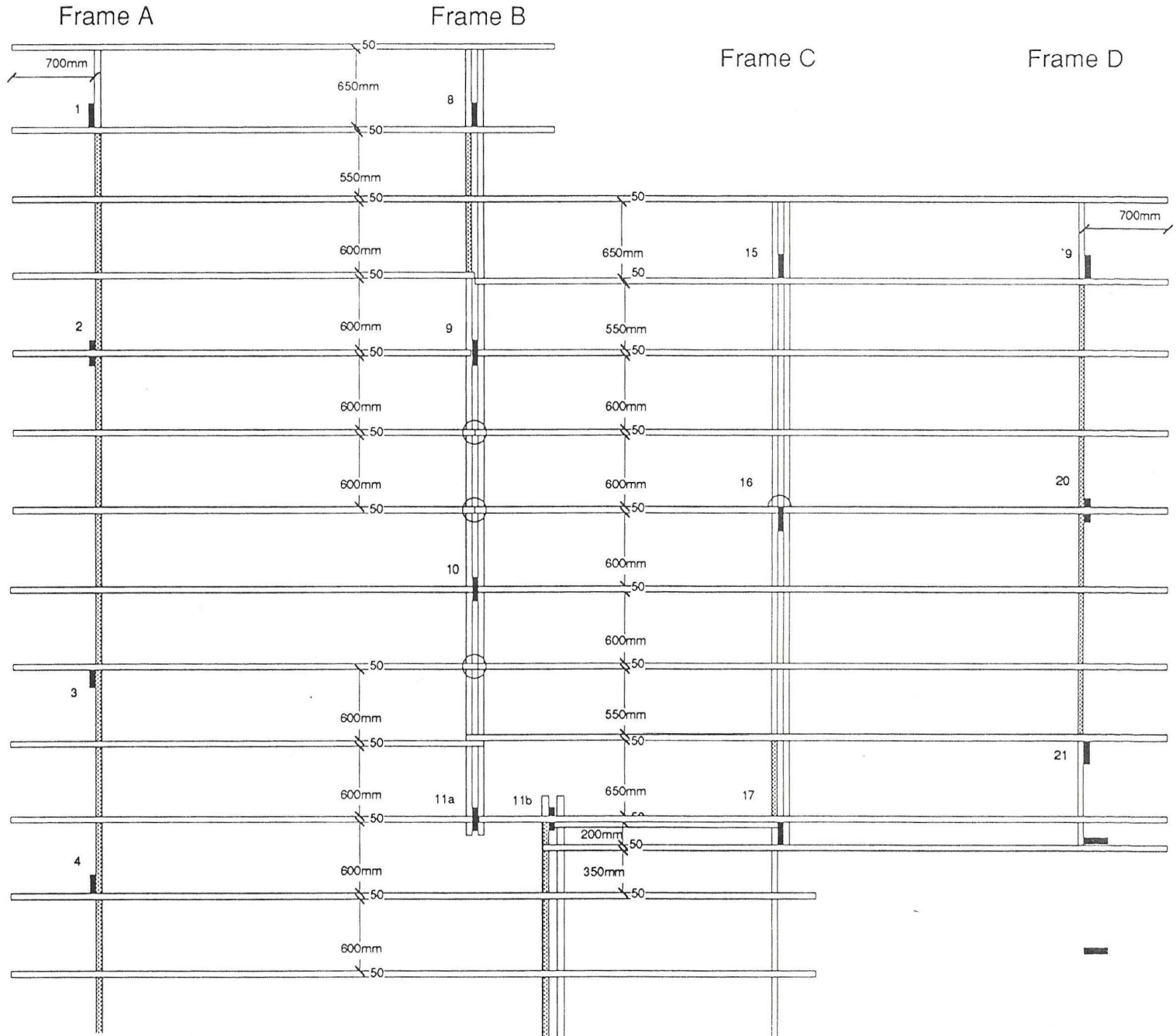
Noggins Ex 50 x 225 are indicated by: 

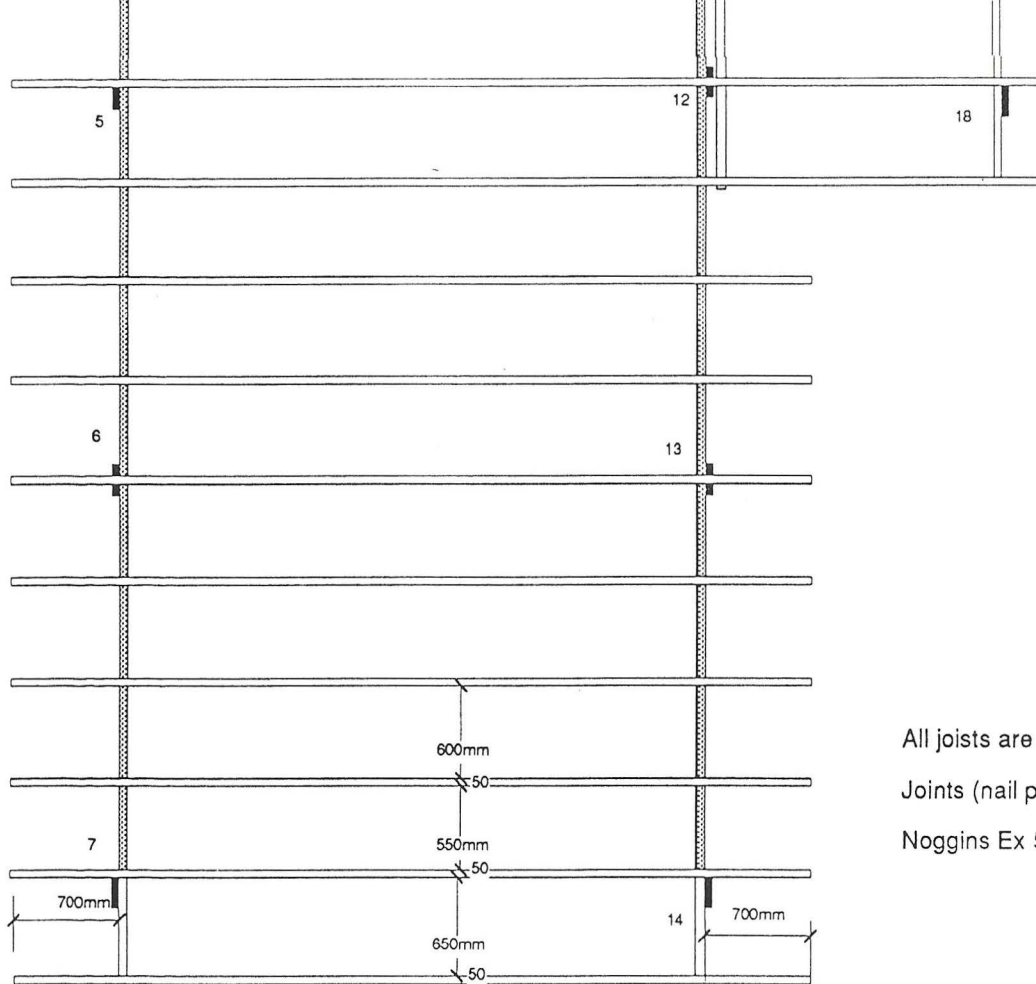
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Job lowther hill	Title house type A : ground floor joist layout	Scale 1:50
For fusions jameen self build / chisel	Number 290/Type A/S/2 B	Date 11/91

Rev A: 13/4/92 Amended for revised floor plan Rev B: 17/11/92: general revisions





All joists are Ex 50 x 200 SS Grade

Joints (nail plate each side of joist) are indicated by: ○

Noggins Ex 50 x 200 are indicated by:



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Job lowther hill	Title house type A : roof joist layout	Scale 1:50
For fusions jameen self build / chisel	Number 290/Type A/S/3	Date 11/91

Rev A: 10 Dec 91: notes amended, conservatory joist added Rev B: 21/4/92 amended for increased plan size Rev C: 11/92: general amendments

EXTERNAL WALLS, WINDOWS AND EXTERNAL DOORS

The external walls are a sandwich construction, the external cladding and finish being a separate operation to the insulation and internal finish. In summary the construction is as follows:

- External:
- 75x50mm vertical studs which are fixed "on grid" at 650mm c/s externally directly to either the beam or joists
 - a layer of 18mm softboard fixed to the studs
 - a 25mm ventilation space formed by 25 x 100mm sawn vertical battens
 - 'Glasal' weatherproof cladding sheet clamped onto the outside by:
 - Ex 100 x 25mm s/w battens (predecorated prior to fixing)

Factory glazed windows and doors are incorporated into the construction. We recommend that the windows are fixed in position prior to fixing of softboard so that the softboard can be trimmed flush with window linings, and the spacer battens can be tightly butted up to the linings. However it is possible for the windows to be fixed at a later stage if this is not possible.

- Internal:
- 25 x 25 battens fixed to the sides of the studs
 - "Warmcell" insulation sprayed into the wall in the space formed by the studs and the horizontal battens
 - 12.5mm plasterboard clamped against the 25 x 25mm battens by:
 - Ex 100 x 25mm s/w battens, plus skirtings and head battens

Holes for electrical boxes for any electrical fittings in the external wall have to be incorporated in the internal battens as the wall is constructed.

These instructions are set out in a stage by stage descriptive way with accompanying 3 - D drawings to explain the principles of the construction. This cannot explain every eventuality and 2 - D construction drawings pick up most of the other details and should be referred to as required. There may also be particular junctions which will need clarification on site - please ask if you are not sure about anything !

METHOD: EXTERNAL:

Fix studwork.

- 1] Skew nail 50 x 75mm sole plate with 75mm round wire galvanised nails to outside face of joists / noggins at base of wall.
- 2] Cut the 50 x 75mm studs to length.
Note: • position of window openings, doors etc.
• ground & 1st floor studs to join at mid point on joists or mid point of beams
- 3] Skew nail studs with 75mm round wire galvanised nails to face of beam or joists depending on whether you are working on the side or end of the house, all to be fixed "on grid" (50:600:50:600:50 etc)
- 4] Nail 25 x 75mm battens with 50mm round wire galvanised nails to the sides of columns (see drawing 830/D/01)
- 5] Nail through side of studs to fix 50 x 75 window head and sole plates and skew nail in addition if necessary (see drawing 830/D/10)
- 6] Horizontal 50 x 50mm horizontal battens to be fixed to the vertical studs with 100mm screws. Alternatively they can be located in position with 100mm nail straight nailed and then skew nailed in both directions.
Note: • columns may need packing out to same depth as 75mm studwork where horizontal battens run across the columns
• bottom spacer batten level with sole plate (see drawing 830/D/04)
• other battens to be at approx 600mm c/s, making sure that battens coincide with the horizontal joints in the bitumen softboard, and with window head and sole plates

- top plate to be flush with underside of roof board on gable side of houses
- 7) Nail 75 x 38mm batten and 50 x 50mm corner post to columns at external corners (see drawing 830/D/01)

Fix windows and external doors into position.

- 8] Apply 2no. strips of dry glazing tape to side jambs, and to head of window and door frames. Tape to be set 10mm back from front and back edges of frame.
- 9] Screw ex 32 x 150 lining to head of window and door frames with outside face of lining 10mm beyond the face of the frame.
- 10] Screw ex 32 x 200 linings to side jambs of window and door frames with inside face of lining being fixed in line with the inside face of the head lining
- 11] Bed aluminium cill piece in silicon mastic and screw to timber window cill.
- 12] Screw frames into position so that inside face of jamb lining projects 12mm inside line of studs and the outside face of lining projects 5mm beyond face of spacer battens (see drawing 830/D/09)

Frames must be installed true and square, with a level cill and without twist or diagonal distortion. Packing to be inserted between frame and studwork at fixing positions to prevent the frame being distorted.

Fixings to be 150mm from each corner to the jambs and head and at 600mm centre in between. Thus 600 high frames have 2no. fixings to the jamb, 1200 and 1500 high frames have 3 fixings and 2100 high frames have 4 no. fixings to the jambs. 1200 wide frames have 3no. fixings to the head. No fixings in the cills except 1no. in the centre of the storey high combination window/door frames.

Fixing should commence with the corner fixings to the jambs and then the corner fixings to the head. Screws to be 100mm no 12 size and fixed through stud and into lining and the window itself. Care should be taken to ensure that the line of the screw does not "miss" the window or project past the window.

Fix softboard and spacer battens to outside of studs.

- 13) Nail the softboard with 40mm galvanised clout nails at 200mm c/s across the external face of horizontal battens making sure that horizontal joints coincide with battens.
- Note:
- Vertical joints do not need to coincide with structure, but should be staggered.
 - at roof level at the eaves the softboard will need to be cut around the joists
 - the softboard will also have to be notched around the 1st floor beams which project through the softboard
 - mark the centre lines of the vertical studs and the intersections with horizontal battens on the face of the softboard
- 14] Cut vertical 25 x 100mm spacer battens of sawn timber to length.
- 15] Screw spacer battens with 100mm no 12 screws, centred on the marked lines, through softboard into the horizontal battens
- Note:
- spacer battens below windows to stop 20mm short of cill level to allow cross ventilation (see drawing 830/D/10)
 - if possible the spacer battens adjacent to window frames to be fixed after windows in position and to be butted up tightly to window linings

Prepare for fixing cladding

- 16] Nail PVC perforated ventilation profile ref 9056 for ventilation at top of wall to face of spacer battens (see drawings 830/D/6 & 7)
- 17] Nail PVC perforated ventilation profile ref 3612 for ventilation at bottom of wall to face of spacer battens (see drawings 830/D/6 & 7)
- 18] Nail PVC perforated ventilation profile ref 3612 for ventilation at head and cill of windows to face of spacer battens (see drawing 830/D/10)