Wood Frame Construction: History and Application

Wood is pretty good in tension and bending

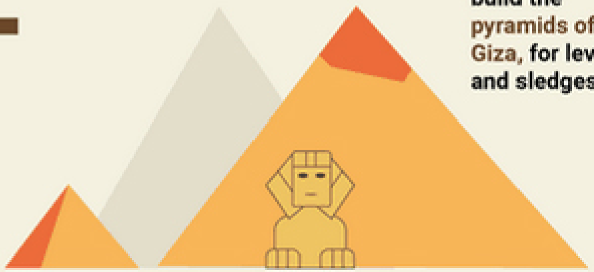
Resilient under repeated loads due to much practice with wind during its natural life https://www.logcabinhub.com/living-with-wood-from-the-beginning-of-time/

BRONZE AGE

The copper and bronze age allowed man to make tools more durable and less brittle.

The copper age also brought about the metal saw which brought on advancements when working with wood.

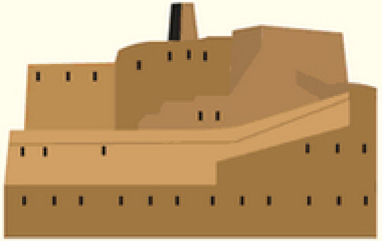
Wattle and daub, a combination of woven wooden strips and other adhesive material has been used to build walls for at least 6,000 years.



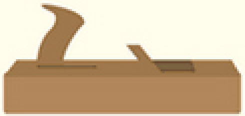
In 2560BC Egypt had to strip every bit of forest and wood they could to build the pyramids of Giza, for levers and sledges.

IRON AGE

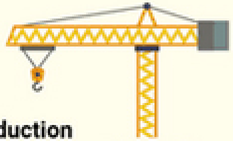
During the Iron Age the main building material was the mud-brick which still required the use of wood- the bricks were formed in wooden moulds.



Largest structure ever made from Adobe



The Iron Age saw more advancement in wood work, steel improved all the existing tools, and introduced the hand-plane.



The introduction of the timber crane during the Roman Empire allowed men to lift much larger weights to higher heights and create more impressive structures.

MIDDLE AGE

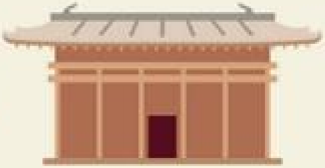
In the Middle Ages, Carpenters were considered to be among the most skilled craftsmen and were in high demand; the construction of every building required wood.

THE WATER MILL, invented during the Renaissance (14th-17th century) had a hugely positive impact on carpenters work and was used to saw timber and convert trees into planks.

The technique we now use today, known as 'Timber Framing' was first developed by the Romans in 50AD.

By the Middle Ages (476 – 1500 AD) timber framing was reaching its heights with impressive structures such as the hammer-beam roof of Westminster Hall.

In China, Temples are usually built with a timber frame on top of a stone base; the oldest wooden building in China is the Nanchan Temple (Wutai) which dates back to 782 AD.

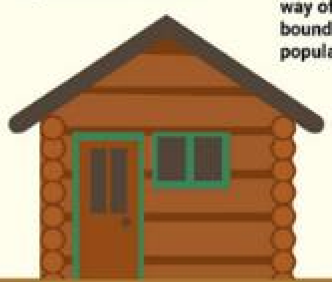


21ST CENTURY

One of the most popular uses for wood in construction now is the rustic log cabin.

The Granot Loma is the largest and most expensive log home in the world.

Wood is still a hugely popular material to build with and it will stay that way for a long time! It is aesthetically pleasing, provides us with a construction method which is renewable and sustainable as the world moves to greener way of living, the log cabin is bound to only increase in popularity.



Whilst North America's forest acreage is stabilizing, more work must be done to ensure they survive for future generations.

Historic Wood Architecture of Japan

Kōfuku-ji Five Storied
Pagoda
Nara, Japan
730 CE


Itsukushima Shrine
Miyajima, Japan
593 CE

Fushimi Inari Shrine
Kyoto, Japan
711 CE


納
奉


株式会社
樋屋
平成二十四年八月吉日建之

Kinkaku-ji (Golden Pavilion)
Kyoto, Japan
1398 CE

Heian Shrine
Kyoto, Japan
1895

Tōdai-ji
Nara, Japan
750 CE


makita

Historic Traditional House
Nichinan, Japan

More contemporary Japanese house
Using the same style of building


Historic Residence
Kitakyushu, Japan


室内立入禁止
Don't enter in the room.
顺路
Route
顺路
순로

太鼓櫓の構造
たい こ やぐら こう ぞう
太鼓櫓頂上部の景観［南西方向］
Landscape [Southwest direction]
太鼓櫓頂上部［南西方向］
Top stage of the Taikoyagura
太鼓櫓頂上部の景観［北西方向］
Landscape [Northwest direction]
太鼓櫓２階踊り場
Second floor
太鼓櫓３～４階
への階段
3F ~ 4F Stairs
太鼓櫓１～２階
への階段
1F ~ 2F Stairs
宝形笠木
銅板葺屋根
腰屋根
階段
階段
階段
桟瓦葺屋根
柿葺屋根
石之間
式台
式台
武者縁
玄関
槍床
畳廊下
現在地
You are here
太鼓櫓下階段
板廊下
西 (West)


よこなわ(横縄)

Historic Wood Architecture of China

Various buildings
Summer Palace
Beijing, China


氣象昭回
雲外天香

Early American Wood Houses
Salem, Massachusetts

Houses in the Swiss Alps
More solid construction
than in North America

Wood Framing Techniques

Two kinds of "wood":

Natural:
- Logged and cut and can have defects
- Limited in size

Engineered:
- Select parts of the wood are "assembled" usually with a binder material (glue) into shapes that are more regular and stronger
- More environmentally responsible
- Very large sizes are available

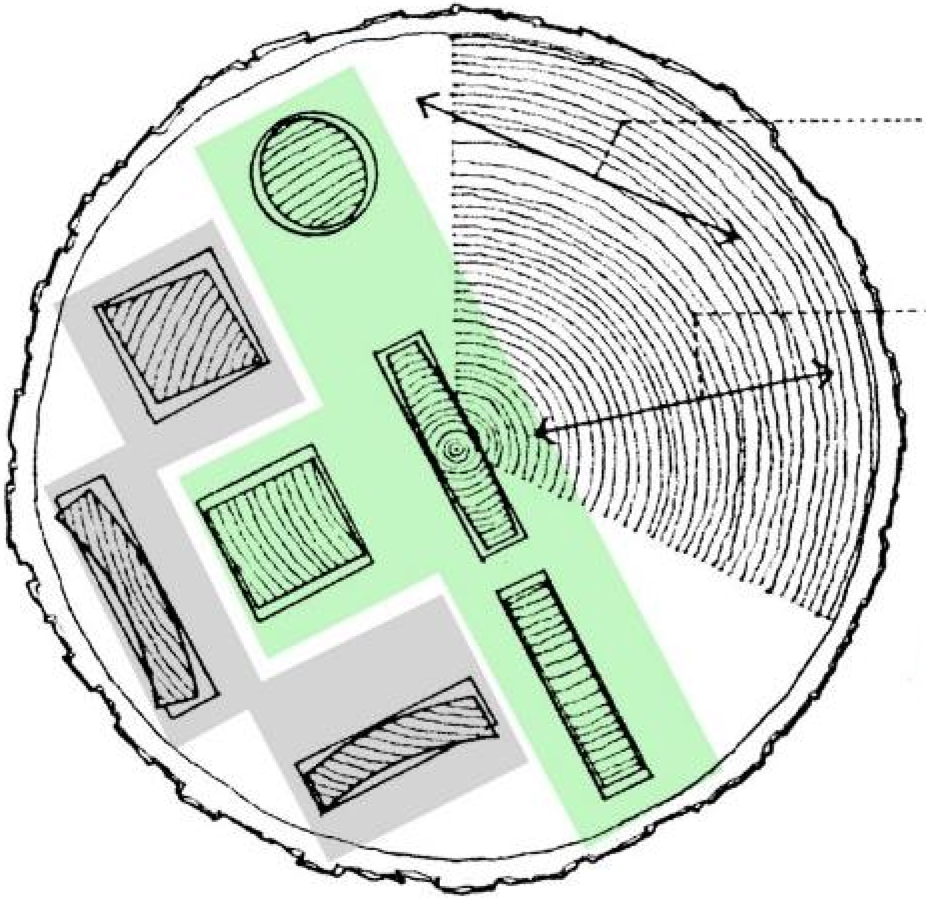
Advantages of Wood:

- Natural material
- Renewable (if forests carefully managed)
- Sequesters carbon
- Easily worked with hand tools on site

Disadvantages of Wood:

- Burns
- Rots
- Foot for termites and carpenter ants
- Not available everywhere in the world
- Height limited
- Natural insulator so cannot store heat

Wood Construction Structural Types:
- Heavy bearing wall (solid)
- Post and Beam
- Light Framing



tangential shrinkage
Wood shrinkage in a direction tangent to the growth rings, about double that of radial shrinkage.

radial shrinkage
Wood shrinkage perpendicular to the grain, across the growth rings.

longitudinal shrinkage
Wood shrinkage parallel to the grain, about 2% of radial shrinkage.

Quartersaw cutting

Plainsaw cutting


TEENS

Platform framing

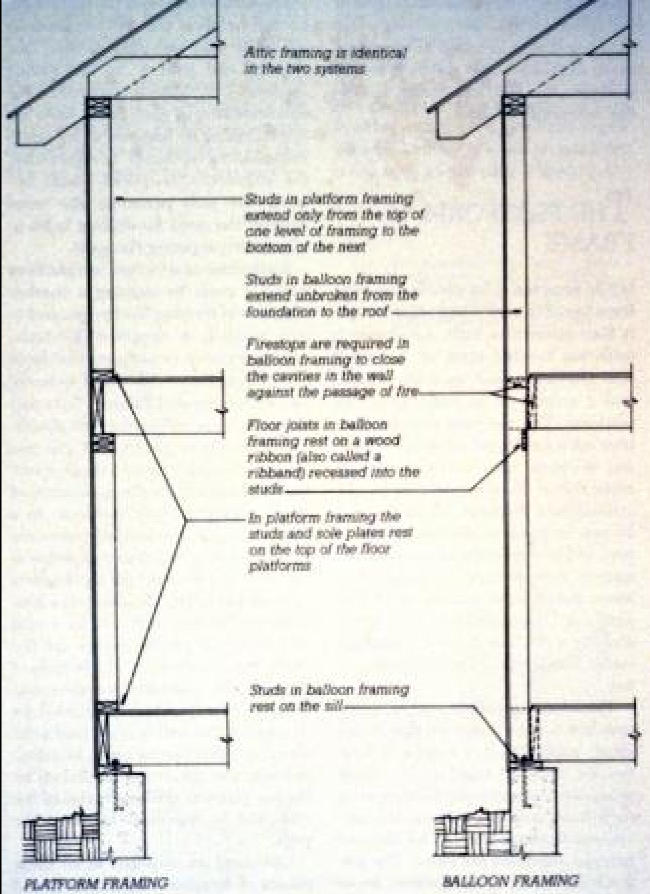
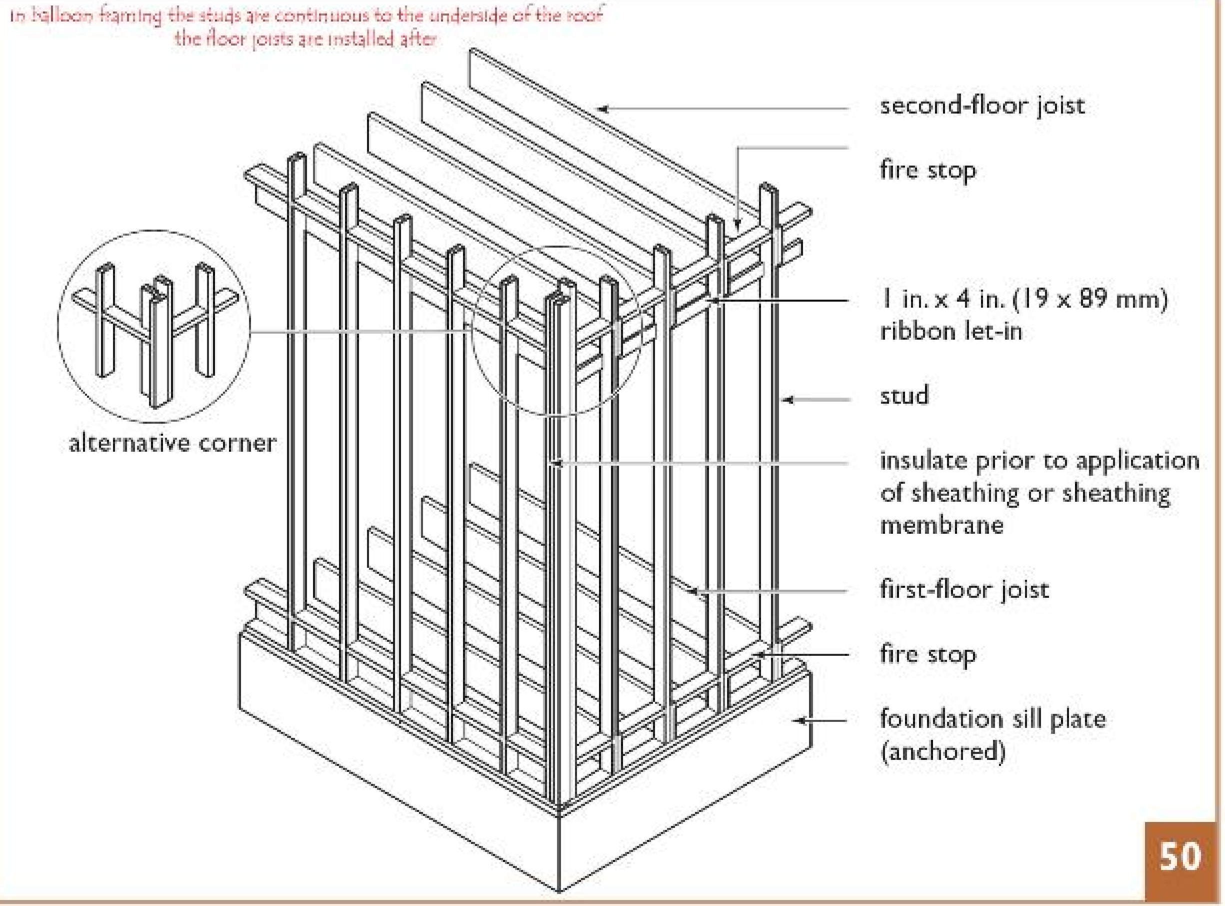


FIGURE 5.2

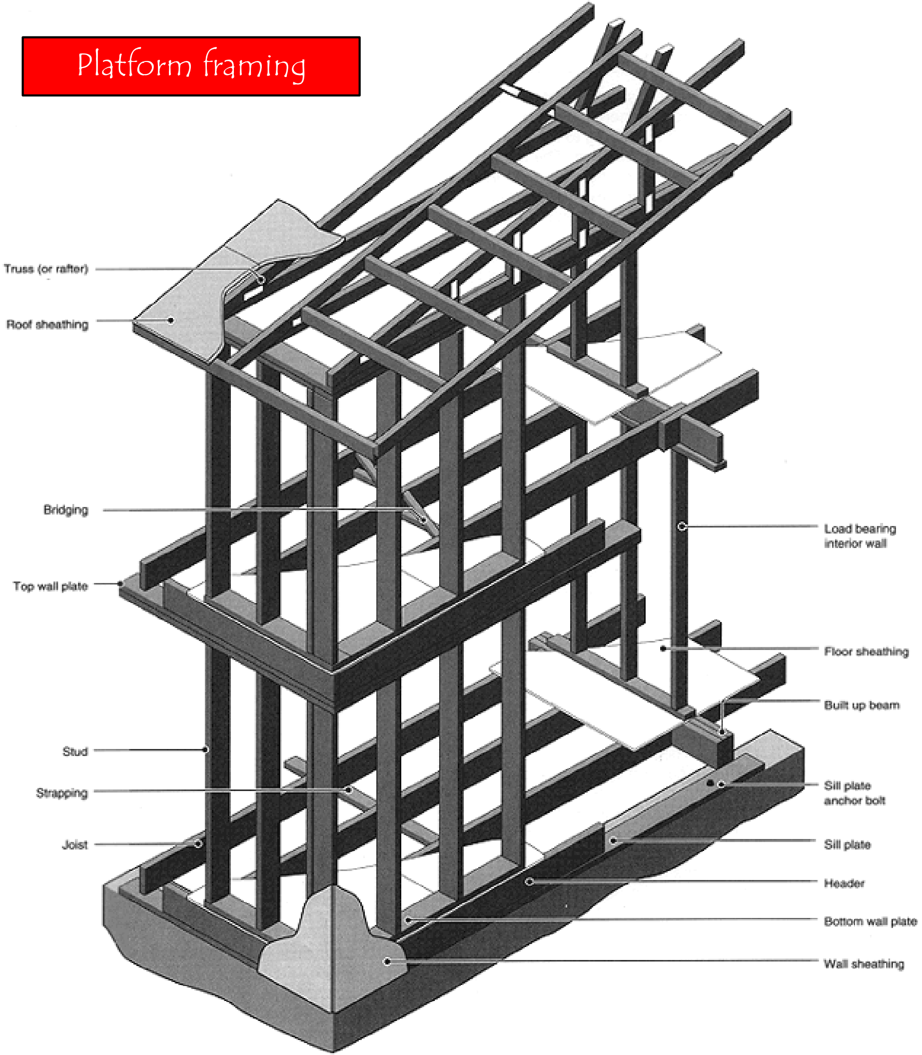
Comparative framing details for platform framing (left) and balloon framing (right). Platform framing is easier to erect but settles considerably as the wood dries and shrinks. If nominal 12-inch (300-mm) joists are used to frame the floors in these examples, the total amount of loadbearing cross-grain wood between the foundation and the attic joists is 33 inches (838 mm) for the platform frame, and only 4½ inches (114 mm) for the balloon frame. Interior partitions in a balloon frame building are essentially platform framed, however, which can result in tilting of floors.

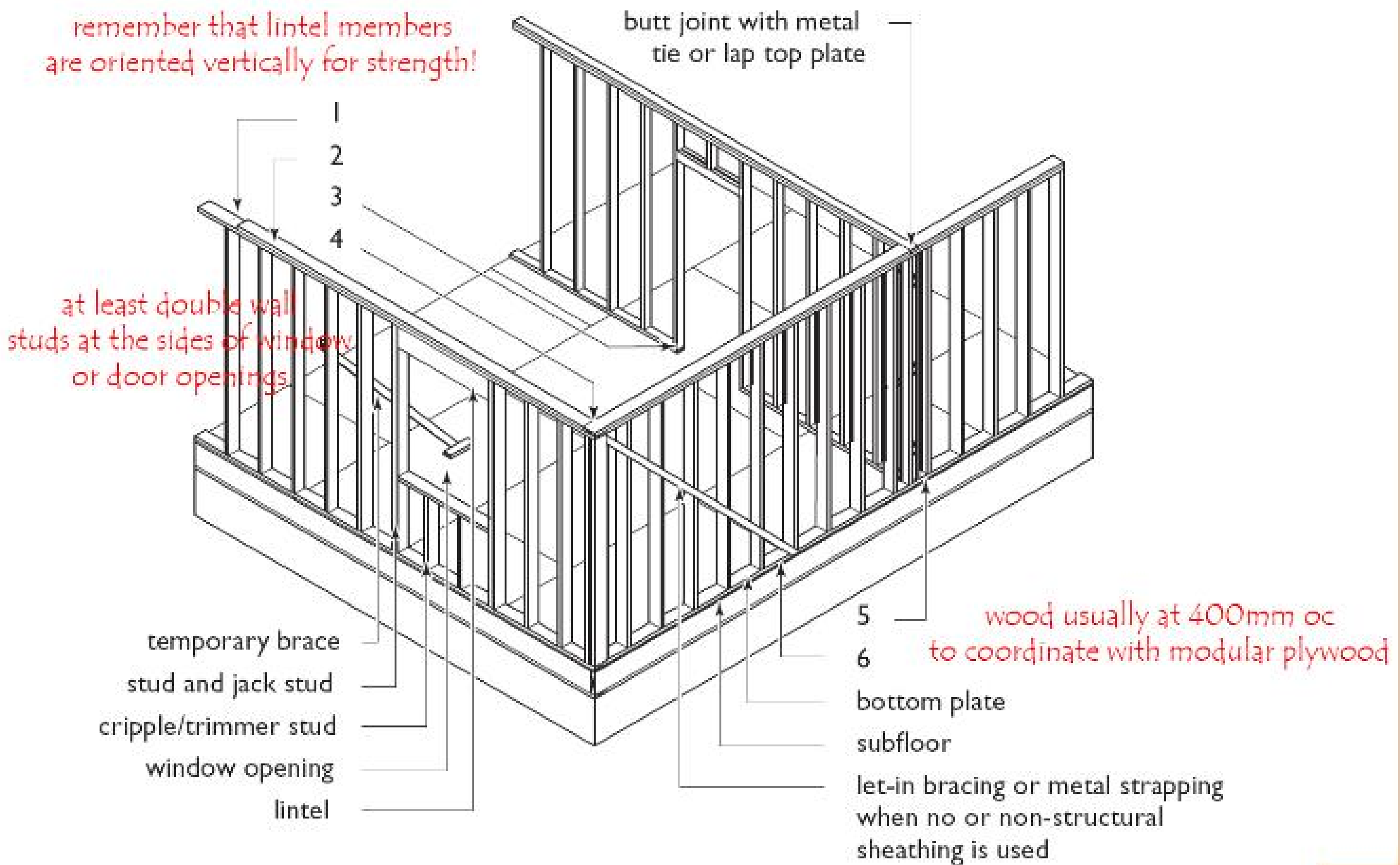
Balloon framing

Wall framing using balloon construction method



Platform framing





Note: Where the lintel exceeds 10 ft. (3 m), the jack stud needs to be doubled on both sides of the opening.

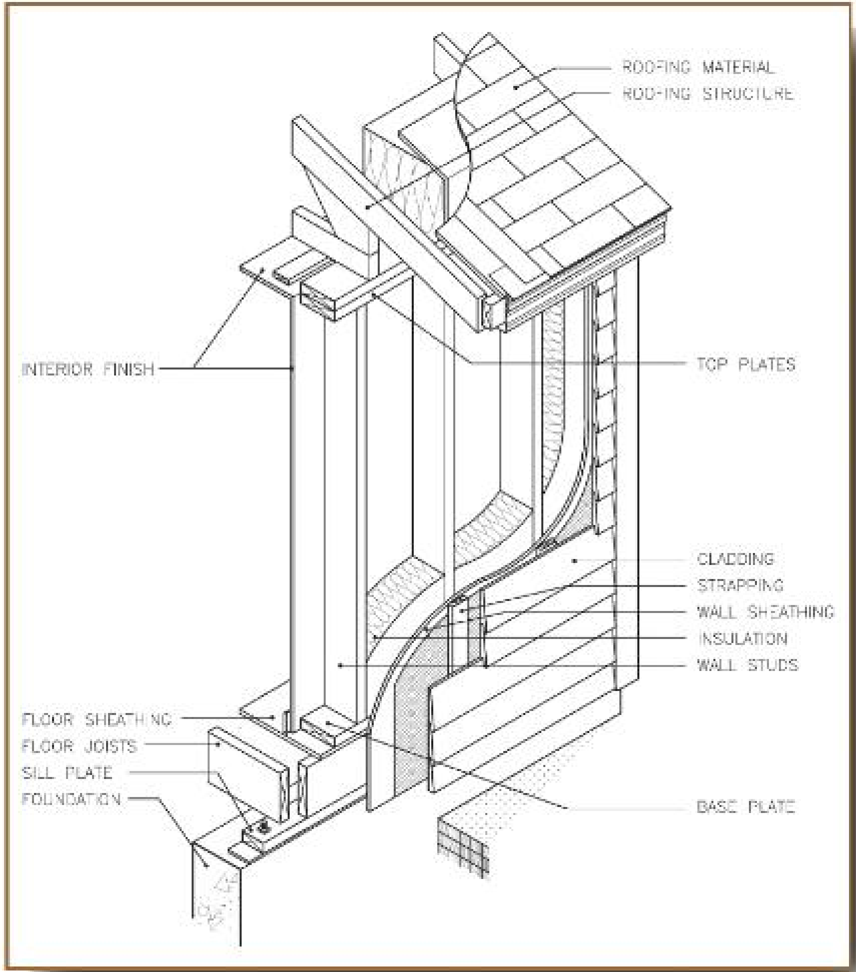


Figure 2.6: Components of a wood frame structure

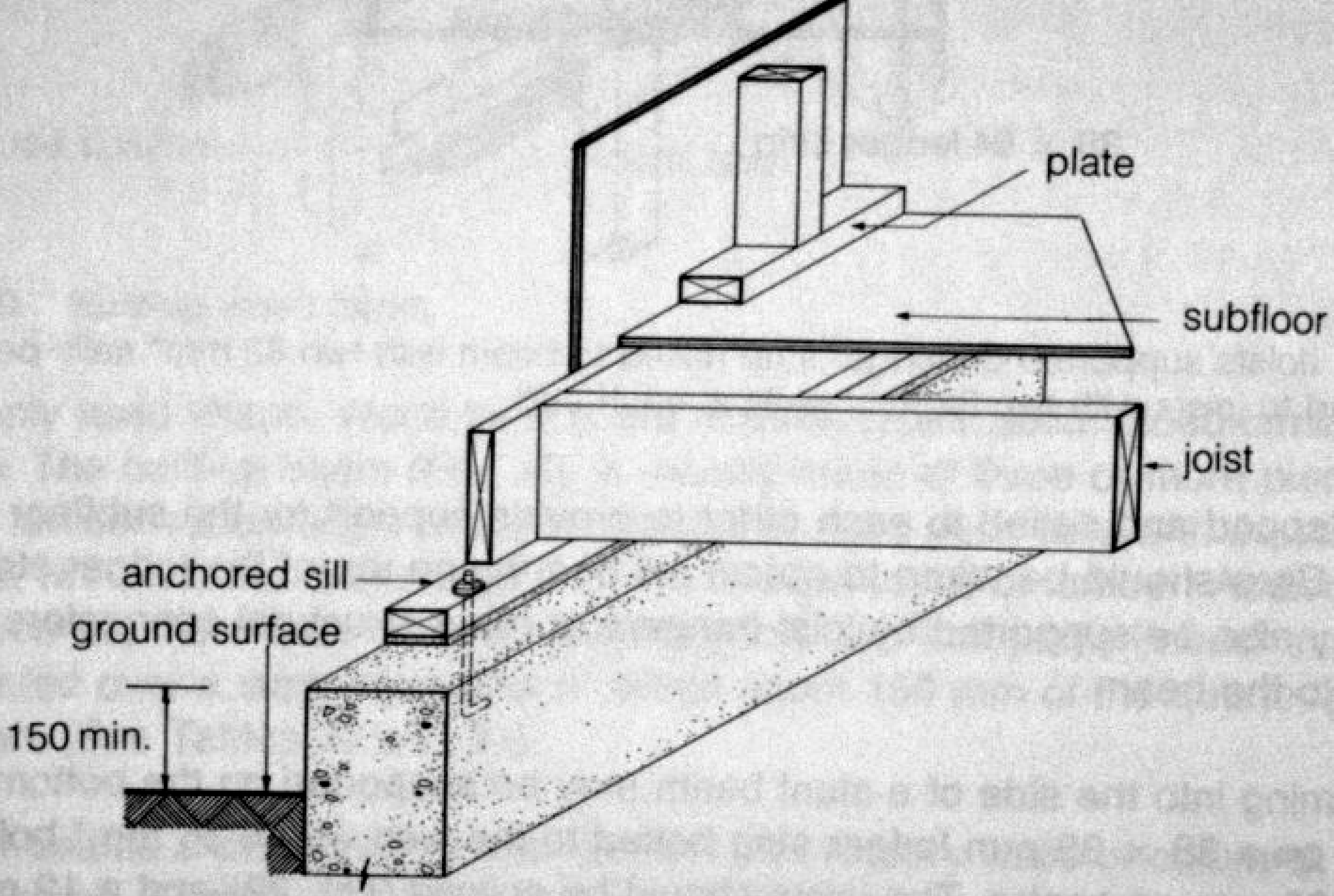


Figure 24. Box-sill method used in platform construction.

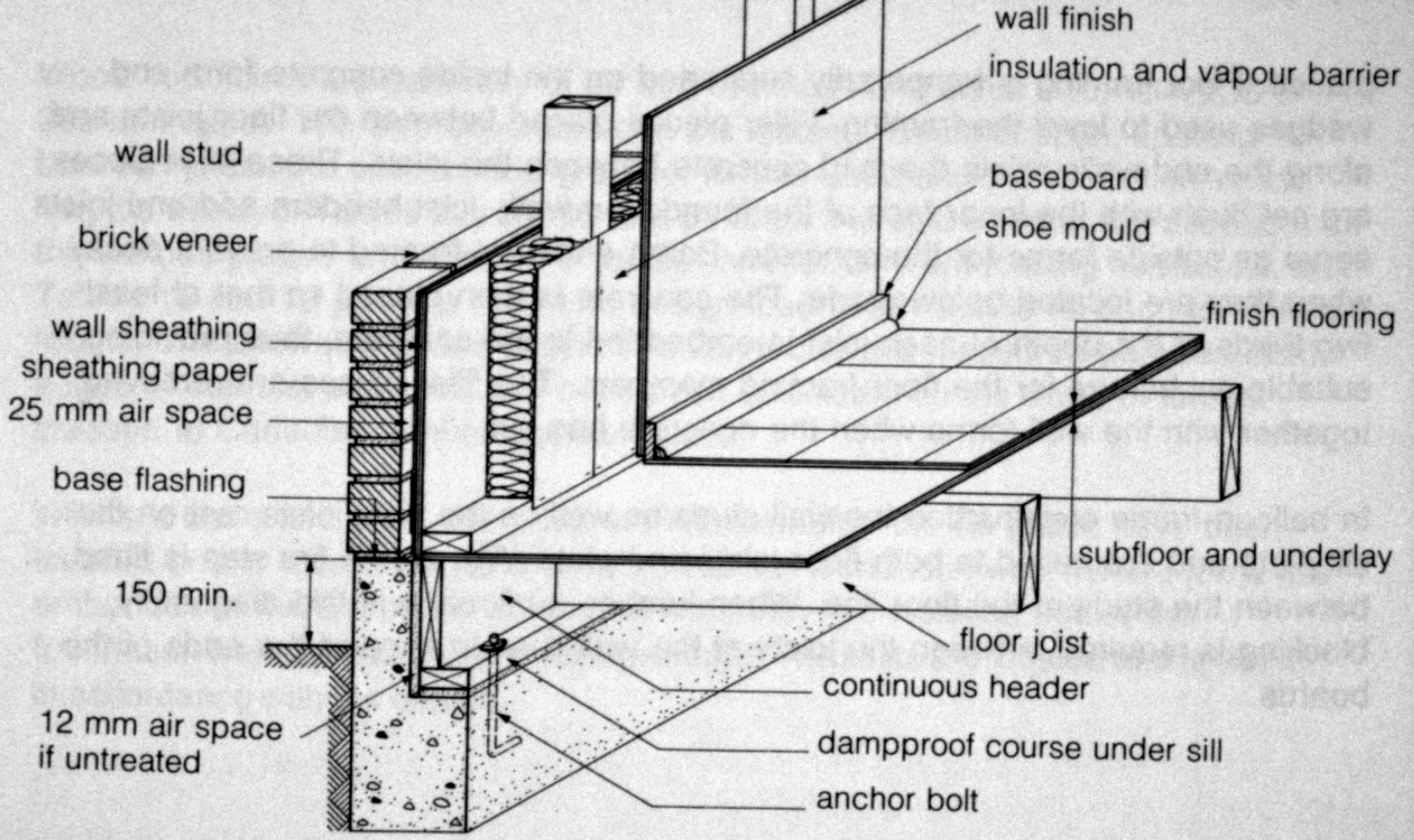


Figure 26. Floor joists are supported on ledge formed in foundation wall. Joists are toenailed to header and sill plate. Masonry veneer supported on top of foundation wall. Wall framing supported on top of the subfloor.

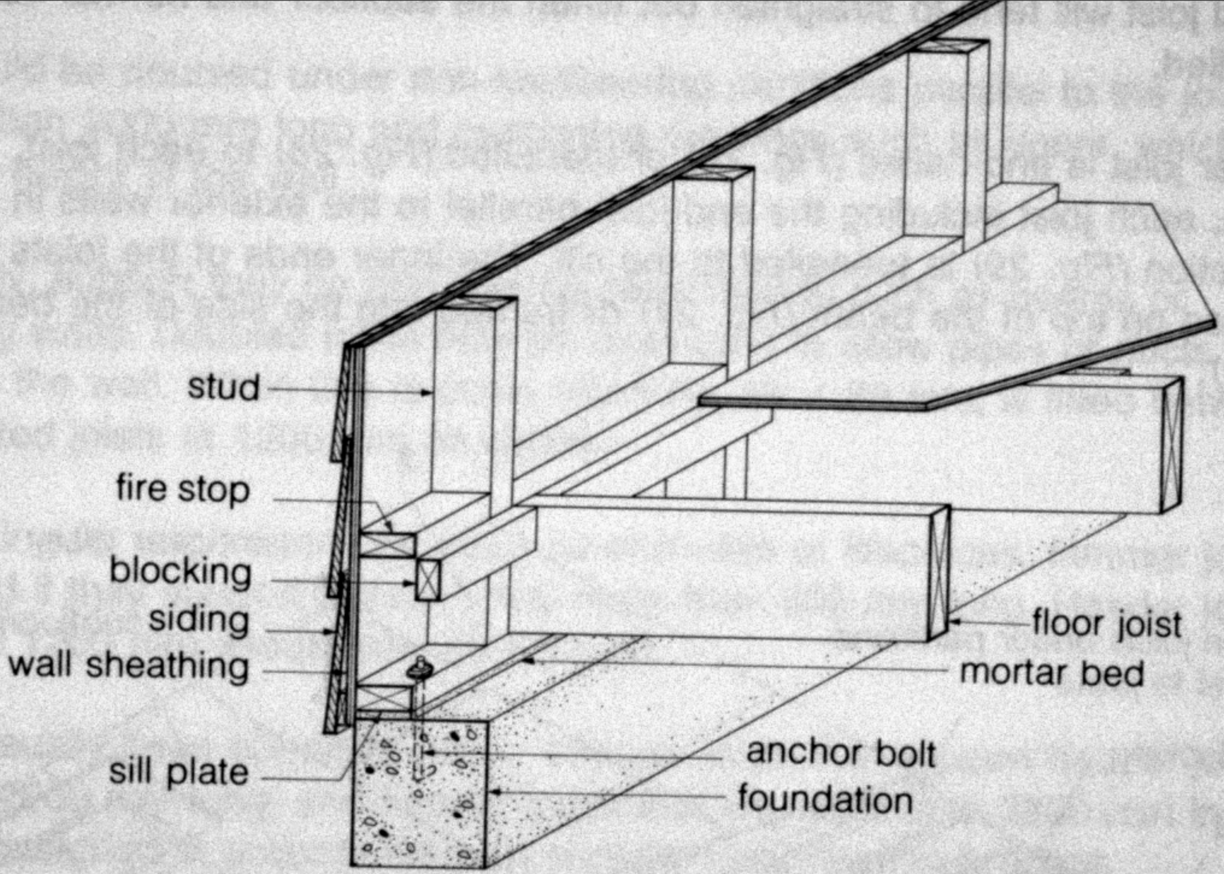
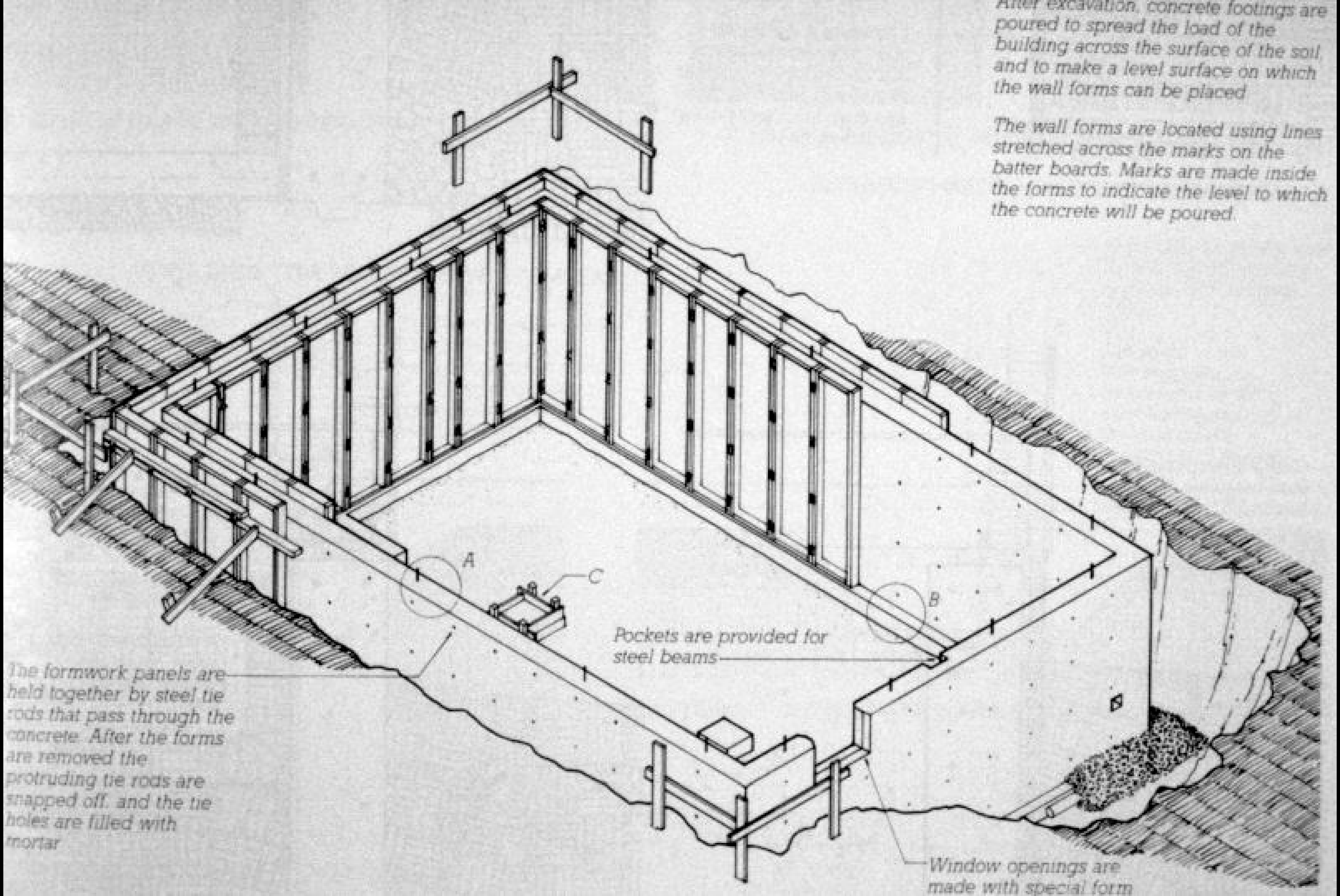
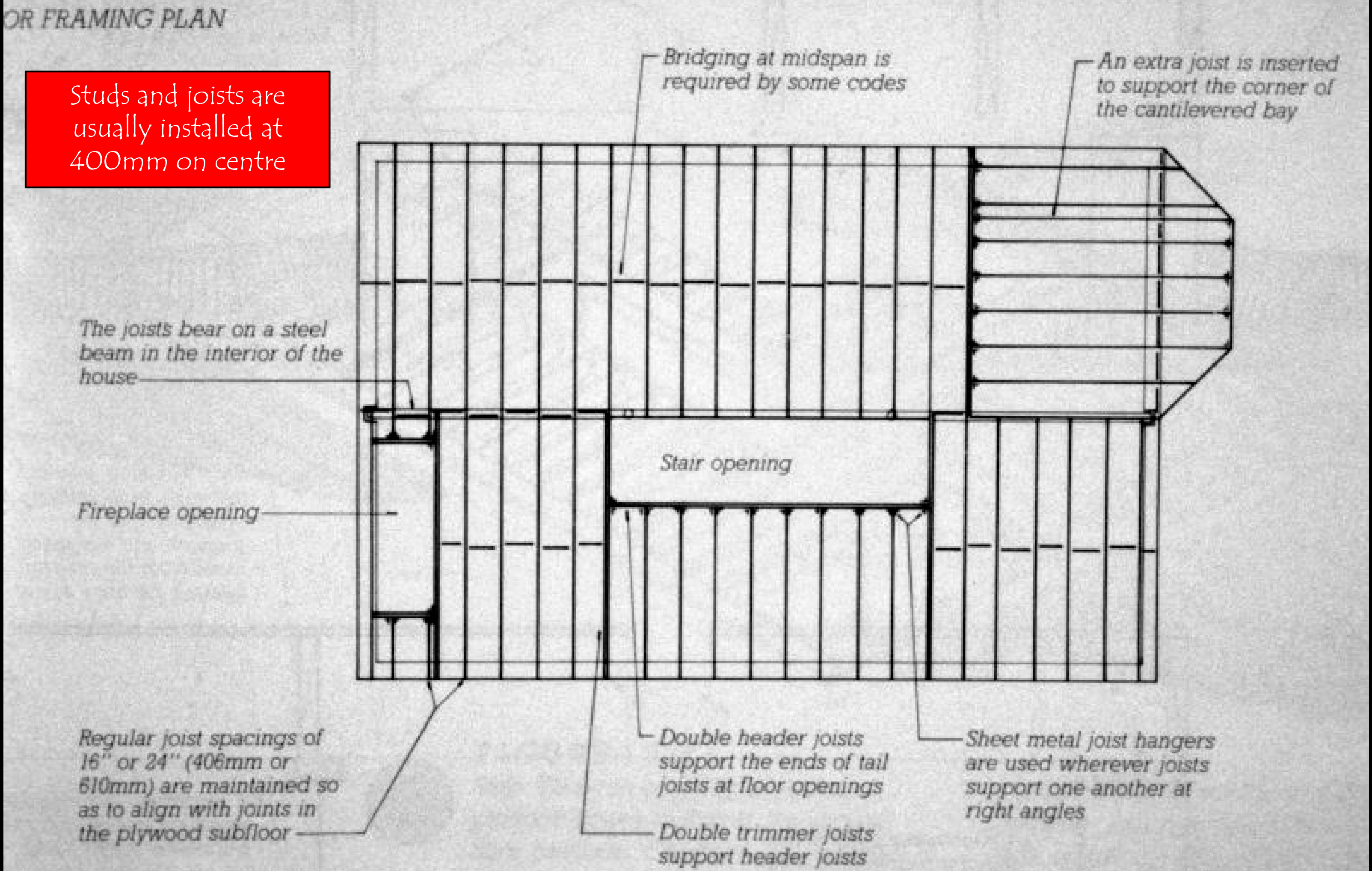


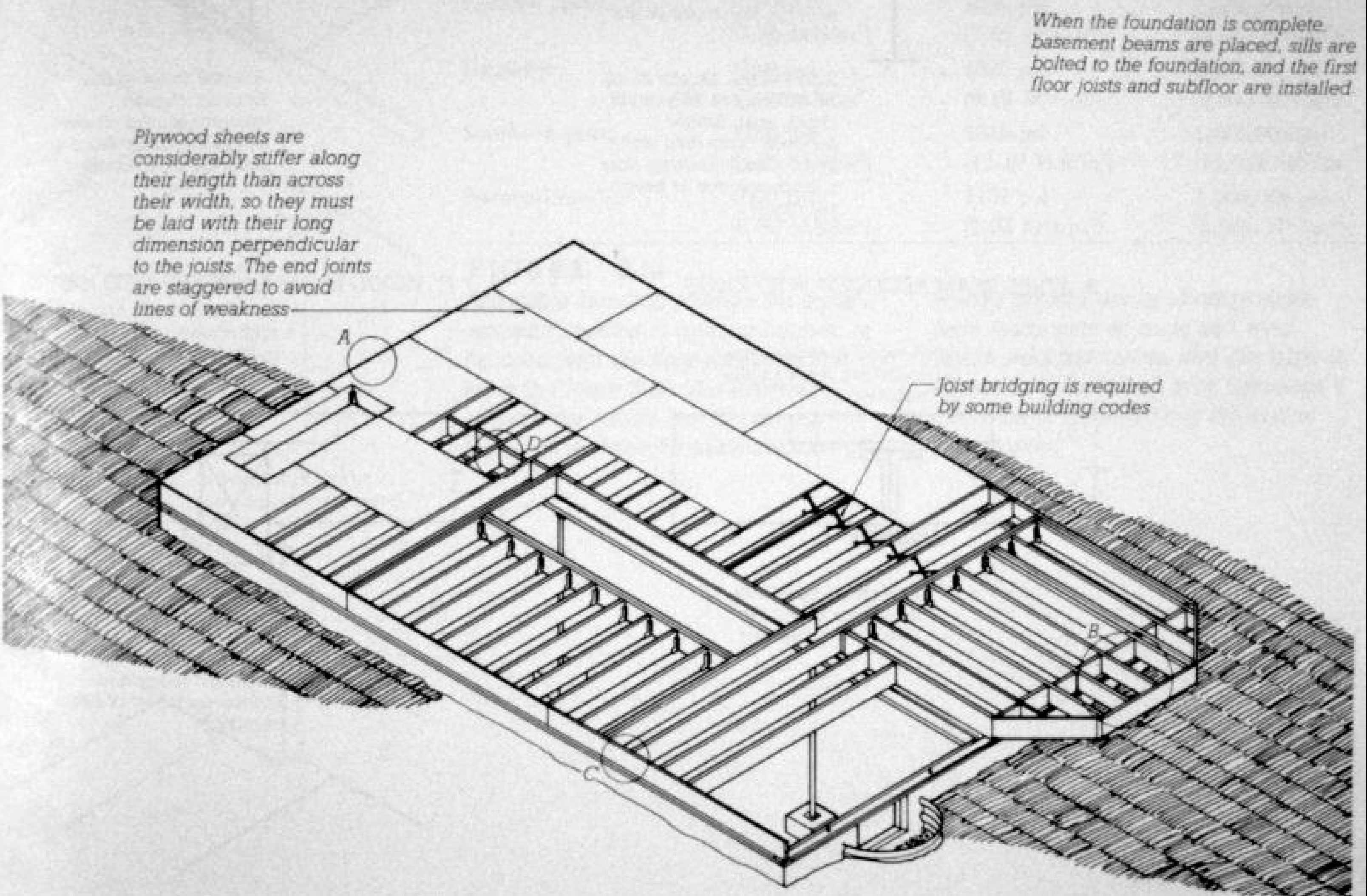
Figure 28. Type of sill used in balloon-frame construction. Wall studs and floor joists are supported on the sill plate. Wall studs are toenailed to the sill plate with four 63 mm* nails, two each side. Floor joists are face-nailed to the studs and toenailed to the sill plate with two 82 mm* nails in each case.



After excavation, concrete footings are poured to spread the load of the building across the surface of the soil, and to make a level surface on which the wall forms can be placed.
The wall forms are located using lines stretched across the marks on the batter boards. Marks are made inside the forms to indicate the level to which the concrete will be poured.
A
C
B
Pockets are provided for steel beams
The formwork panels are held together by steel tie rods that pass through the concrete. After the forms are removed the protruding tie rods are snapped off, and the tie holes are filled with mortar
Window openings are made with special form

Studs and joists are usually installed at 400mm on centre




When the foundation is complete basement beams are placed, sills are bolted to the foundation, and the first floor joists and subfloor are installed.
Plywood sheets are considerably stiffer along their length than across their width, so they must be laid with their long dimension perpendicular to the joists. The end joints are staggered to avoid lines of weakness
A
D
Joist bridging is required by some building codes
B
C

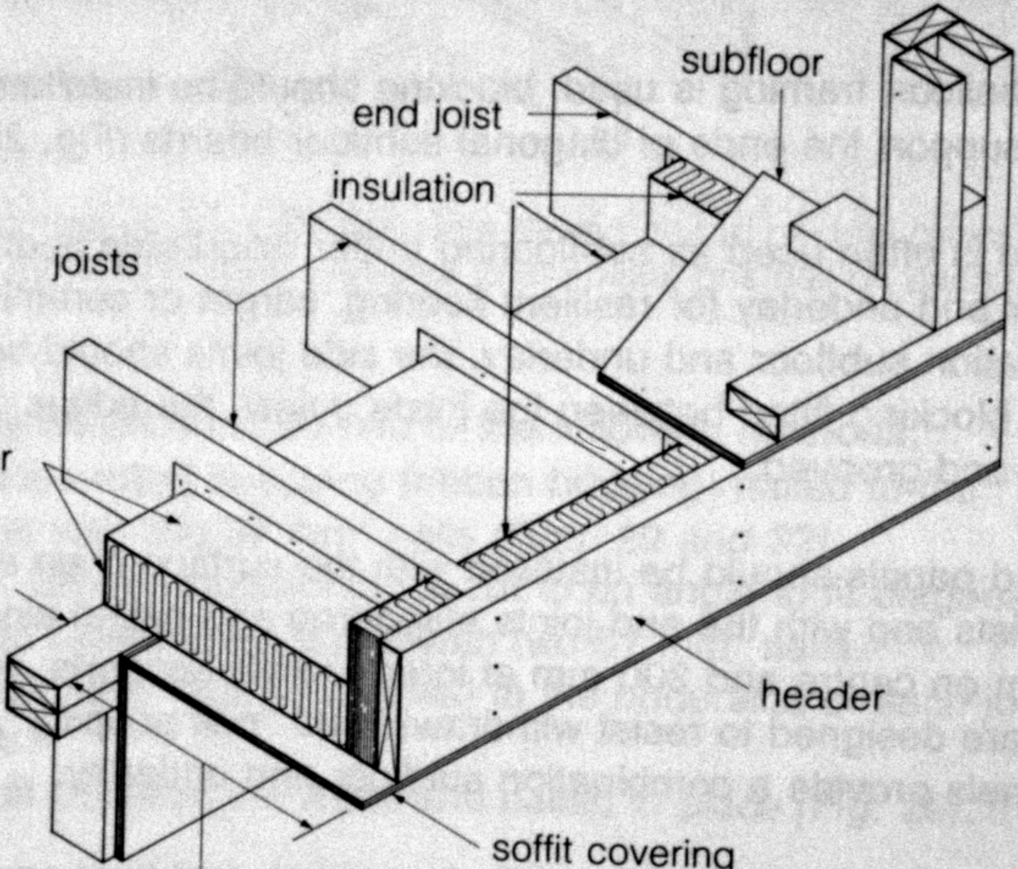
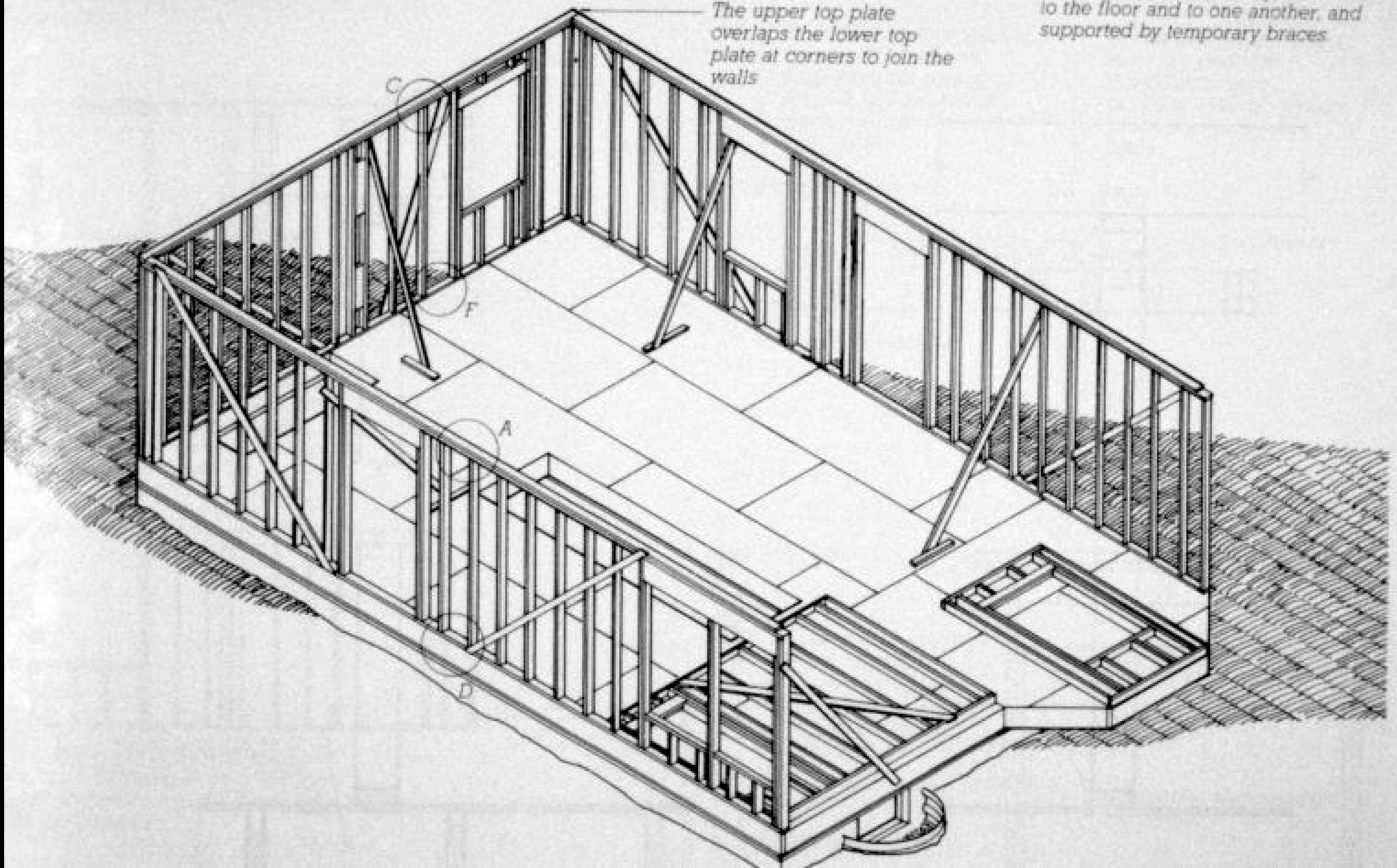
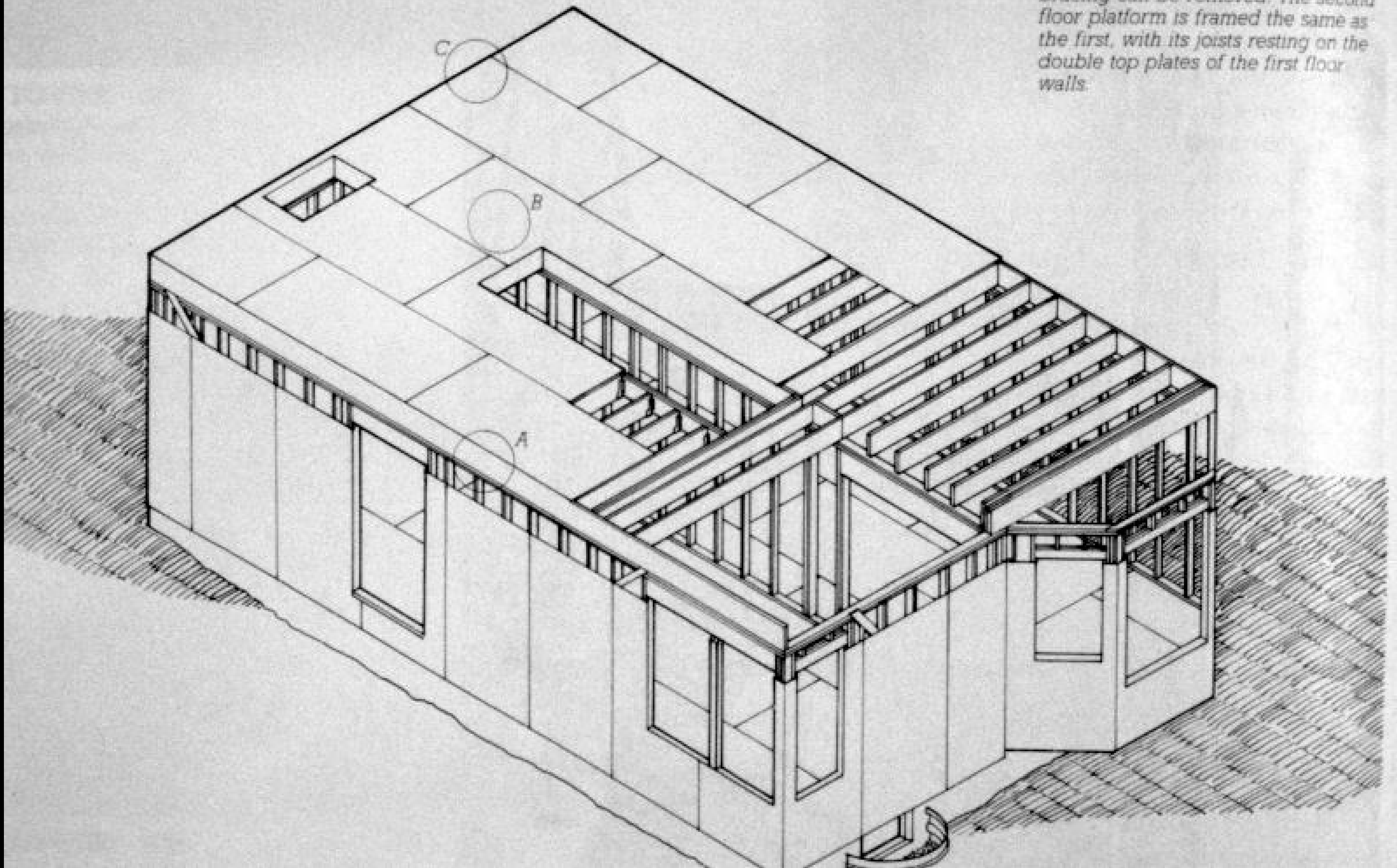


Figure 33. Floor framing at projections.



The subfloor makes a convenient platform on which to assemble the first floor wall frames. The assembled frames are tilted up into place, nailed to the floor and to one another, and supported by temporary braces.
The upper top plate overlaps the lower top plate at corners to join the walls
C
F
A
D



When the first floor walls are complete and sheathed, much of the temporary bracing can be removed. The second floor platform is framed the same as the first, with its joists resting on the double top plates of the first floor walls.

Wall framing procedures for the second floor are identical to those for the first floor.

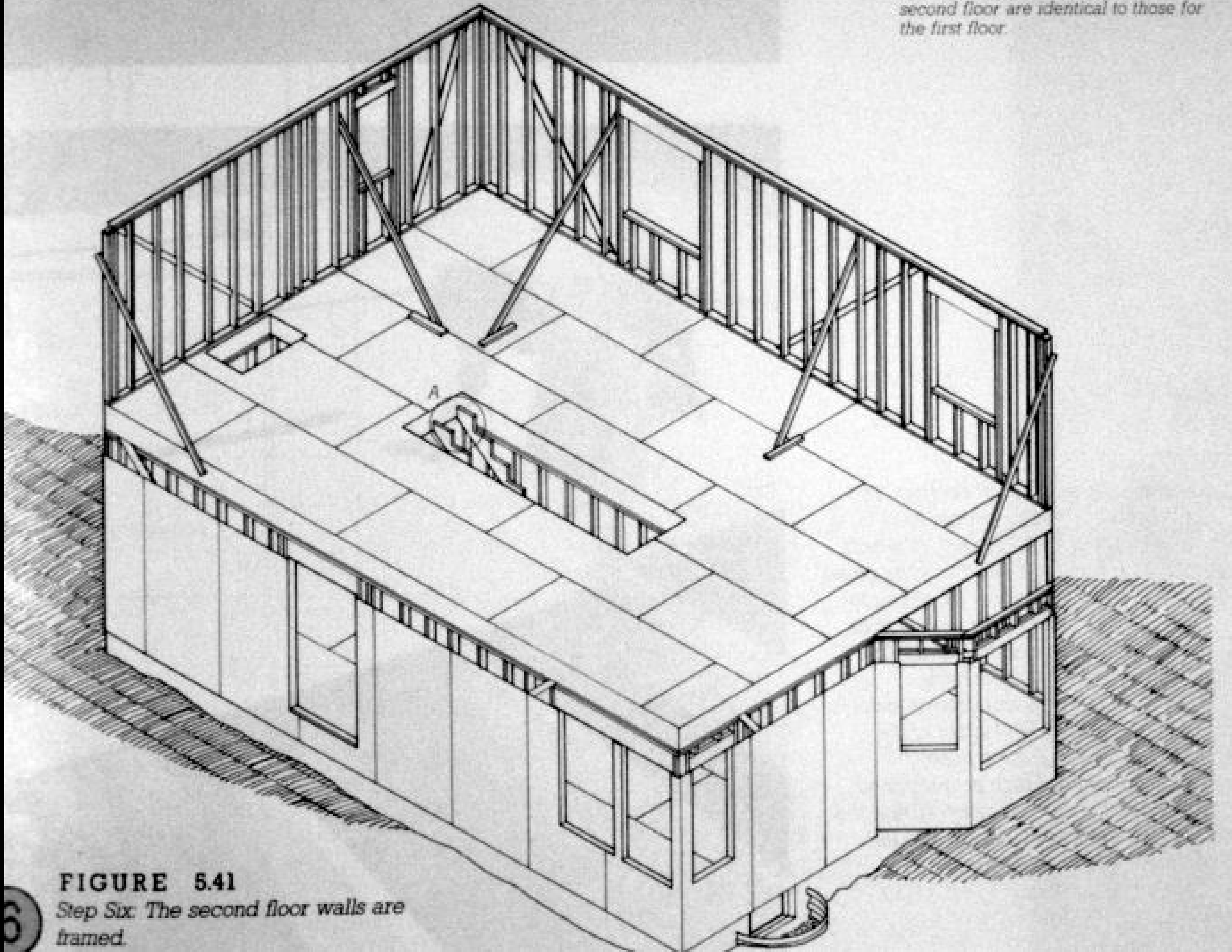
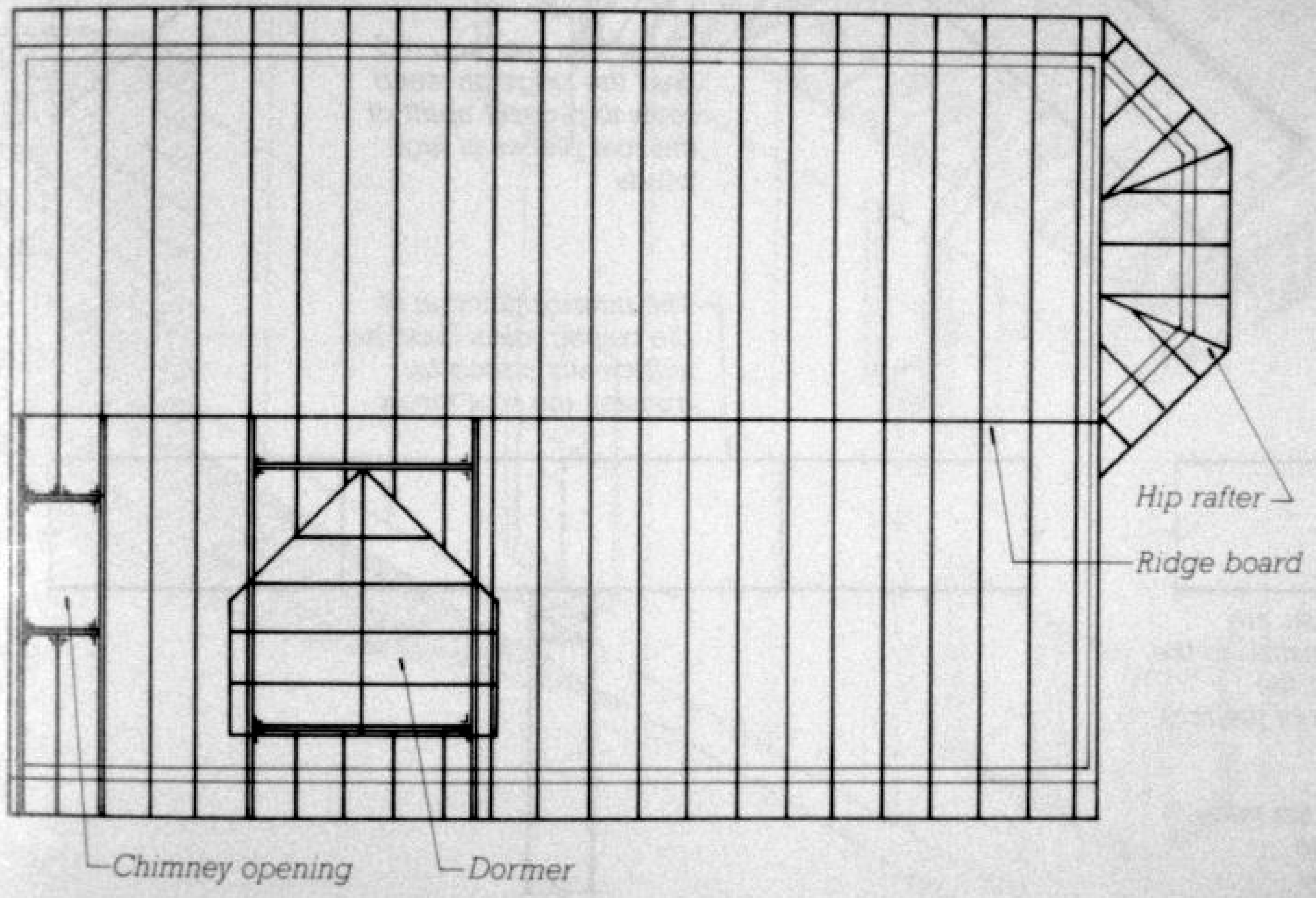
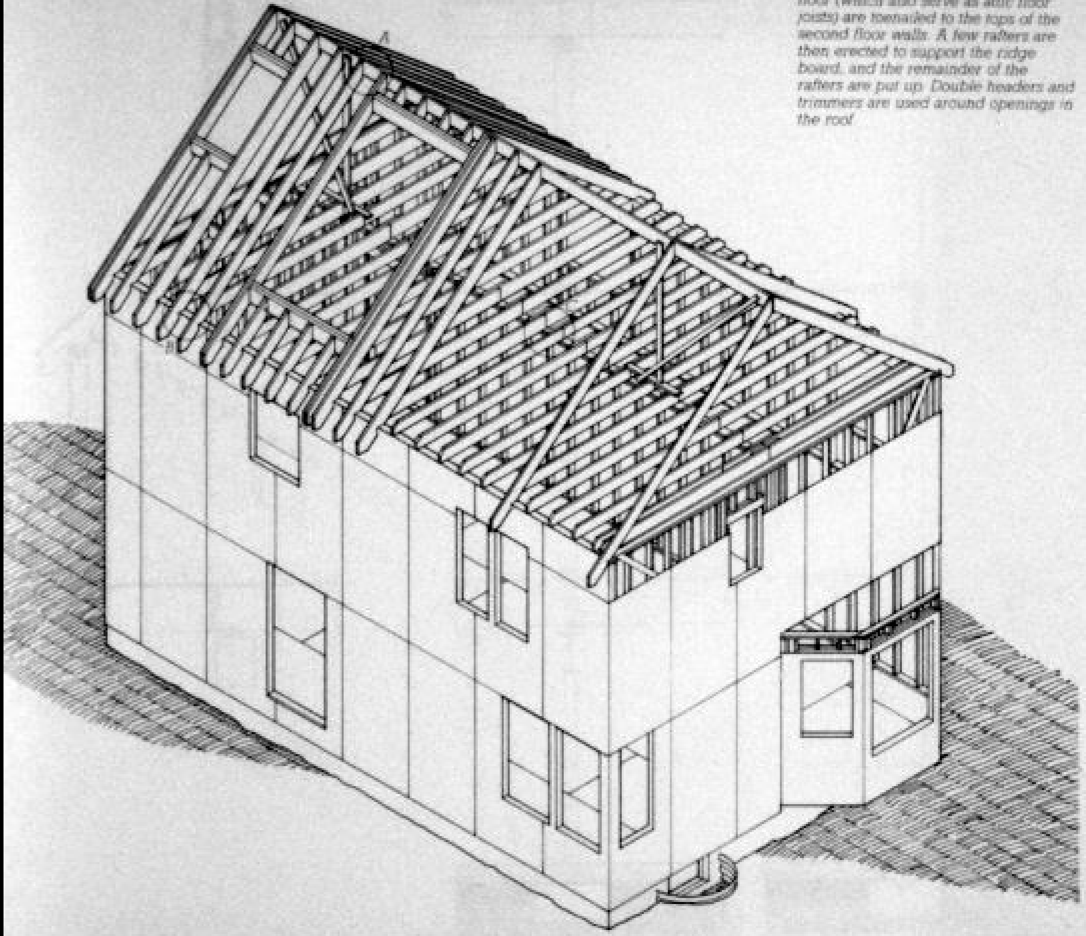


FIGURE 5.41

Step Six: The second floor walls are framed.



ROOF FRAMING PLAN



The ceiling joists above the second floor (which also serve as attic floor joists) are toenailed to the tops of the second floor walls. A few rafters are then erected to support the ridge board, and the remainder of the rafters are put up. Double headers and trimmers are used around openings in the roof.

FIGURE 5.48

7 *Step Seven: Framing the attic floor and roof.*

The framing of the building is completed with installation of the roof sheathing, the gable end walls, and the dormer.

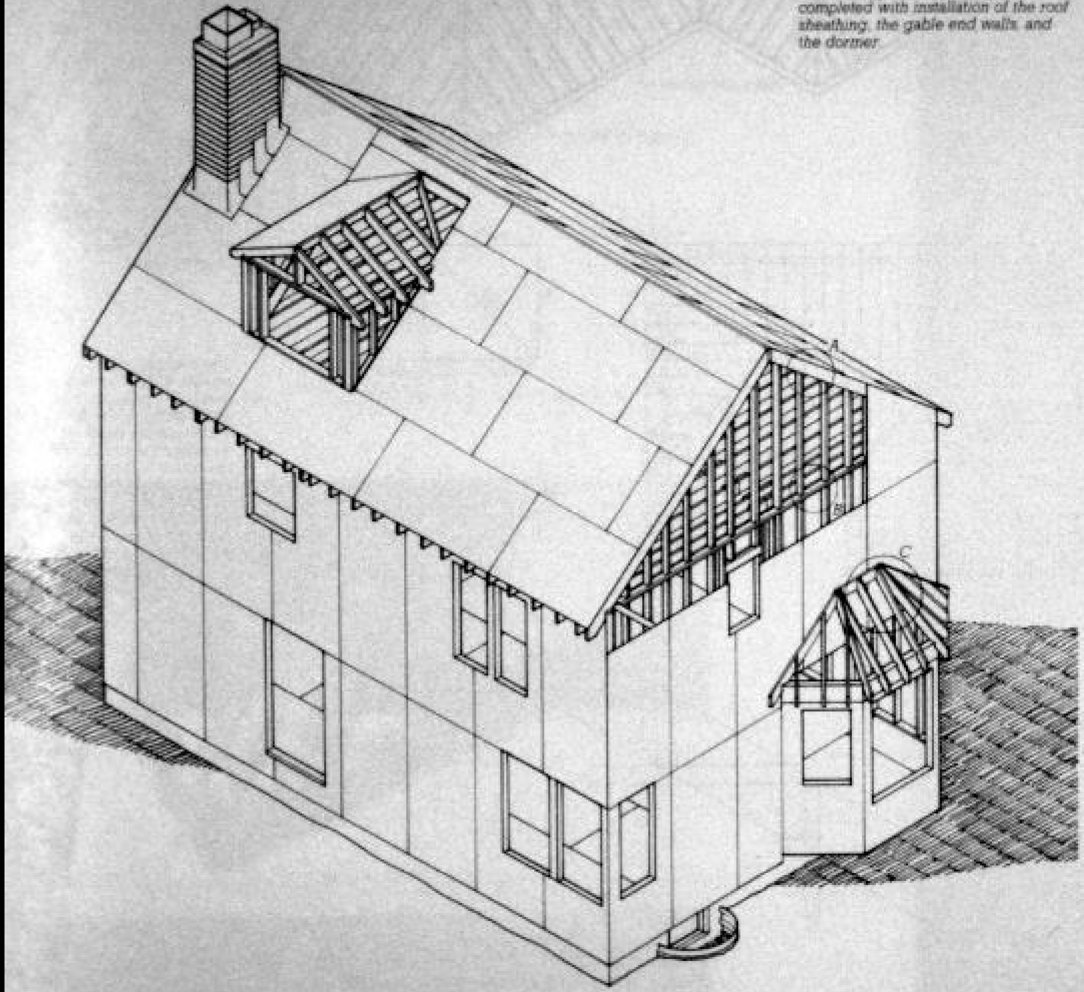


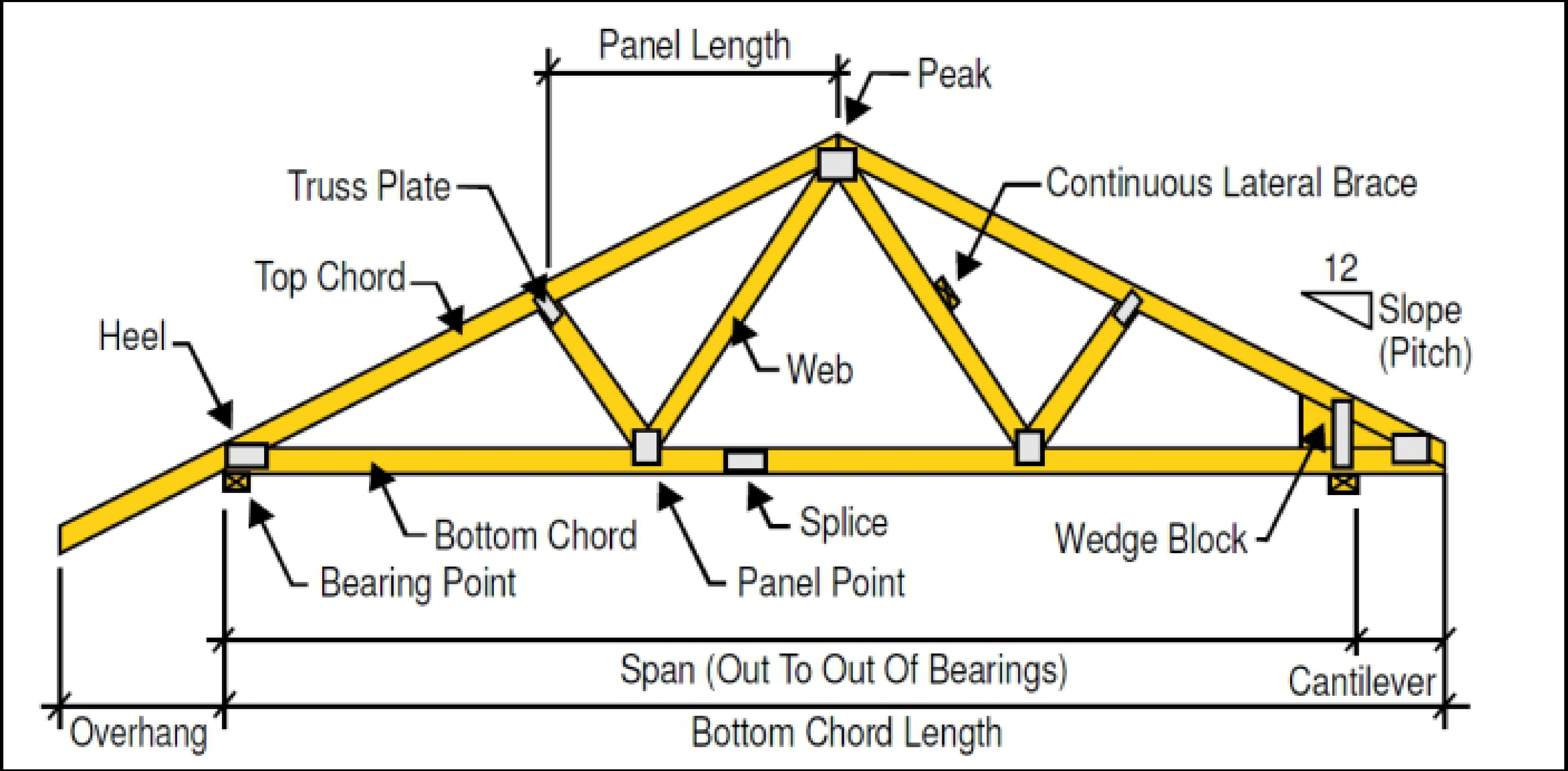
FIGURE 5.50

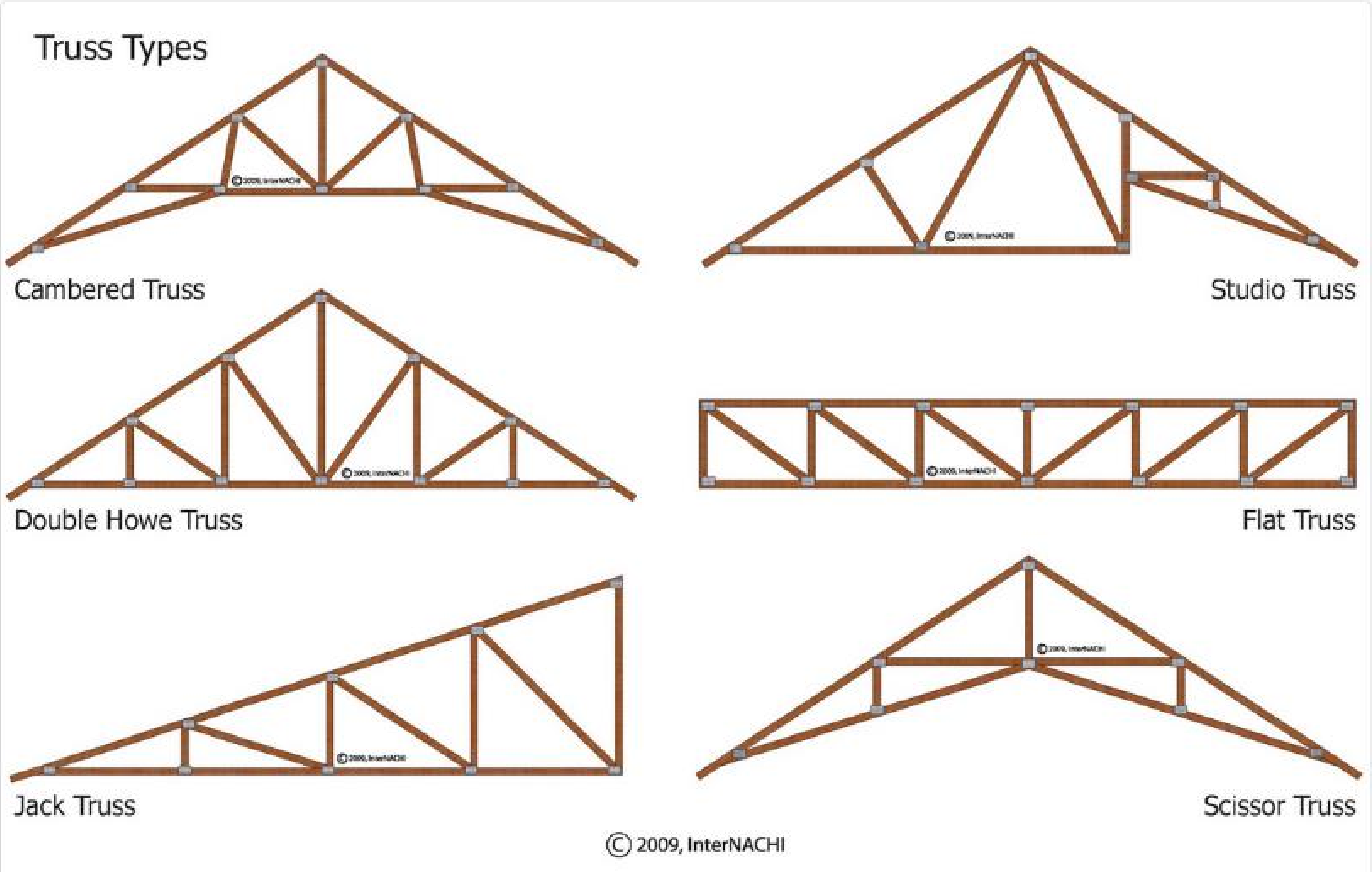
8 *Step Eight: The frame is completed.*

Two ways of framing a residential roof:

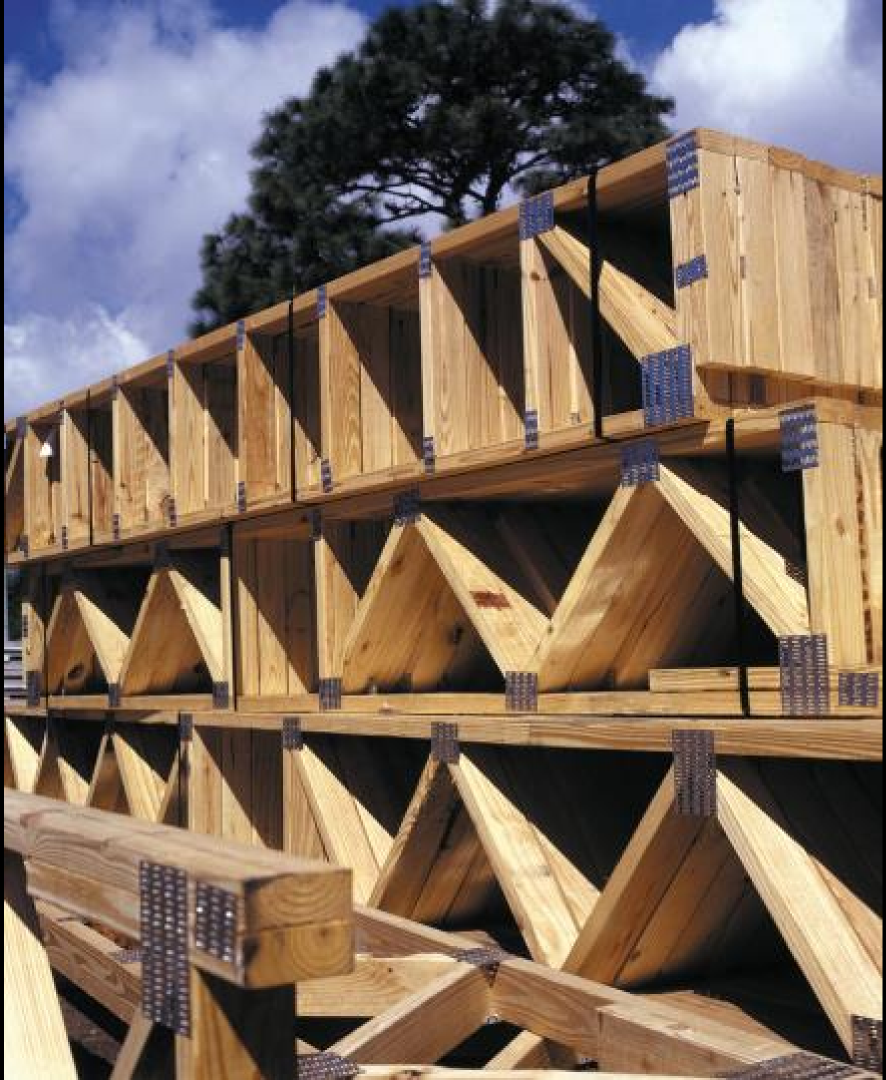
1. Traditional uses rafters and collar ties for stability
   - Can inhabit the space below the roof

1. Contemporary uses prefab trusses for speed of construction
   - Cannot inhabit the space below the roof

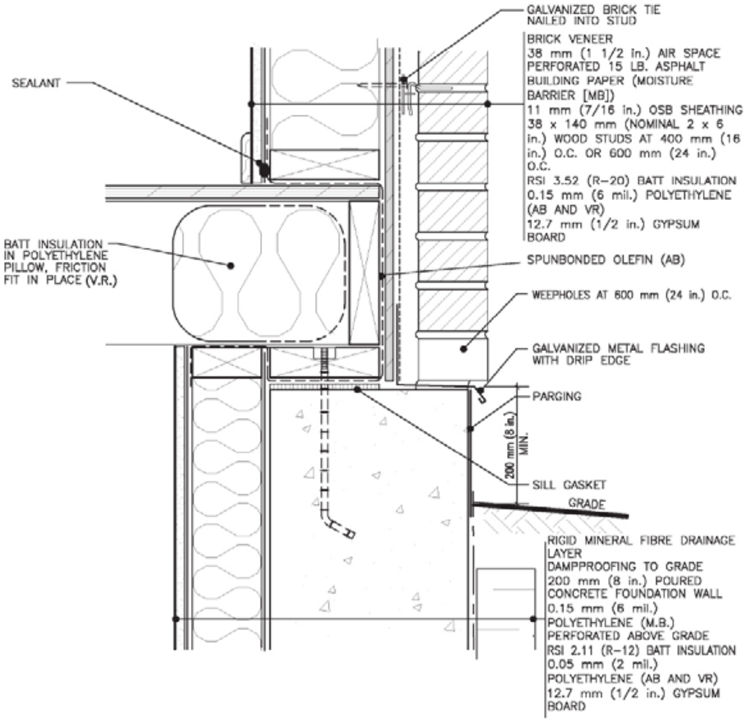

Panel Length
Peak
Truss Plate
Continuous Lateral Brace
Top Chord
12
Slope
(Pitch)
Heel
Web
Bottom Chord
Splice
Wedge Block
Bearing Point
Panel Point
Span (Out To Out Of Bearings)
Cantilever
Overhang
Bottom Chord Length



Truss Types
Cambered Truss
Studio Truss
Double Howe Truss
Flat Truss
Jack Truss
Scissor Truss
© 2009, InterNACHI



Brick Veneer

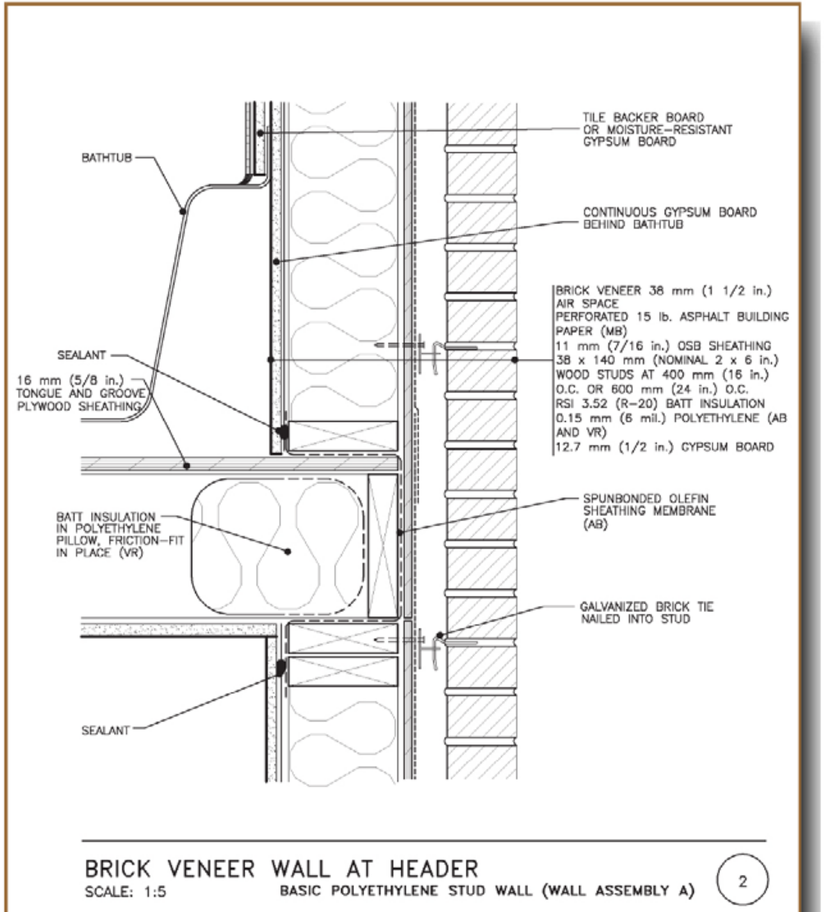


BRICK VENEER WALL AT FOUNDATION

SCALE: 1:5 BASIC POLYETHYLENE STUD WALL (WALL ASSEMBLY A) 1

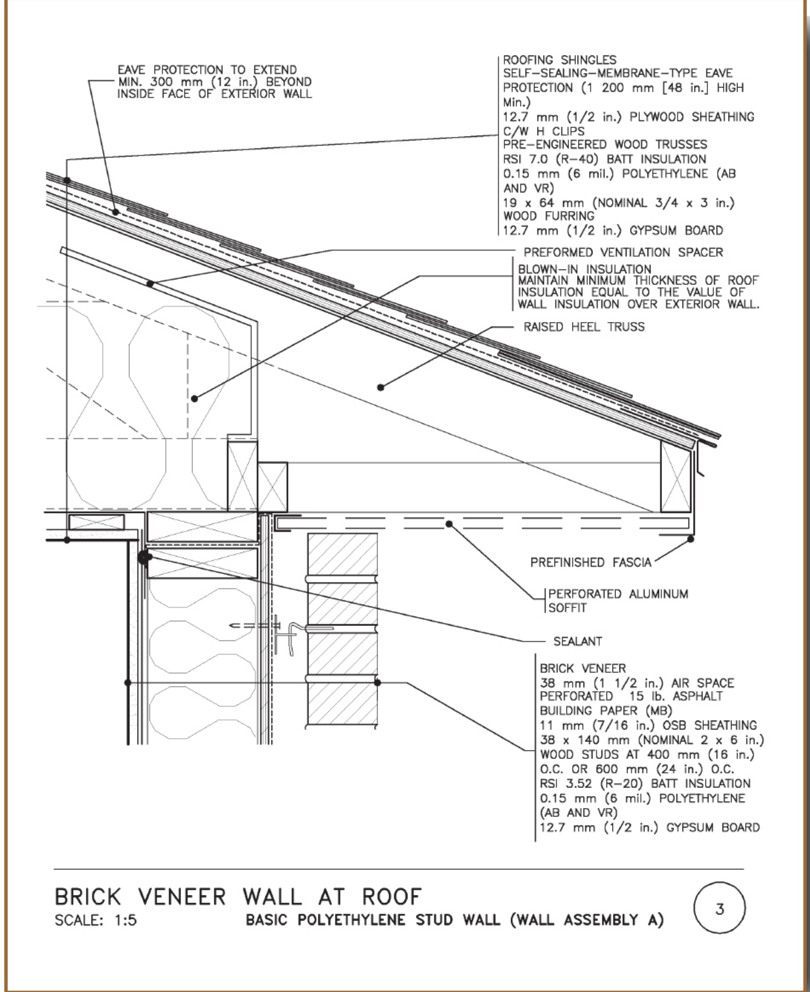
issue with this wall is lack of cavity insulation
adding requires alteration to foundation wall
width in order to also support the brick veneer

***Detail 1:** Brick Veneer Wall at Foundation*

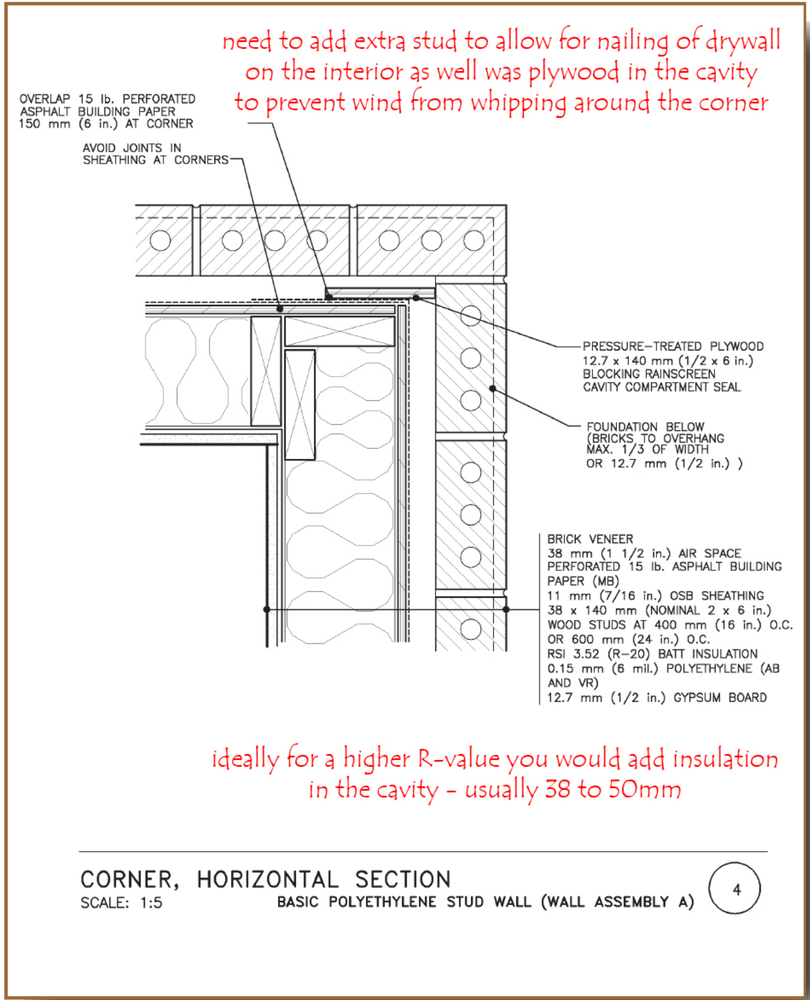


issue with this wall is lack of cavity insulation

Detail 2: Brick Veneer Wall at Header

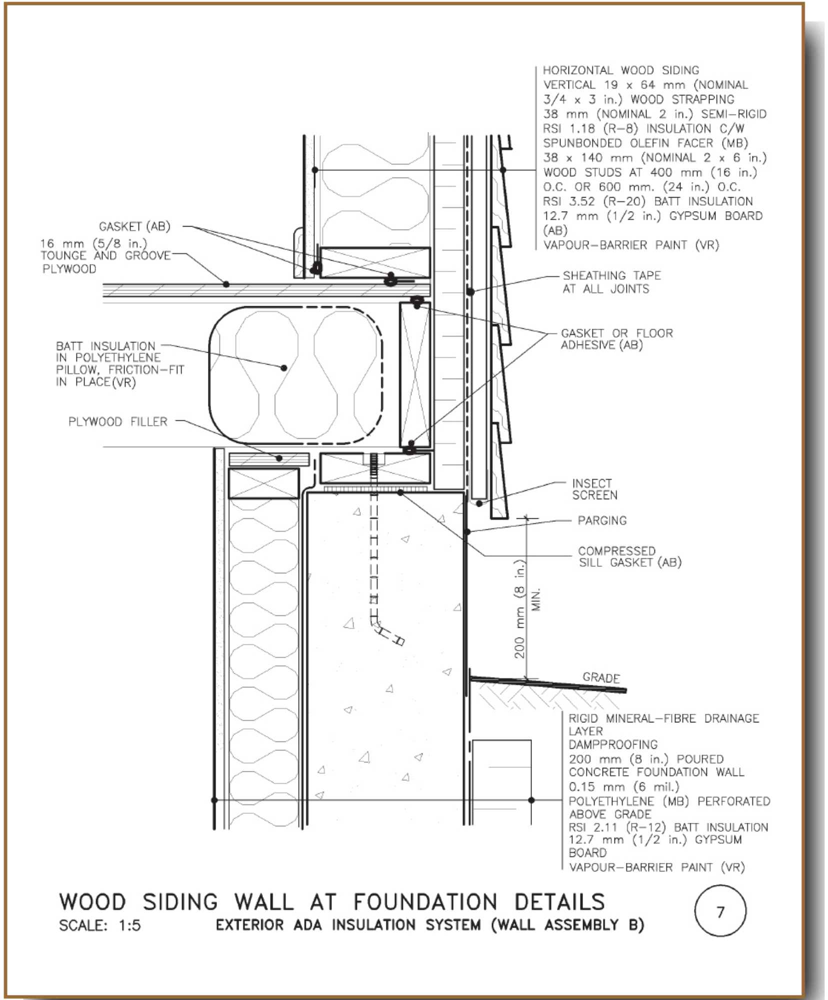


Detail 3: Brick Veneer Wall at Roof

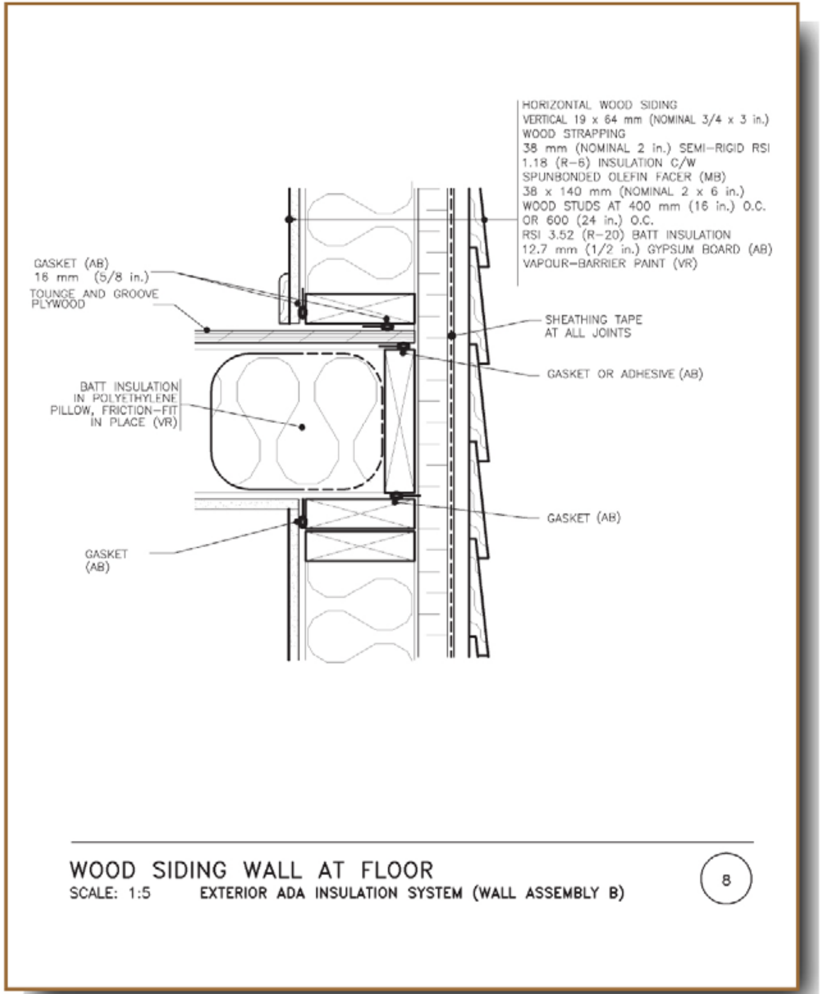


Detail 4: *Corner, Horizontal Section*

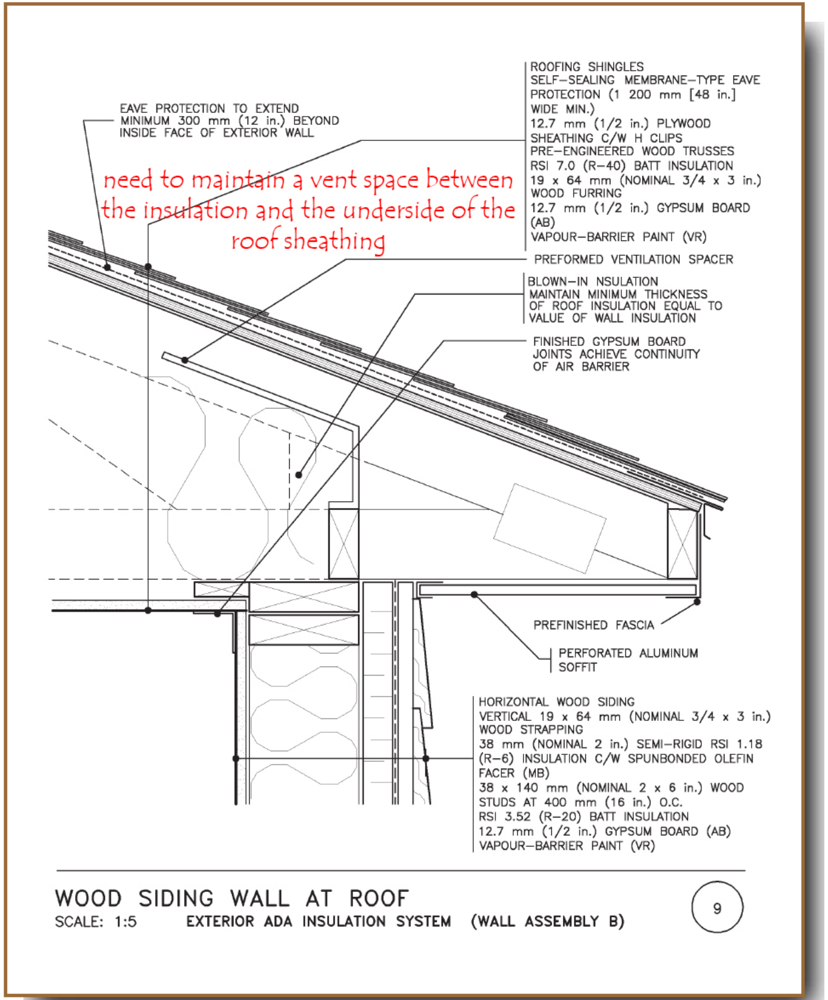
Wood Veneer



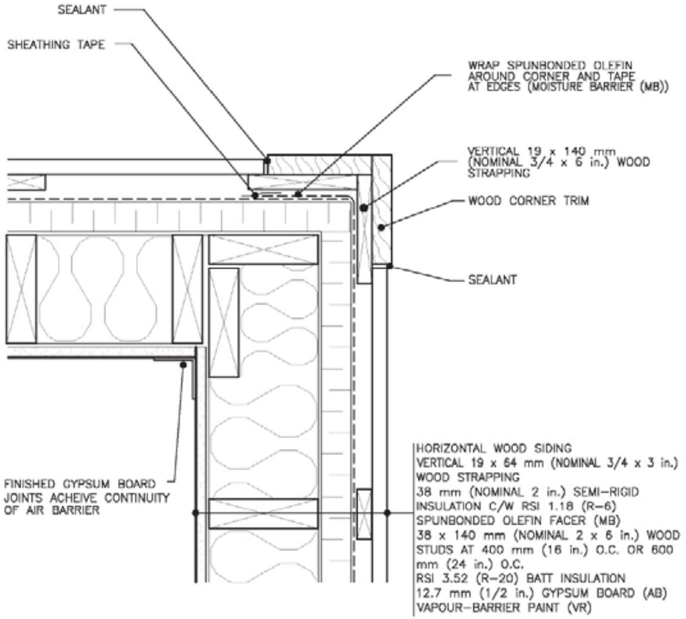
Detail 7: *Wood Siding Wall at Foundation*



Detail 8: *Wood Siding Wall at Floor*



Detail 9: *Wood Siding Wall at Roof*



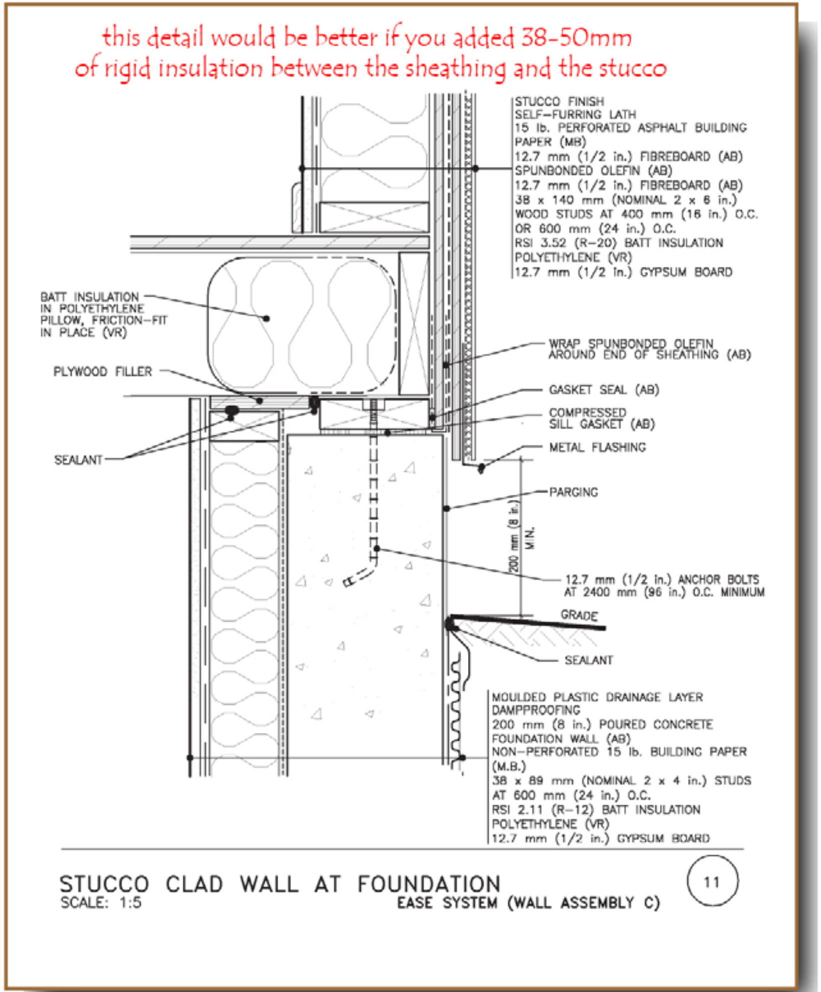
CORNER, HORIZONTAL SECTION

SCALE: 1:5 EXTERIOR ADA INSULATION SYSTEM (WALL ASSEMBLY B)

10

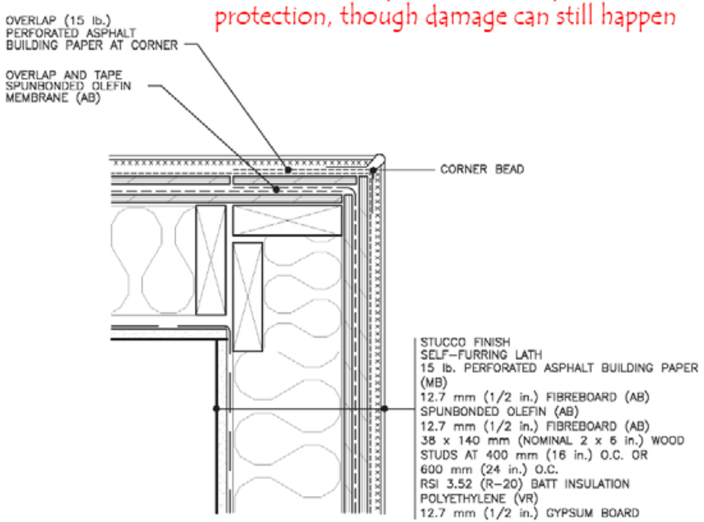
Detail 10: *Corner, Horizontal Section*

Stucco



Detail 11: Stucco Clad Wall at Foundation

stucco is fairly vulnerable to damage so they use a metal bead up the corner to provide better protection, though damage can still happen



CORNER, HORIZONTAL SECTION

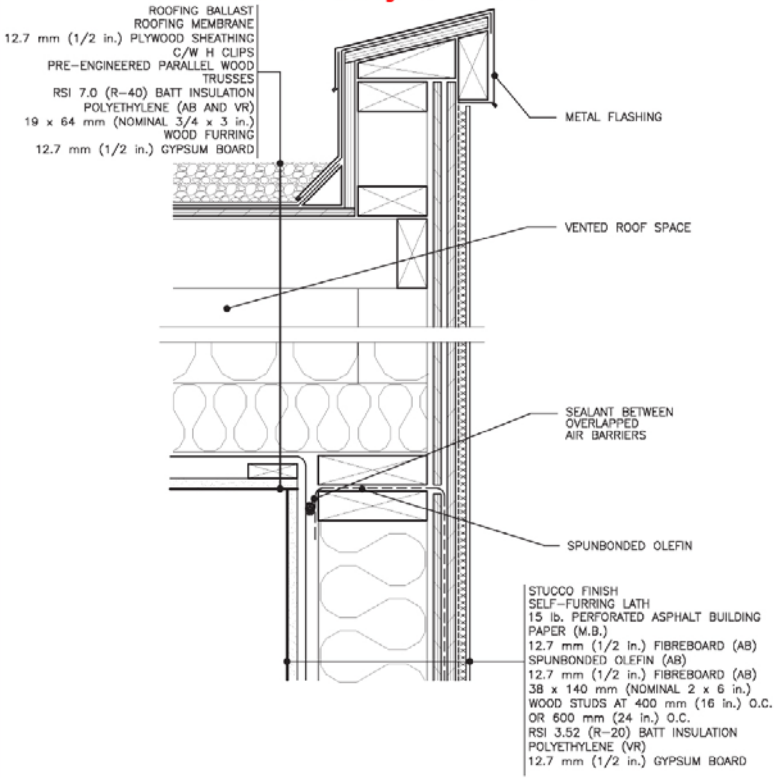
SCALE: 1:5

EASE SYSTEM (WALL ASSEMBLY C)

14

Detail 14: Corner, Horizontal Section

the parapet flashing always drains into the roof to avoid staining on the facade



STUCCO CLAD WALL AT ROOF

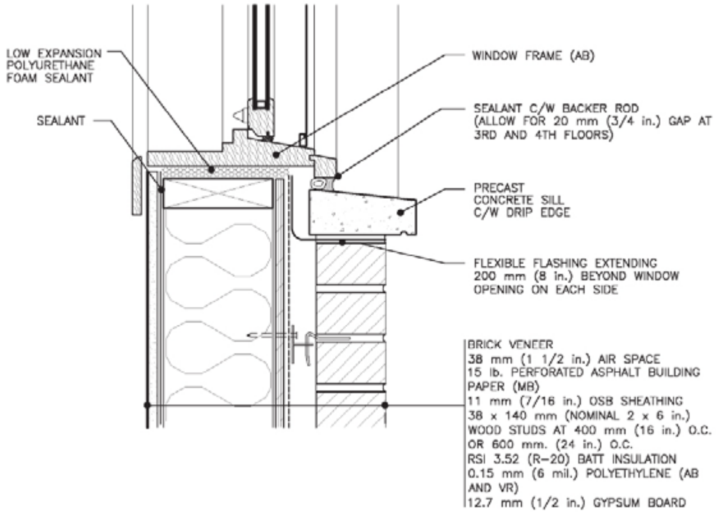
SCALE: 1:5

EASE SYSTEM (WALL ASSEMBLY C)

13

Detail 13: Stucco Clad Wall at Roof

Window Openings



the rough framed opening is always larger than the window in order to allow the placement of shims that allow the carpenters to ensure that the windows are plumb and square

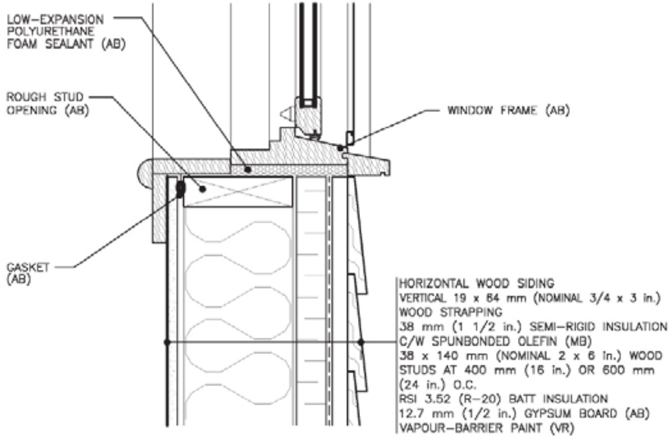
WINDOW OPENING
SCALE: 1:5

(WALL ASSEMBLY A)

17

Detail 17: *Window Opening, A*

the insulated window unit is generally placed in line with the insulation
note that the window is closer to the exterior face in the wood clad wall than with a brick veneer



WINDOW OPENING

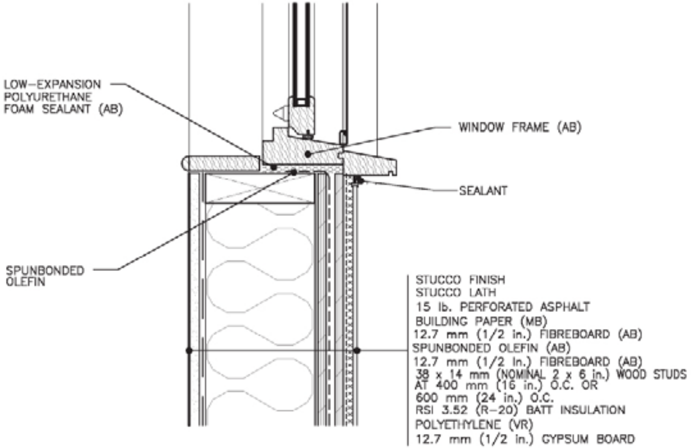
SCALE: 1:5

(WALL ASSEMBLY B)

18

Detail 18: Window Opening, B

the window placement in a stucco wall is similar to a wood clad wall



WINDOW OPENING

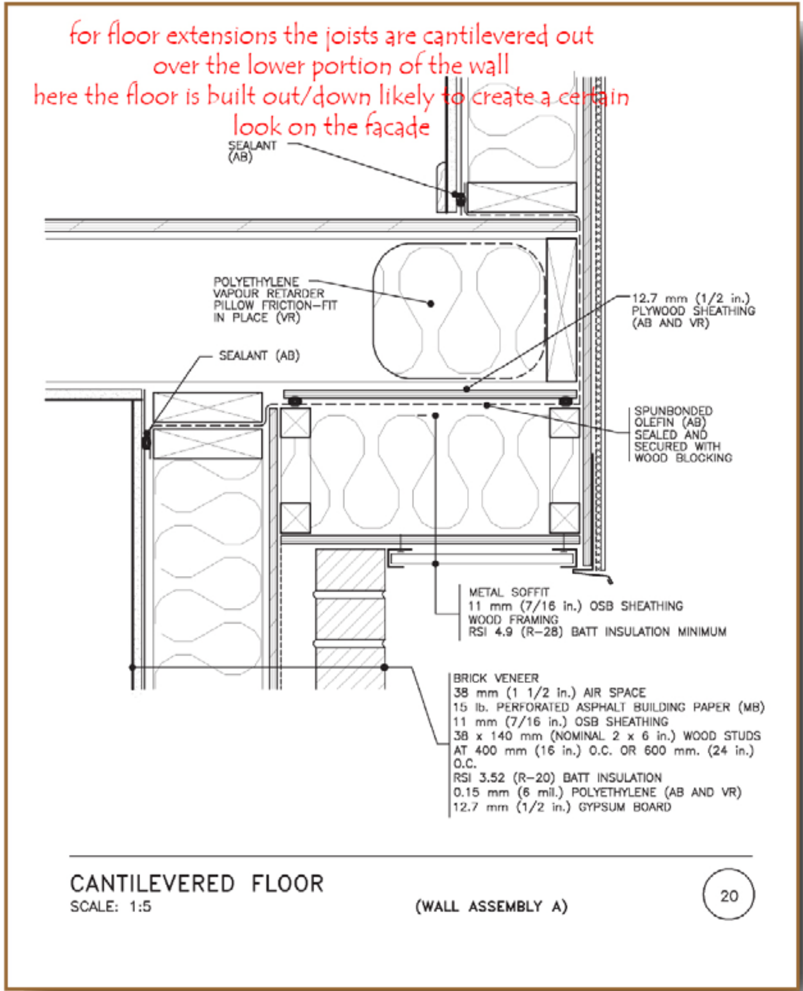
SCALE: 1:5

(WALL ASSEMBLY C)

19

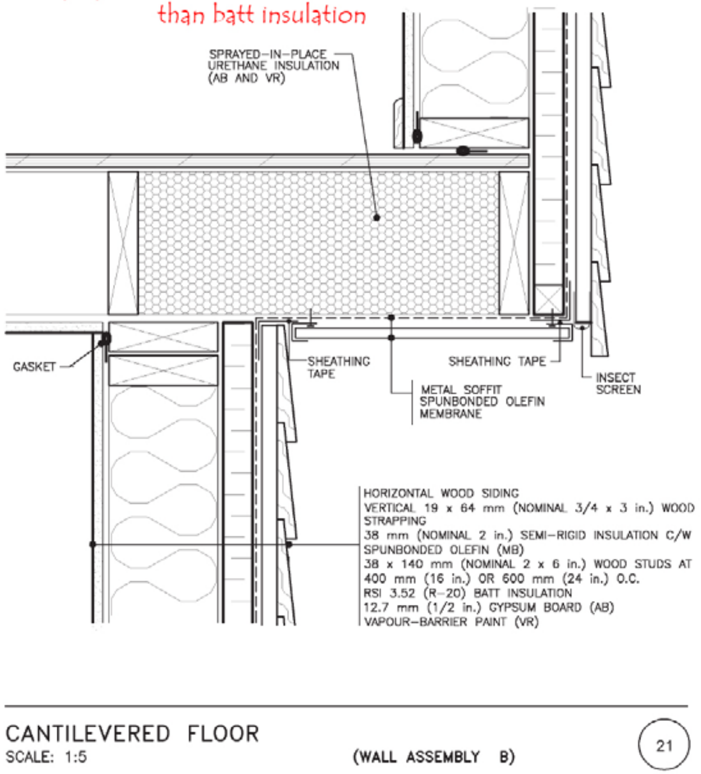
Detail 19: Window Opening, C

Floor Overhang



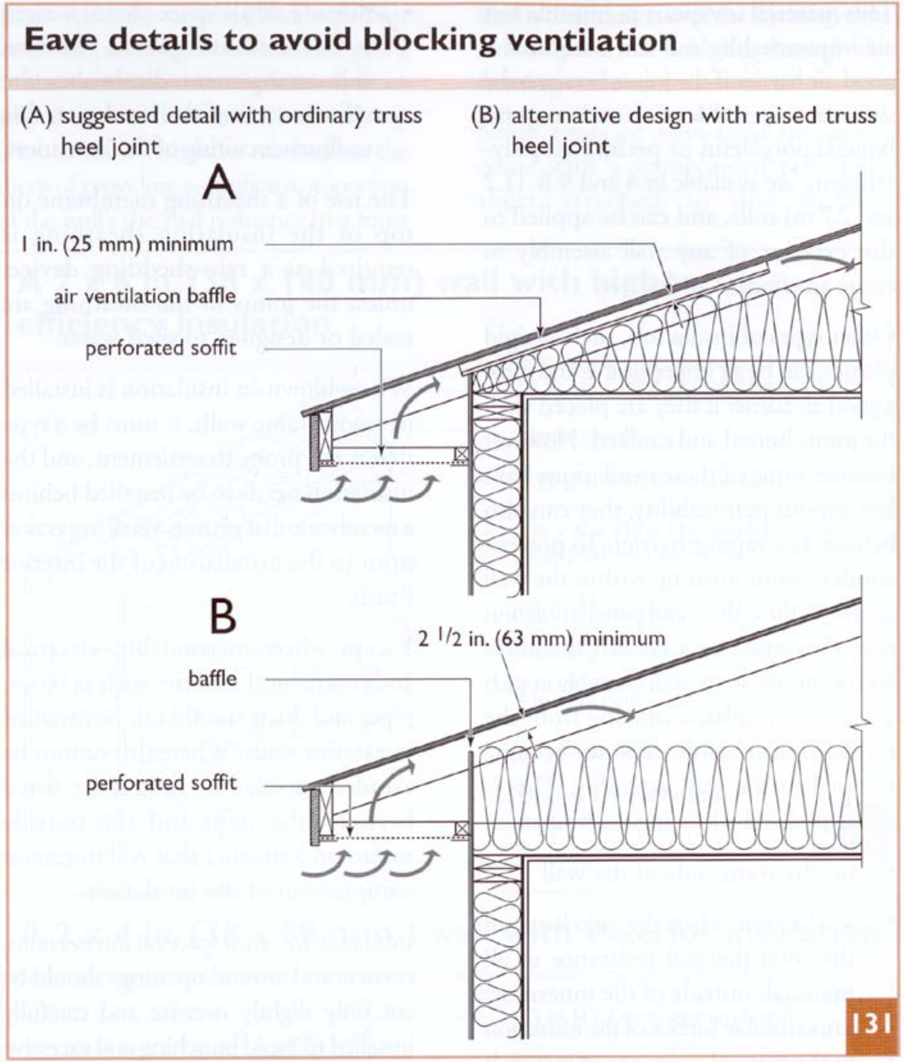
Detail 20: Cantilevered Floor, A

similar cantilevered detail
there is blocking placed between the joists to contain the spray foam insulation - more effective kind than batt insulation

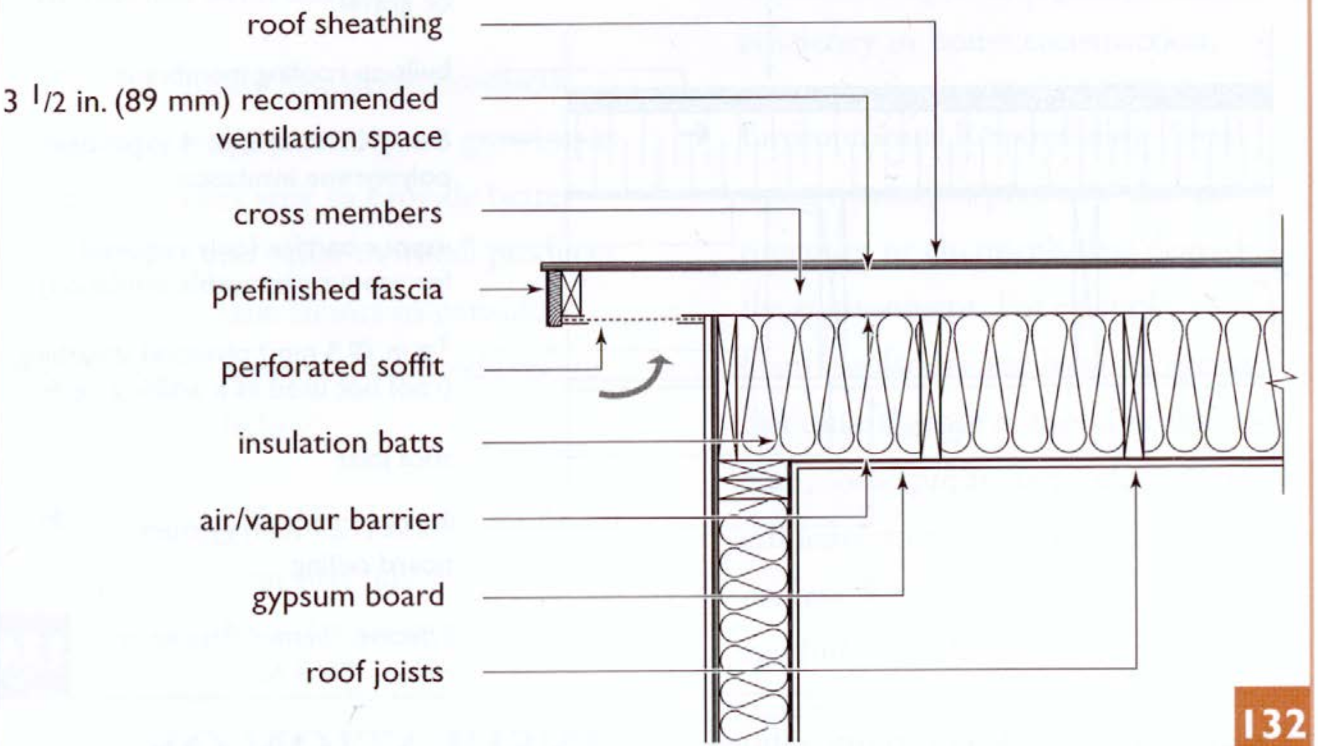


Detail 21: *Cantilevered Floor, B*

Eave Detail


Eave details to avoid blocking ventilation
(A) suggested detail with ordinary truss heel joint
(B) alternative design with raised truss heel joint
A
1 in. (25 mm) minimum
air ventilation baffle
perforated soffit
B
2 1/2 in. (63 mm) minimum
baffle
perforated soffit
131

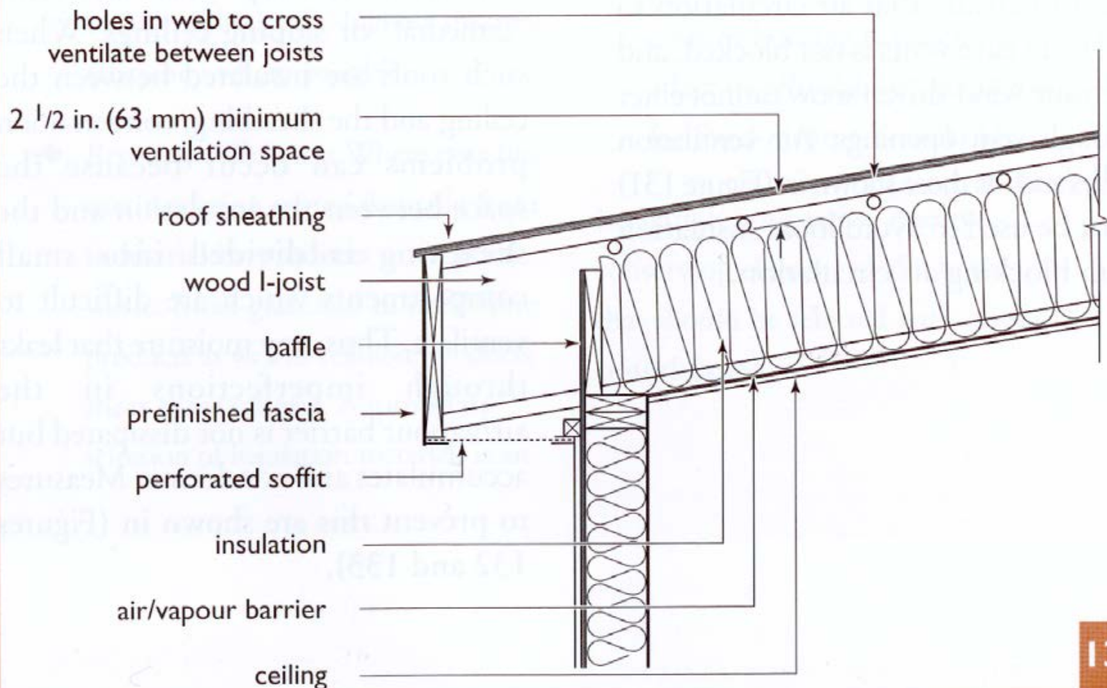
Insulating joist-type roof-ceiling between the ceiling and sheathing



132

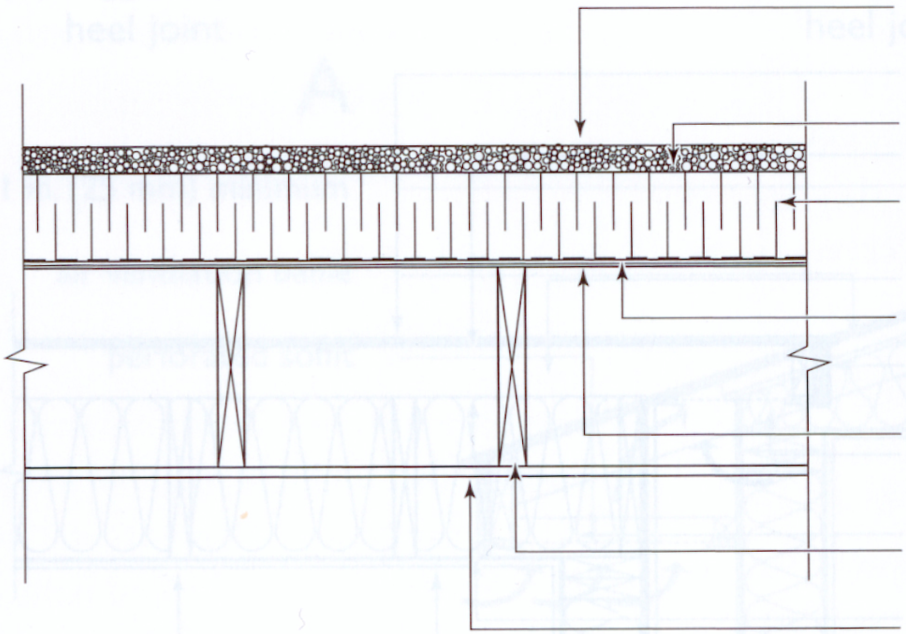
Alternative method of insulating joist-type roof-ceiling between the ceiling and sheathing

This method can be used where the slope is at least 1:6, the joists run in the same direction as the slope, and the ventilation space is continuous from eave to ridge and is vented in both directions.



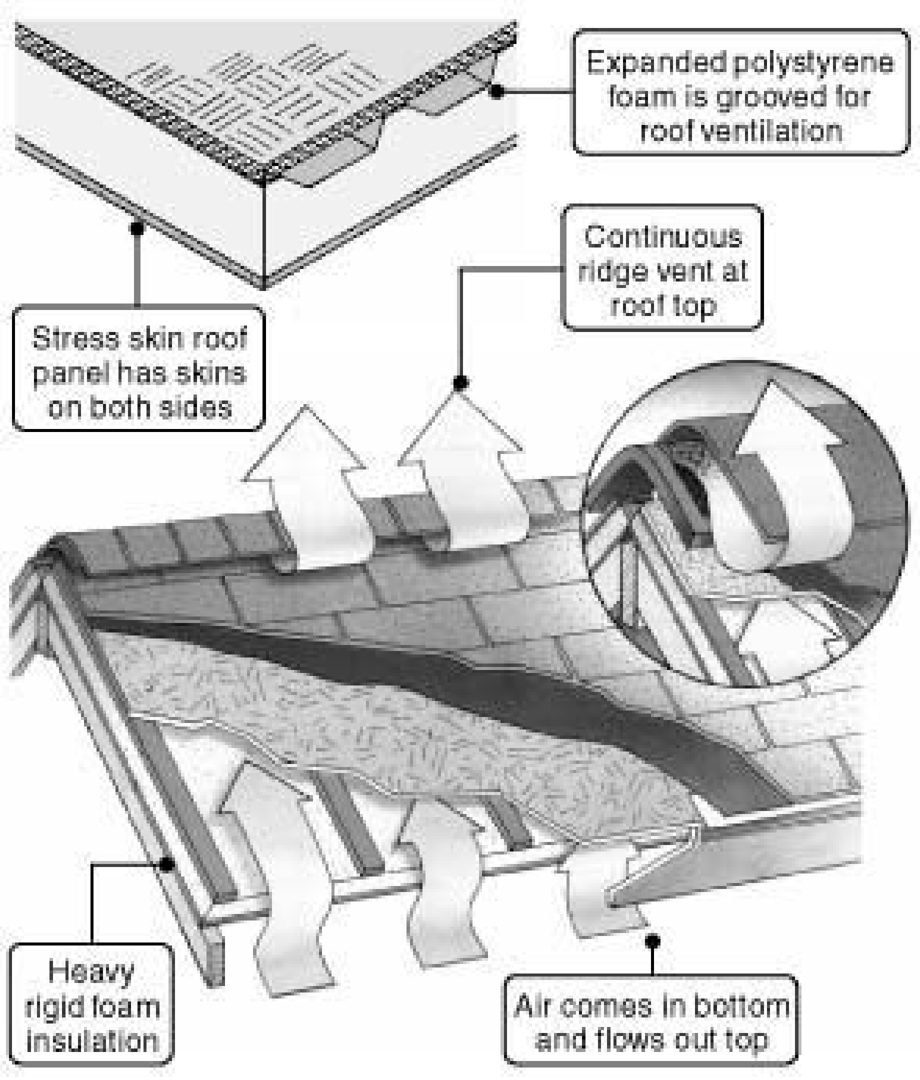
133

Insulation of nominally flat joist-type roof-ceiling above the sheathing



Effective Thermal Resistance R-26.6 (RSI 4.68)

134


Expanded polystyrene foam is grooved for roof ventilation
Continuous ridge vent at roof top
Stress skin roof panel has skins on both sides
Heavy rigid foam insulation
Air comes in bottom and flows out top

Framing Sizes

Table 16
Maximum spans for floor joists – general cases[1, 2]

Commercial Designation	Grade	Joist Size, in. (mm)	With Strapping 12 (300)	With Strapping 16 (400)	With Strapping 24 (600)	With Bridging 12 (300)	With Bridging 16 (400)	With Bridging 24 (600)	With Strapping and Bridging 12 (300)	With Strapping and Bridging 16 (400)	With Strapping and Bridging 24 (600)
			Maximum Span, ft.-in. (m) — Joist Spacing, in. (mm)								
Douglas fir	No. 1	2x6	10–2	9–7	8–7	10–10	9–10	8–7	10–10	9–10	8–7
– larch	and	(38x140)	(3.09)	(2.91)	(2.62)	(3.29)	(2.99)	(2.62)	(3.29)	(2.99)	(2.62)
(includes	No. 2	2x8	12–2	11–7	11–0	13–1	12–4	11–3	13–9	12–10	11–3
Douglas fir		(38x184)	(3.71)	(3.53)	(3.36)	(4.00)	(3.76)	(3.44)	(4.19)	(3.90)	(3.44)
and western		2x10	14–4	13–8	13–0	15–3	14–4	13–6	15–10	14–10	
13–10											
larch)		(38x235)	(4.38)	(4.16)	(3.96)	(4.66)	(4.38)	(4.11)	(4.84)	(4.51)	(4.20)
		2x12	16–5	15–7	14–10	17–2	16–2	15–3	17–10	16–7	15–6
		(38x286)	(4.99)	(4.75)	(4.52)	(5.26)	(4.94)	(4.65)	(5.43)	(5.06)	(4.72)
Hem – fir	No. 1	2x6	10–2	9–7	8–7	10–10	9–10	8–7	10–10	9–10	8–7
(includes	and	(38x140)	(3.09)	(2.91)	(2.62)	(3.29)	(2.99)	(2.62)	(3.29)	(2.99)	(2.62)
western	No. 2	2x8	12–2	11–7	11–0	13–1	12–4	11–3	13–9	12–10	11–3
hemlock		(38x184)	(3.71)	(3.53)	(3.36)	(4.00)	(3.76)	(3.44)	(4.19)	(3.90)	(3.44)
and		2x10	14–4	13–8	13–0	15–3	14–4	13–6	15–10	14–10	
13–10											
amabilis fir)		(38x235)	(4.38)	(4.16)	(3.96)	(4.66)	(4.38)	(4.11)	(4.84)	(4.51)	(4.20)
		2x12	16–5	15–7	14–10	17–2	16–2	15–3	17–10	16–7	15–6
		(38x286)	(4.99)	(4.75)	(4.52)	(5.26)	(4.94)	(4.65)	(5.43)	(5.06)	(4.72)
Spruce –	No. 1	2x6	9–7	8–11	8–2	10–4	9–4	8–2	10–4	9–4	8–2
pine – fir	and	(38x140)	(2.92)	(2.71)	(2.49)	(3.14)	(2.85)	(2.49)	(3.14)	(2.85)	(2.49)
(includes	No. 2	2x8	11–7	11–0	10–6	12–5	11–9	10–9	13–1	12–2	10–9
spruce		(38x184)	(3.54)	(3.36)	(3.20)	(3.81)	(3.58)	(3.27)	(3.99)	(3.72)	(3.27)
[all species		2x10	13–8	13–0	12–4	14–6	13–8	12–10	15–1	14–1	13–2
except		(38x235)	(4.17)	(3.96)	(3.77)	(4.44)	(4.17)	(3.92)	(4.60)	(4.29)	(4.00)
coast sitka		2x12	15–7	14–10	14–1	16–4	15–5	14–6	17–0	15–10	14–9
spruce],		(38x286)	(4.75)	(4.52)	(4.30)	(5.01)	(4.71)	(4.42)	(5.17)	(4.82)	(4.49)
jack pine,											
lodgepole pine,											
balsam fir and											
alpine fir)											
Northern	No. 1	2x6	8–3	7–8	7–1	9–3	8–5	7–5	9–4	8–5	7–5
species	and	(38x140)	(2.51)	(2.33)	(2.16)	(2.83)	(2.57)	(2.25)	(2.83)	(2.57)	(2.25)
(includes	No. 2	2x8	10–6	10–0	9–4	11–3	10–7	9–8	11–10	11–0	9–8
any		(38x184)	(3.19)	(3.04)	(2.84)	(3.44)	(3.23)	(2.96)	(3.60)	(3.36)	(2.96)
Canadian		2x10	12–4	11–9	11–2	13–1	12–4	11–7	13–8	12–9	
11–10											
species		(38x235)	(3.76)	(3.58)	(3.41)	(4.01)	(3.77)	(3.54)	(4.16)	(3.88)	(3.62)
covered by		2x12	14–1	13–5	12–9	14–9	13–11	13–1	15–4	14–4	13–4
the NLGA		(38x286)	(4.29)	(4.08)	(3.88)	(4.53)	(4.25)	(4.00)	(4.67)	(4.35)	(4.06)
Standard											
Grading Rules)											

Note to Table 16

1. Spans apply only where the floors serve residential areas.
2. Subfloor must comply with minimum requirements from tables 18 and 19.

These tables can be found in the CMHC Handbook you can download on the course page

Table 22
Maximum spans for spruce – pine – fir lintels – No. 1 or No. 2 grade – non-structural sheathing[7]

Lintel Supporting	Lintel Size, in. (mm)[4], 2-ply	Maximum Span, ft.–in. (m)[2,3] — Exterior Walls — Specified Snow Load, psf (kPa)[6] 20.9 1.0	31.3 1.5	41.8 2.0	52.2 2.5	62.7 3.0	Interior Walls
Limited attic storage and ceiling	2–2 x 4	This area intentionally left blank					4–2
	2–38 x 89						1.27
	2–2 x 6						6–4
	2–38 x 140						1.93
	2–2 x 8						7–9
	2–38 x 184						2.35
	2–2 x 10						9–5
	2–38 x 235)						2.88
	2–2 x 12						11–0
	2–38 x 286						3.34
Lintel Supporting Roof and ceiling only (tributary width 2 ft. (0.6 m))[6]	2-2x4	8-4	7-4	6-8	6-2	5-10	6-2
	2-38x89	2.55	2.23	2.02	1.88	1.77	1.88
	2-2x6	13-2	11-6	10-5	9-8	9-2	9-8
	2-38x140	4.01	3.50	3.18	2.96	2.78	2.96
	2-2x8	17-4	15-1	13-9	12-9	12-0	12-9
	2-38x184	5.27	4.61	4.18	3.88	3.66	3.88
	2-2x10	20-11	18-11	17-6	16-3	15-4	16-3
	2-38x235	6.37	5.76	5.34	4.96	4.67	4.96
	2-2x12	24-3	21-11	20-4	19-3	18-5	19-3
	2-38x286	7.38	6.67	6.21	5.87	5.61	5.87
Lintel Supporting Roof and ceiling only (tributary width 16 ft. 0 in. (4.9 m))[1]	2-2x4	4-2	3-8	3-4	3-1	2-10	3-1
	2-38x89	1.27	1.11	1.01	0.93	0.87	0.93
	2-2x6	6-4	5-5	4-10	4-5	4-1	4-5
	2-38x140	1.93	1.66	1.48	1.35	1.25	1.35
	2-2x8	7-9	6-8	5-11	5-5	5-0	5-5
	2-38x184	2.35	2.02	1.80	1.64	1.52	1.64
	2-2x10	9-5	8-1	7-3	6-7	6-1	6-7
	2-38x235	2.88	2.47	2.20	2.01	1.84	2.01
	2-2x12	11-0	9-5	8-5	7-8	6-10	7-8
	2-38x286	3.34	2.87	2.56	2.33	2.09	2.33
Lintel Supporting Roof ceiling and 1 storey[1,2,5]	2-2x4	3-5	3-2	2-11	2-9	2-7	2-5
	2-38x89	1.05	0.96	0.89	0.84	0.79	0.74
	2-2x6	4-11	4-6	4-2	3-11	3-8	3-4
	2-38x140	1.49	1.37	1.27	1.19	1.13	1.02
	2-2x8	6-0	5-6	5-1	4-9	4-4	3-11
	2-38x184	1.82	1.67	1.55	1.44	1.33	1.20
	2-2x10	7-3	6-8	6-2	5-8	5-3	4-9
	2-38x235	2.22	2.04	1.89	1.73	1.59	1.45
	2-2x12	8-5	7-9	7-1	6-5	5-11	5-5
	2-38x286	2.58	2.36	2.15	1.96	1.81	1.66

Continued on p. 381

Table 26
Maximum spans for roof joists – specified roof snow loads 52.2 and 62.7 psf (2.5 and 3.0 kPa)

			Maximum Span, ft.–in. (m)					
			Specified Snow Load, psf (kPa)[1]					
			52.2 (2.5)			62.7 (3.0)		
			Joist Spacing, in. (mm)			Joist Spacing, in. (mm)		
Commercial Designation	Grade	Joist Size, in. (mm)	12 (300)	16 (400)	24 (600)	12 (300)	16 (400)	24 (600)
Douglas fir – larch (includes Douglas fir and western larch)	No. 1 and No. 2	2x4 (38x89)	6–3 (1.91)	5–8 (1.74)	5–0 (1.52)	5–11 (1.80)	5–4 (1.63)	4–8 (1.43)
		2x6 (38x140)	9–10 (3.01)	9–0 (2.73)	7–10 (2.39)	9–3 (2.83)	8–5 (2.57)	7–4 (2.25)
		2x8 (38x184)	13–0 (3.95)	11–9 (3.59)	10–3 (3.14)	12–2 (3.72)	11–1 (3.38)	9–6 (2.90)
		2x10 (38x235)	16–7 (5.05)	15–1 (4.59)	12–7 (3.84)	15–7 (4.75)	14–2 (4.32)	11–8 (3.55)
		2x12 (38x286)	20–2 (6.14)	17–11 (5.46)	14–8 (4.46)	19–0 (5.78)	16–7 (5.05)	13–6 (4.12)
Hem – fir (includes western hemlock and amabilis fir)	No. 1 and No. 2	2x4 (38x89)	6–3 (1.91)	5–8 (1.74)	5–0 (1.52)	5–11 (1.80)	5–4 (1.63)	4–8 (1.43)
		2x6 (38x140)	9–10 (3.01)	9–0 (2.73)	7–10 (2.39)	9–3 (2.83)	8–5 (2.57)	7–4 (2.25)
		2x8 (38x184)	13–0 (3.95)	11–9 (3.59)	10–3 (3.14)	12–2 (3.72)	11–1 (3.38)	9–8 (2.95)
		2x10 (38x235)	16–7 (5.05)	15–1 (4.59)	13–2 (4.01)	15–7 (4.75)	14–2 (4.32)	12–3 (3.72)
		2x12 (38x286)	20–2 (6.14)	18–4 (5.58)	15–4 (4.68)	19–0 (5.78)	17–3 (5.25)	14–2 (4.32)
Spruce – pine – fir (includes spruce [all species except coast sitka spruce], jack pine, lodgepole pine, balsam fir and alpine fir)	No. 1 and No. 2	2x4 (38x89)	6–0 (1.82)	5–5 (1.65)	4–9 (1.44)	5–7 (1.71)	5–1 (1.56)	4–6 (1.36)
		2x6 (38x140)	9–5 (2.86)	8–6 (2.60)	7–5 (2.27)	8–10 (2.69)	8–0 (2.45)	7–0 (2.14)
		2x8 (38x184)	12–4 (3.76)	11–3 (3.42)	9–10 (2.99)	11–7 (3.54)	10–7 (3.22)	9–3 (2.81)
		2x10 (38x235)	15–9 (4.81)	14–4 (4.37)	12–6 (3.82)	14–10 (4.52)	13–6 (4.11)	11–9 (3.59)
		2x12 (38x286)	19–2 (5.85)	17–5 (5.31)	15–3 (4.64)	18–1 (5.50)	16–5 (5.00)	14–4 (4.37)
Northern species (includes any Canadian species covered by the NLGA Standard Grading Rules)	No. 1 and No. 2	2x4 (38x89)	5–5 (1.64)	4–11 (1.49)	4–3 (1.31)	5–1 (1.55)	4–7 (1.41)	4–0 (1.23)
		2x6 (38x140)	8–6 (2.59)	7–9 (2.35)	6–9 (2.05)	8–0 (2.43)	7–3 (2.21)	6–4 (1.93)
		2x8 (38x184)	11–2 (3.40)	10–2 (3.09)	8–10 (2.70)	10–6 (3.20)	9–6 (2.91)	8–4 (2.53)
		2x10 (38x235)	14–3 (4.34)	12–11 (3.94)	11–0 (3.35)	13–5 (4.09)	12–2 (3.71)	10–2 (3.10)
		2x12 (38x286)	17–4 (5.28)	15–7 (4.76)	12–9 (3.89)	16–4 (4.97)	14–5 (4.40)	11–9 (3.59)

Note to Table 26

1. To determine the specified snow load in your location, contact your municipal building department.

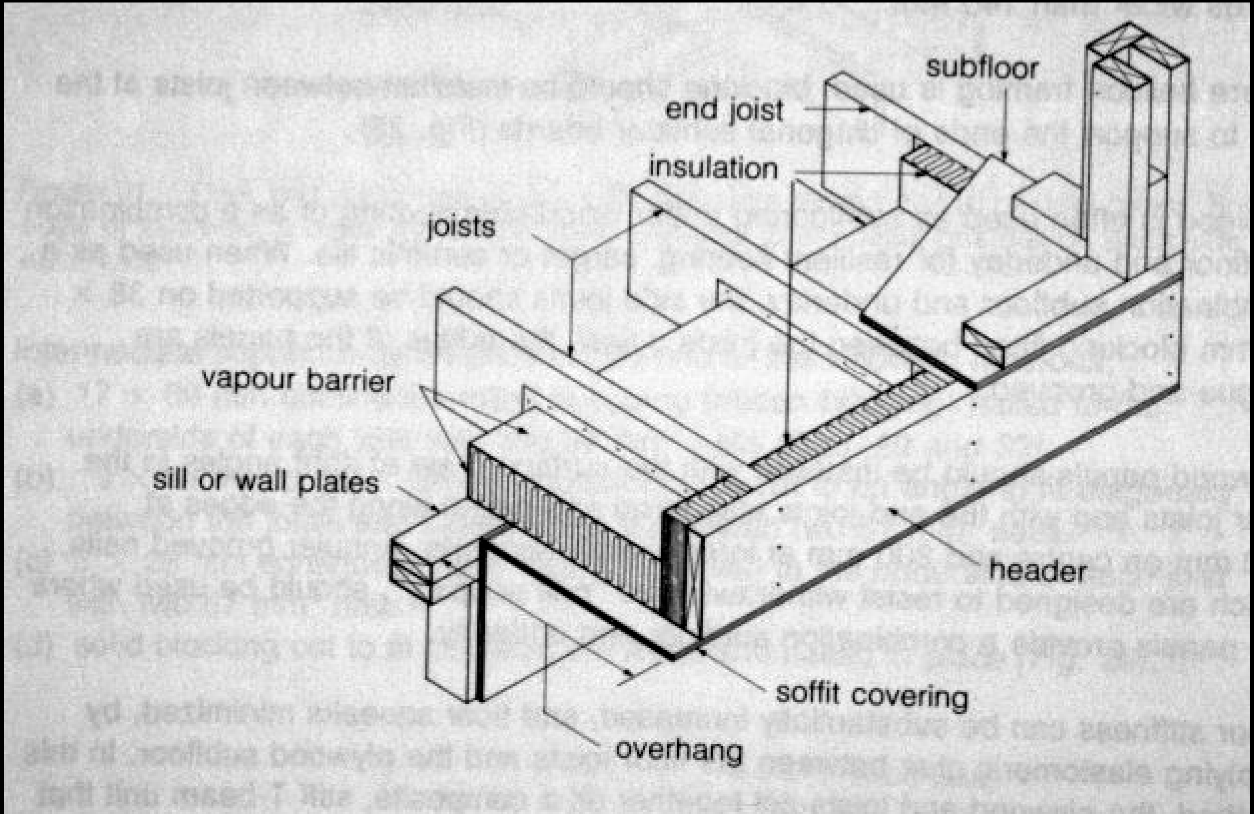


Figure 33. Floor framing at projections.



unik

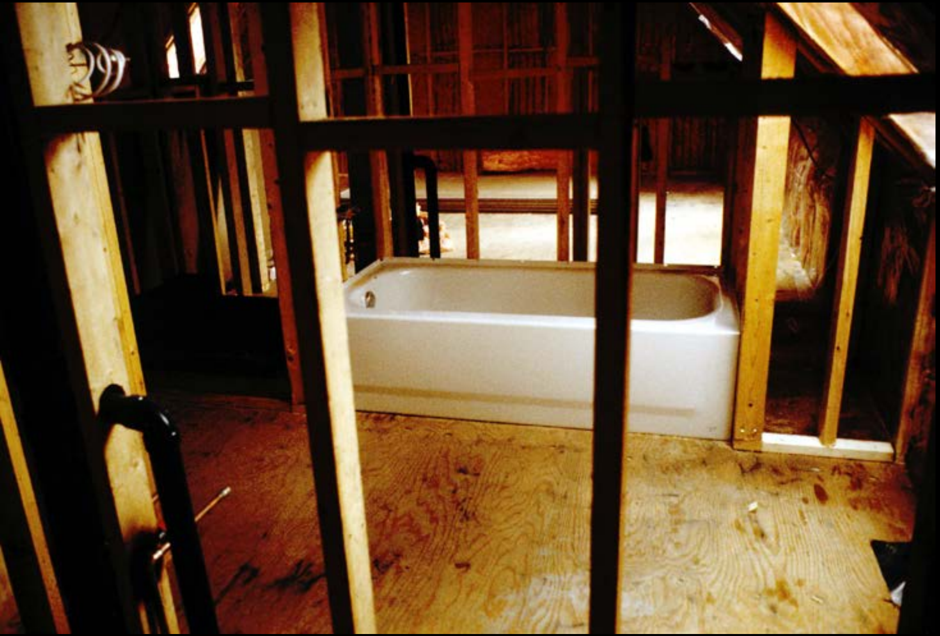

#193
HENRY
DIG WELL
HERE


PEACHTREE


PEACHTREE

The House on Blythwood Road, Toronto


DEPTH
14"/38

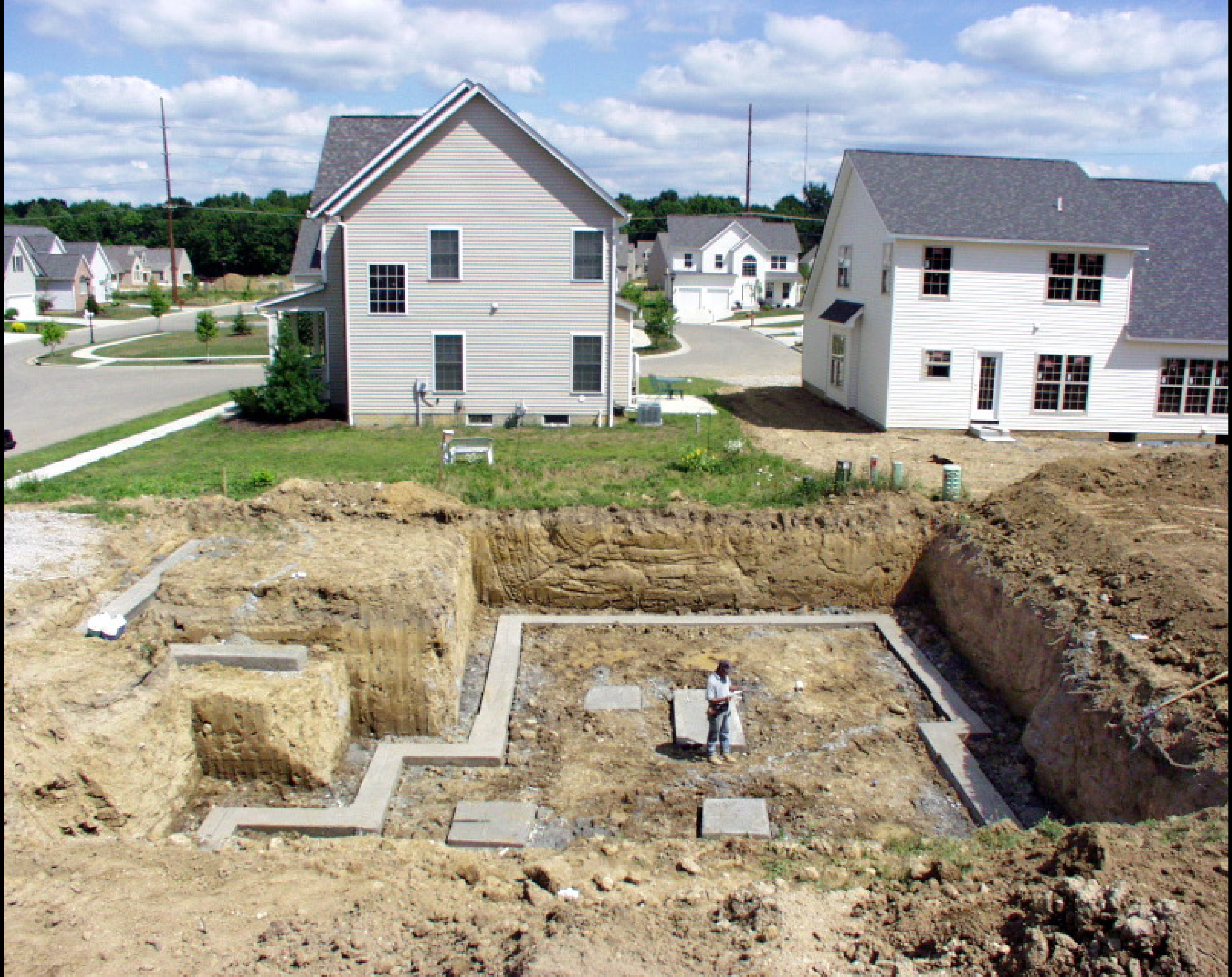




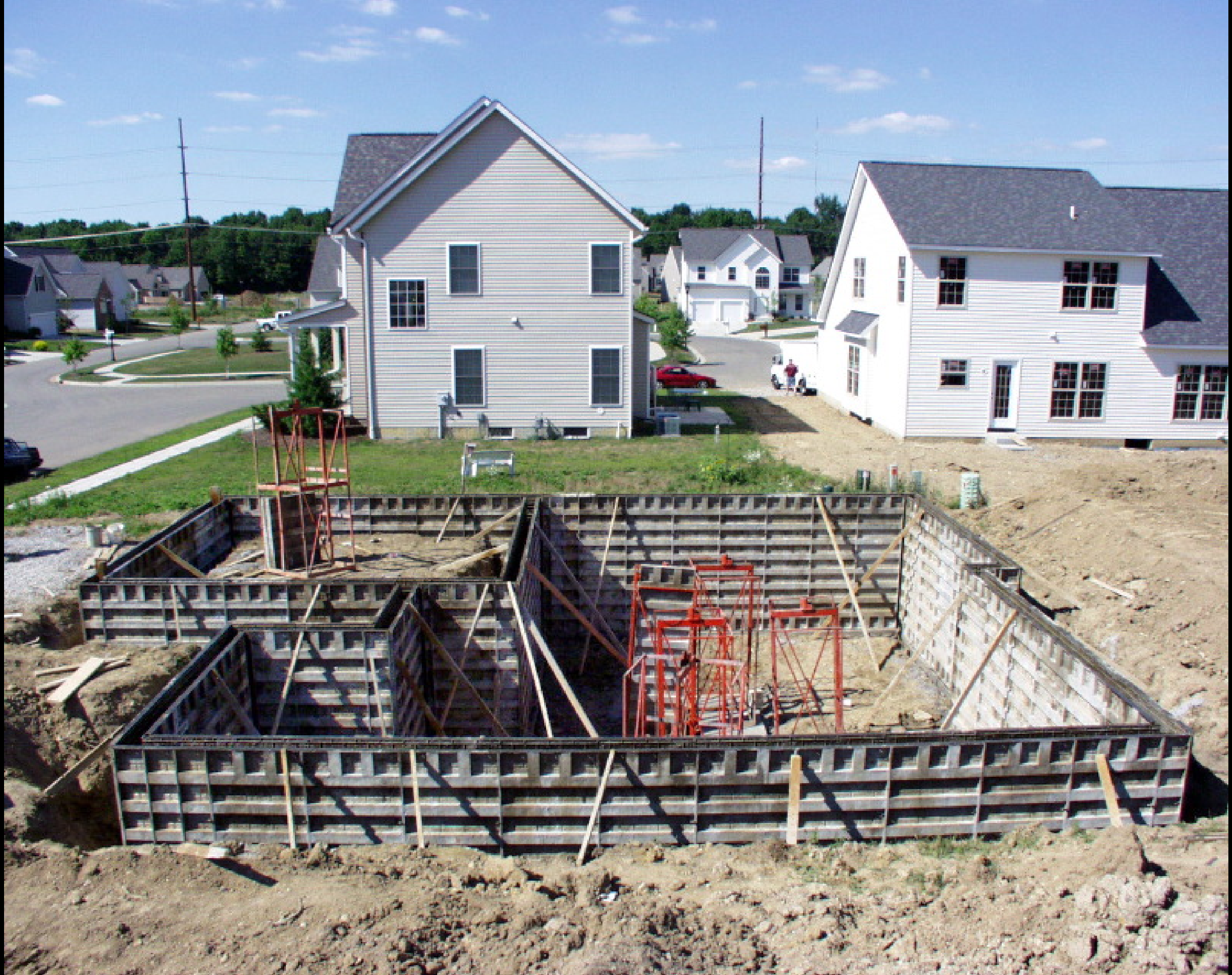

BAGGIES
BAGGIES


The Dickson House
Somewhere in New England, USA

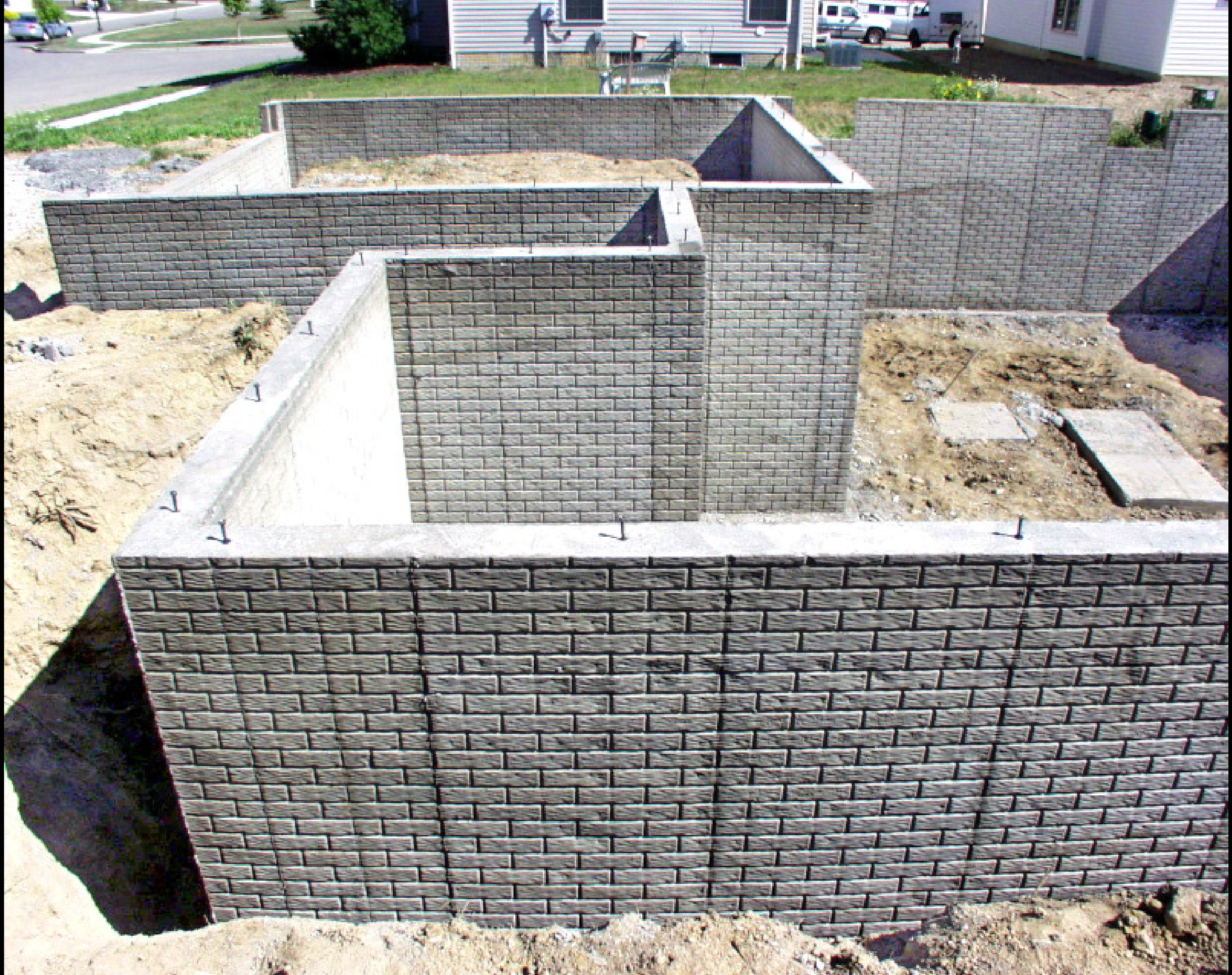

a world of
difference




PK 32000




KIMBLE
MIXER
COMPANY




Hold


TOYOTA




488


488


NU-WOOL
PDC 4925


The cellulose insulation industry does NOT recommend the use of a vapour barrier with this type of insulation.