Build Math

Raking Wall Framing

One worked example, with the maths behind each result - follow it in the app and check it by hand.

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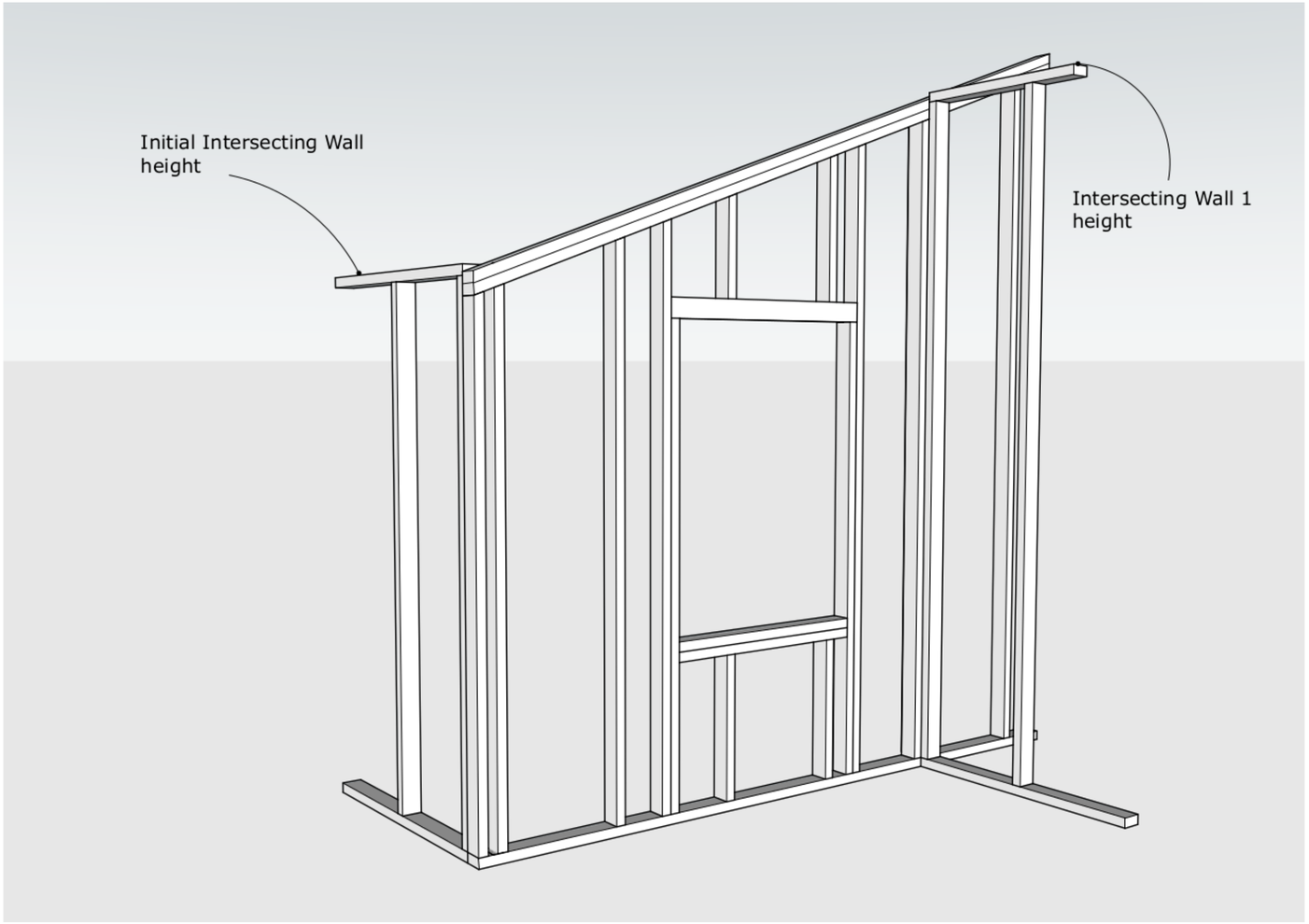


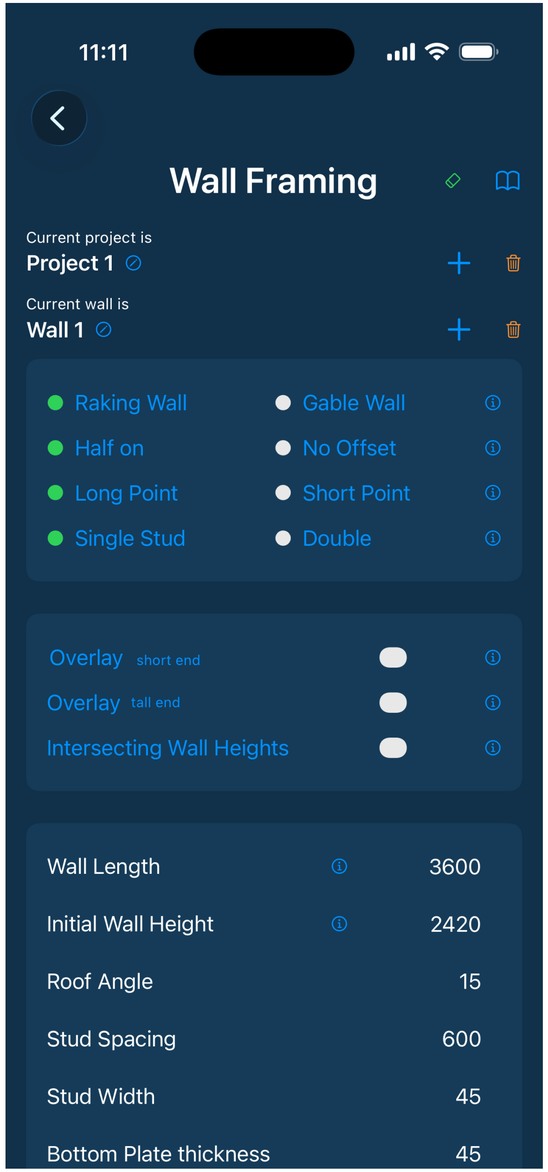
Raking Wall Framing gives the full markout and cutting list for a raking or gable wall: every stud, jack, sill and plate, including around openings.

Stud length = initial height – plates + mark × tan(angle)

Top plate mark = bottom plate mark ÷ cos(angle)

Note:
To work back from a finished height to the Initial Wall Height, use Calculate an initial Height.

Inputs



Choose Raking Wall or Gable Wall
Raking Wall here. Gable Wall works the same way, up to the apex and back down.

Choose the layout
Half on - studs set back so vertical sheets can start in the corner. This example is Half on.
Long Point - marks and lengths to the long point of the cut. This example is Long Point.
Single Stud or Double, Ordinary or Overlay at each end.

Enter the values

Wall Length	3600 - along the bottom plate.
Initial Wall Height	2420 - overall, plates included, at the low end.
Roof Angle	15
Stud Spacing	600
Stud Width	45
Bottom Plate thickness	45
Top Plate thickness	90 - flat thickness; the app allows for the angle.

Entering values, saving configs and projects: see Build Math - the basics.

Openings



Add an opening

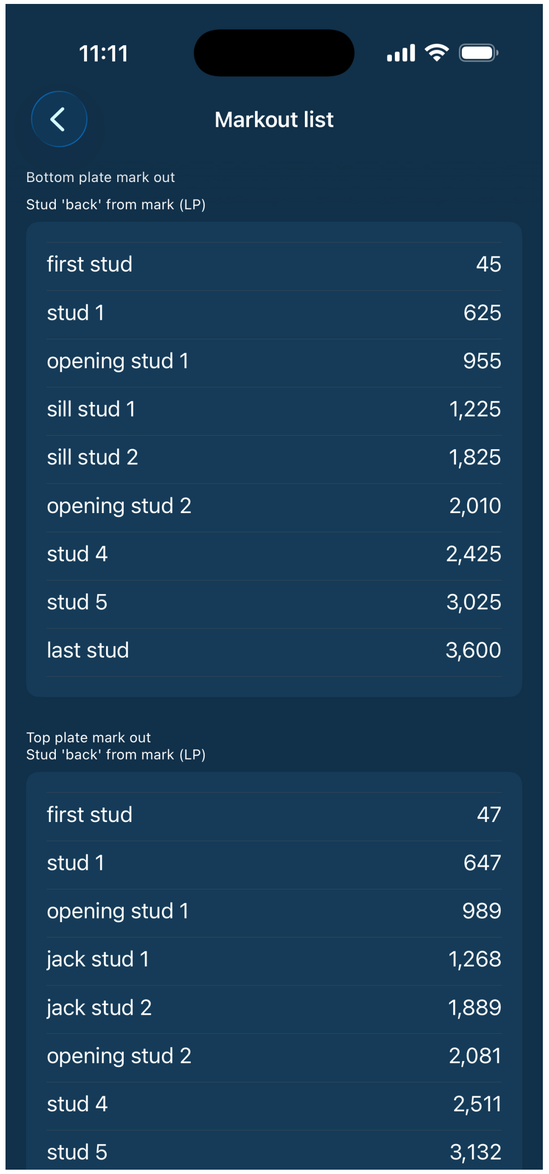
Position from start	1000 - from the low end to the trim.
Trim width	920
Lintel height	2100 - floor to the underside of the lintel.
Sill height	800 - 0 for a door.
Lintel size	90

Wall Junctions work the same way: position from start and wall width.

Turn on **Intersecting Wall Heights** to get the heights of the walls that meet it.

It adds a birdsmouth from the Rafter Depth, so the rafter sits on the plate of each wall that meets it.

Markout



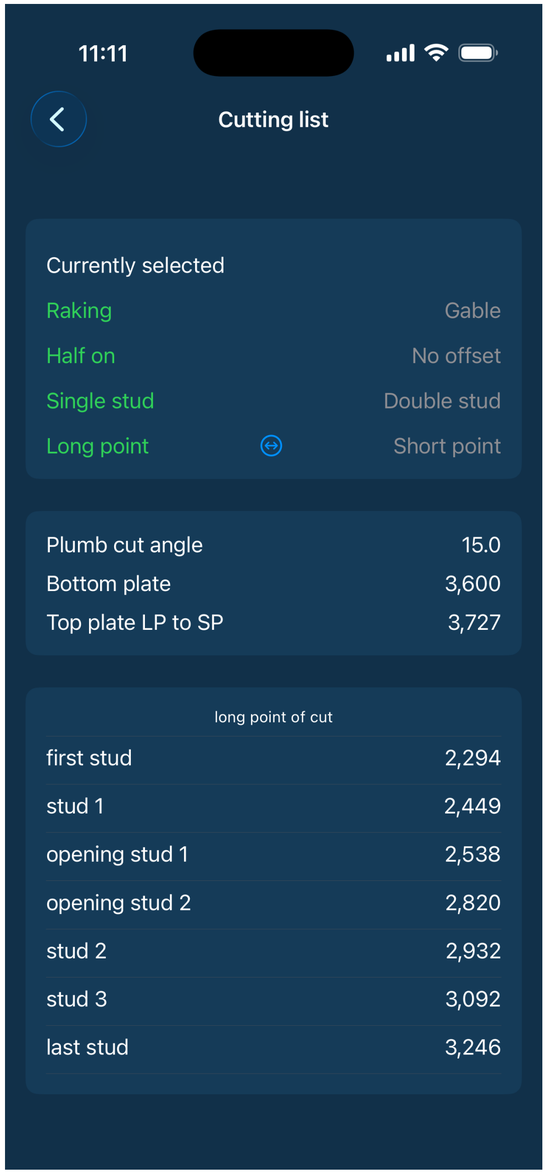
Half on: the layout starts 20 back from the end (half the stud less 2.5, rounded down),
so the studs land at 600 – 20 + 45 = 625, 1225, 1825 …

The layout lines over the opening become jacks on the top plate and sill studs on the bottom plate.

Top plate - each mark ÷ cos(15°)

625 ÷ 0.9659 = 647

The next page shows the cutting list for these marks.



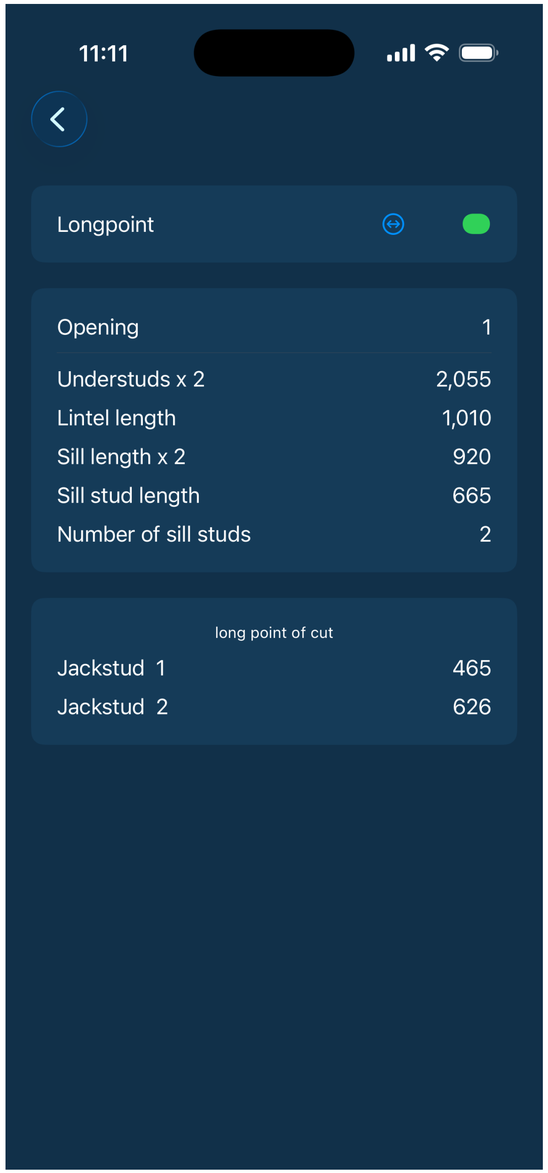
Stud Cutting List

Plates	
Bottom plate	3600
Top plate LP to SP	3600 ÷ cos(15°) = 3727
Plumb cut angle	15.0

Studs - to the long point	
Top plate on the angle	90 ÷ cos(15°) = 93.2
Height to the plates	2420 – 45 – 93.2 = 2281.8
stud 1	2281.8 + 625 × tan(15°) = 2281.8 + 167.5 = 2449

No studs inside the opening - the jacks and sill studs are on the next page.

Opening Components



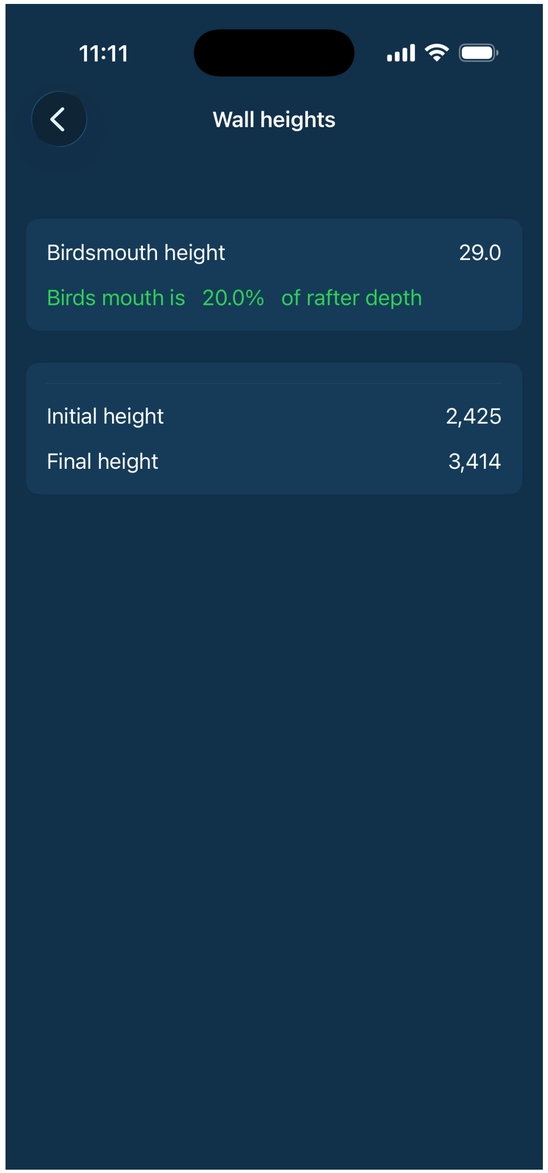
Understuds x 2	2100 – 45 = 2055
Lintel length	920 + 2 × 45 = 1010
Sill length x 2	920
Sill stud length	800 – (45 + 2 × 45) = 665
Number of sill studs	2
Jackstud 1	2420 + 1225 × tan(15°) – 93.2 – (2100 + 90) = 465
Jackstud 2	2420 + 1825 × tan(15°) – 93.2 – (2100 + 90) = 626

The jacks follow the stud spacing, so the sheet layout carries on over the opening.

The last page shows how the opening parts fit together.

Read the list out loud: see Build Math - the basics.

Intersecting Wall Heights



Rafter Depth	140 - Use 20% birdsmouth.
Birdsmouth height	140 × 20% ÷ cos(15°) = 29.0
Birdsmouth length	29.0 ÷ tan(15°) = 108.2 - square to the birdsmouth height.

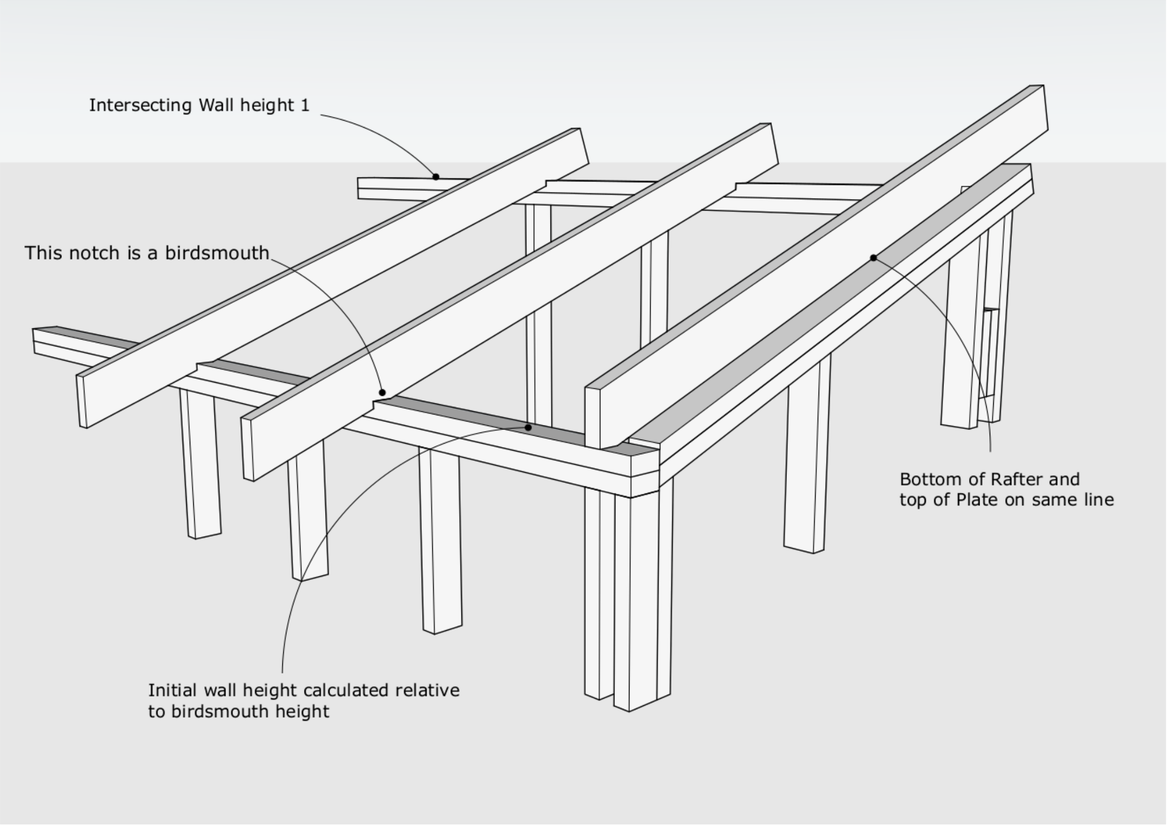
The heights of the walls at each end, so the underside of the rafter sits on the top plate line:

Initial height	2420 – 90 × tan(15°) + 29.0 = 2425
Final height	2425 + (3600 + 90) × tan(15°) = 3414

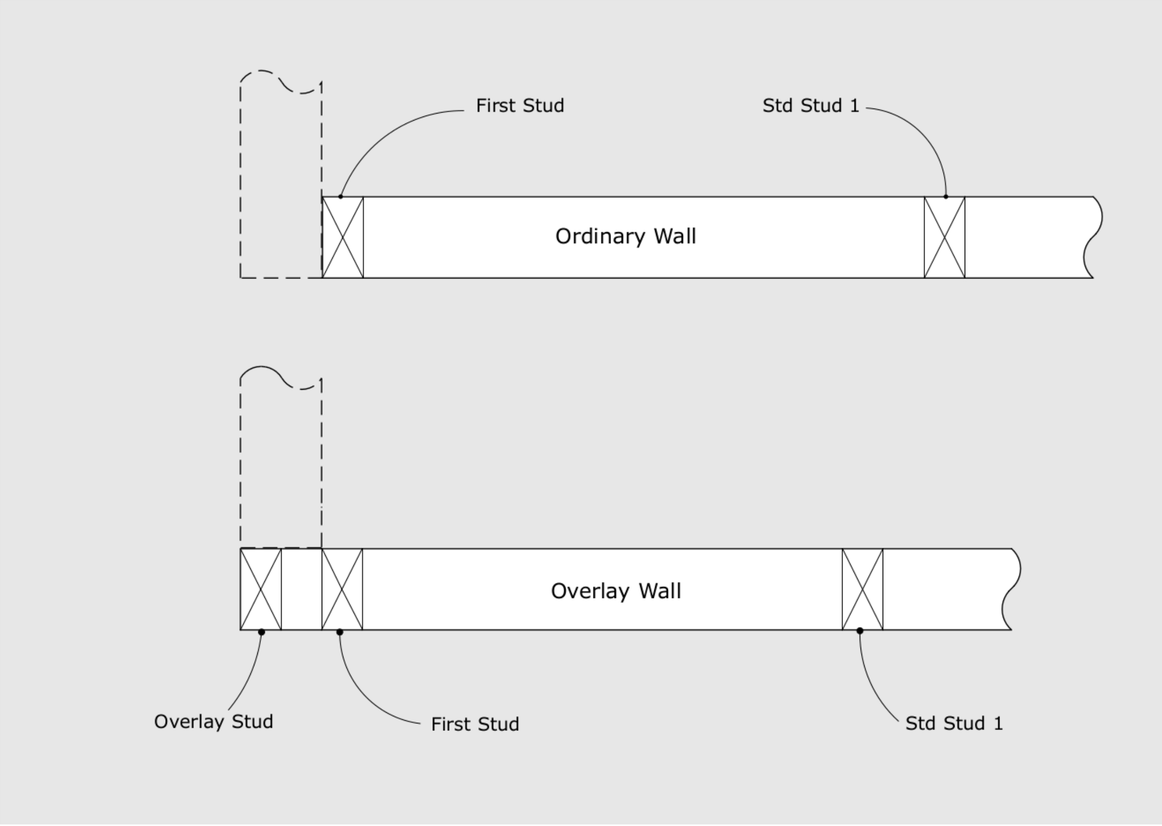
The 90 is the width of the end wall, taken from Overlay Wall Width.

The next page shows the rafter on the plates.

Wall Intersections

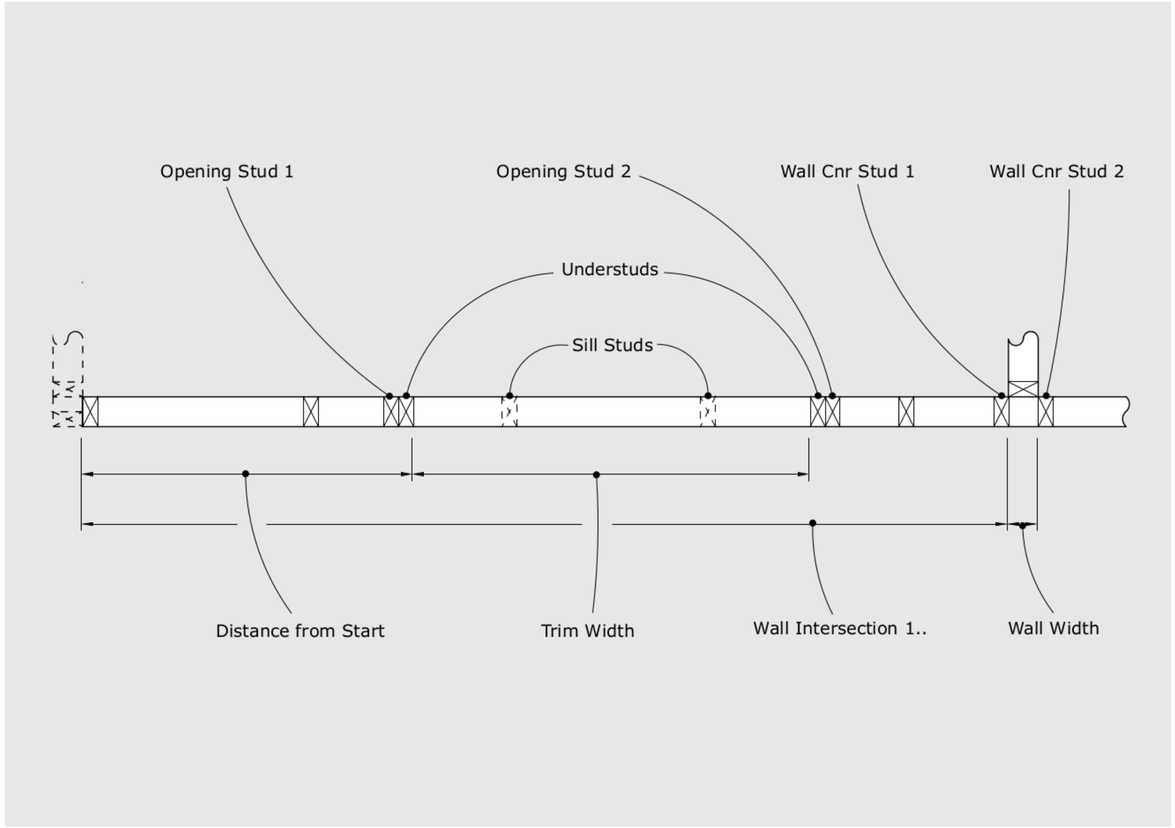


Rafter and Wall height relationship

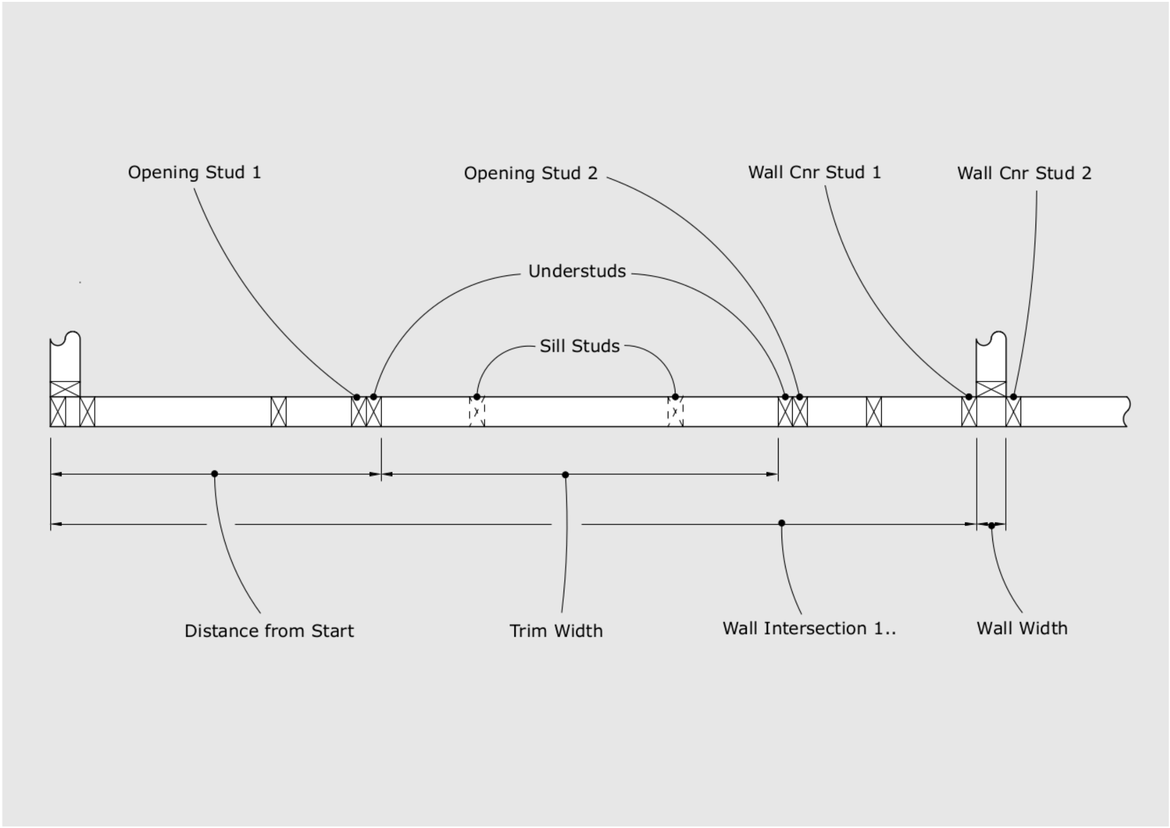


Overlay - Ordinary walls

Openings and Wall Intersections

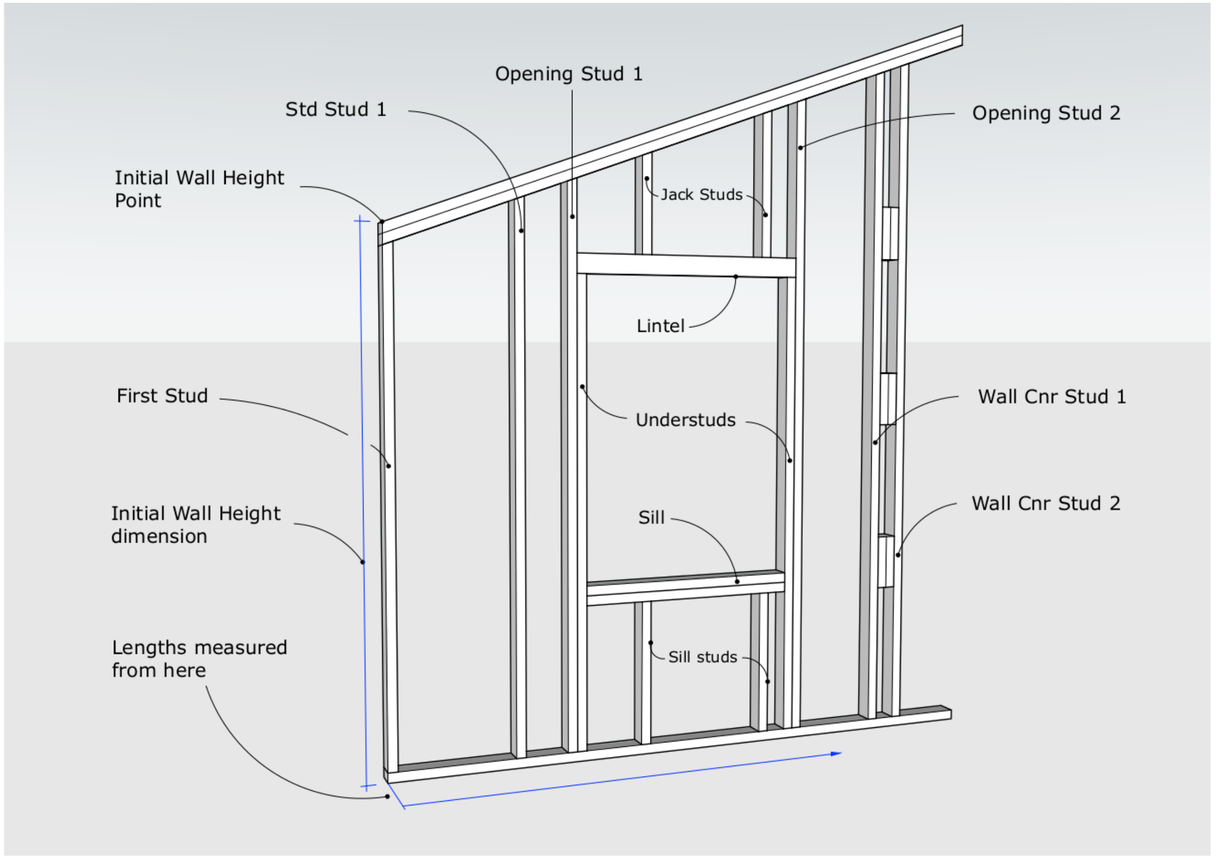


Ordinary wall

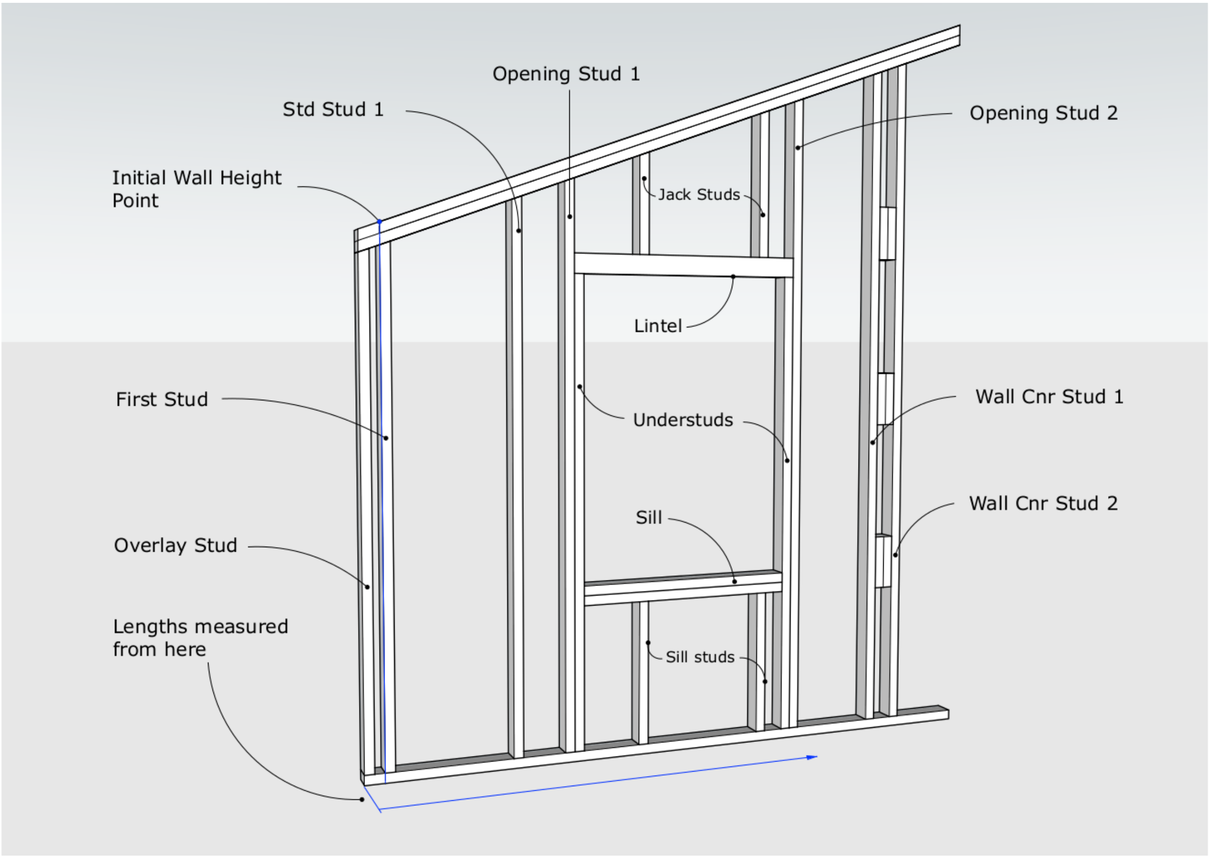


Overlay wall

Wall diagrams



Ordinary wall



Overlay wall