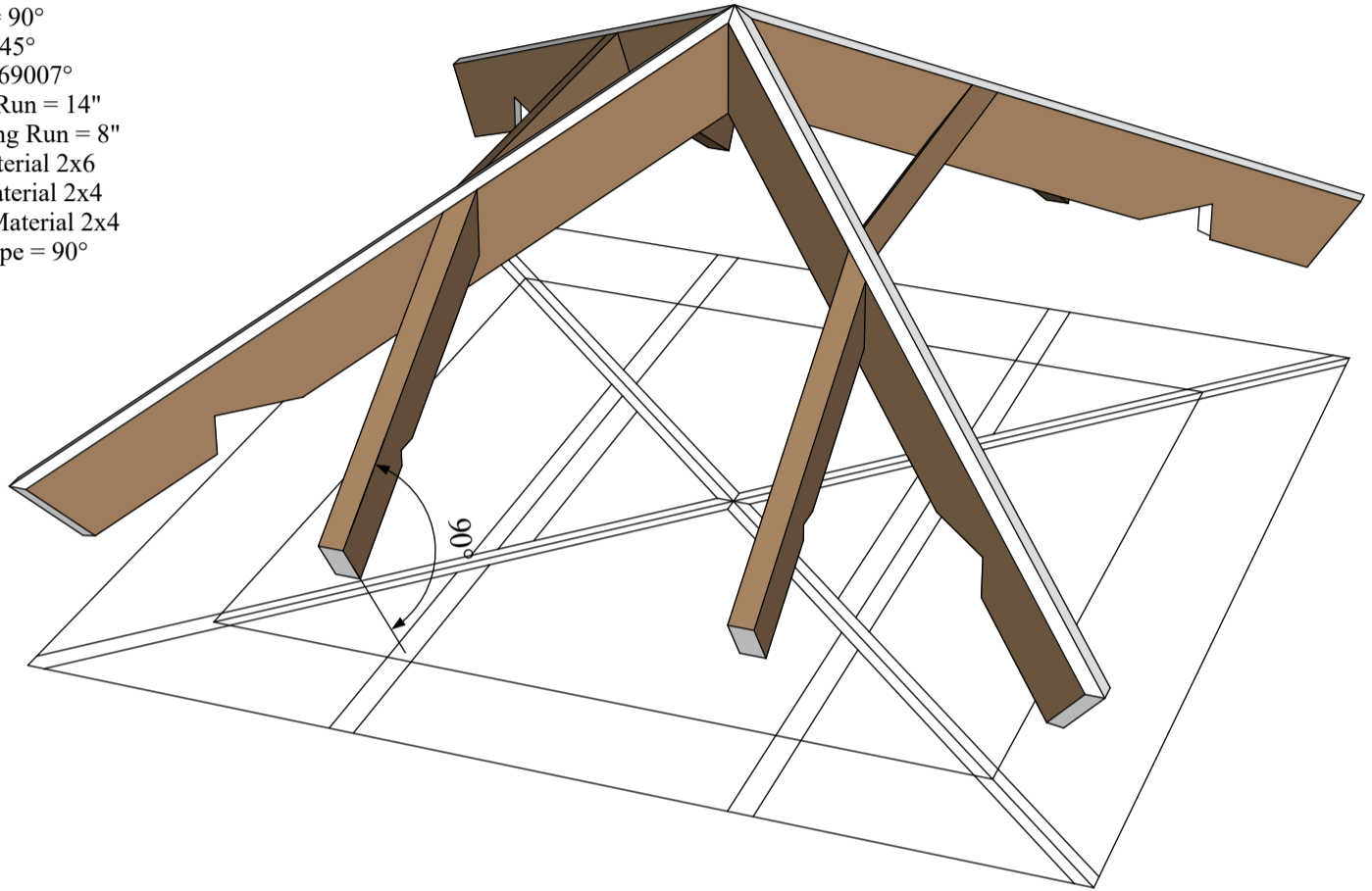


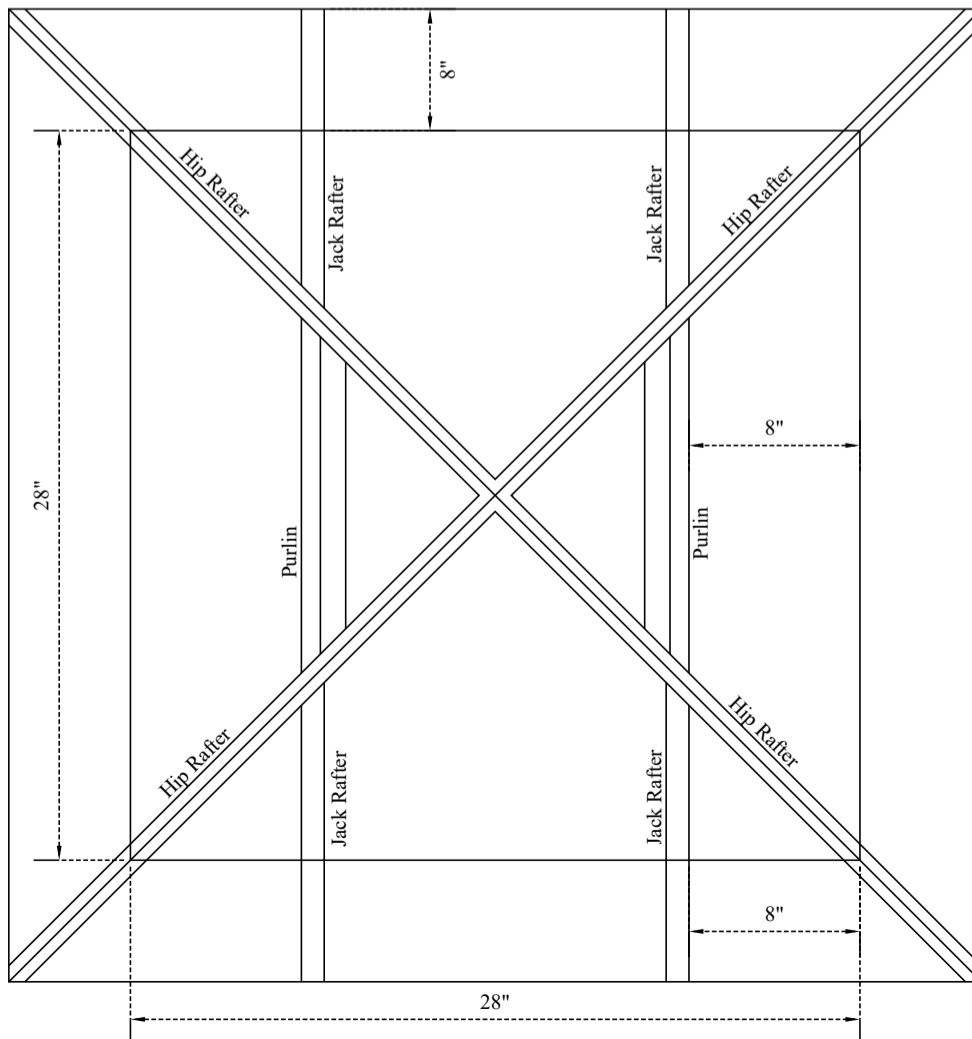
Level 1 Roof Cutter's Task Model

Each participant is to layout and cut one hip rafter, one jack rafter, and one end of a purlin rafter. There will be four participants that cut and build each task model. Anyone who takes this exam at home must layout and cut all 4 hip rafters, 4 jack rafters and two purlin rafters. Participants must have their instructor verify the rafters, have all of the correct layout lines on the rafter, before their allowed to cut the rafters with power tools. Participants taking this exam at home must take pictures of all of their rafters before the rafters are cut. Layout the plan view of this equal pitched pyramid roof, with square cut rafter tails, on a sheet of plywood 28" x 28". The rafter tails will extend past the sheet of plywood. Participants must print their name, with a felt tip pen, on each rafter.

- Deck Angles = 90°
- Plan Angles = 45°
- Pitch 8:12, 33.69007°
- Profile Rafter Run = 14"
- Rafter Overhang Run = 8"
- Hip Rafter Material 2x6
- Jack Rafter Material 2x4
- Purlin Rafter Material 2x4
- Rafter Tail Slope = 90°
- HAP = 3 1/2"



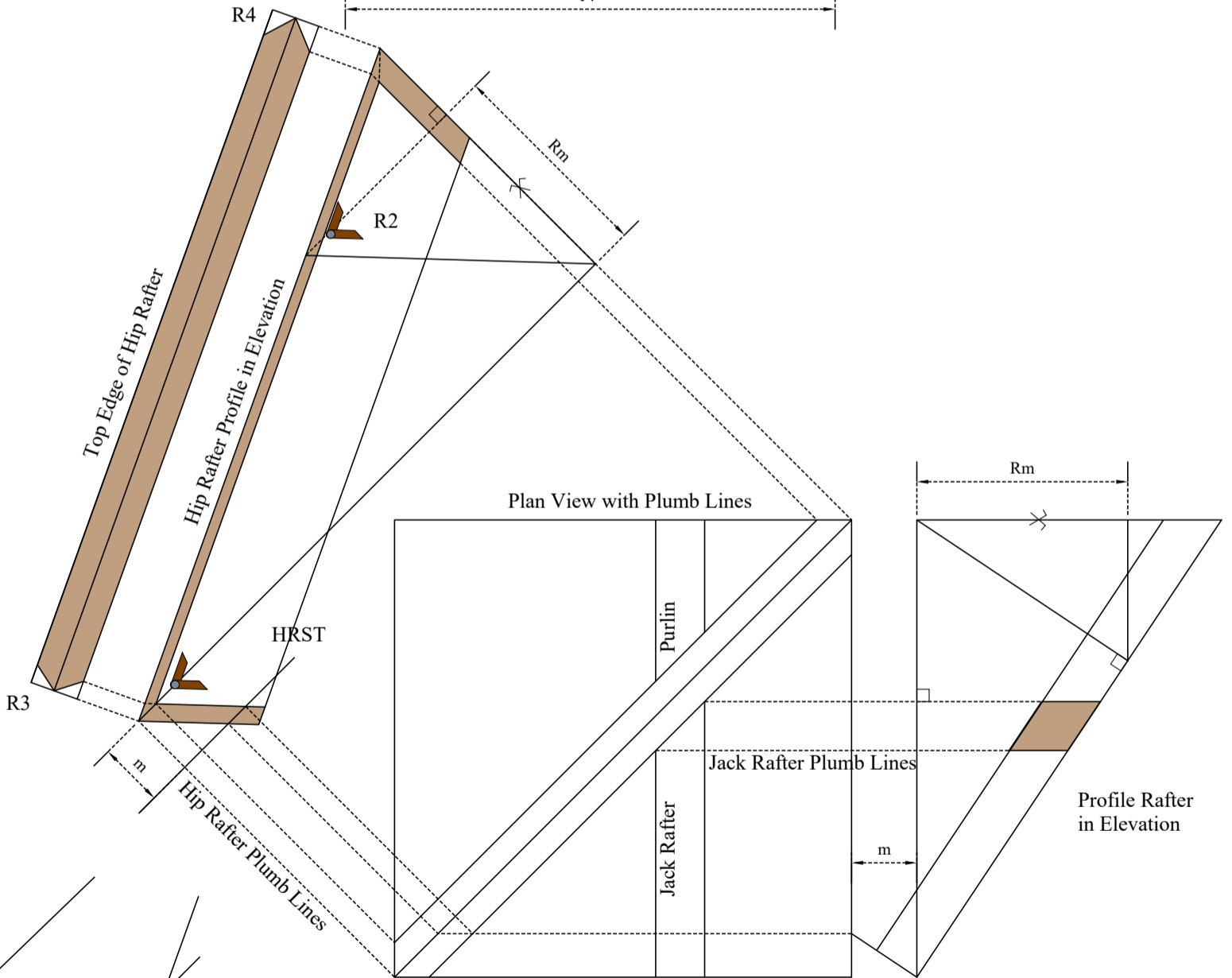
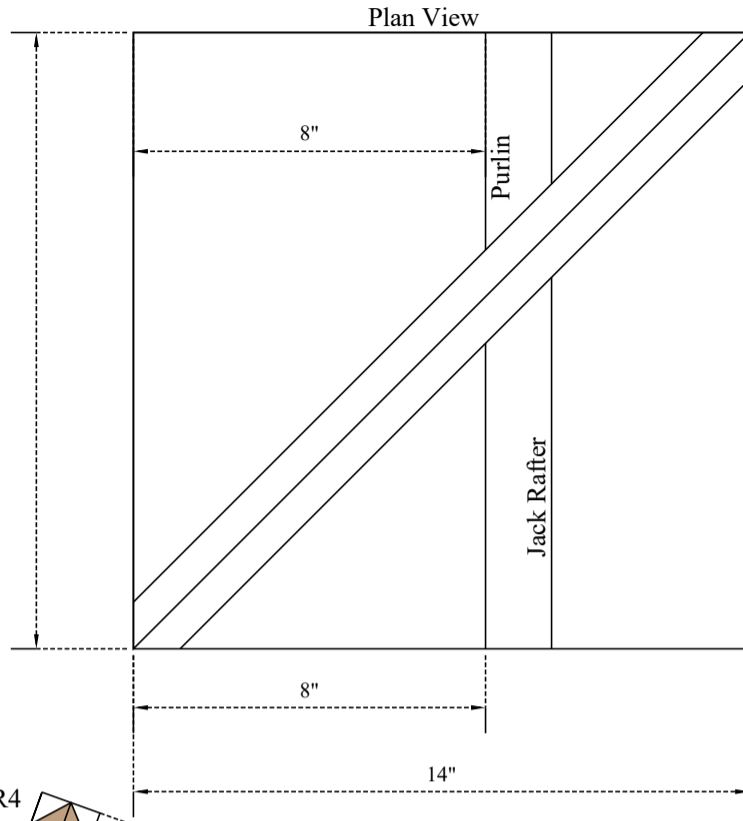
Plan View



Level 1 Roof Cutter's Exam

Task Model for Workshop

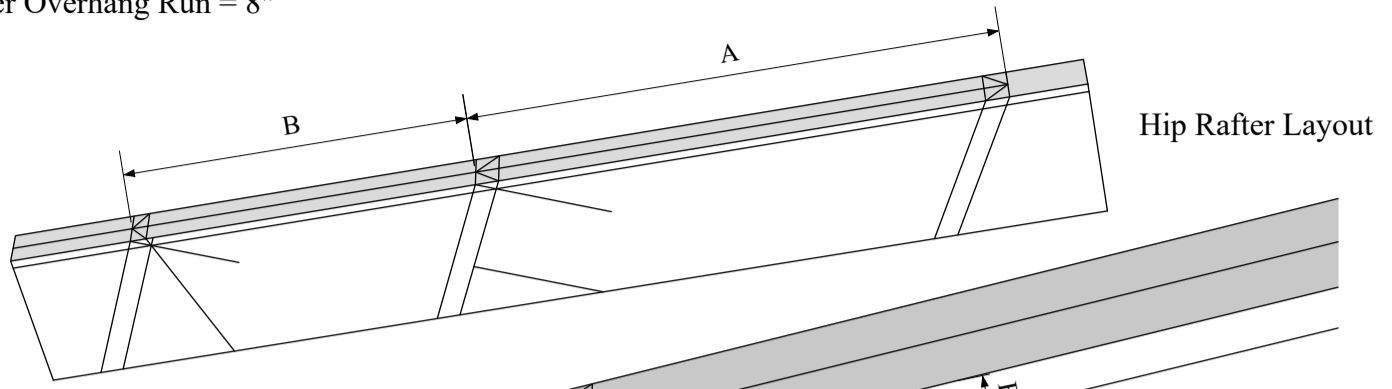
Deck Angles = 90°
 Plan Angles = 45°
 Pitch 8:12, 33.69007°
 Profile Rafter Run = 14"
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 Jack Rafter Material 2x4
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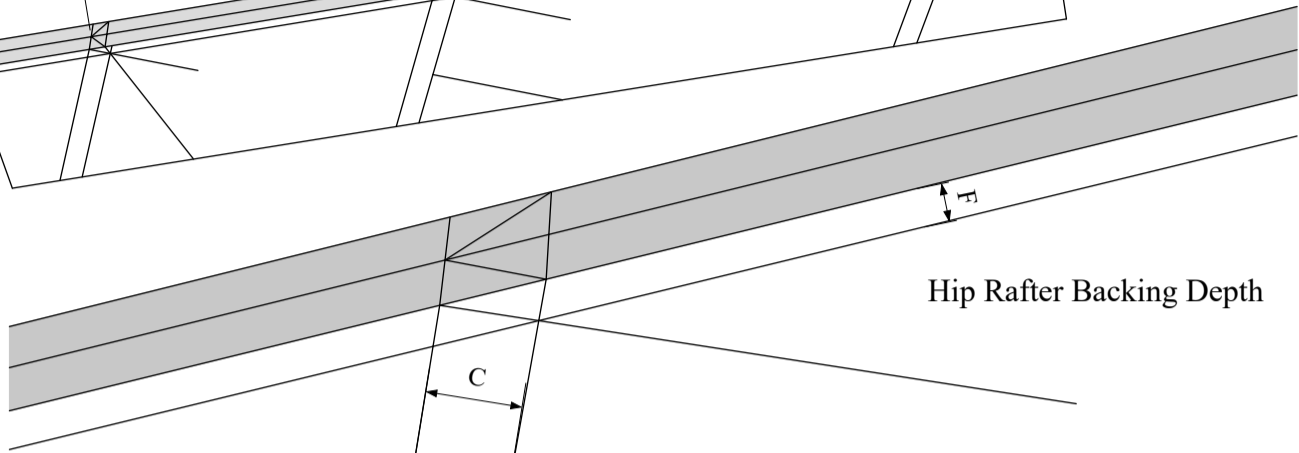
Task Model geometric development

Level 1 Roof Cutter's Exam

Equal Pitched 8:12 Roof on a 90° Deck-Eaves Angle
 Common Rafter Run = 12"
 Common Rafter Overhang Run = 8"



Hip Rafter Layout

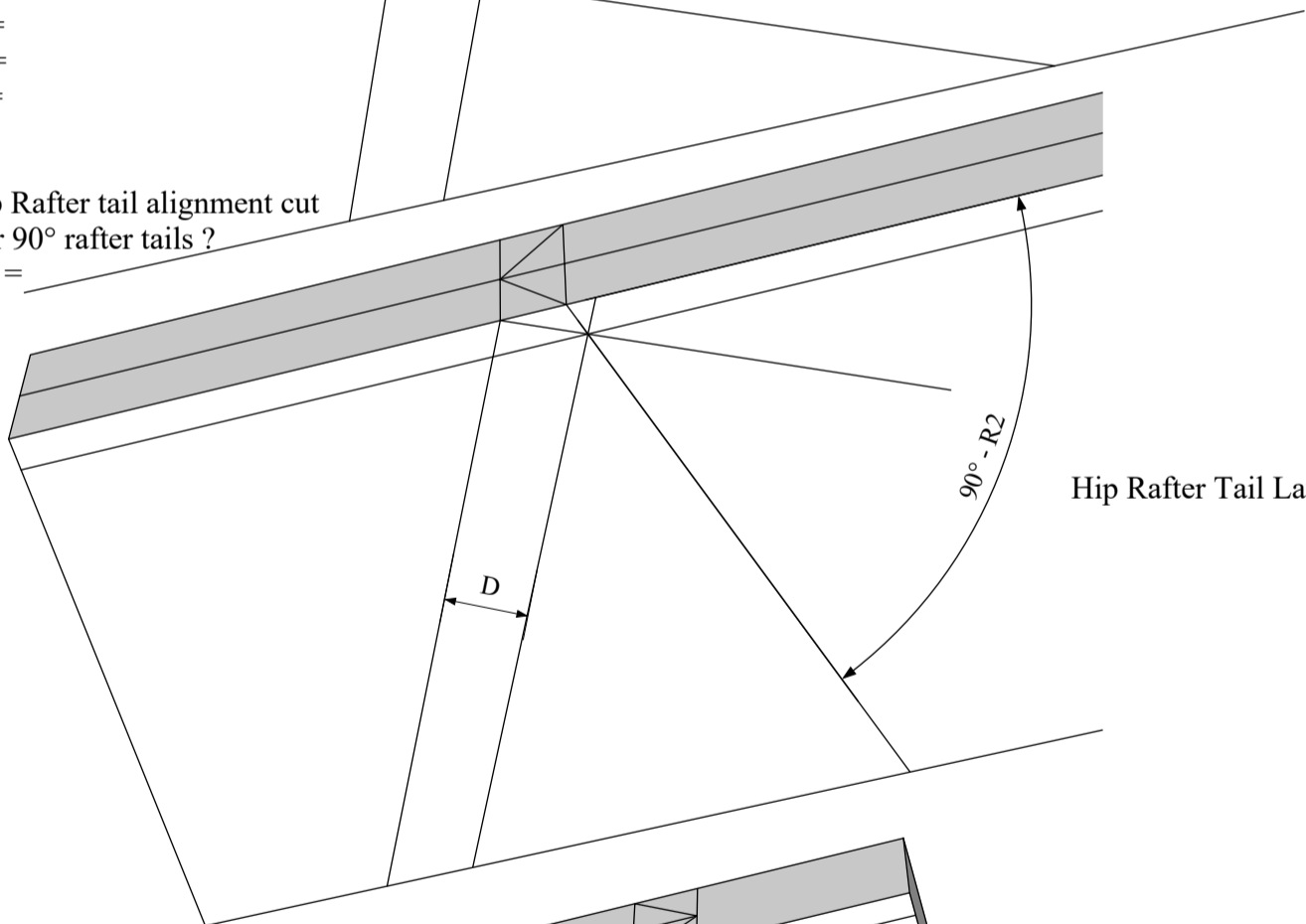


Hip Rafter Backing Depth

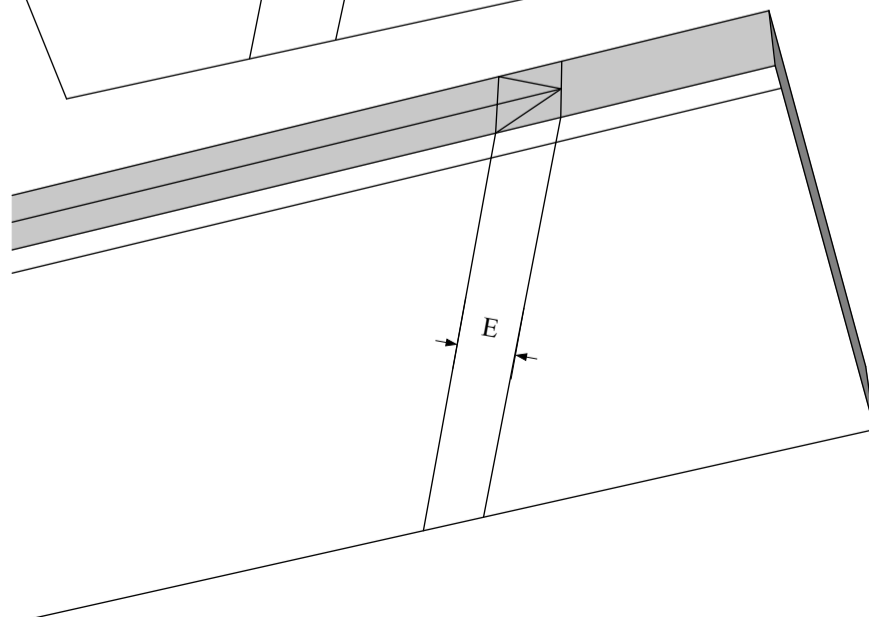
Hip Rafter Material 1.5" x 5.5"
 What is the length of the hip rafter ?
 What is the overhang length of the hip rafter?
 What is the hip rafter backing depth?
 What are the hip rafter plumb line shift dimensions?
 Dimension A =
 Dimension B =
 Dimension C =
 Dimension D =
 Dimension E =
 Dimension F =

Hip Rafter Seat Cut Layout

What is the Hip Rafter tail alignment cut layout angle for 90° rafter tails ?
 Angle $90^\circ - R2 =$



Hip Rafter Tail Layout



Hip Rafter Head Cut Layout

Level 1 Roof Cutter's Exam

This level 1 roof cutter's compound skills test can be solved with a combination of geometric drawings, trigonometry, framing square, or practical skills. Determine all of the dimensions and angles for this roof from the following information. These exams follow the WorldSkills carpentry competition layout format. The main focus of this exam is transferring plumb line dimensions from a plan view drawing to the timber that automatically develop the top bevel angles on the timber. The hip rafters and jack rafters must be completely laid out, as if you were going to cut the rafters with a handsaw. However, after the rafters are completely laid out you can cut the rafters with a handsaw, draw knife, hand plane or power tools. The hip rafters will have a minimum of 30 layout lines on the rafter. The jack rafter will have a minimum of 16 layout lines. You can use calculators(CMC) or 2D CAD drawings, but no iPhone or Android apps. You must be able to show graphic proof of your plumb line shift calculations. All plumb rafters must be laid-out using plumb lines from a plan view drawing.

The roof in this test is an equal pitched hip roof with deck angles of 90° . The eave lines are level in the horizontal plane at the eave line and the rafter tails will be cut 90° to the roof surface plane. The hip rafter tails will also be cut to align the hip rafter tail with the common rafter tails. The hip rafters will be edge beveled on each side of the hip rafter for roof plane alignment.

Deck Corner Angle = 90°

Pitch 8:12

Plan View building dimension are 21' - 0" x 19' - 0"

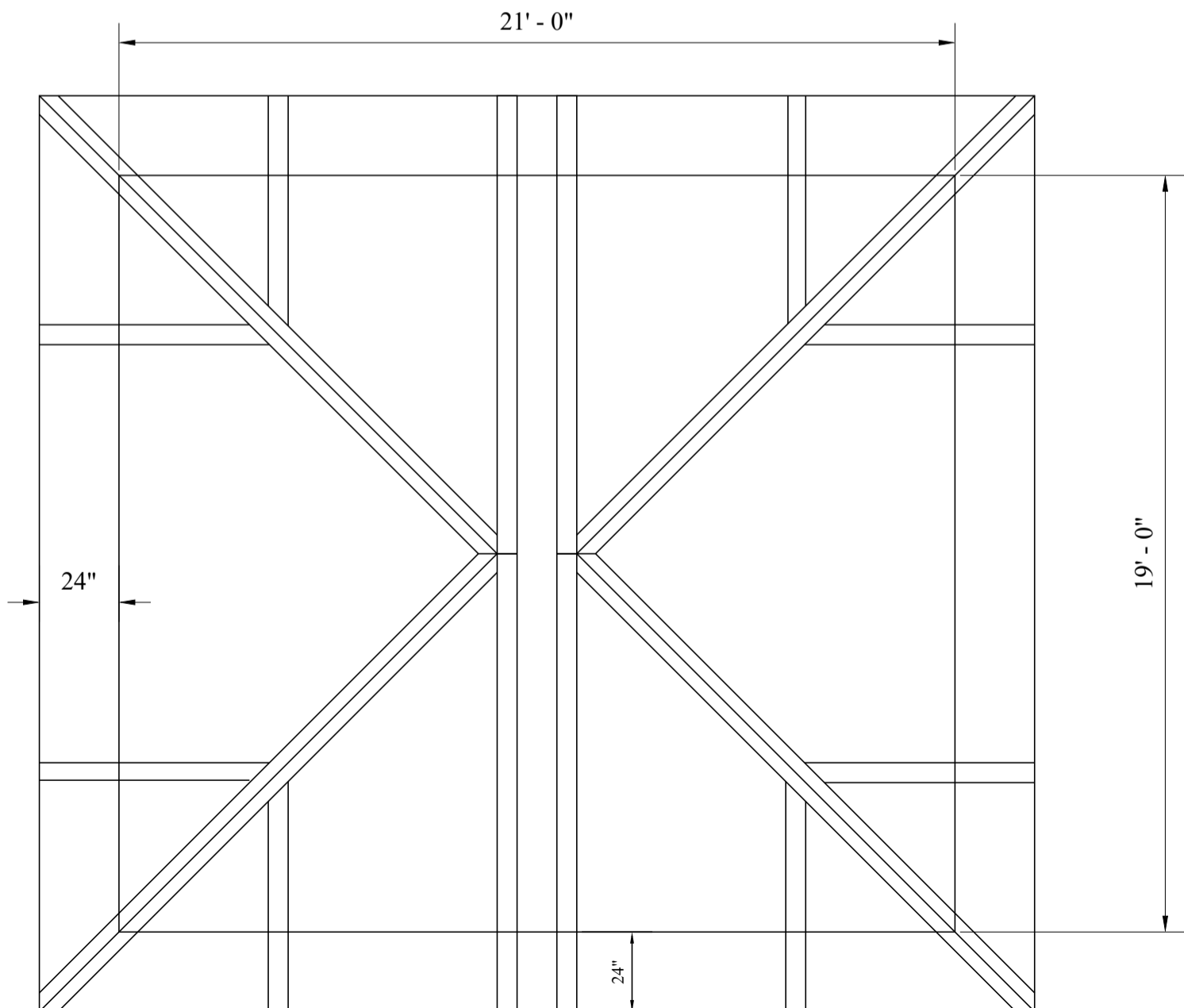
Overhang run of 24" for the 8:12 Pitch

Hip Rafter 8" x 12"

Jack Rafter 6" x 8"

Jack Rafter spacing is 24" on center from the corner of the plate line.

Height above plate for the common rafters and hip rafters will be 6".



Level 1 Roof Cutter's Exam Questions

Provide dimensions or angles to these Level 1 Roof Cutter's Exam roof cutting questions
Provide Framing Square Usage for all of the miter angles

Plan Angle

Hip Rafter Slope Angle and Framing Square Usage
Main 8:12 Common Rafter Length to theoretical Ridge Line
Main 8:12 Overhang Rafter Length

Hip Rafter Length to theoretical Ridge Line
Hip Rafter Overhang Length
Hip Rafter Backing Angle
Hip Rafter Backing Depth
Hip Rafter Dimension C
Hip Rafter Dimension D
Hip Rafter Plumb Line Shift Dimension E
Hip Rafter Plumb Line Shift Dimension G

Jack Rafter Plumb Line Shift Dimension J
Jack Rafter Saw Blade Bevel Angle to Cut 8:12 Miter Line
Jack Rafter Length Difference
Jack Rafter Layout Dimension on Hip Rafter

Roof Sheathing Angle

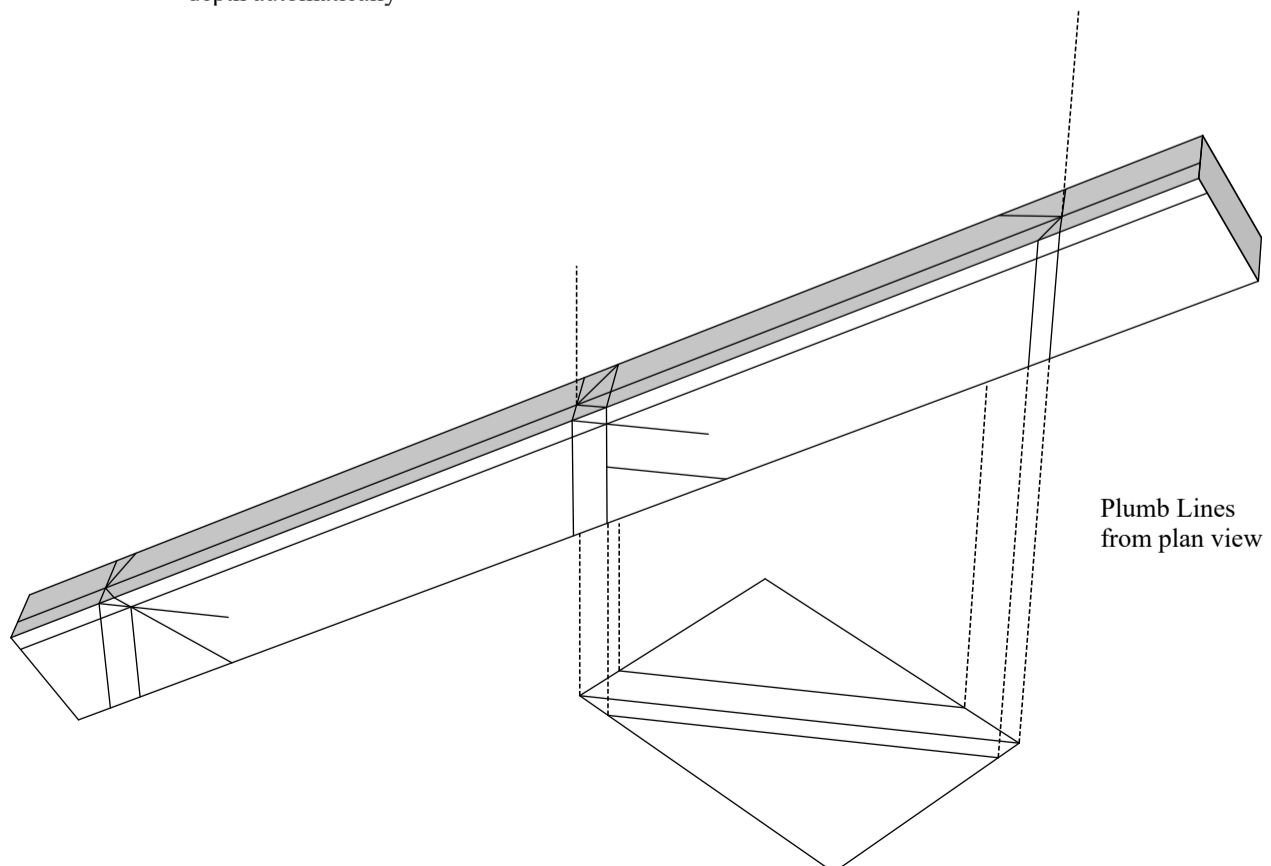
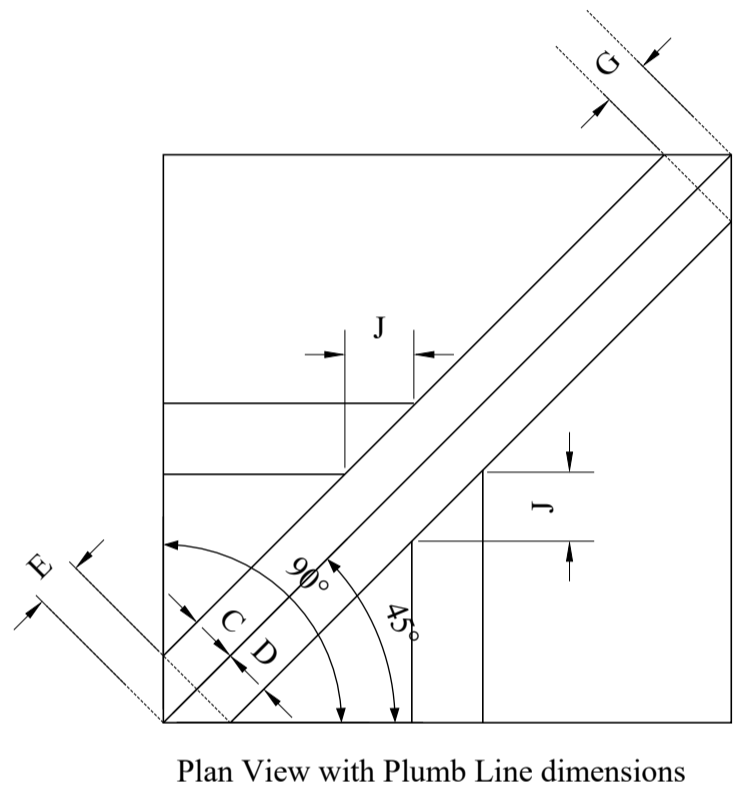
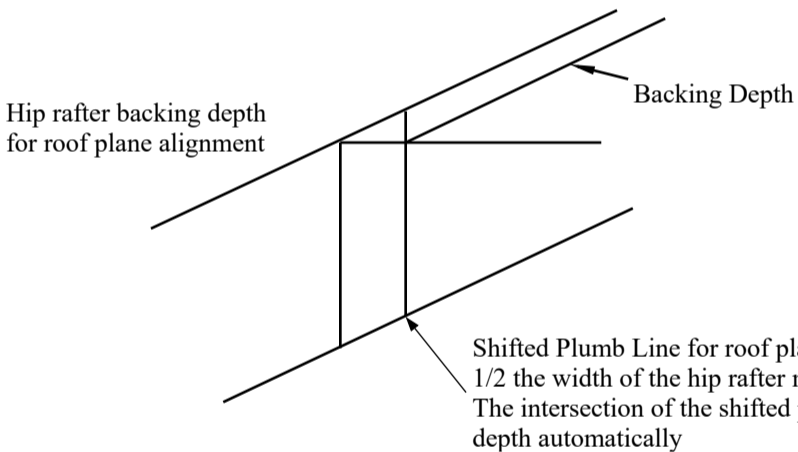
Purlin Rafter Miter Angle, framing square usage
Purlin Rafter Saw Blade Bevel Angle
Miter Angle to cut 2x6 T&G Roof Decking in the roof surface plane
Saw Blade Bevel Angle for 2x6 T&G Roof Decking

Hip Rafter Miter Angle for square cut tails
Hip Rafter Saw Blade Bevel Angle for square cut tails

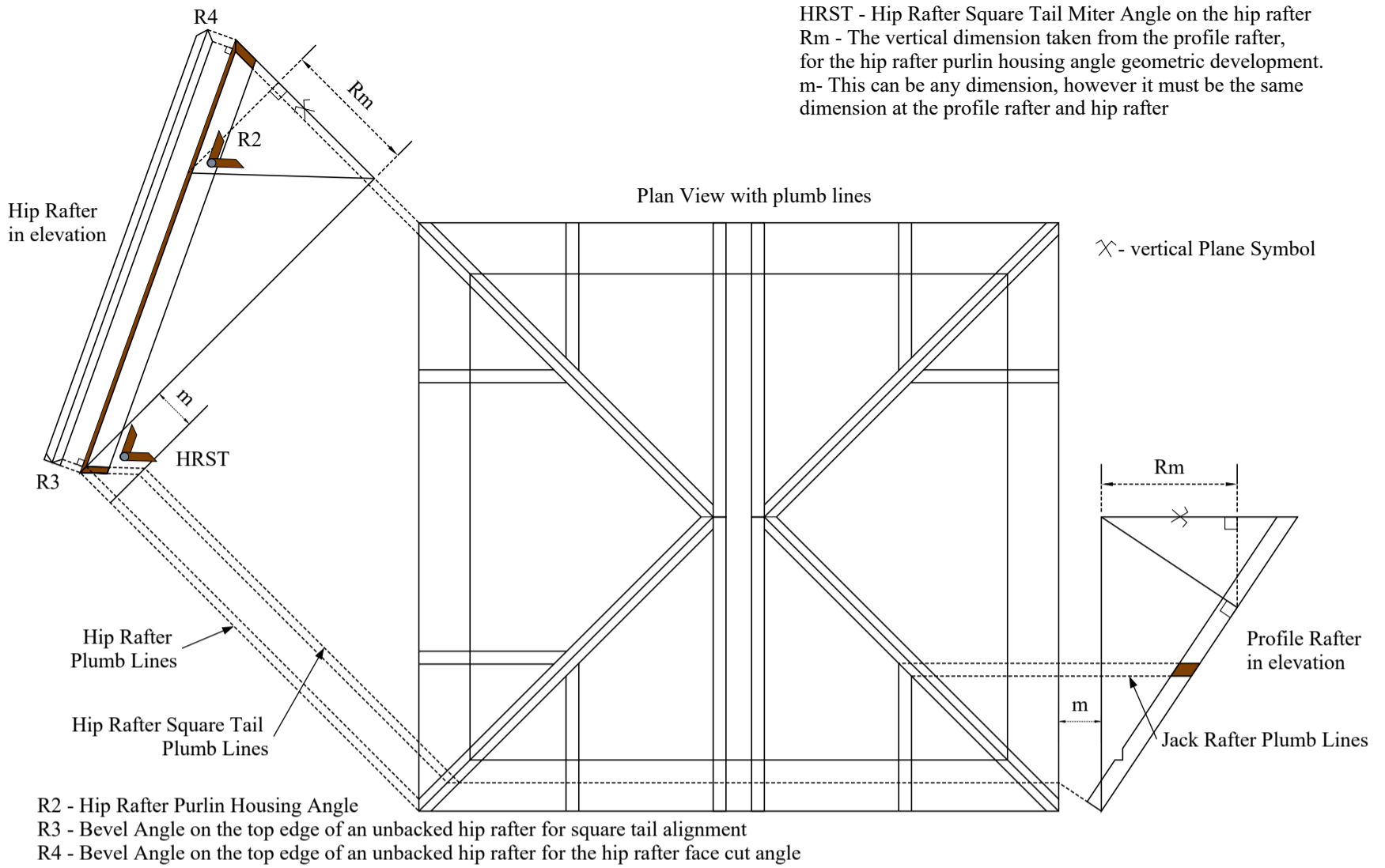
Note:

These top bevel angles are automatically developed on plumb rafters using plumb lines. Showing the Framing square usage is optional.
Hip Rafter Top Bevel Angle
Jack Rafter Top Bevel Angle
Hip Rafter Square Tail Top Bevel

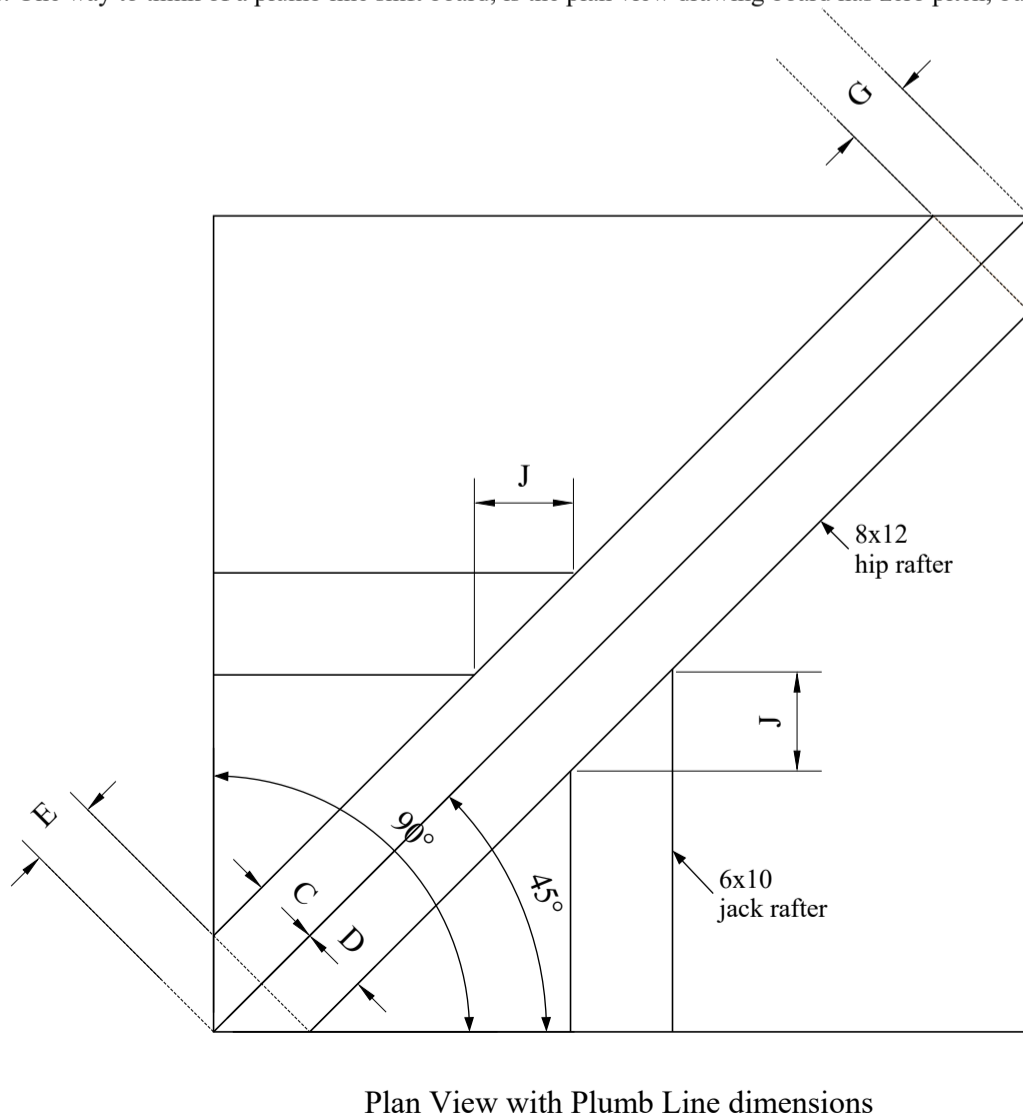
Top bevel angles are not laid out with a framing square in this exam.



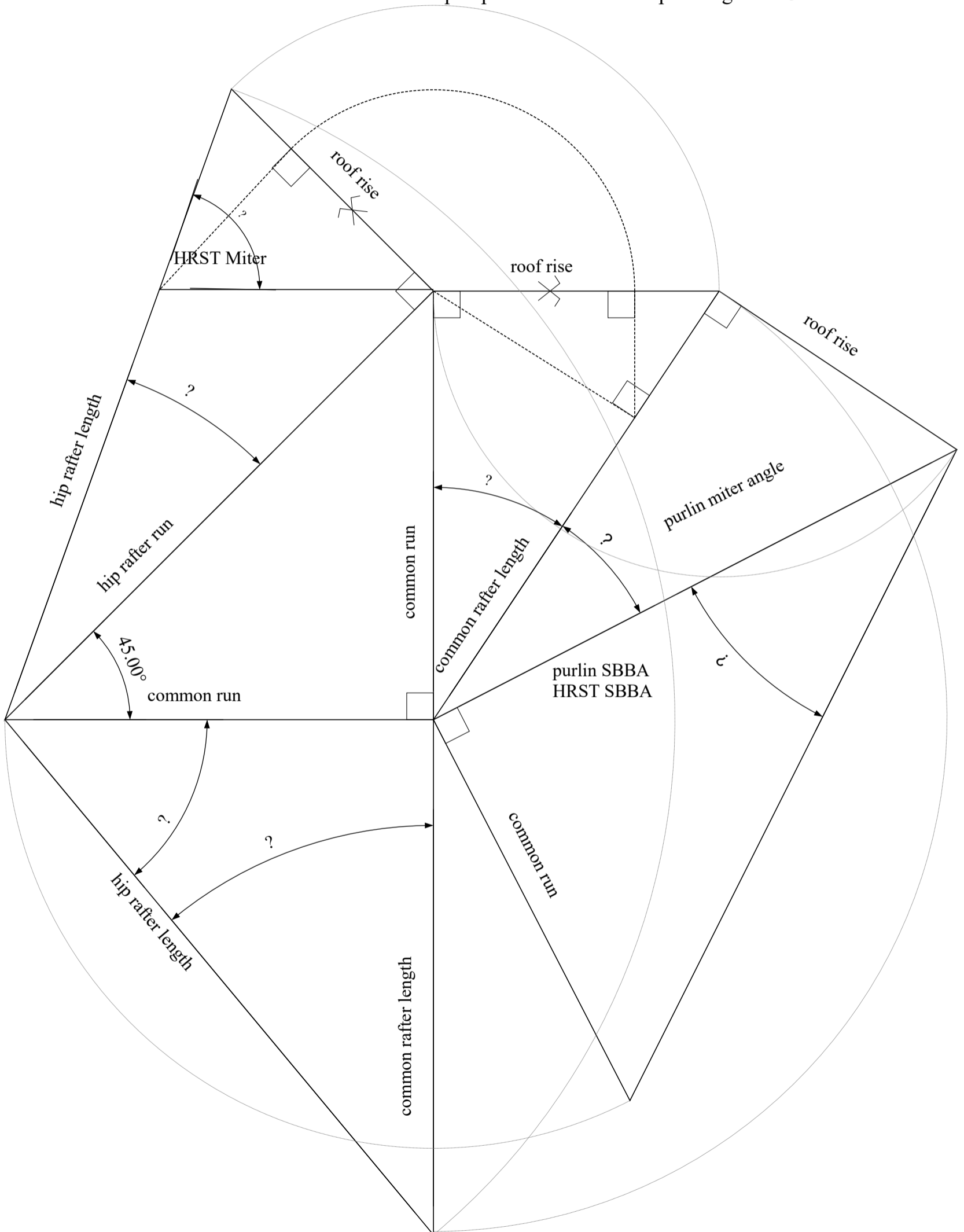
Level 1 Roof Cutter's Exam



Equal pitched roof, Hip Rafter and Jack Rafter plumb line shift board. This technique does not require the hip rafter and profile rafters to be drawn in elevation-profile. The hip rafter run lines in plan view are drawn to the correct width, but the length of the hip rafter run is not the true length of the hip rafter run in plan view. This can be drawn on a 48" x 48" piece of plywood on the jobsite. This technique is used to transfer the plumb lines in a plan view drawing to the timber. One way to think of a plumb line shift board, is the plan view drawing board has zero pitch, but can be used for any pitch.



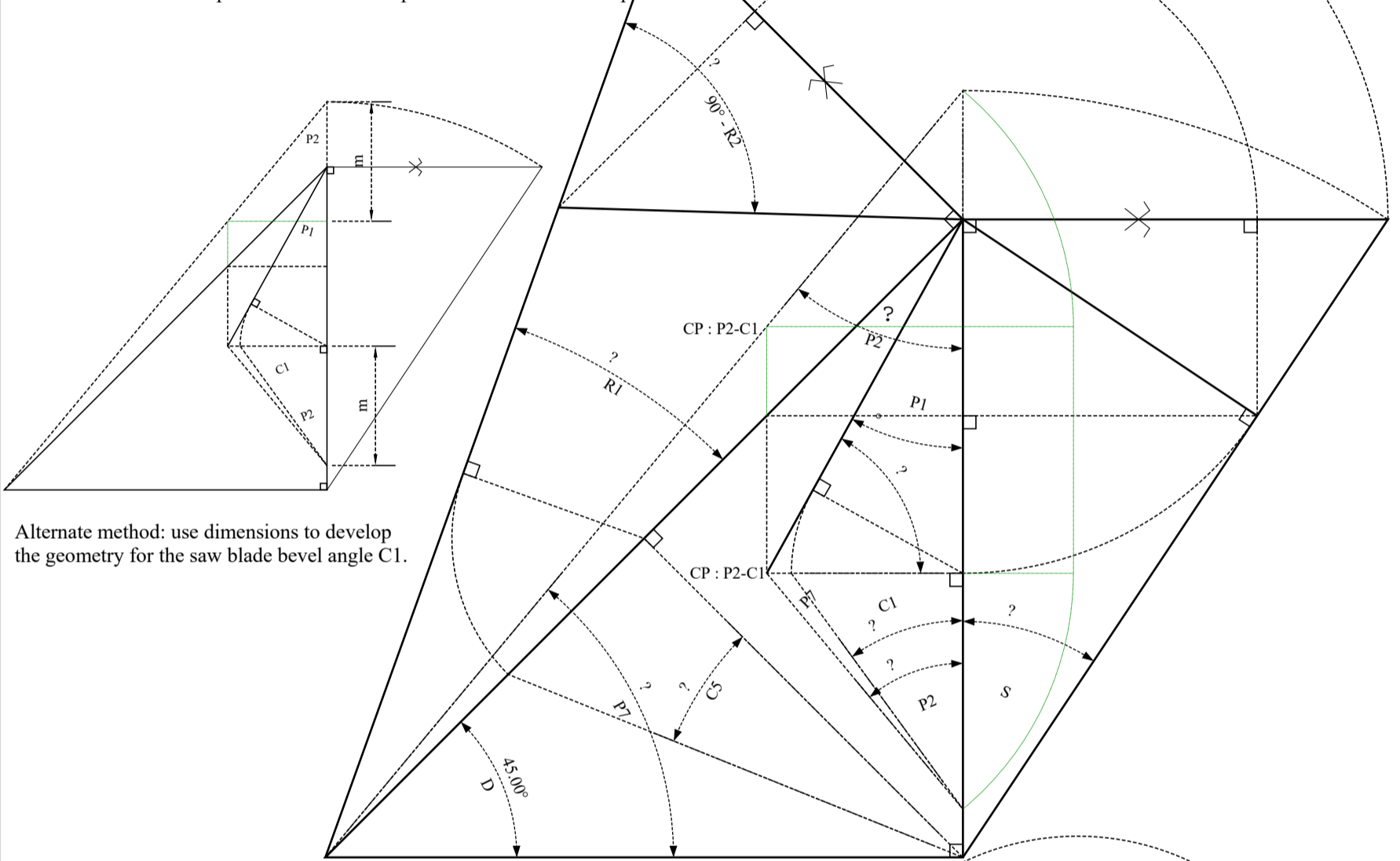
Roof Framing Kernel geometric development for the purlin miter angle and the SBBA for purlin rafters and square tail hip rafters. This geometric development can be developed with just a framing square. This only works on equal pitched roofs with a plan angle of 45°.



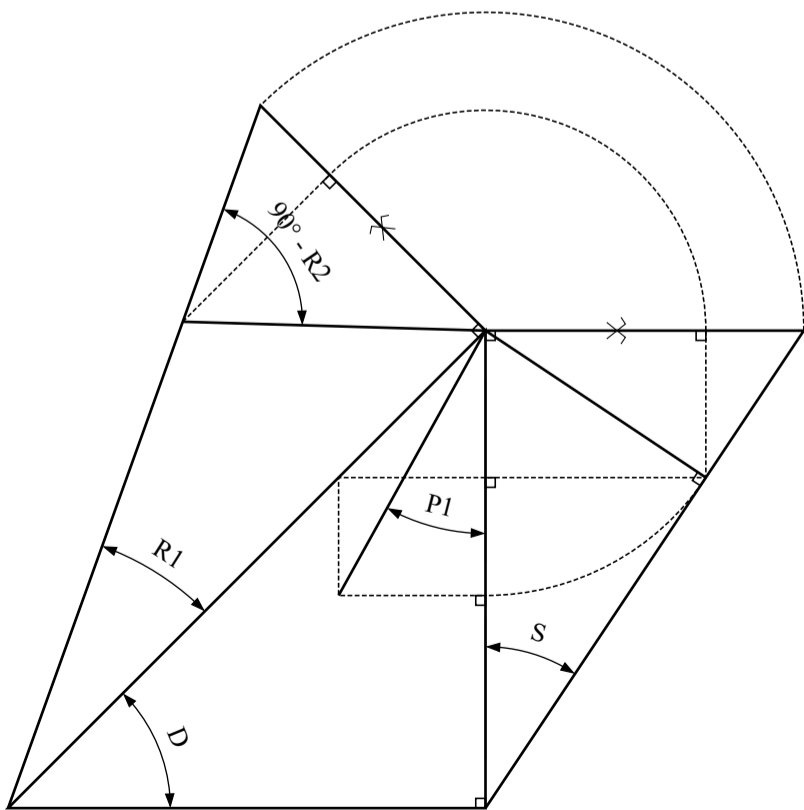
Level 1 Roof Cutter's Exam

TFG - Roof Framing Kernel geometric development for the purlin miter angle and the SBBA for purlin rafters and square tail hip rafters. This geometric development can be developed with just a framing square. This works on all plan angles with equal pitched roofs or unequal pitched roofs.

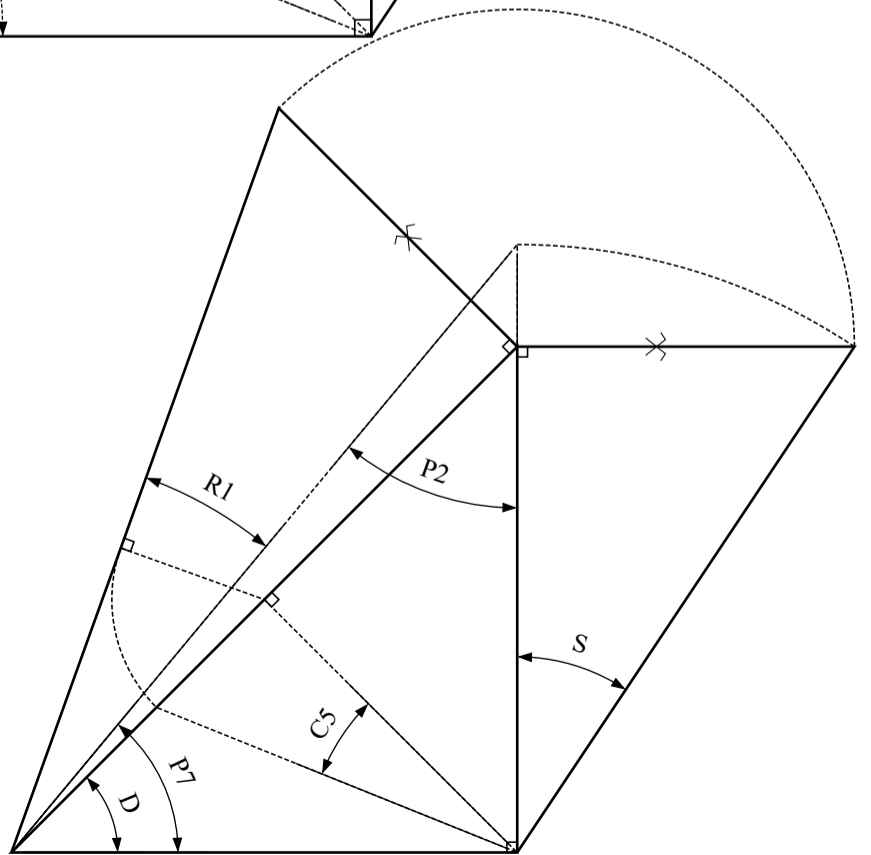
- S = Roof Slope Angle
- D = Plan Angle
- R1 = Hip Rafter Slope Angle
- P2 = Jack Rafter Bevel
- P7 = Roof Sheathing Angle
- P1 = Purlin Miter Angle
- R2 = Hip Rafter Purlin Housing Angle & Square Tail Hip Rafter Miter
- C1 = SBBA for Purlin Miter Line, Hip Rafter Square Tail Miter Line
- C5 = Hip Rafter Backing Angle
- CP : P2-C1 = Center point of Arc to develop lines for P2 - C1 development



Alternate method: use dimensions to develop the geometry for the saw blade bevel angle C1.

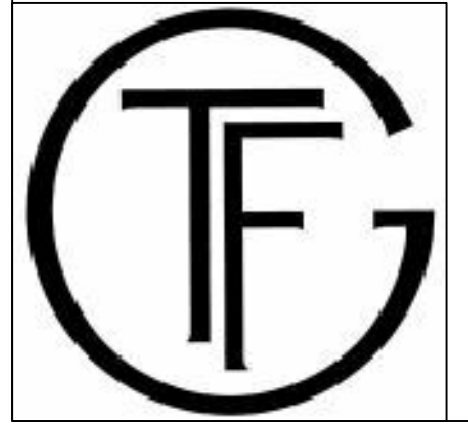


Purlin Miter Angle P1 geometric development

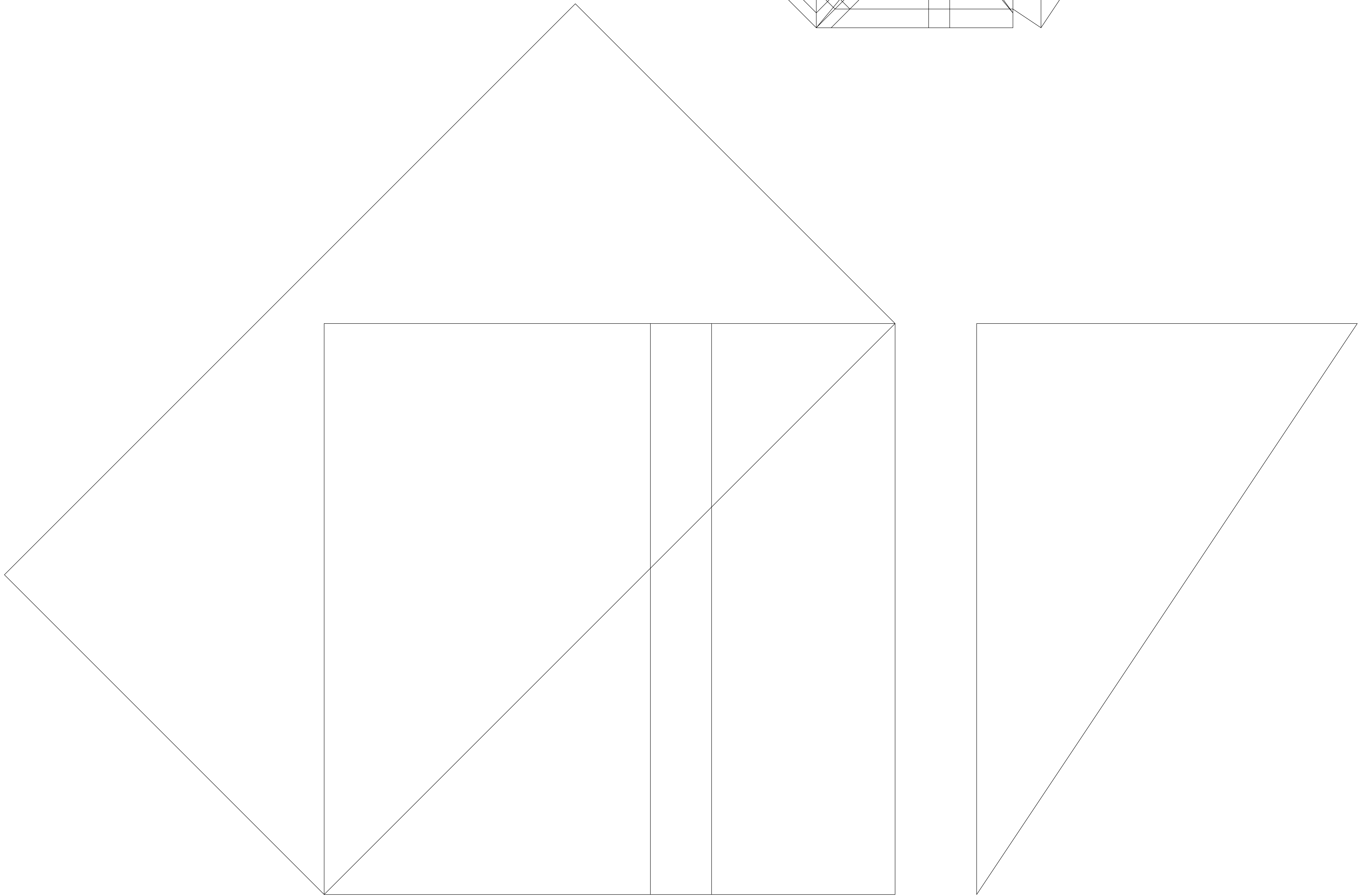
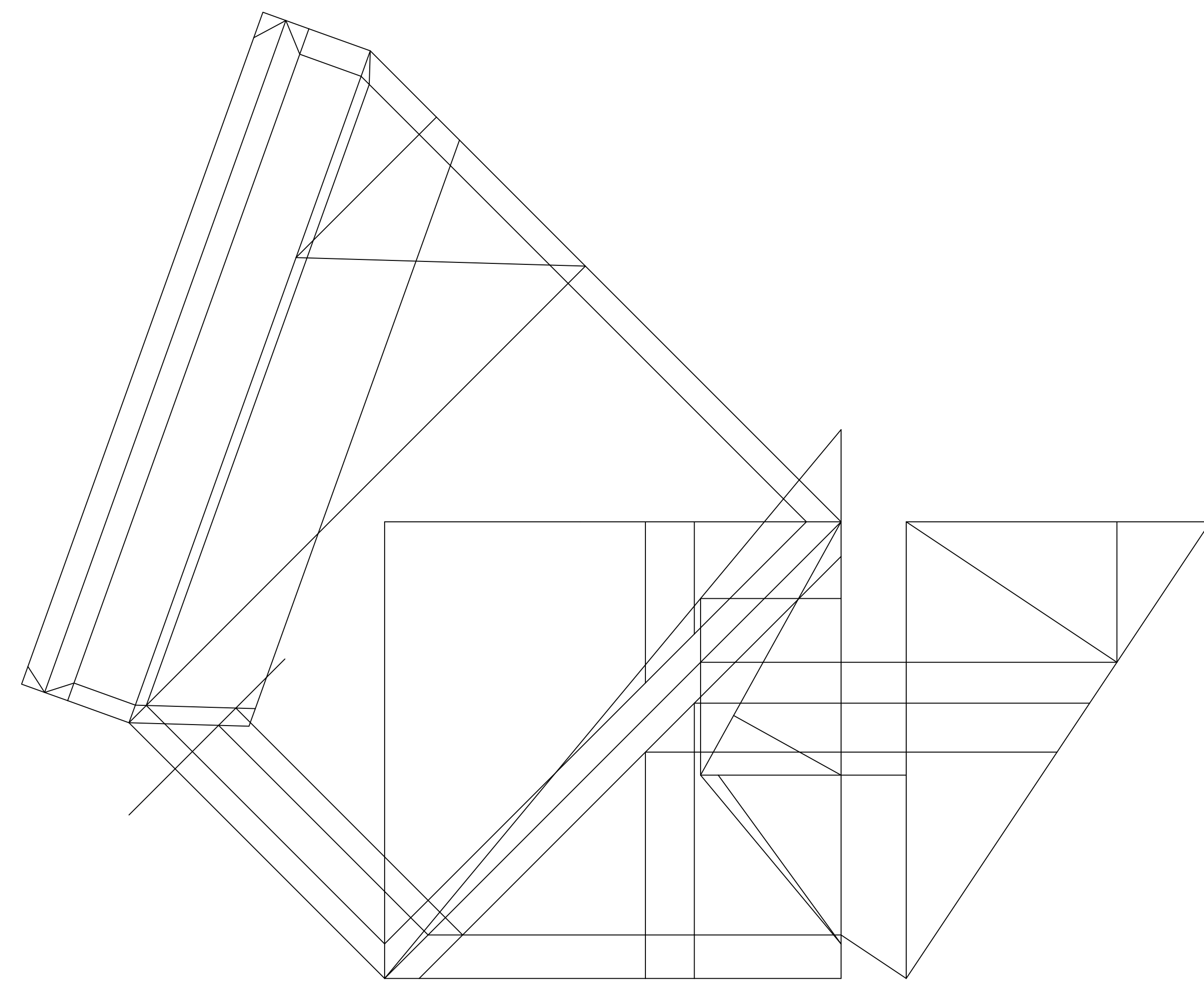


Roof Surface geometric development for Jack Rafter Bevel P2 & Roof Sheathing angle P7

Level 1 Task Model



2018 TFG CONFERENCE - EAST
Virginia Beach, VA



Level 1 Task Model



2018 TFG Conference-East
Virginia Beach, Virginia

