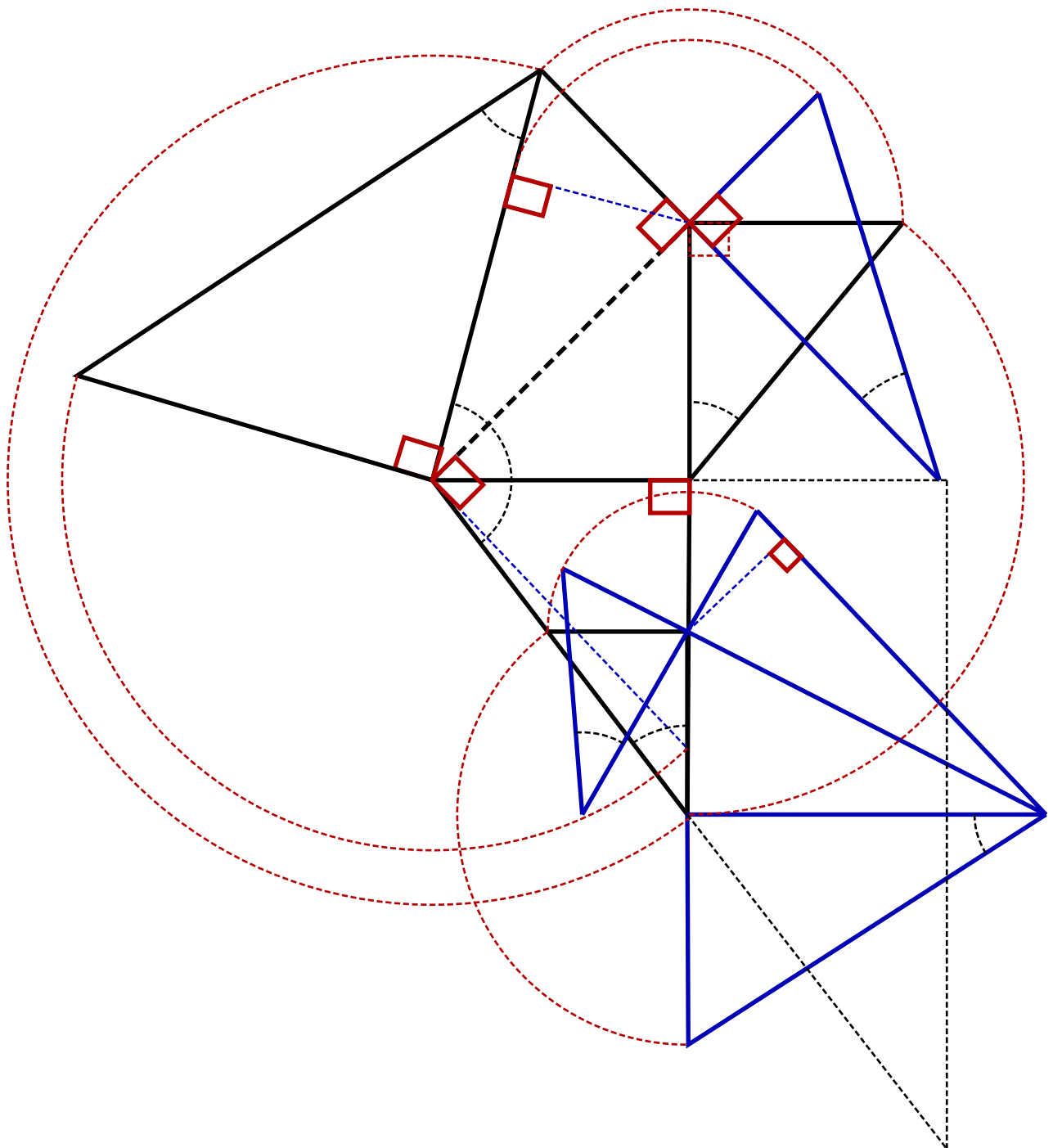


Canadian & American Geometric Roof Framing Development using a steel framing square.





The Canadian & American Geometric Roof Framing

Development is a simple **10 step** process of drawing **10 triangles** with a steel framing square. No math skills are required, just a framing square. You only need to know the pitch of the roof.

The 10 triangles will produce:

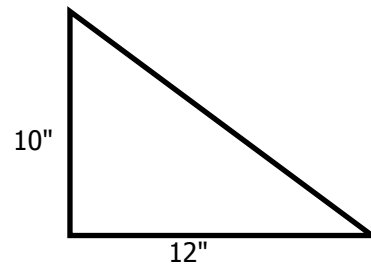
- 1: Common Rafter Length for 12" of run
- 2: Hip Rafter Length for 12" of run
- 3: Common Rafter Pitch Angle
- 4: Hip Rafter Pitch Angle
- 5: Hip Rafter Side Cut Angle
- 6: Hip Rafter Backing Angle
- 7: Roof Sheathing Angle
- 8: Jack Rafter Side Cut Angle
- 9: Frieze Block Miter Angle
- 10: Frieze Block Saw Bevel Angle
- 11: Jack Rafter Length Difference
- 12: First Jack Rafter length for 2x, 4x or 6x hip rafters.

Draw the triangles out on a sheet of plywood. After you have drawn the 10 triangles you can cut out the triangles and use them for templates to cut your rafters. Or use a bevel square to transfer the angles to the material your using for your rafters.

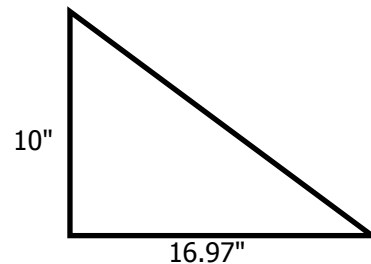
To check any of the angles using a Construction Master Calculator simply enter the two legs of any of the triangles to fine the angle in degrees.

Example:

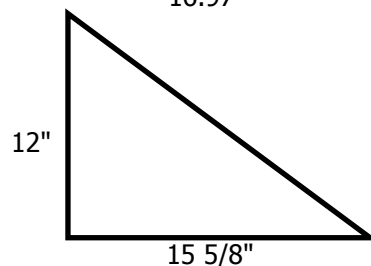
```
[On/C][On/C]
[10"] [÷] [12"] [=] 0.833333
[Conv][Tan] DEG 39.80557°
```



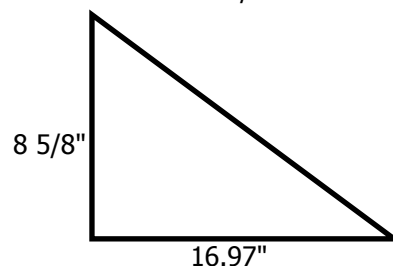
```
[On/C][On/C]
[10"] [÷] [16.97"] [=] 0.589275
[Conv][Tan] DEG 30.50979°
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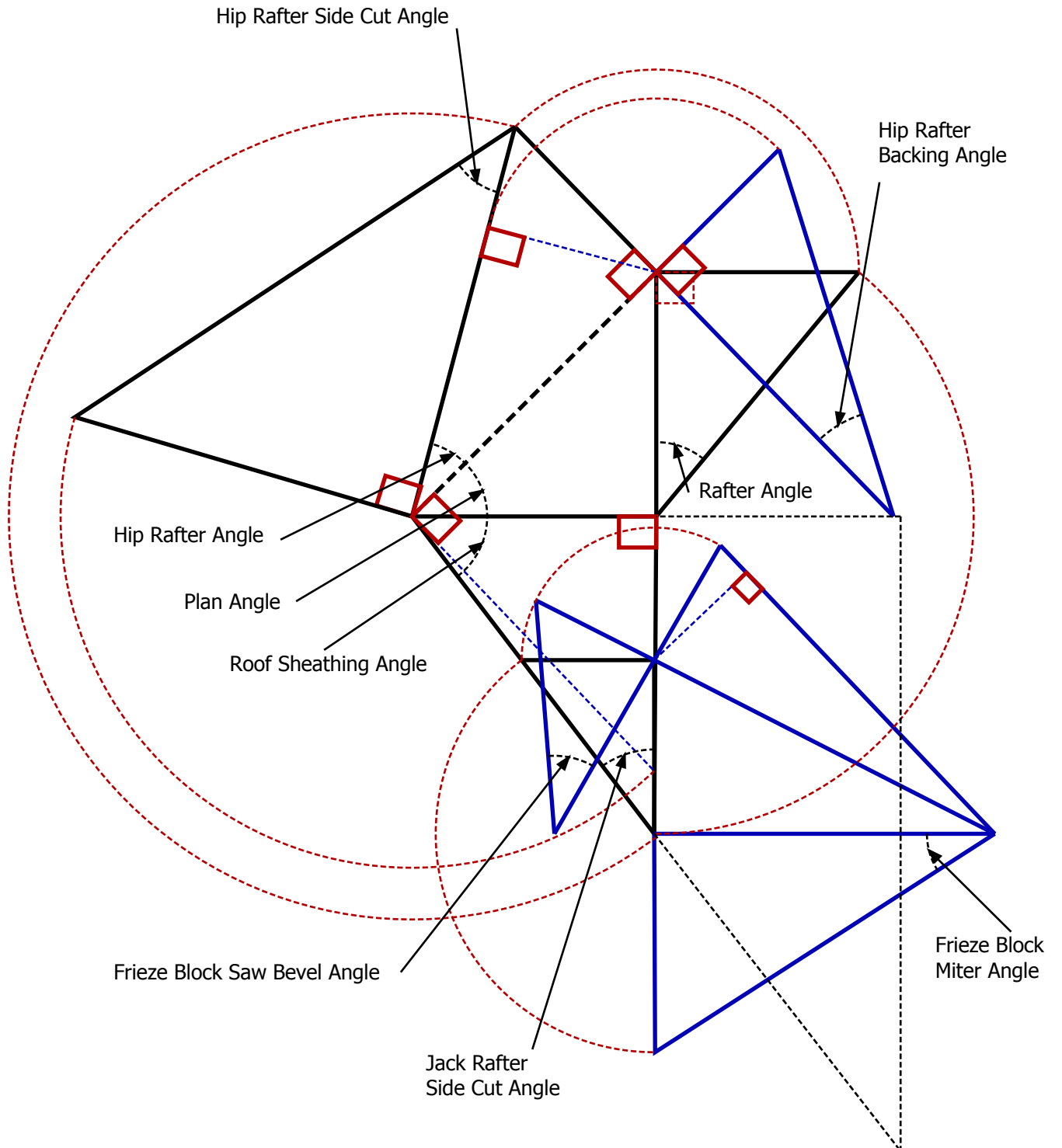
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[On/C][On/C]
[12"] [÷] [15 5/8"] [=] 0.768
[Conv][Tan] DEG 37.52426°
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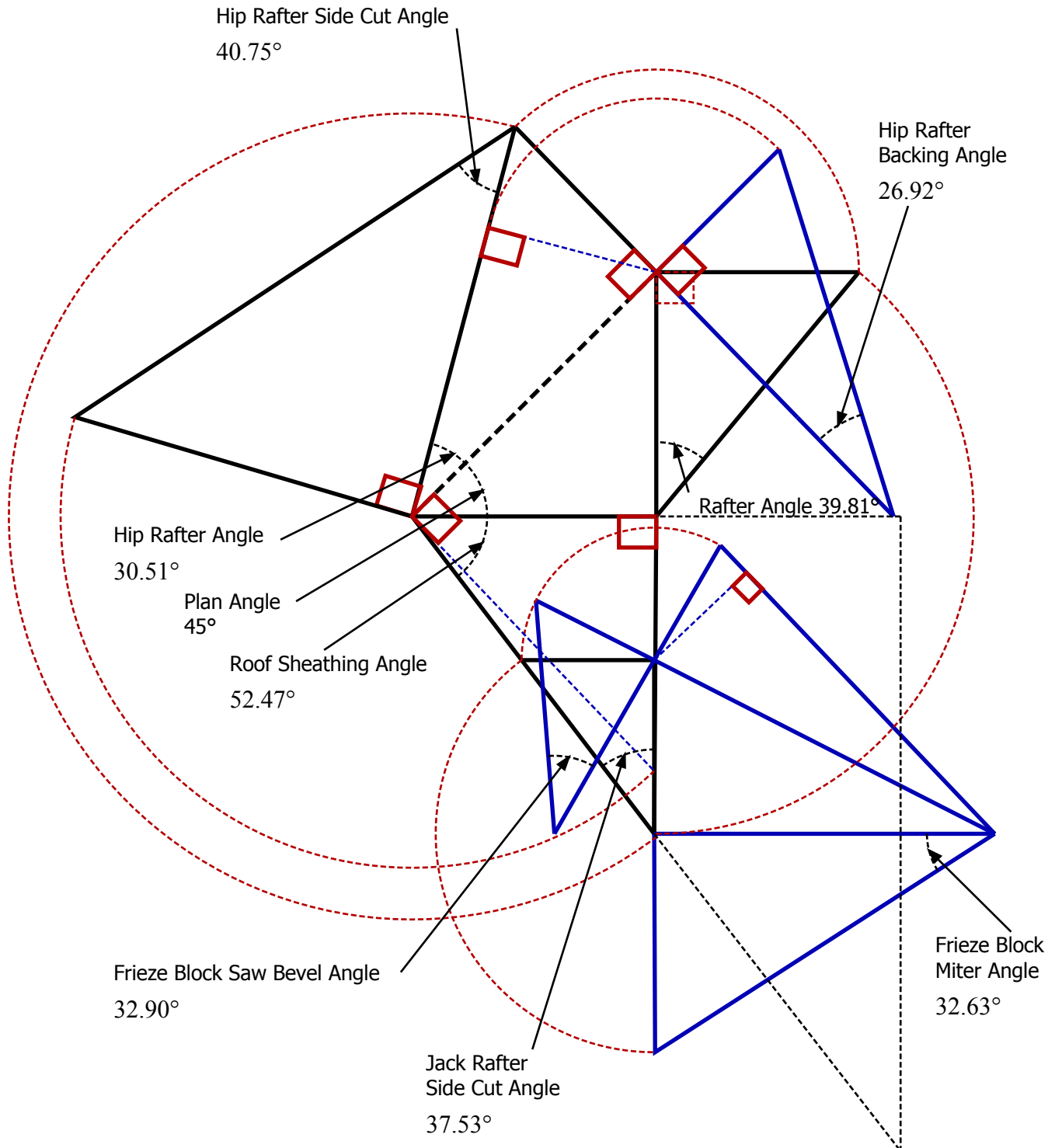
```
[On/C][On/C]
[8 5/8"] [÷] [16.97"] [=] 0.50825
[Conv][Tan] DEG 26.94195°
```



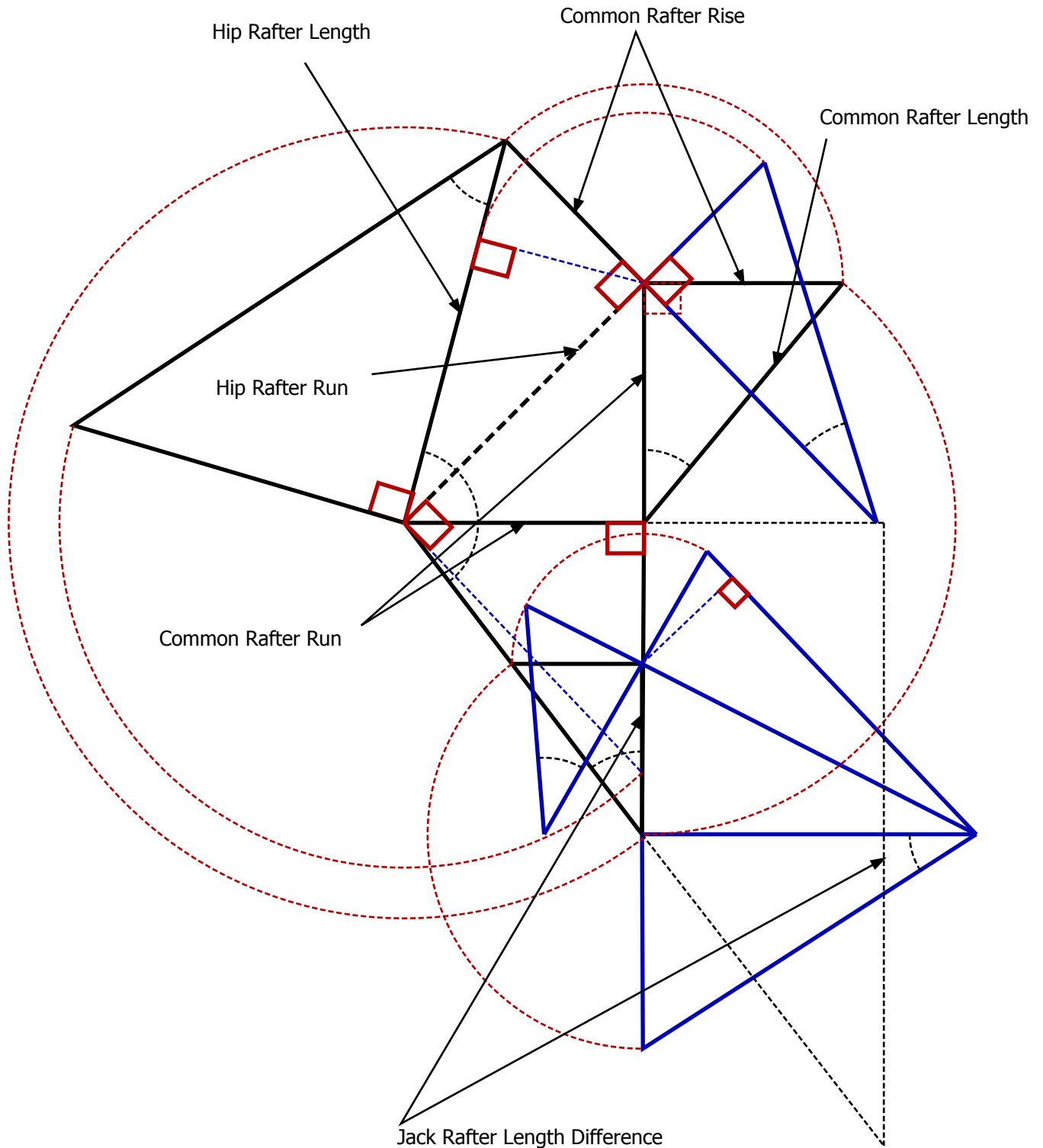
Roof Framing Angles



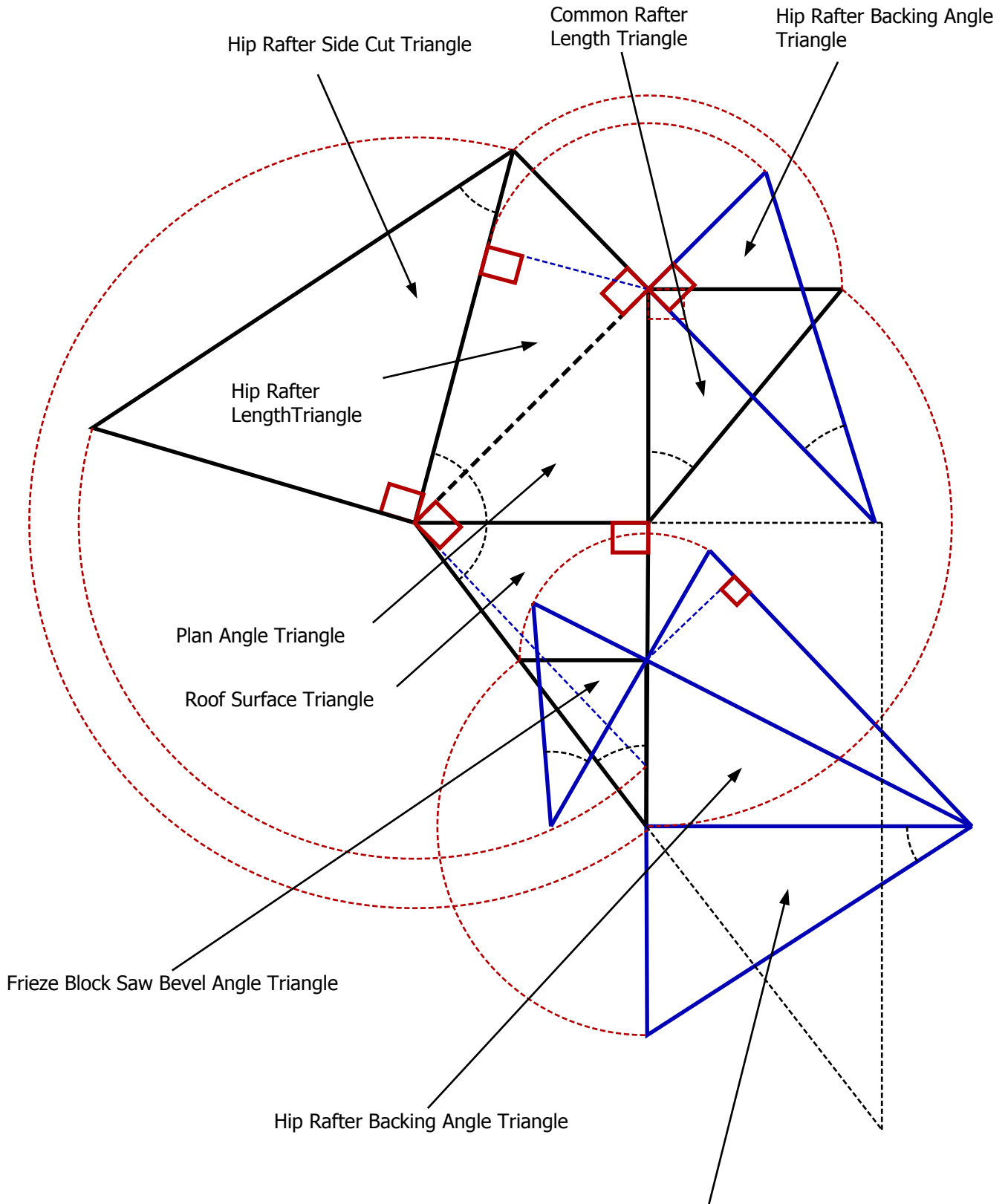
Roof Framing Angles 10:12 Pitch Example



Roof Framing Dimensions for 12" Run



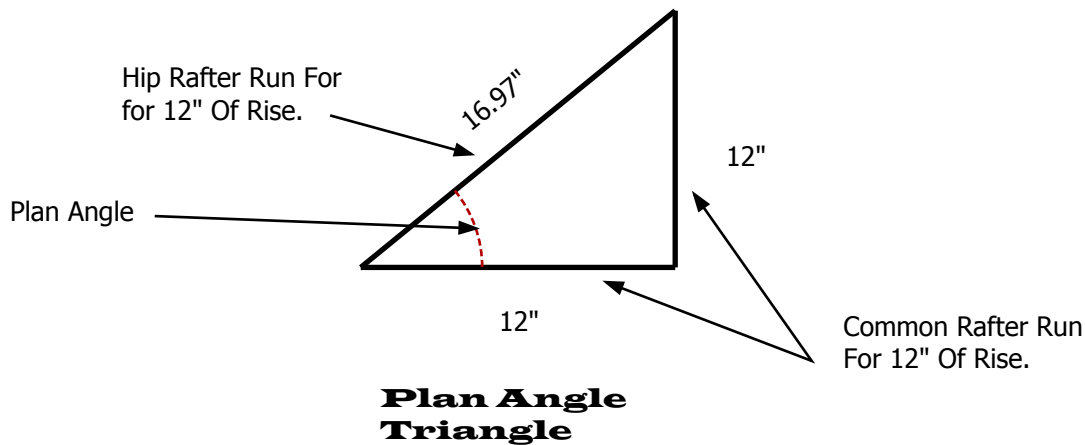
Roof Framing Triangles





Step: 1 **Plan Angle Triangle**

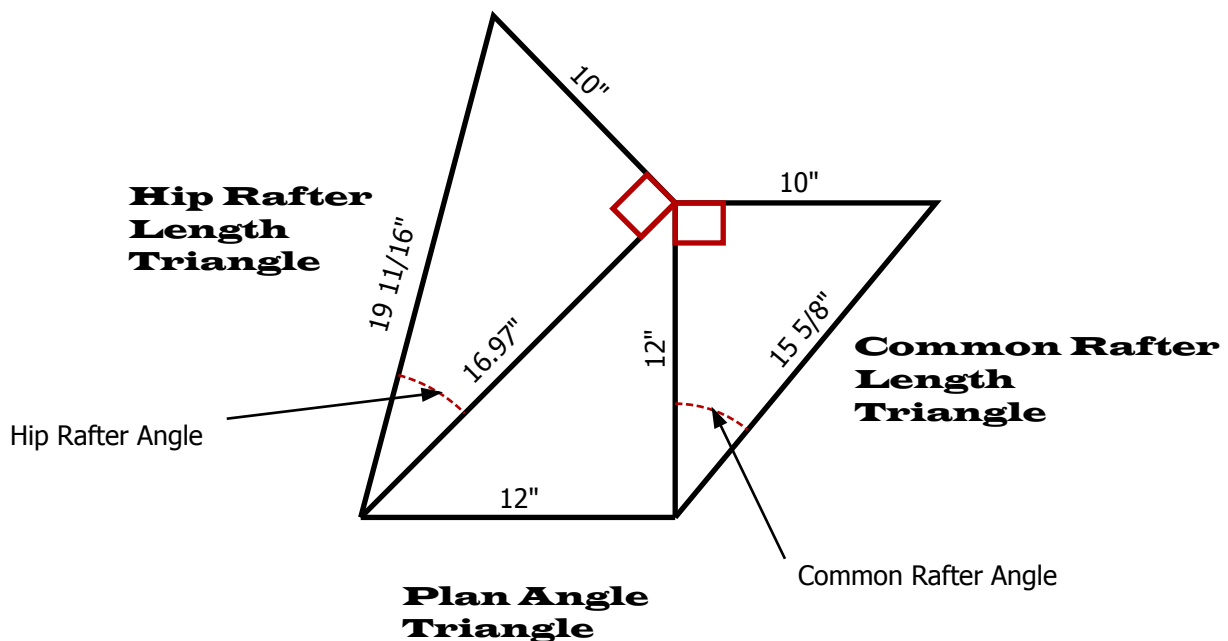
Draw the **plan angle triangle** right triangle with two legs of the triangle equal to 12". The third leg of the triangle will be 16.97" in length.



Step: 2 **Common Rafter Length Triangle & Hip Rafter Length Triangle**

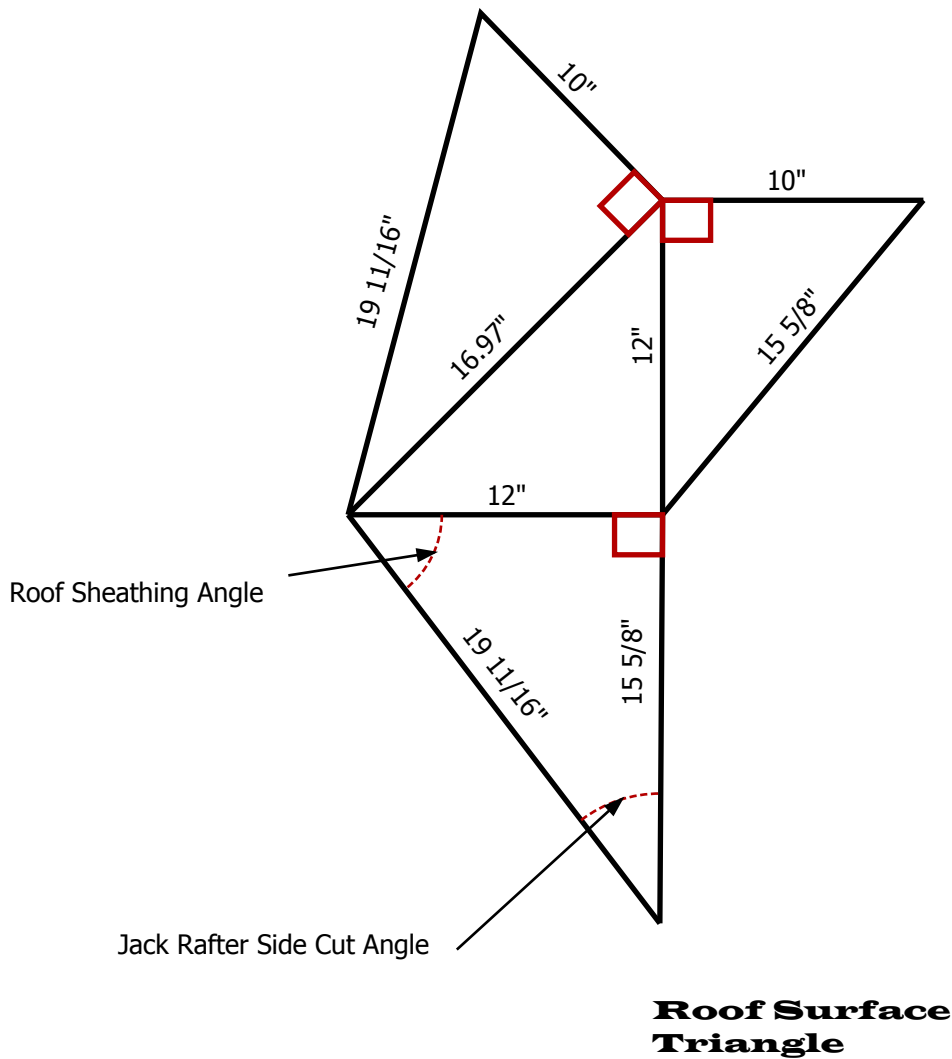
Draw a right triangle with the pitch of the roof as the leg of the triangle. In this example it's 10". It will be perpendicular to the common rafter run leg of the plan angle triangle. Then draw the leg of the triangle from the pitch of the roof leg to the base of the first triangle. In this example the third leg of the triangle will be $15 \frac{5}{8}$ " in length, which represents the length of the common rafter for 12" of run.

Next draw another right triangle with the pitch of the roof as the length of leg of the triangle. This leg of the right triangle will be perpendicular to the hip rafter run leg of the plan angle triangle. Then draw another leg of the triangle that connects with the first triangle. In this example it's $19 \frac{11}{16}$ " in length, which represents the length of the hip rafter for 12" of run of the common rafter.



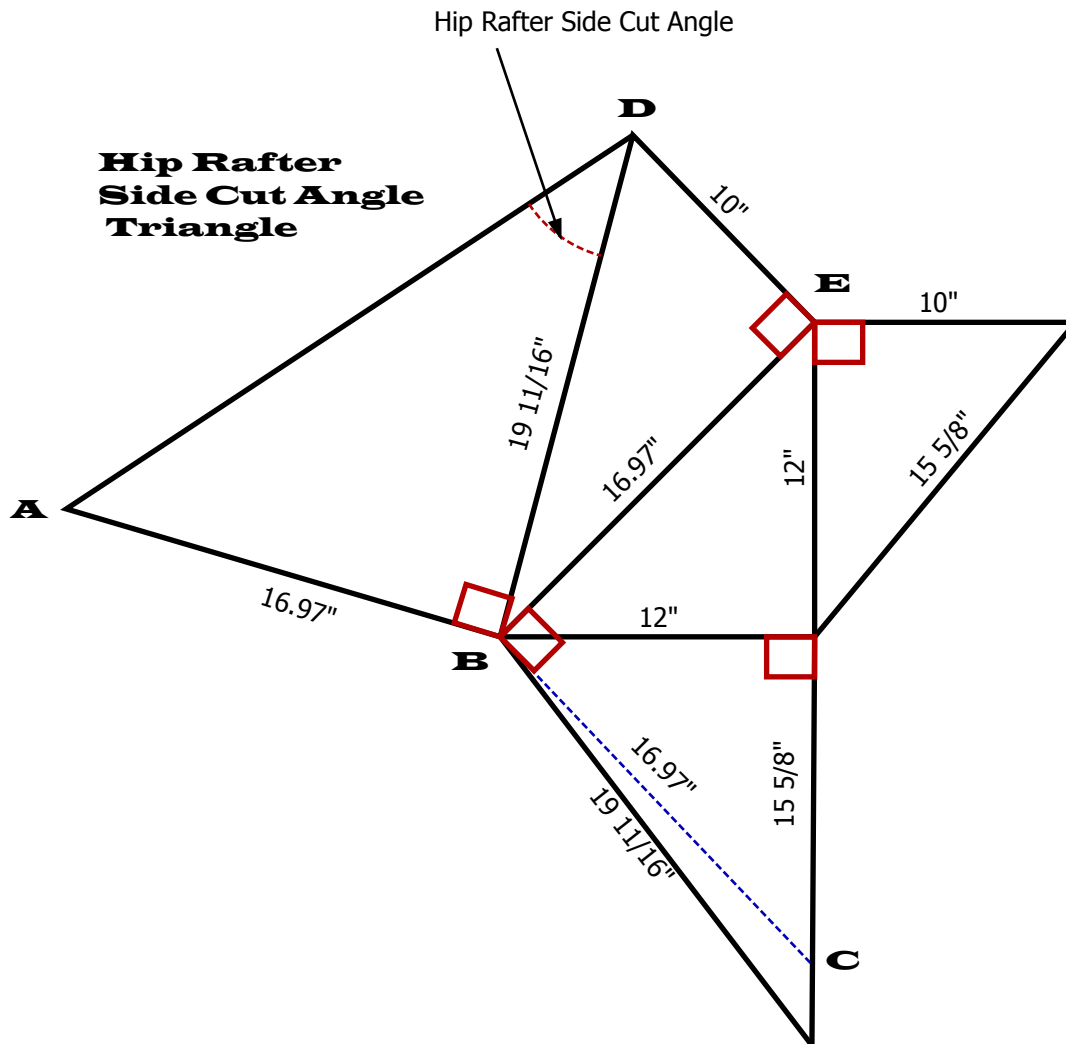
Step:3 **Roof Surface Triangle**

Draw the **roof surface triangle** right triangle with length of the common rafter as the leg of the triangle. In this example it's $15 \frac{5}{8}$ ". This leg is perpendicular to the common rafter run leg of the plan angle triangle. Then draw the leg of the triangle from the base of the first triangle. In this example the third leg of the triangle will be $19 \frac{11}{16}$ " in length, which represents the length of the



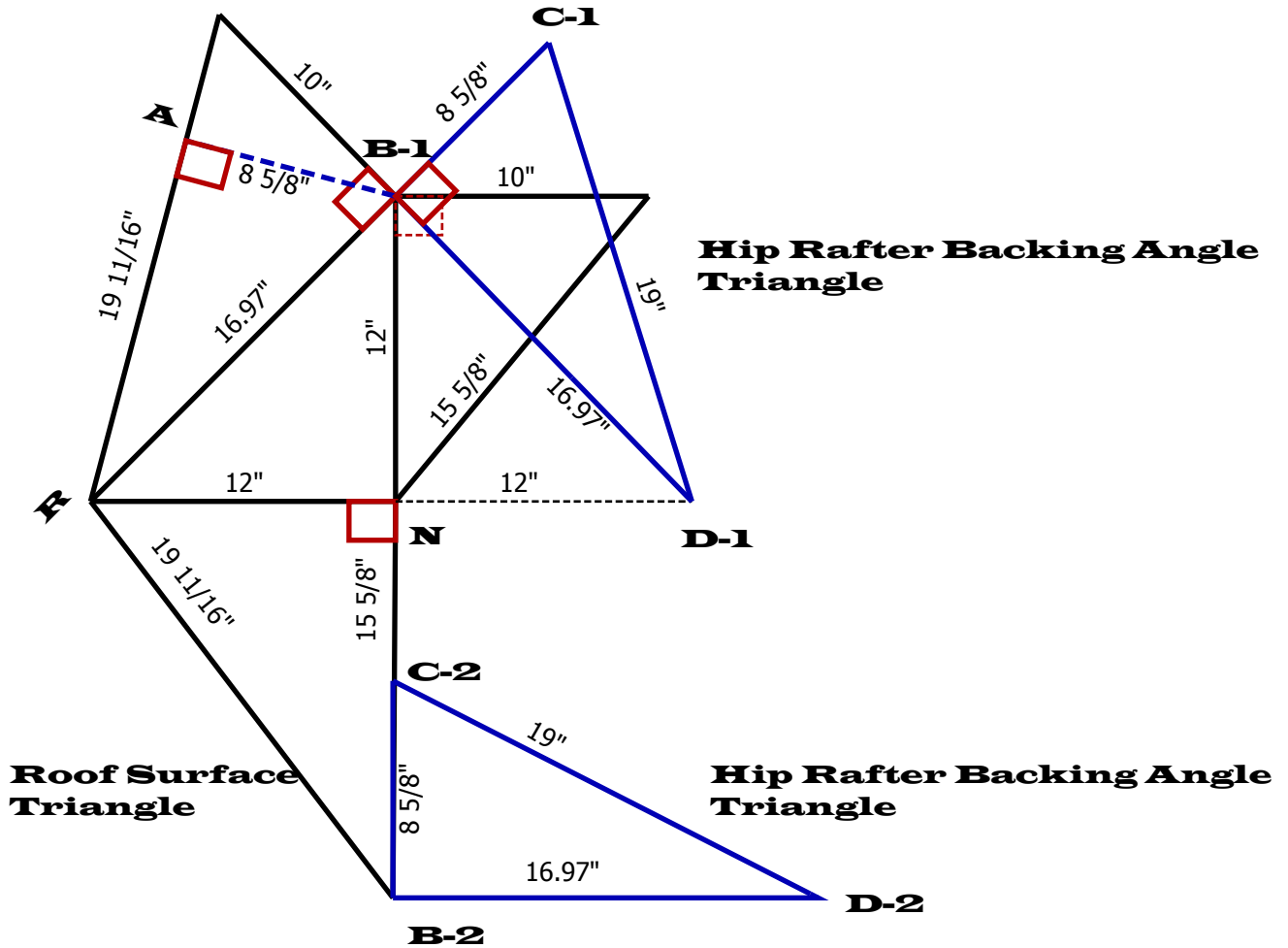
Step:4 Hip Rafter Side Cut Angle Triangle

Draw the **hip rafter side cut triangle** right triangle. Start with line **B-C** that is perpendicular to line **B-E**. In this example it's 16.97". Then draw the line **A-B** of the triangle that is perpendicular to **B-D** and the same length as **B-C**. Next draw line **A-D** to complete the **Hip Rafter Side Cut Angle Triangle**.



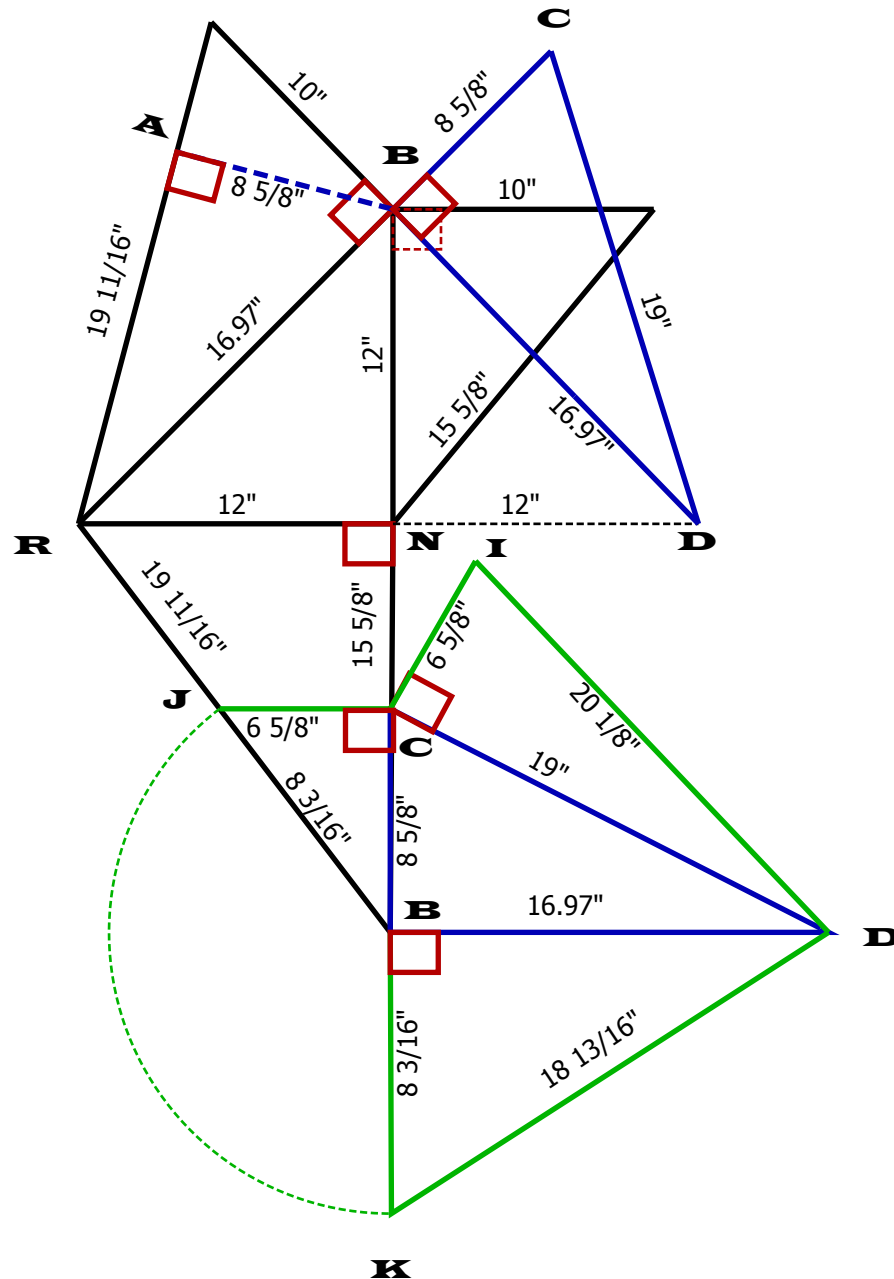
Step:6 **Hip Rafter Backing Angle Triangle - Transferred**

Transfer the blue **hip rafter backing angle triangle** to the bottom of the **Roof Surface Triangle**.



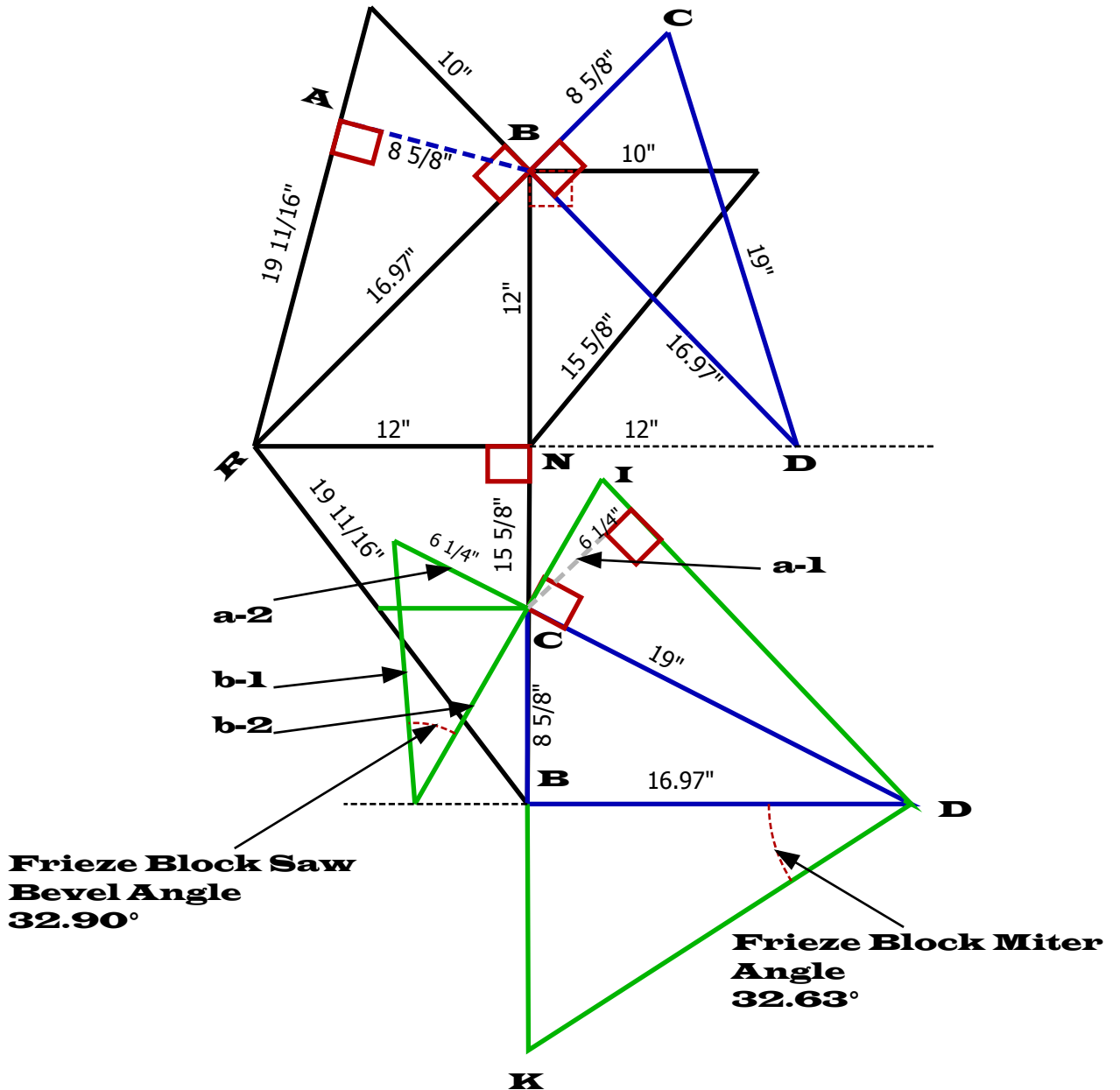
Draw line **C-J** (green line) perpendicular to the common rafter length leg **N-B** ($15 \frac{5}{8}$ "), at the top of the **Hip Rafter Backing Angle Triangle** that was transferred to the bottom of the **Roof Surface Triangle**. This line will intersect at the hip rafter length leg **R-B** ($19 \frac{11}{16}$ "). Then draw line **C-I** the same length as **C-J** and draw line **I-D**.

Next, draw line **B-K** the same length as **J-B**, then draw line **K-D**.



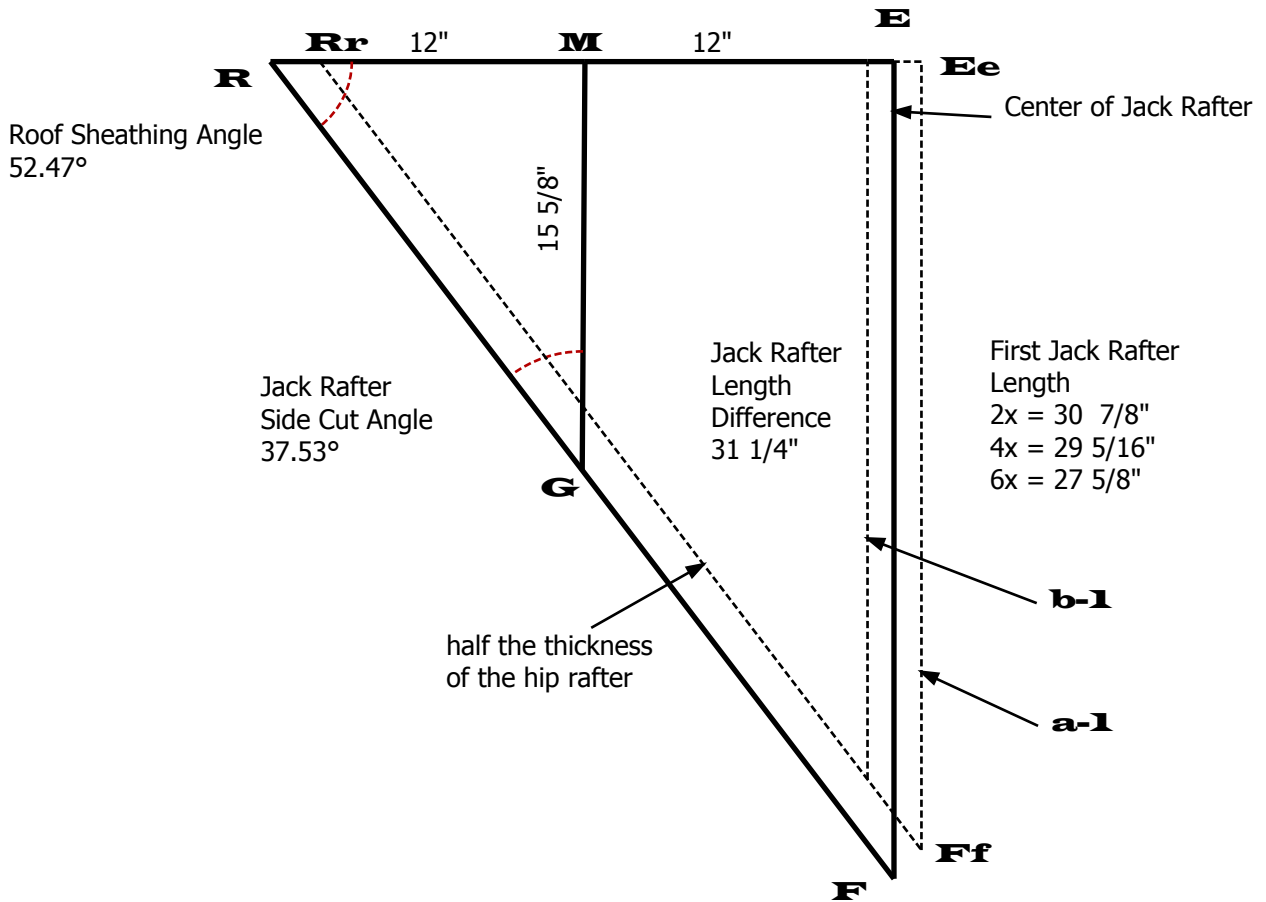
Draw line **a-1** (gray dashed line) perpendicular to the line **I-D**. Then draw line **a-2** the same length as **a-1**.

Next, draw line **b-1** and **b-2**. These lines form the **Frieze Block Saw Bevel Angle**.



Draw line **Rr-Ff** (black dashed line) parallel to line **R-F**, half the thickness of the hip rafter.

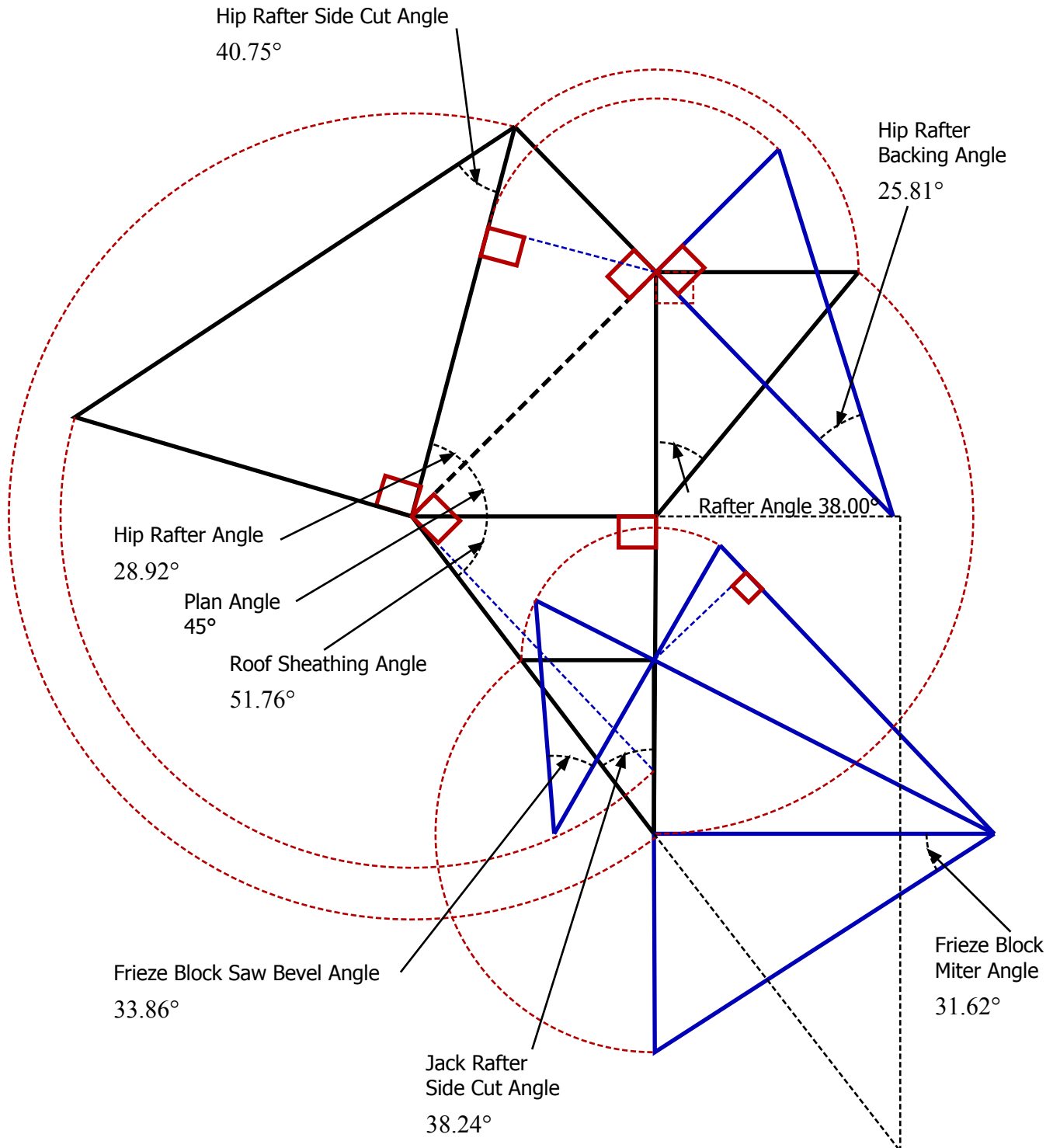
Next, draw lines **a-l** and **b-l** centered on line **E-F**. These lines represent half the thickness of the jack rafter. Line **a-l** will be the length of the first jack rafter.



Roof Framing Angles

9 3/8:12 Pitch Example

38° Slope Angle



Crown molding with a spring angle of 38° has a compound miter saw angle of 31.62° and a compound saw bevel angle of 33.86°.