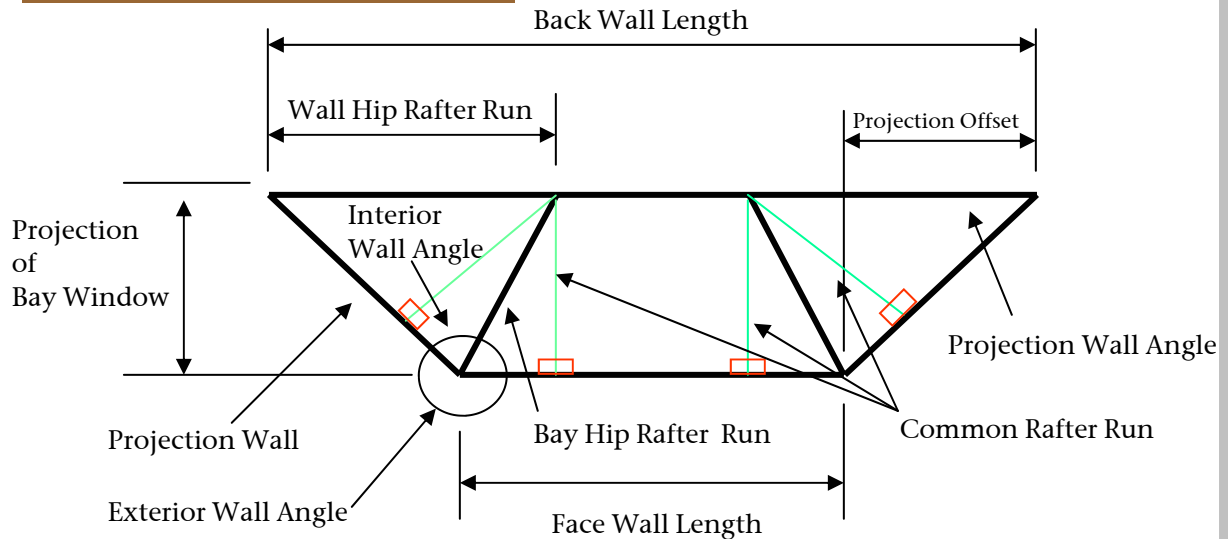


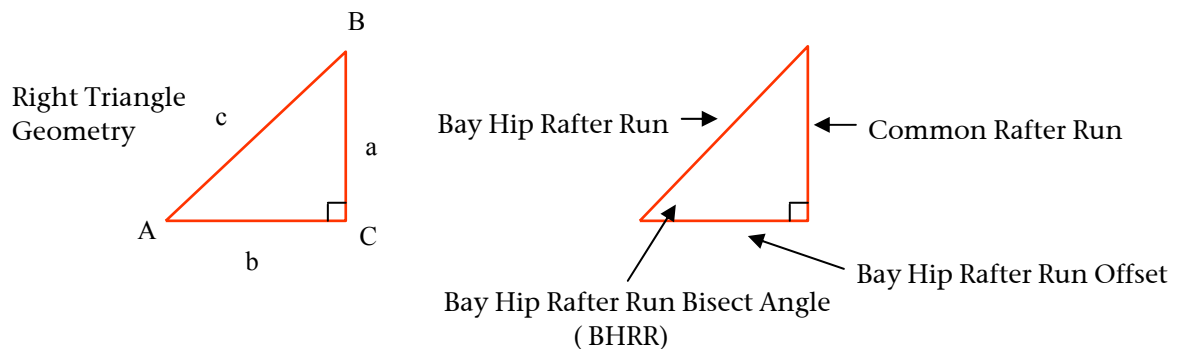
EQUAL PITCH BAY WINDOW RAFTER FRAMING CHEAT SHEET

SBE BUILDERS

Bay Window Geometry



Interior Wall Angle divided by 2 = Bay Hip Rafter Run Bisect Angle



Common Rafter Rise	= Common Rafter Run * \tan (Rafter Pitch Angle)
Common Rafter Length	= Common Rafter Run \div \cos (Rafter Pitch Angle)
Projection Offset	= (Back Wall - Face Wall) / 2
Projection Wall Angle	= \arctan (Common Rafter Run \div Projection Offset)
Interior Wall Angle	= (90° - Projection Wall Angle) + 90°
BHRR Bisect Angle	= Interior Wall Angle \div 2
Bay Hip Rafter Run	= Common Rafter Run \div \sin (BHRR Bisect Angle)
Bay Hip Rafter Angle	= \arctan (Common Rafter Rise \div Bay Hip Rafter Run)
Bay Hip Rafter Bevel Angle	= 90° - BHRR Bisect Angle
Bay Hip Rafter Length	= Bay Hip Rafter Run \div \cos (Bay Hip Rafter Angle)
Bay Hip Rafter Run Offset	= Common Rafter Run \div \tan (BHRR Bisect Angle)
Projection Offset	= (Back Wall - Face Wall) / 2
Wall Hip Rafter Run	= Projection Offset + Bay Hip Rafter Run Offset
Wall Hip Rafter Angle	= \arctan (Common Rafter Rise \div Wall Hip Rafter Run)
Wall Hip Rafter Length	= Wall Hip Rafter Run \div \cos (Wall Hip Rafter Angle)
Wall Hip Rafter Bevel Angle	= Projection Wall Angle
Projection Wall Length	= Projection Offset \div \cos (Projection Wall Angle)

Calculate Bay Window Roof Projection Angles

ANGLES AND DIMENSIONS

Projection Wall Angle

Projection Offset = (Back Wall Length — Face Wall Length) ÷ 2
 Projection Wall Angle = \arctan (Projection Offset ÷ Projection)

Example with CMC

back wall = 8' - 0"
 face wall = 4' - 0"
 projection = 24"
 projection offset = 24"

Enter [24] [÷] [24] [=] 1

1 is the **tan** of the angle, to find the **arctan** press [Conv] [tan] 45°

Projection Wall Angle = 45°

Press [Pitch] Enter [24] [Inch] [Run] [Diag] 33 15/16"

Projection Angled Wall Length = 33 15/16"

Press [Inch] again and the CMC will display the length in decimal inches 33.94113

Projection Offset Wall Angle = 90° - 45° = 45°

Example with CMC

back wall = 10' - 0"
 face wall = 4' - 0"
 projection = 24"
 projection offset = 36"

Enter [24] [÷] [36] [=] 0.666667

0.666667 is the **tan** of the angle, to find the **arctan** press [Conv] [tan] 33.69°

Projection Wall Angle = 33.69°

Press [Pitch] Enter [36] [Inch] [Run] [Diag] 43 1/4"

Projection Angled Wall Length = 43 1/4"

Press [Inch] again and the CMC will display the length in decimal inches 43.26662

Projection Offset Wall Angle = 90° - 33.69° = 56.31°

Interior Wall Angle

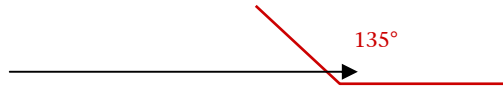
Interior Wall Angle = 90° + Projection Offset Wall Angle

Example with CMC

Projection Offset Wall Angle = 45°

Enter [90] [+] [45] [=] 135°

Interior Wall Angle = 135°



Bay Hip Rafter Run Bisect Angle

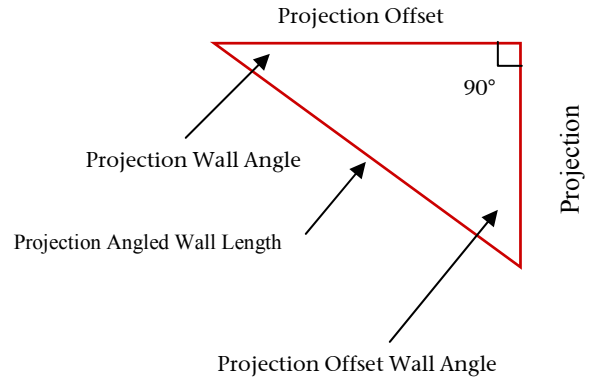
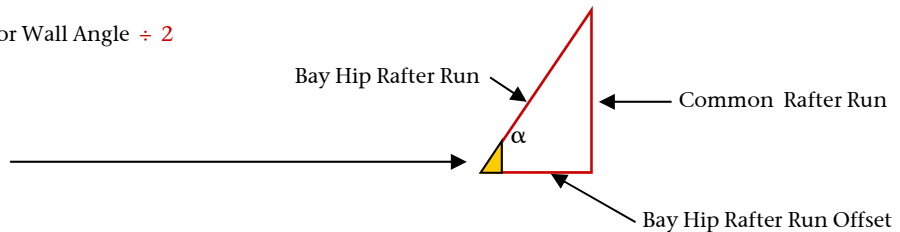
Bay Hip Rafter Run Bisect Angle = Interior Wall Angle ÷ 2

Example with CMC

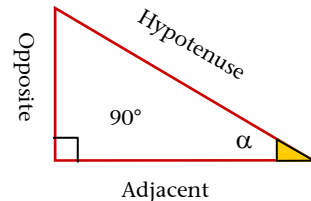
Interior Wall Angle = 135°

Enter [135] [÷] [2] [=] 67.5°

Bay Hip Rafter Run Bisect Angle = 67.5°



Right Triangle Trig Functions



	α	=	angle
tan	α	=	opp ÷ adj
cosine	α	=	adj ÷ hyp
sin	α	=	opp ÷ hyp

Calculate Bay Window Roof Wall & Bay Hip Rafters

RAFTER LENGTHS

Bay Hip Rafter Run Offset

Bay Hip Rafter Run Offset = Common Rafter Run \div \tan (Bay Hip Rafter Bisect Angle)

Example with **CMC**

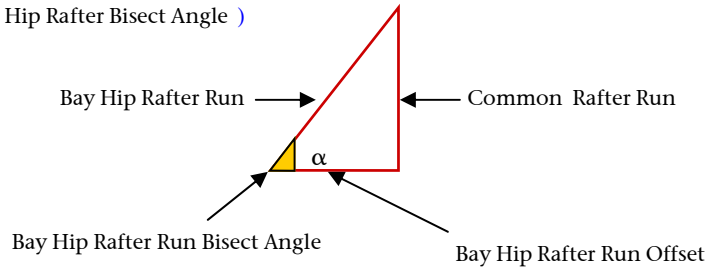
Bay Hip Rafter Bisect Angle = 65.7°

Common Rafter Run = $24''$

Enter [24] [Inch] [=] [67.5] [tan] [=] $9\ 15/16''$

Bay Hip Rafter Run Offset = $9\ 15/16''$

Press [Inch] again and the **CMC** will display the length in decimal inches 9.941125



Bay Hip Rafter Run

Bay Hip Rafter Run = Common Rafter Run \div \sin (Bay Hip Rafter Bisect Angle)

Example with **CMC**

Bay Hip Rafter Bisect Angle = 65.7°

Common Rafter Run = $24''$

Enter [24] [Inch] [=] [67.5] [sin] [=] $26''$

Bay Hip Rafter Run = $26''$

Press [Inch] again and the **CMC** will display the length in decimal inches 25.97741

Common Rafter Rise & Common Rafter Length

Common Rafter Rise = Common Rafter Run \times (Common Rafter Pitch \div 12)

Example with **CMC**

Common Rafter Pitch = 8

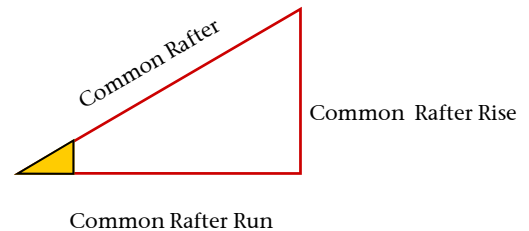
Common Rafter Run = $24''$

Enter [8] [Inch] [Pitch] displays 8

Enter [24] [Inch] [Run] [Rise] displays $16''$

Press [Diag] the **CMC** will display the length in inches $28\ 7/8''$

Press [Feet] the **CMC** will display the length in feet & inches $2' - 4\ 7/8''$



Bay Hip Rafter Angle & Bay Hip Rafter Length

Bay Hip Rafter Angle = \arctan (Common Rafter Rise \div Bay Hip Rafter Run)

Example with **CMC**

Bay Hip Rafter Run = $25.97741''$

Common Rafter Rise = $16''$

Enter [16] [=] [25.97741] [=] 0.61592 [Conv] [tan] [=] 31.63°

Press [Pitch] four times until it displays the pitch express in inches [$7\ 3/8''$ pitch]

Enter [25.97741] [Inch] [Run] [Diag] 30.50944 [Feet] [Feet] $2' - 6\ 1/2''$

Wall Hip Rafter Angle & Wall Hip Rafter Length

Wall Hip Rafter Run = Projection Offset + Bay Hip Rafter Run Offset

Wall Hip Rafter Angle = \arctan (Common Rafter Rise \div Wall Hip Rafter Run)

Example with **CMC**

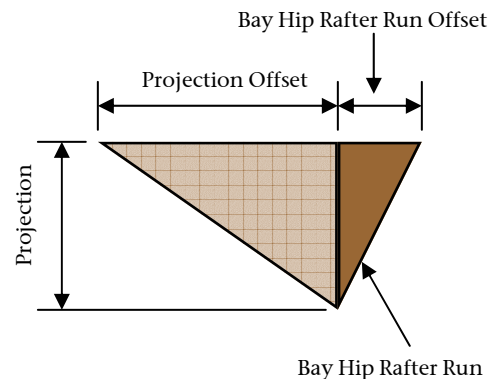
Wall Hip Rafter Run = $24 + 9.941125 = 33.941125$

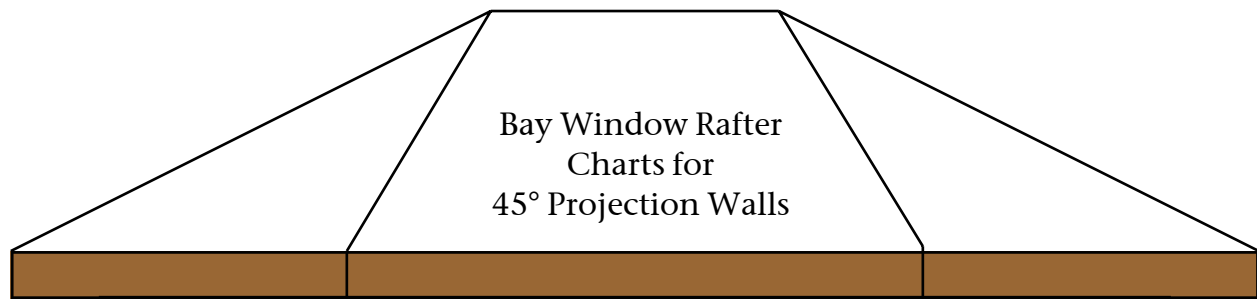
Common Rafter Rise = $16''$

Enter [16] [=] [33.941125] [=] 0.471405 [Conv] [tan] [=] 25.24°

Press [Pitch] four times until it displays the pitch express in inches [$5\ 11/16''$ pitch]

Enter [33.941125] [Inch] [Run] [Diag] 37.502332 [Feet] [Feet] $3' - 1\ 1/2''$





Projection of Bay Window = 2'-0"
 Projection Offset = 2'-0"
 Projection Wall Length = 2'-9 15/16"
 Projection Wall Angle = 45.00
 Projection Offset Wall Angle = 45.00
 Interior Wall Angle = 135.00
 Bay Hip Rafter Run Bisect Angle = 67.50
 Bay Hip Rafter Bevel Angle = 22.50

Pitch	Projection Run	Rise	Common Rafter	Wall Hip Rafter	Wall Hip Angle	Bay Hip Rafter	Bay Hip Angle	Frieze Block Angle	Frieze Block Bevel	Bay Hip Rafter Drop	Wall Hip Rafter Drop
3	2'-0"	0'-6"	2'-0 3/4"	2'-10 1/2"	10.02	2'-2 11/16"	13.01	5.74	21.79	0'-0 1/8"	0'-0 3/16"
4	2'-0"	0'-8"	2'-1 5/16"	2'-10 7/8"	13.26	2'-3 3/16"	17.12	7.46	21.29	0'-0 1/8"	0'-0 3/16"
5	2'-0"	0'-10"	2'-2"	2'-11 7/16"	16.42	2'-3 7/8"	21.05	9.05	20.69	0'-0 1/8"	0'-0 1/4"
6	2'-0"	1'-0"	2'-2 7/8"	3'-0"	19.47	2'-4 5/8"	24.79	10.49	20.02	0'-0 3/16"	0'-0 5/16"
7	2'-0"	1'-2"	2'-3 13/16"	3'-0 3/4"	22.42	2'-5 9/16"	28.32	11.79	19.3	0'-0 3/16"	0'-0 5/16"
8	2'-0"	1'-4"	2'-4 7/8"	3'-1 1/2"	25.24	2'-6 1/2"	31.63	12.94	18.57	0'-0 1/4"	0'-0 3/8"
9	2'-0"	1'-6"	2'-6"	3'-2 7/16"	27.94	2'-7 5/8"	34.72	13.96	17.83	0'-0 1/4"	0'-0 7/16"
10	2'-0"	1'-8"	2'-7 1/4"	3'-3 7/16"	30.51	2'-8 13/16"	37.59	14.85	17.1	0'-0 1/4"	0'-0 1/2"
11	2'-0"	1'-10"	2'-8 9/16"	3'-4 1/2"	32.95	2'-10 1/16"	40.26	15.64	16.39	0'-0 5/16"	0'-0 1/2"
12	2'-0"	2'-0"	2'-9 15/16"	3'-5 5/8"	35.26	2'-11 3/8"	42.73	16.32	15.7	0'-0 5/16"	0'-0 9/16"
13	2'-0"	2'-2"	2'-11 7/16"	3'-6 13/16"	37.45	3'-0 13/16"	45.02	16.93	15.04	0'-0 5/16"	0'-0 5/8"
14	2'-0"	2'-4"	3'-0 15/16"	3'-8"	39.52	3'-2 1/4"	47.15	17.46	14.42	0'-0 3/8"	0'-0 5/8"
15	2'-0"	2'-6"	3'-2 7/16"	3'-9 5/16"	41.47	3'-3 11/16"	49.11	17.92	13.83	0'-0 3/8"	0'-0 11/16"
16	2'-0"	2'-8"	3'-4"	3'-10 11/16"	43.31	3'-5 1/4"	50.93	18.33	13.27	0'-0 7/16"	0'-0 3/4"