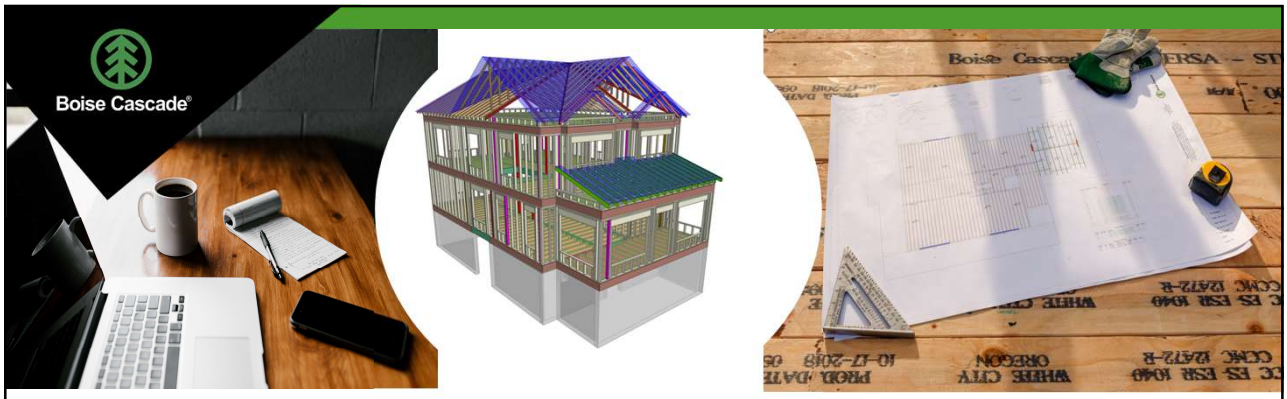


USER DEFINED – CUSTOM BRACING

BC Calc, BC Framer/Mitek Structure

February 26, 2021

Mike Collins, BC EWP Software Training SE Region

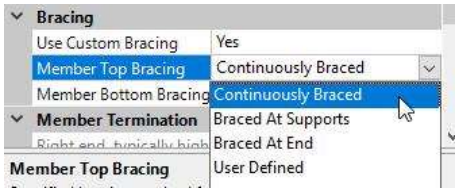
BC Framer

1

1

User Defined Custom Bracing

- Prior to ver 8.4.1
  - BC Framer/ Sapphire did not have the ability to recognize/evaluate the model for proper beam bracing. The software took the shortest unbraced length and applied this span to both top and bottom edges. This allowed certain beams to be incorrectly labeled as continuous braced members
- ver 8.4.2
  - Mitek introduced the ability to define bracing along the length of a beam. This provides the ability to design a more accurate, safer building than what was possible in prior versions. This is an opportunity for designers to begin modeling and analyzing proper beam bracing along top and bottom edge of members. This can be done by modeling the appropriate members or turning on the "Custom Bracing" functionality.
- ver 8.4.3 (build 7888)
  - Boise Design Engine now recognizes the modeling for proper bracing condition in headers.



BC Framer

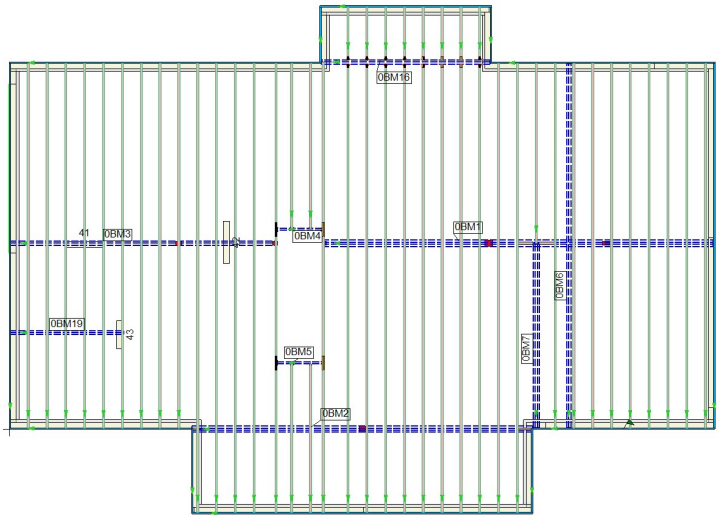
2

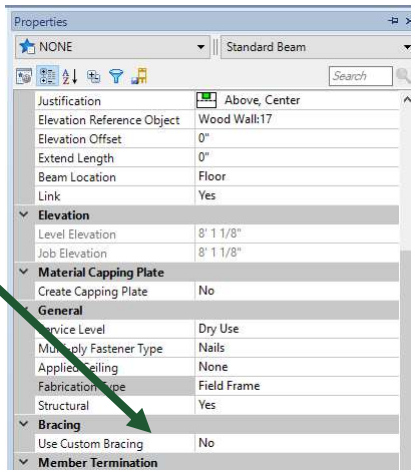
2

Custom Bracing – Default to NO

Boise Cascade

Beam/Header members will use the modeled framing condition providing the appropriate bracing analysis.





BCFramer

3

3

Custom Bracing – Set to NO

Boise Cascade

Beam/Header members will use the modeled framing condition providing the appropriate bracing analysis.

- Direct Applied Ceiling setting in the floor container does NOT apply to beam and header members.
- Direct Applied Ceiling setting in the beam member will result in a fully braced member along the bottom edge ONLY.
  - Can set up Job Defaults for ALL Beam/ Headers
  - Turning ON Beam Bracing will override Direct Applied Ceiling
- Intermediate Posts & Columns are NOT considered bracing points.
- Perpendicular Walls are considered intermediate bracing points.
  - Parallel Walls DO NOT provide Bracing

BCFramer

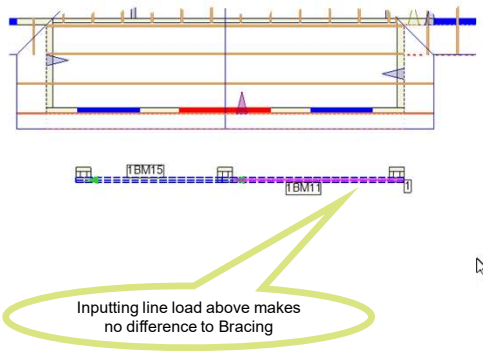
4

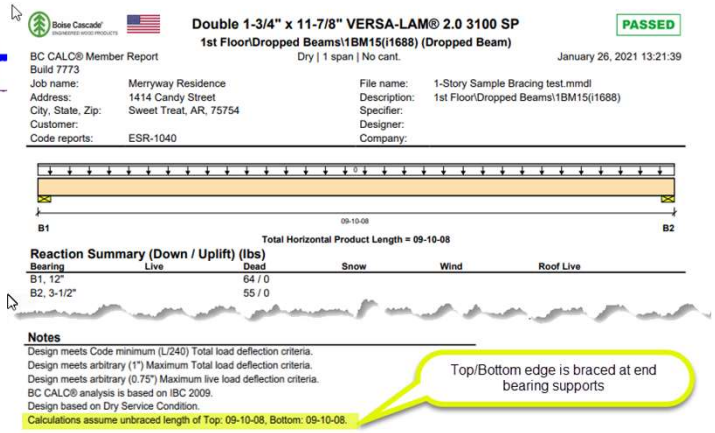
4

Custom Beam Bracing – Set to NO

Let's review a few examples:

- Beam is modeled w/out any framing members connecting into member. **1BM15**





BCFramer

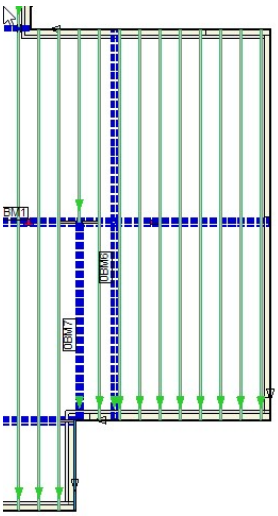
5

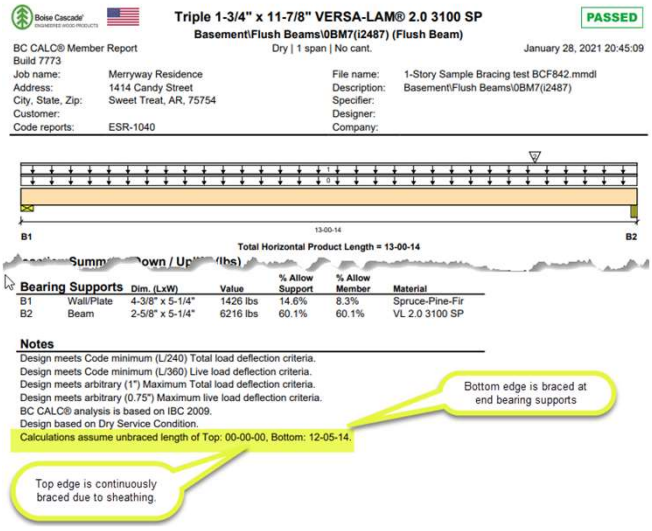
5

Custom Beam Bracing – Set to NO

Let's review a few examples:

- Flush Beam Parallel to Joists. **OBM7**





BCFramer

6

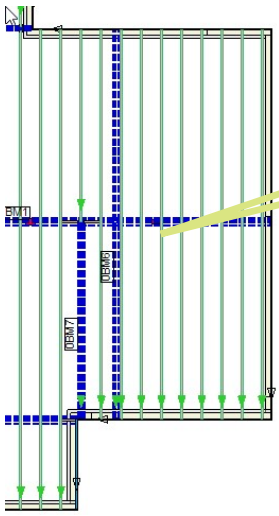
6

Custom Beam Bracing – Set to NO

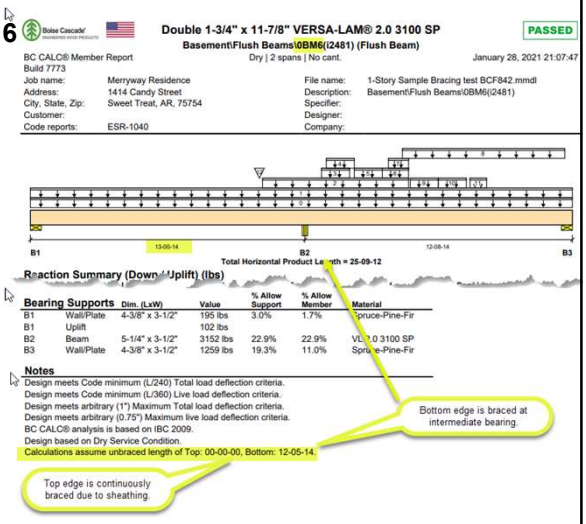
Boise Cascade

Let's review a few examples:

- Continuous Flush Beam Parallel to Joists. **OBM6**



Dropped Beam provides bracing point..



Double 1-3/4" x 11-7/8" VERSA-LAM® 2.0 3100 SP — PASSED

Basement\Flush Beams\0BM6(i2481) (Flush Beam)

BC CALC® Member Report — Dry | 2 spans | No cant. — January 28, 2021 21:07:47

Build 7773

Job name:	Merryway Residence	File name:	1-Story Sample Bracing test BCF842.mmdl
Address:	1414 Candy Street	Description:	Basement\Flush Beams\0BM6(i2481)
City, State, Zip:	Sweet Treat, AR, 75754	Specifier:	
Customer:		Designer:	
Code reports:	ESR-1040	Company:	

B1 — 13-00-14 — B2 — 12-08-14 — B3

Total Horizontal Product Length = 25-09-12

Reaction Summary (Down / Uplift) (lbs)

Bearing	Supports	Dim. (LxW)	Value	% Allow Support	% Allow Member	Material
B1	Wall/Plate	4-3/8" x 3-1/2"	195 lbs	3.0%	1.7%	Spruce-Pine-Fir
B1	Uplift		102 lbs			
B2	Beam	5-1/4" x 3-1/2"	3152 lbs	22.9%	22.9%	VL 0 3100 SP
B3	Wall/Plate	4-3/8" x 3-1/2"	1259 lbs	19.3%	11.0%	Spru e-Pine-Fir

Notes

Design meets Code minimum (L/240) Total load deflection criteria.
Design meets Code minimum (L/360) Live load deflection criteria.
Design meets arbitrary (1") Maximum Total load deflection criteria.
Design meets arbitrary (0.75") Maximum live load deflection criteria.
BC CALC® analysis is based on IBC 2009.
Design based on Dry Service Condition.
Calculations assume unbraced length of Top: 00-00-00, Bottom: 12-05-14.

Bottom edge is braced at intermediate bearing.

Top edge is continuously braced due to sheathing.

BCFramer

7

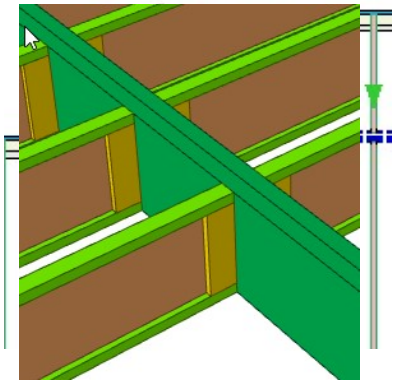
7

Custom Beam Bracing – Set to NO

Boise Cascade

Let's review a few examples:

- Flush Beam Perpendicular to Joists. **OBM16**



Double 1-3/4" x 11-7/8" VERSA-LAM® 2.0 3100 SP — PASSED

Basement\Flush Beams\0BM16(i2468) (Flush Beam)

BC CALC® Member Report — Dry | 1 span | No cant. — January 28, 2021 21:59:28

Build 7773

Job name:	Merryway Residence	File name:	1-Story Sample Bracing test BCF842.mmdl
Address:	1414 Candy Street	Description:	Basement\Flush Beams\0BM16(i2468)
City, State, Zip:	Sweet Treat, AR, 75754	Specifier:	
Customer:		Designer:	
Code reports:	ESR-1040	Company:	

Notes

Design meets Code minimum (L/240) Total load deflection criteria.
Design meets Code minimum (L/360) Live load deflection criteria.
Design meets arbitrary (1") Maximum Total load deflection criteria.
Design meets arbitrary (0.75") Maximum live load deflection criteria.
BC CALC® analysis is based on IBC 2009.
Design based on Dry Service Condition.
Calculations assume unbraced length of Top: 00-00-00, Bottom: 01-07-06.

Bottom edge is braced by joist.

Top edge is braced by sheathing

BCFramer

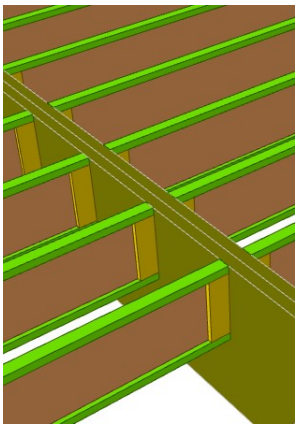
8

8

Custom Beam Bracing – Set to NO

Let's review a few examples:

- Flush Beam Perpendicular to Joists. **OBM16**



Boise Cascade

Double 1-3/4" x 24" VERSA-LAM® 2.0 3100 SP PASSED

Basement\Flush Beams\0BM16(i2691) (Flush Beam)

BC CALC® Member Report — Dry | 1 span | No cant. — January 28, 2021 22:12:51
Build 7773

Job name:	Merryway Residence	File name:	1-Story Sample Bracing test BCF842.mmdl
Address:	1414 Candy Street	Description:	Basement\Flush Beams\0BM16(i2691)
City, State, Zip:	Sweet Treat, AR, 75754	Specifier:	
Customer:		Designer:	
Code reports:	ESR-1040	Company:	

Notes

Design meets Code minimum (L/240) Total load deflection criteria.
Design meets Code minimum (L/360) Live load deflection criteria.
Design meets arbitrary (1") Maximum Total load deflection criteria.
Design meets arbitrary (0.75") Maximum live load deflection criteria.
BC CALC® analysis is based on IBC 2009.
Design based on Dry Service Condition.
Calculations assume unbraced length of Top: 00-00-00, Bottom: 01-06-09.

Bottom Edge is braced by Joist - Incorrect

Top edge is fully braced by sheathing.

BCFramer

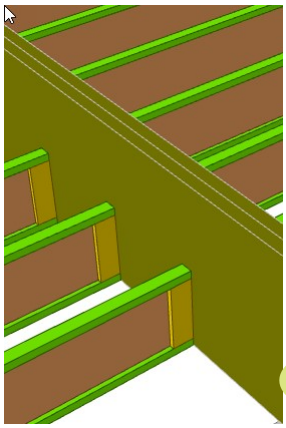
9

9

Custom Beam Bracing – Set to NO

Let's review a few examples:

- Flush Beam Perpendicular to Joists. **OBM16**



Boise Cascade

Double 1-3/4" x 24" VERSA-LAM® 2.0 3100 SP PASSED

Basement\Flush Beams\0BM16(i2690) (Flush Beam)

BC CALC® Member Report — Dry | 1 span | No cant. — January 28, 2021 22:08:16
Build 7773

Job name:	Merryway Residence	File name:	1-Story Sample Bracing test BCF842.mmdl
Address:	1414 Candy Street	Description:	Basement\Flush Beams\0BM16(i2690)
City, State, Zip:	Sweet Treat, AR, 75754	Specifier:	
Customer:		Designer:	
Code reports:	ESR-1040	Company:	

Notes

Design meets Code minimum (L/240) Total load deflection criteria.
Design meets Code minimum (L/360) Live load deflection criteria.
Design meets arbitrary (1") Maximum Total load deflection criteria.
Design meets arbitrary (0.75") Maximum live load deflection criteria.
BC CALC® analysis is based on IBC 2009.
Design based on Dry Service Condition.
Calculations assume unbraced length of Top: 00-00-00, Bottom: 01-07-06.

Bottom edge is braced by joist.

Top Edge is braced by Joist - Incorrect

BCFramer

10

10

Slide 9

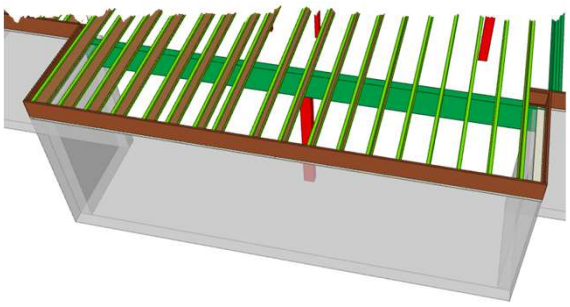
VB1 Villalobos, Bertha, 2/26/2021

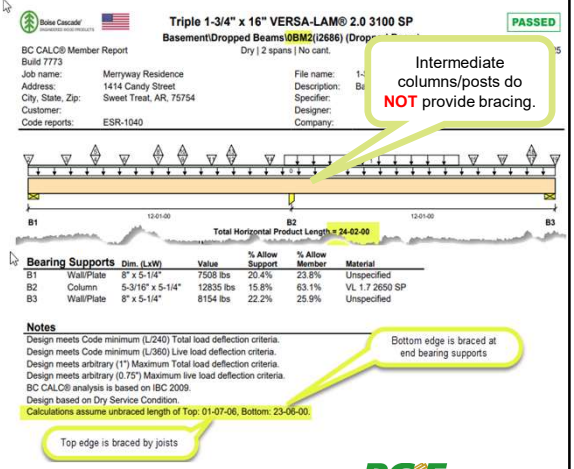
Custom Beam Bracing – Set to NO

Boise Cascade

Let's review a few examples:

- Dropped Beam with framing members on top. **0BM2**
  - Intermediate Posts/Column do not provide bracing.





- Direct Applied Ceiling should NOT be applied to Dropped Members, allow modeled condition to provide bracing or User defined Bracing.

BCFramer

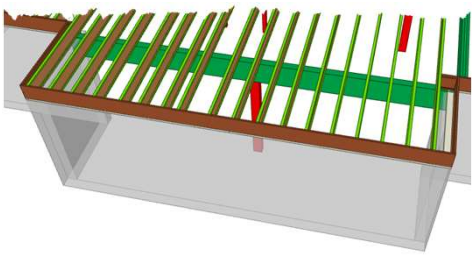
11

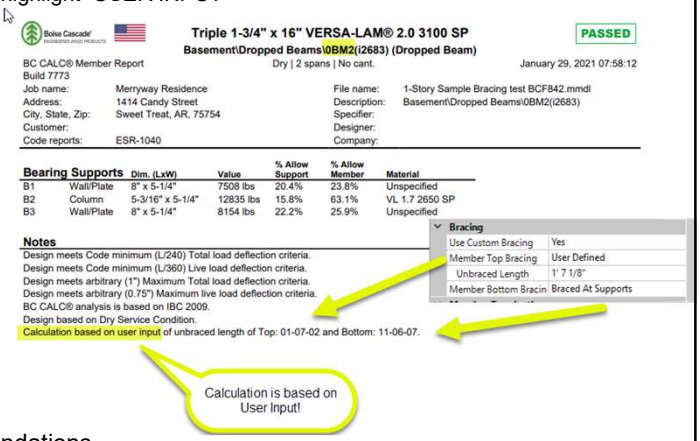
11

Custom Beam Bracing – Set to YES

Boise Cascade

- Must specify Top & Bottom Bracing
  - BC Framer & BC Calc Member Report will highlight "USER INPUT"





Note: you can set Use Custom Bracing to yes
If column has a cap plate or a pier you can set to Braced at supports. See Engineering recommendations

BCFramer

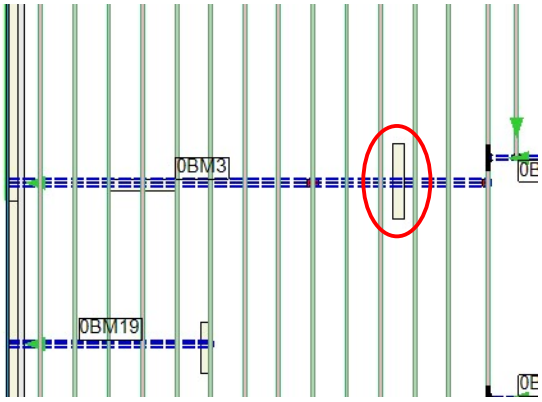
12

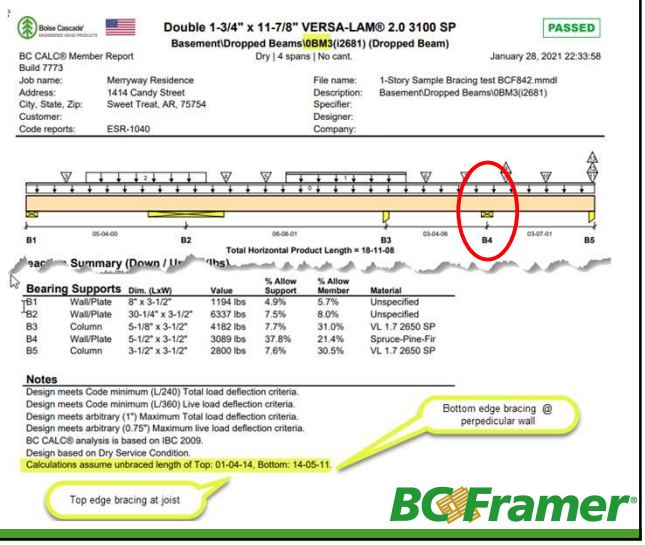
12

Custom Beam Bracing – Set to NO

Let's review a few examples:

- Dropped Beam with framing members on top. **0BM3**
  - Perpendicular wall provides bracing
  - Parallel wall does NOT provide bracing





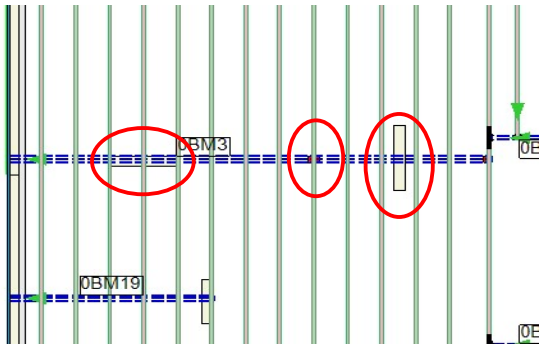
13

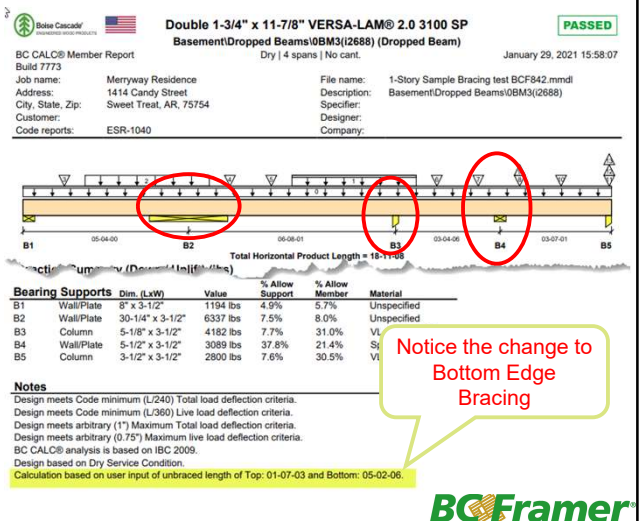
13

Custom Beam Bracing – Set to YES

Let's review a few examples:

- Dropped Beam with framing members on top. **0BM3**
  - Perpendicular wall provides bracing
  - Set Custom Bracing for bottom edge to: Braced @ Supports





14

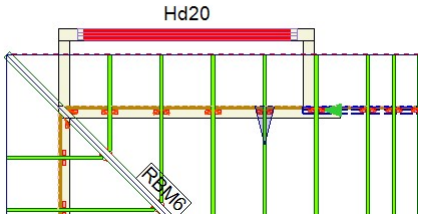
14

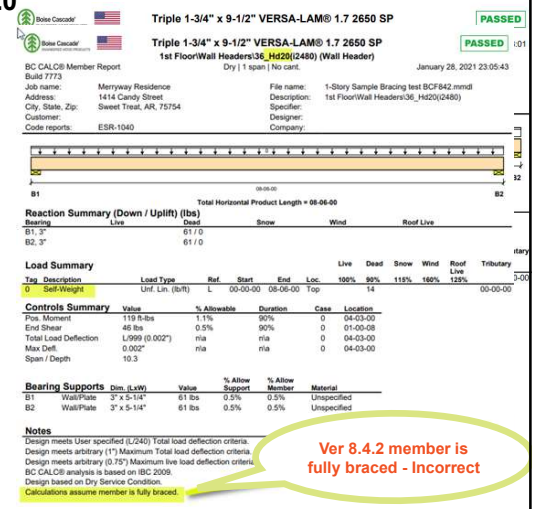
Custom Beam Bracing – Set to NO

Boise Cascade

Let's review a few examples:

- Garage Header w/no members framing into header. **Hd20**
  - Headers input with Quick Opening Function are Fully braced.




Triple 1-3/4" x 9-1/2" VERSA-LAM® 1.7 2650 SP — PASSED

Triple 1-3/4" x 9-1/2" VERSA-LAM® 1.7 2650 SP — PASSED
1st Floor\Wall Headers\36_Hd20(i2480) (Wall Header)
Dry | 1 span | No cant.

BC CALC® Member Report
Build 7773
January 28, 2021 23:05:43

Job name: Merryway Residence
Address: 1414 Candy Street
City, State, Zip: Sweet Treat, AR, 75754
Customer:
Code reports: ESR-1040

File name: 1-Story Sample Bracing test BCF842.mmdl
Description: 1st Floor\Wall Headers\36_Hd20(i2480)
Specifier:
Designer:
Company:

B1 B2
Total Horizontal Product Length = 08-06-00

Reaction Summary (Down / Uplift) (lbs)

Bearing	Live	Dead	Snow	Wind	Roof Live
B1, 3"		61 / 0			
B2, 3"		61 / 0			

Load Summary

Tag	Description	Load Type	Ref.	Start	End	Loc.	Live 100%	Dead 90%	Snow 115%	Wind 160%	Roof Live 125%	Tributary
0	Self-Weight	Unif. Lin. (lb/ft)	L	00-00-00	08-06-00	Top		14				00-00-00

Controls Summary

	Value	% Allowable	Duration	Case	Location
Pos. Moment	119 ft-lbs	1.1%	90%	0	04-03-00
End Shear	46 lbs	0.5%	90%	0	01-00-08
Total Load Deflection	L/999 (0.002")	n/a	n/a	0	04-03-00
Max Defl.	0.002"	n/a	n/a	0	04-03-00
Span / Depth	10.3				

Bearing Supports

	Dim. (LxW)	Value	% Allow Support	% Allow Member	Material
B1	Wall/Plate 3" x 5-1/4"	61 lbs	0.5%	0.5%	Unspecified
B2	Wall/Plate 3" x 5-1/4"	61 lbs	0.5%	0.5%	Unspecified

Notes
Design meets User specified (L/240) Total load deflection criteria.
Design meets arbitrary (1") Maximum Total load deflection criteria.
Design meets arbitrary (0.75") Maximum live load deflection criteria.
BC CALC® analysis is based on IBC 2009.
Design based on Dry Service Condition.
Calculations assume member is fully braced.

Ver 8.4.2 member is fully braced - Incorrect

BC Framer

15

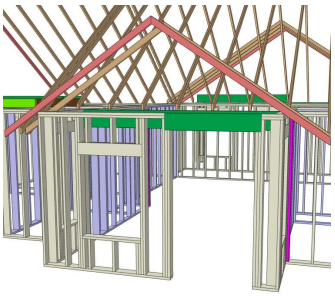
15

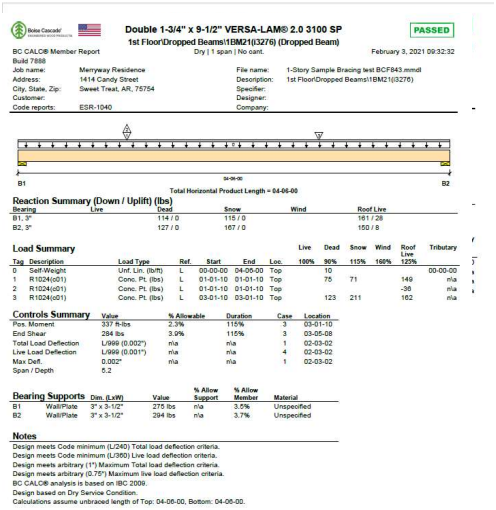
Custom Beam Bracing – Set to NO

Boise Cascade

Let's review a few examples:

- Window Header on Gable end wall. **Hd6**
  - Headers input with Quick Opening Function braced at bearings
    - ALL Headers with Gable sitting on top assume bracing @ Ends
  - Dropped Beams as Header in Gable end wall. 1BM21




Double 1-3/4" x 9-1/2" VERSA-LAM® 2.0 3100 SP — PASSED
1st Floor\Dropped Beams\1BM21(i3276) (Dropped Beam)
Dry | 1 span | No cant.

BC CALC® Member Report
Build 7888
February 3, 2021 09:32:32

Job name: Merryway Residence
Address: 1414 Candy Street
City, State, Zip: Sweet Treat, AR, 75754
Customer:
Code reports: ESR-1040

File name: 1-Story Sample Bracing test BCF843.mmdl
Description: 1st Floor\Dropped Beams\1BM21(i3276)
Specifier:
Designer:
Company:

B1 B2
Total Horizontal Product Length = 04-06-00

Reaction Summary (Down / Uplift) (lbs)

Bearing	Live	Dead	Snow	Wind	Roof Live
B1, 3"		114 / 0	115 / 0		161 / 28
B2, 3"		127 / 0	167 / 0		150 / 8

Load Summary

Tag	Description	Load Type	Ref.	Start	End	Loc.	Live 100%	Dead 90%	Snow 115%	Wind 160%	Roof Live 125%	Tributary
0	Self-Weight	Unif. Lin. (lb/ft)	L	00-00-00	04-06-00	Top		10				00-00-00
1	R1024(c01)	Conc. Pt. (lbs)	L	01-01-10	01-01-10	Top		75	71		149	n/a
2	R1024(c01)	Conc. Pt. (lbs)	L	01-01-10	01-01-10	Top					-36	n/a
3	R1024(c01)	Conc. Pt. (lbs)	L	03-01-10	03-01-10	Top		123	211		162	n/a

Controls Summary

	Value	% Allowable	Duration	Case	Location
Pos. Moment	337 ft-lbs	2.3%	115%	3	03-01-10
End Shear	284 lbs	3.9%	115%	3	03-05-08
Total Load Deflection	L/999 (0.002")	n/a	n/a	1	02-03-02
Live Load Deflection	L/999 (0.001")	n/a	n/a	4	02-03-02
Max Defl.	0.002"	n/a	n/a	1	02-03-02
Span / Depth	5.2				

Bearing Supports

	Dim. (LxW)	Value	% Allow Support	% Allow Member	Material
B1	Wall/Plate 3" x 3-1/2"	275 lbs	n/a	3.5%	Unspecified
B2	Wall/Plate 3" x 3-1/2"	294 lbs	n/a	3.7%	Unspecified

Notes
Design meets Code minimum (L/240) Total load deflection criteria.
Design meets Code minimum (L/360) Live load deflection criteria.
Design meets arbitrary (1") Maximum Total load deflection criteria.
Design meets arbitrary (0.75") Maximum live load deflection criteria.
BC CALC® analysis is based on IBC 2009.
Design based on Dry Service Condition.
Calculations assume unbraced length of Top: 04-06-00, Bottom: 04-06-00.

BC Framer

16

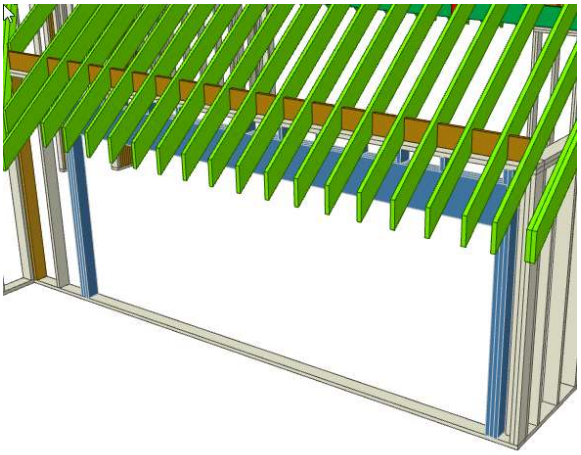
16

Custom Beam Bracing – Set to NO

Boise Cascade

Let's review a few examples:

- Garage Header with framing members above. **Hd16**
  - Headers input using Quick Opening Function are Fully Braced



Boise Cascade

Triple 1-3/4" x 14" VERSA-LAM® 2.0 3100 SP

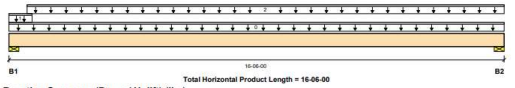
1st Floor\Wall Headers\E18_Hd16(i2494) (Wall Header)

PASSED

BC CALC® Member Report — Dry | 1 span | No cant. — January 28, 2021 23:19:35

Build 7773

Job name:	Merryway Residence	File name:	1-Story Sample Bracing test BCF842.mmdl
Address:	1414 Candy Street	Description:	1st Floor\Wall Headers\E18_Hd16(i2494)
City, State, Zip:	Sweet Treat, AR, 75754	Specifier:	
Customer:		Designer:	
Code reports:	ESR-1040	Company:	



Total Horizontal Product Length = 16-06-00

Reaction Summary (Down / Uplift) (lbs)

Bearing	Live	Dead	Snow	Wind	Roof Live
B1, 3"		1049 / 0	2024 / 0		1347 / 0
B2, 3"		1072 / 0	2077 / 0		1382 / 0

Load Summary

Tag	Description	Load Type	Ref.	Start	End	Loc.	Live 100%	Dead 90%	Snow 115%	Wind 160%	Roof Live 125%	Tributary
0	Self-Weight	Unf. Lin. (lb/ft)	L	00-00-00	16-06-00	Top		21				00-00-00
1	Smoothed Load	Unf. Lin. (lb/ft)	L	00-00-00	00-09-04	Top		72	167		111	n/a
2	Smoothed Load	Unf. Lin. (lb/ft)	L	00-07-04	16-06-00	Top		107	248		165	n/a

Controls Summary

	Value	% Allowable	Duration	Case	Location
Pos. Moment	12235 ft-lbs	89.4%	115%	2	08-03-00
End Shear	2983 lbs	18.6%	115%	2	01-05-00
Total Load Deflection	L/811 (0.239")	29.6%	n/a	2	08-03-00
Live Load Deflection	L/1231 (0.157")	29.2%	n/a	4	08-03-00
Max Defl.	0.239"	23.9%	n/a	2	08-03-00
Span / Depth	13.8				

Bearing Supports

	Dim. (LxW)	Value	% Allow Support	% Allow Member	Material
B1	Wall/Plate	3" x 5-1/4"	3073 lbs	24.4%	26.0%	Unspecified
B2	Wall/Plate	3" x 5-1/4"	3149 lbs	25.0%	26.7%	Unspecified

Notes

Design meets User specified (L/240) Total load deflection criteria.
Design meets User specified (L/360) Live load deflection criteria.
Design meets arbitrary (1") Maximum Total load deflection criteria.
Design meets arbitrary (0.75") Maximum live load deflection criteria.
BC CALC® analysis is based on IBC 2009.
Design based on Dry Service Condition.
Calculations assume member is fully braced.

Ver 8.4.2 Header is <6" below top plate bottom edge incorrectly shows bottom fully braced

BCFramer

17

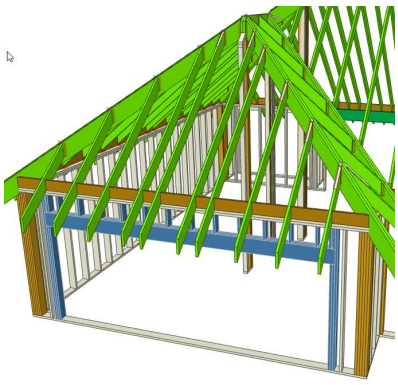
17

Custom Beam Bracing – Set to NO

Boise Cascade

Let's review a few examples:

- Garage Header with framing members above. **Hd17**
  - Header input using Quick Opening function



Boise Cascade

Triple 1-3/4" x 9-1/2" VERSA-LAM® 2.0 3100 SP

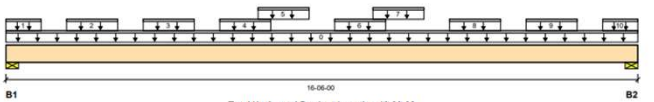
1st Floor\Wall Headers\E20_Hd17(i2353) (Wall Header)

PASSED

BC CALC® Member Report — Dry | 1 span | No cant. — January 28, 2021 23:24:22

Build 7773

Job name:	Merryway Residence	File name:	1-Story Sample Bracing test BCF842.mmdl
Address:	1414 Candy Street	Description:	1st Floor\Wall Headers\E20_Hd17(i2353)
City, State, Zip:	Sweet Treat, AR, 75754	Specifier:	
Customer:		Designer:	
Code reports:	ESR-1040	Company:	



Total Horizontal Product Length = 16-06-00

Bearing Supports

	Dim. (LxW)	Value	% Allow Support	% Allow Member	Material
B1	Wall/Plate	3" x 5-1/4"	2130 lbs	16.9%	18.0%	Unspecified
B2	Wall/Plate	3" x 5-1/4"	2131 lbs	16.9%	18.0%	Unspecified

Notes

Design meets User specified (L/240) Total load deflection criteria.
Design meets User specified (L/360) Live load deflection criteria.
Design meets arbitrary (1") Maximum Total load deflection criteria.
Design meets arbitrary (0.75") Maximum live load deflection criteria.
BC CALC® analysis is based on IBC 2009.
Design based on Dry Service Condition.
Calculations assume member is fully braced.

Ver 8.4.2 Header is <6" below top plate bottom edge incorrectly shows bottom fully braced

BCFramer

18

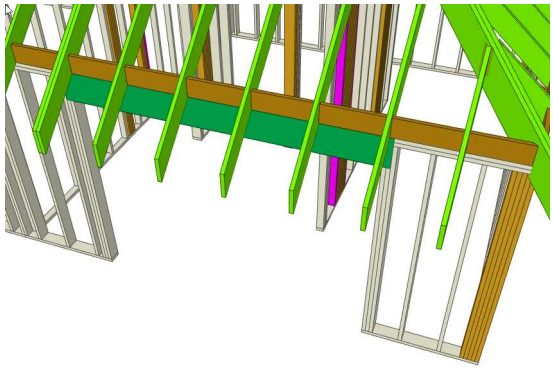
18

Custom Beam Bracing – Set to NO

Boise Cascade

Let's review a few examples:

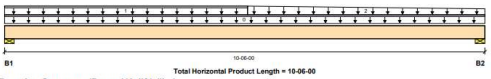
- Garage Header with framing members above.**1BM12**
  - Header input as dropped Beam



Double 1-3/4" x 11-7/8" VERSA-LAM® 2.0 3100 SP — PASSED
1st Floor\Dropped Beams\1BM12(2465) (Dropped Beam)
Dry | 1 span | No cant.

BC CALC® Member Report — January 28, 2021 23:15:54
Build 7773

Job name:	Merryway Residence	File name:	1-Story Sample Bracing test BCF842.mmdl
Address:	1414 Candy Street	Description:	1st Floor\Dropped Beams\1BM12(2465)
City, State, Zip:	Sweet Treat, AR, 75754	Specifier:	
Customer:		Designer:	
Code reports:	ESR-1040	Company:	



Total Horizontal Product Length = 10-06-00

Reaction Summary (Down / Uplift) (lbs)

Bearing	Live	Dead	Snow	Wind	Roof Live
B1, 3"		598 / 0	1233 / 0		821 / 0
B2, 3"		504 / 0	1017 / 0		678 / 0

Load Summary

Tag	Description	Load Type	Ref.	Start	End	Loc.	Live 100%	Dead 90%	Snow 115%	Wind 160%	Roof Live 125%	Tributary
0	Self-Weight	Unf. Lin. (lb/ft)	L	00-00-00	10-06-00	Top		12				00-00-00
1	Smoothed Load	Unf. Lin. (lb/ft)	L	00-00-00	05-03-12	Top		106	244		162	n/a
2	Smoothed Load	Trapezoidal (lb/ft)	L	05-03-12		Top		94	218		145	n/a
					10-06-00			65	151		101	

Controls Summary

	Value	% Allowable	Duration	Case	Location
Pos. Moment	3713 ft-lbs	15.6%	115%	2	04-03-12
End Shear	1233 lbs	13.6%	115%	2	01-02-14
Total Load Deflection	L/999 (0.069")	n/a	n/a	2	05-02-04
Live Load Deflection	L/999 (0.046")	n/a	n/a	4	05-02-04
Max Defl.	0.069"	n/a	n/a	2	05-02-04
Span / Depth	10.2				

Bearing Supports

	Dim. (LxW)	Value	% Allow Support	% Allow Member	Material
B1	Wall/Plate	3" x 3-1/2"	1831 lbs	41.0%	23.3%	Spruce-Pine-Fir
B2	Wall/Plate	3" x 3-1/2"	1521 lbs	34.1%	19.3%	Spruce-Pi

Notes
Design meets Code minimum (L/240) Total load deflection criteria.
Design meets Code minimum (L/360) Live load deflection criteria.
Design meets arbitrary (1") Maximum Total load deflection criteria.
Design meets arbitrary (0.75") Maximum live load deflection criteria.
BC CALC® analysis is based on IBC 2009.
Design based on Dry Service Condition.
Calculations assume unbraced length of Top: 01-10-08, Bottom: 01-10-08.

Top & Bottom Edge – braced @ joist O/C - Incorrect

BCFramer

19

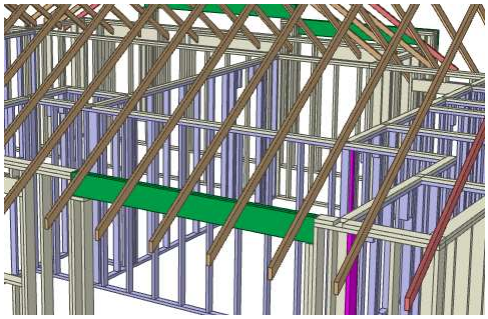
19

Custom Beam Bracing – Set to NO

Boise Cascade

Let's review a few examples:

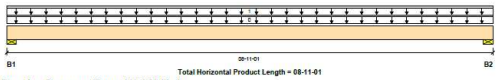
- Header with Roof Trusses above.**1BM20**
  - Header input as dropped Beam



Double 1-3/4" x 9-1/2" VERSA-LAM® 2.0 3100 SP — PASSED
1st Floor\Dropped Beams\1BM20(2823) (Dropped Beam)
Dry | 1 span | No cant.

BC CALC® Member Report — February 3, 2021 09:21:18
Build 7888

Job name:	Merryway Residence	File name:	1-Story Sample Bracing test BCF843.mmdl
Address:	1414 Candy Street	Description:	1st Floor\Dropped Beams\1BM20(2823)
City, State, Zip:	Sweet Treat, AR, 75754	Specifier:	
Customer:		Designer:	
Code reports:	ESR-1040	Company:	



Total Horizontal Product Length = 08-11-01

Reaction Summary (Down / Uplift) (lbs)

Bearing	Live	Dead	Snow	Wind	Roof Live
B1, 3"		1581 / 0	2245 / 0		1505 / 0
B2, 6-9/16"		1586 / 0	2249 / 0		1505 / 0

Load Summary

Tag	Description	Load Type	Ref.	Start	End	Loc.	Live 100%	Dead 90%	Snow 115%	Wind 160%	Roof Live 125%	Tributary
0	Self-Weight	Unf. Lin. (lb/ft)	L	00-00-00	08-11-01	Top		10				00-00-00
1	Smoothed Load	Unf. Lin. (lb/ft)	L	00-00-00	08-11-01	Top		346	504		337	n/a

Controls Summary

	Value	% Allowable	Duration	Case	Location
Pos. Moment	8421 ft-lbs	40.8%	115%	2	04-03-12
End Shear	2302 lbs	31.7%	115%	2	01-00-08
Total Load Deflection	L/963 (0.149")	36.2%	n/a	2	04-03-12
Live Load Deflection	L/999 (0.087")	n/a	n/a	4	04-03-12
Max Defl.	0.149"	14.9%	n/a	2	04-03-12
Span / Depth	10.4				

Bearing Supports

	Dim. (LxW)	Value	% Allow Support	% Allow Member	Material
B1	Wall/Plate	3" x 3-1/2"	3826 lbs	n/a	48.6%	Unspecified
B2	Wall/Plate	6-9/16" x 3-1/2"	3936 lbs	n/a	22.3%	Unspecified

Notes
Design meets Code minimum (L/240) Total load deflection criteria.
Design meets Code minimum (L/360) Live load deflection criteria.
Design meets arbitrary (1") Maximum Total load deflection criteria.
Design meets arbitrary (0.75") Maximum live load deflection criteria.
BC CALC® analysis is based on IBC 2009.
Design based on Dry Service Condition.
Calculations assume unbraced length of Top: 01-10-08, Bottom: 08-11-01.

BCFramer

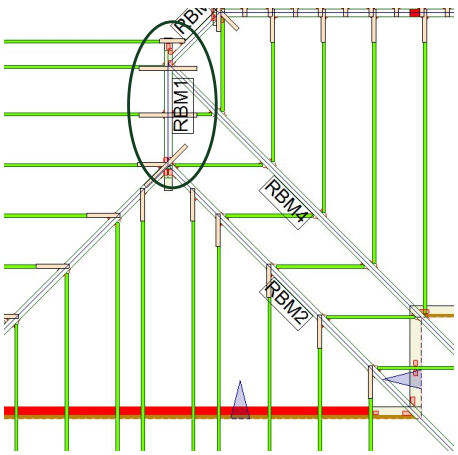
20

20

Custom Beam Bracing – Set to NO

Let's review a few examples:

- Flush Ridge Beam. **RBM1**
  - **Ridge beam same depth as rafters**



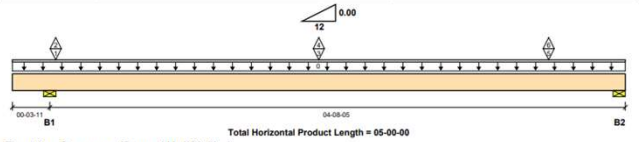
Double 1-3/4" x 11-7/8" VERSA-LAM® 2.0 3100 SP — PASSED

1st Floor\Flush Roof Beams\RBM1(i2314) (Flush Roof Beam)

BC CALC® Member Report — Dry | 2 spans | L cant. — January 29, 2021 08:20:35

Build 7773

Job name:	Merryway Residence	File name:	1-Story Sample Bracing test BCF842.mmdl
Address:	1414 Candy Street	Description:	1st Floor\Flush Roof Beams\RBM1(i2314)
City, State, Zip:	Sweet Treat, AR, 75754	Specifier:	
Customer:		Designer:	
Code reports:	ESR-1040	Company:	



Total Horizontal Product Length = 05-00-00

Reaction Summary (Down / Uplift) (lbs)

Notes

Design meets Code minimum (L/180) Total load deflection criteria.
Design meets Code minimum (L/240) Live load deflection criteria.
Design meets arbitrary (1") Maximum Total load deflection criteria.
Design meets arbitrary (1") Cantilever Maximum Total load deflection criteria.
Design meets arbitrary (0.75") Maximum live load deflection criteria.
BC CALC® analysis is based on IBC 2009.
Design based on Dry Service Condition.
Cantilevers require sheathed bottom flanges, blocking at cantilever support and closure at
Calculations assume unbraced length of Top: 00-04-04, Bottom: 02-01-12.

Bottom is braced @ Joist O/C

Top is braced By sheathing

BCFramer

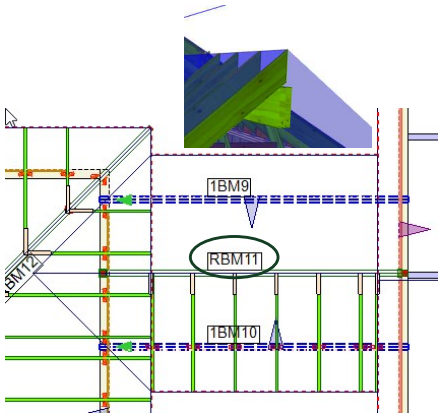
21

21

Custom Beam Bracing – Set to NO

Let's review a few examples:

- Dropped Ridge Beam. **RBM11**



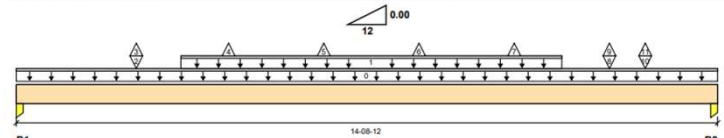
Double 1-3/4" x 11-7/8" VERSA-LAM® 2.0 3100 SP — PASSED

1st Floor\Dropped Roof Beams\RBM11(i1839) (Dropped Roof Beam)

BC CALC® Member Report — Dry | 1 span | No cant. — January 29, 2021 08:27:07

Build 7773

Job name:	Merryway Residence	File name:	1-Story Sample Bracing test BCF842.mmdl
Address:	1414 Candy Street	Description:	1st Floor\Dropped Roof Beams\RBM11(i1839)
City, State, Zip:	Sweet Treat, AR, 75754	Specifier:	
Customer:		Designer:	
Code reports:	ESR-1040	Company:	



Total Horizontal Product Length = 14-08-12

Notes

Design meets Code minimum (L/180) Total load deflection criteria.
Design meets Code minimum (L/240) Live load deflection criteria.
Design meets arbitrary (1") Maximum Total load deflection criteria.
Design meets arbitrary (0.75") Maximum live load deflection criteria.
BC CALC® analysis is based on IBC 2009.
Design based on Dry Service Condition.
Calculations assume unbraced length of Top: 02-06-04, Bottom: 02-06-04.

Top & Bottom Edge – braced @ joist O/C - Incorrect

BCFramer

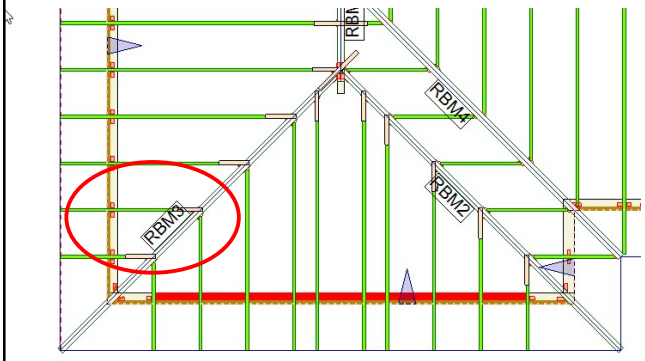
22

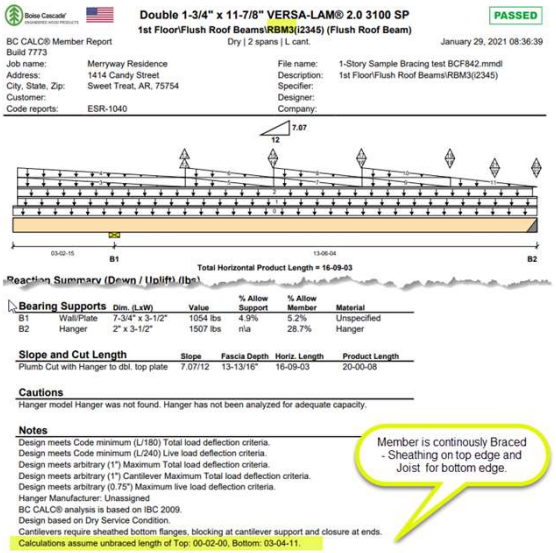
22

Custom Beam Bracing – Set to NO

Let's review a few examples:

- Roof Line Beam as a Valley/ Hip. **RMB3**





Double 1-3/4" x 11-7/8" VERSA-LAM® 2.0 3100 SP
1st Floor\Flush Roof Beams\RBM3(I2345) (Flush Roof Beam)

PASSED

BC CALC® Member Report — Dry | 2 spans | L cant. — January 29, 2021 08:36:39
Build 7773

Job name:	Merryway Residence	File name:	1-Story Sample Bracing test BCF842.mmdl
Address:	1414 Candy Street	Description:	1st Floor\Flush Roof Beams\RBM3(I2345)
City, State, Zip:	Sweet Treat, AR, 75754	Specifier:	
Customer:		Designer:	
Code reports:	ESR-1040	Company:	

7.07 / 12

B1 — B2

Total Horizontal Product Length = 16-09-03

Reaction Summary (Down / Uplift) (lbs)

Bearing Supports	Dim. (LxW)	Value	% Allow Support	% Allow Member	Material
B1	Wall/Plate	7-3/4" x 3-1/2"	1054 lbs	4.9%	5.2%	Unspecified
B2	Hanger	2" x 3-1/2"	1507 lbs	n/a	28.7%	Hanger

Slope and Cut Length	Slope	Fascia Depth	Horiz. Length	Product Length
Plumb Cut with Hanger to dbl. top plate	7.07/12	13-13/16"	16-09-03	20-00-08

Cautions
Hanger model Hanger was not found. Hanger has not been analyzed for adequate capacity.

Notes
Design meets Code minimum (L/180) Total load deflection criteria.
Design meets Code minimum (L/240) Live load deflection criteria.
Design meets arbitrary (1") Maximum Total load deflection criteria.
Design meets arbitrary (1") Cantilever Maximum Total load deflection criteria.
Design meets arbitrary (0.75") Maximum live load deflection criteria.
Hanger Manufacturer: Unassigned
BC CALC® analysis is based on IBC 2009.
Design based on Dry Service Condition.
Cantilevers require sheathed bottom flanges, blocking at cantilever support and closure at ends.
Calculations assume unbraced length of Top: 00-02-00, Bottom: 03-04-11.

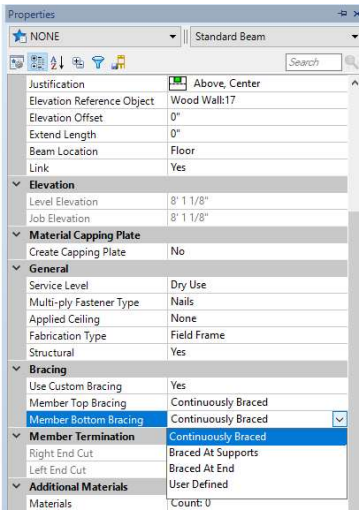
Member is continously Braced - Sheathing on top edge and Joist for bottom edge.

23

23

Custom Beam Bracing – Set to YES

- Must specify Top & Bottom Bracing



- Continuously Braced
  - Sheathing, direct applied ceiling, wall along full length
- Braced at Supports
  - Posts & Columns and Parallel Walls will be considered brace points
- Braced at Ends
- User defined
  - Must specify the maximum unbraced length

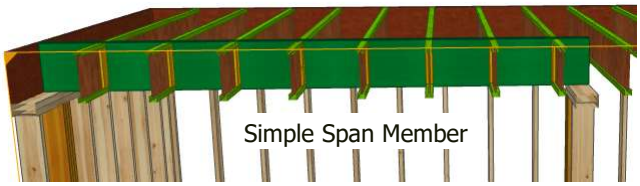
24

24

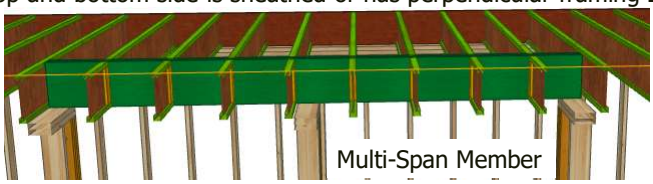
Fully Braced Definition (BCCalc)
Continually Braced (BC Framer & Mitek Structure)

Boise Cascade

For full length, top and bottom side is sheathed or has perpendicular framing 24" o.c. or less



For full length, top and bottom side is sheathed or has perpendicular framing 24" o.c. or less



- Top and bottom side are laterally braced and restrained at supports to prevent rotation
- Supports are assumed to not move in any direction
- If wind load uplift does not exist on simple span or multi-span member then sheathing or bracing on bottom side of member is not required.

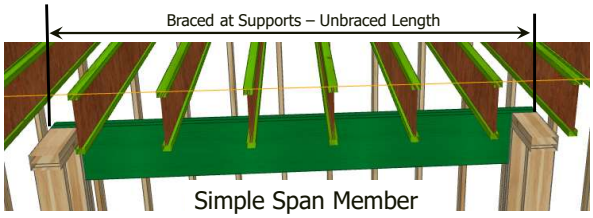
BC Framer

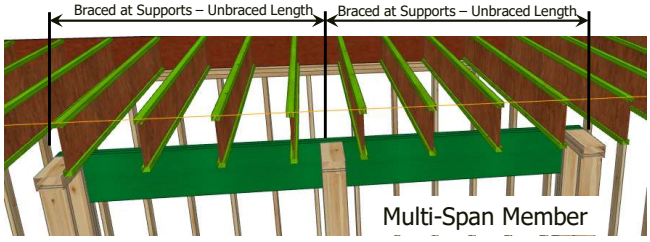
25

25

Braced at Supports Definition (BCCalc, BC Framer & Mitek Structure)

Boise Cascade





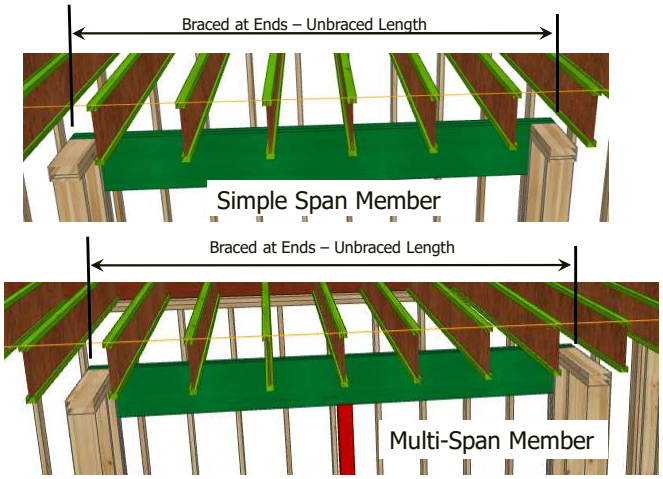
- Top and bottom side are laterally braced and restrained at supports only to prevent rotation
- Supports are assumed to not move in any direction
- Some adjustments are made at bearing location depending on assumed bearing size & type.

BC Framer

26

26

Braced at ends Definition (BCCalc, BC Framer & Mitek Structure)

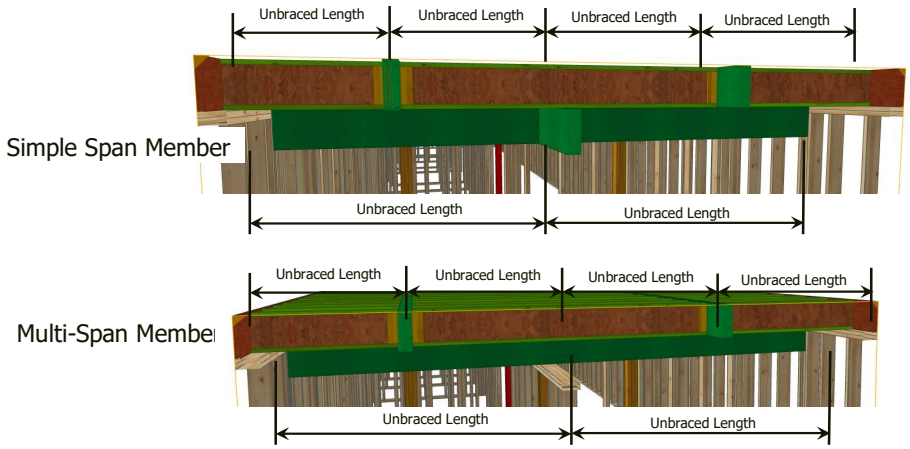


- Top and bottom side are laterally braced and restrained at ends only to prevent rotation
- Supports at ends are assumed to not move in any direction
- Interior bearing(s) assumed they can move perpendicular to member length
- Some adjustments are made at bearing location depending on assumed bearing size & type.

27

27

Specify Unbraced Length Definition (BCCalc, BC Framer & Mitek Structure)



- Top and bottom side are laterally braced and restrained at supports to prevent rotation
- Supports are assumed to not move in any direction
- If wind load uplift does not exist on simple span or multi-span member then sheathing or bracing on bottom side of member is not required.

28

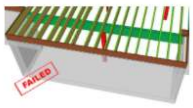
28

Custom Bracing

Boise Cascade®

User-Defined Custom Bracing

Why is my beam now failing? What changed? What now?



If you have upgraded to BC Framer® version 8.4.1 or newer, you may have noticed an occasional beam that fails design, when it was passing in prior versions.

The difference comes from a change in how beam bracing is considered in the analysis!

Starting in version 8.4.1, BC Framer® more accurately evaluates the modeled members based on their bracing conditions. When the modeled bracing condition is insufficient to prevent the potential for buckling under the applied loads, the member may fail in Moment.

What changed?
BC Framer® version 8.4.1 or newer now looks at the modeled framing condition to evaluate the bracing points for both top edge and bottom edge of beam and header members and applies reductions to the Moment capacity per applicable building code provisions in cases where the distance between bracing points is too large to prevent the potential for buckling.

What conditions are affected?
All beams and headers go through the same analysis for bracing conditions. If a beam or header does not have custom bracing specified, it will use the modeled conditions to precisely determine bracing and apply that in member analysis.

How do I resolve the issue?

1. Check the member report - if you have a failure in Moment, scroll down to the Notes section of the report and view the bracing conditions (fully braced or assumed unbraced lengths). Anything other than "fully braced" indicates that bracing conditions may be the cause of the Moment failure in a member that previously passed.
2. Confirm the Bracing conditions - if the reported bracing conditions accurately reflect the real world installed conditions then you need to address the failure by increasing the beam width as appropriate or by cutting multiple span members at an intermediate support to create simple span members. Our Technical Services team is available to help should you need it.
3. If the bracing conditions in the report do not accurately reflect the real world installed conditions - adjust as needed by editing the member properties (***Properties > Bracing***).
4. Set ***Bracing: Use Custom Bracing*** to ***Yes*** for the member in question:
   - Specify ***Member Top Bracing*** and ***Member Bottom Bracing***
   - Re-run analysis

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