Boise Cascade
Engineered Wood Products

BOISE GLULAM®
Beam Product Guide

WEBGLPROD
02/2010

Glued laminated timbers from Boise Cascade Engineered Wood Products add functional beauty to any residential or commercial project.

Just ask for BOISE GLULAM® beams.

No discussion of engineered wood products is complete without mention of glued laminated timber. Glulams are sometimes forgotten in what has become an increasingly crowded field of newer products.

Laminated timbers are often the most cost-effective and easy-to-install alternative for beam applications to residential, commercial and light industrial construction. It is usually easy to determine whether to specify a balanced or unbalanced layup and whether to choose Industrial or Architectural appearance grade beams.

The benefit to BOISE GLULAM® beams is that they can be manufactured either with or without camber. Most stock beams are available with either a small amount of camber (3,500' radius) or no camber, depending on market demands.

BOISE GLULAM® beams are manufactured from Douglas Fir-Larch and carry the AITC trademark.

STOCK BEAMS

For most residential applications, stock beams are the product of choice. BOISE GLULAM® stock beams are available through our trusted distributors, located strategically throughout the country. Our beams are manufactured in widths of 3¹/8", 3¹/2", 5¹/8", 5¹/2", 6³/4", and 8³/4", with depths ranging from 6" to 24" and lengths up to 66 feet, with or without camber. Stock beams are available in Architectural appearance grade, which is intended for exposed applications but can also be used for concealed beams, headers, columns, and rafters. Check with your local distributor for availability.

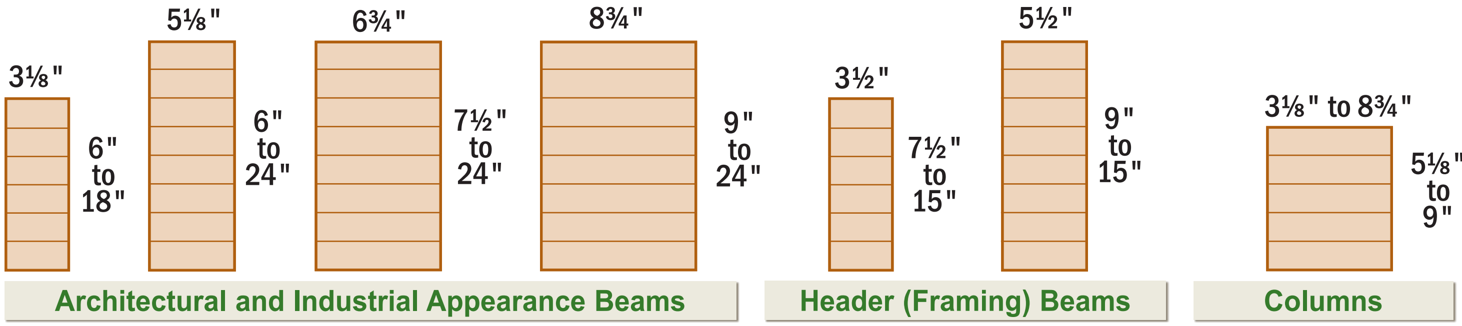
Rough Sawn Glulam
Just one of our custom beams

CUSTOM BEAMS

Custom beams are manufactured in typical widths of 3¹/8" through 12¹/4", with even greater widths subject to inquire and in depths ranging from 6" to over 48". They are used when large cross-sections, longer lengths, curved and arched shapes, different appearances, or specific certifications are required. BOISE GLULAM® custom beams are manufactured on a made-to-order basis. Please call to determine availability of BOISE GLULAM® custom beams.

Table of Contents

BOISE GLULAM® Stock Beam and Column Sizes



ARCHITECTURAL APPEARANCE BEAMS

These beams are the beams of choice in applications where members are exposed to view, because they have a smooth, attractive finish. Stock beams are often supplied with this appearance so they may be exposed to view in the finished structure. Voids greater than 3/4" are filled, three sides (excluding the top) are planed or sanded, and edges are eased on the bottom face of the member.

INDUSTRIAL APPEARANCE BEAMS

These beams are used in concealed applications or in other places where appearance is not of primary importance, such as such as commercial buildings, warehouses, and garages. Voids are not filled, and only the two wide faces are planed.

COLUMNS

Glulam columns are straight and dimensionally true, making framing an easy task. Because columns are available in long lengths, the members do not have to be spliced together, as is often necessary with sawn lumber. The columns can be exposed to view as a unique architectural feature of the framing system.

BOISE GLULAM® columns have all four edges eased to match the widths of the Architectural glulams beams and have the same architectural appearance. All sides may be exposed to view.

HEADER BEAMS

BOISE GLULAM® headers are commonly used for concealed applications such as doors and windows where appearance is not of importance. They come in two common widths, 3 1/2" and 5 1/2". Check with your local distributor for availability.

BALANCED AND UNBALANCED BEAM LAYUPS

The most critical areas of a glulam beam are the outside laminations. Thus, the strongest laminations are placed in these areas in either unbalanced or balanced layups.

In unbalanced beams, typically known as V4s, the bottom lamination is stronger than all the other laminations. This allows for a more efficient use of timber resources. It is very important to install unbalanced BOISE GLULAM® beams with the top side up. *(The word "top" is always printed on the corresponding side.)* V4 glulams may be designed and installed in both single and multiple-span applications, and in relatively short cantilevers.

Balanced glulam beams, or V8s, have the same high-strength laminations on both the top and bottom of the beam, creating a symmetric layup. A V8 glulam can be designed for multiple-span conditions and cantilevers. V8s can also be used for single spans, but V4s are most cost-effective for this type of application. V8 BOISE GLULAM® beams may be special ordered at an additional cost; check with your local distributor for availability.

LAYUP COMBINATIONS

Balanced Versus Unbalanced Layup Example

Unbalanced (V4)	Balanced (V8)
No. 2D	T.L.
No. 2	No. 1
No. 2	No. 2
No. 3	No. 3
No. 2	No. 2
No. 1	No. 1
T.L.	T.L.

T.L. = Tension Lamination

DEFLECTION AND CAMBER

For relatively long span lengths, deflection may control the design of glulam beams. Building codes limit deflection for floor and roof members with "L/over" limits. The "L" is simply the span length in inches. It can be divided by a number — *for example, 360 for live load on floors* — to determine the maximum amount of deflection a member can have for the corresponding span under full design loads. Thus, a greater amount of deflection is allowed for members with longer spans.

Camber is a curvature that is built into a glulam beam during the manufacturing process to offset a portion of the design load deflection. Beams may be manufactured with a 3,500' radius camber on a special order basis . The following chart displays 3,500' radius camber for the listed span lengths:

Span Length [ft]												
12	16	20	24	28	32	36	40	44	48	52	56	60
3,500' Radius Camber at Midspan [in]												
0.06	0.11	0.17	0.25	0.34	0.44	0.56	0.69	0.83	0.99	1.16	1.34	1.54

Camber is specified mostly to reduce the aesthetic effect of long-span members. Camber can also be specified to reduce the amount of deflection — *for example, it may be used to limit water collection on near-flat roofs.*

ADHESIVES

BOISE GLULAM® beams are manufactured with exterior-grade or wet-use adhesives that comply with all recognized national glulam standards. The purpose of exterior-grade adhesives is to ensure that the design values of the beams are not compromised when the beams are directly exposed to the weather during construction. Though wet-use adhesives are required when glulam beams exceed a moisture content of 16% for extended periods of time after installation, the beams still must be protected from exterior exposure. *(For applications where moisture content may exceed 19%, see Preservative Treatment.)*

(ANSI/AITC Standard A190.1-2002 American National Standard for Structural Glued Laminated Timber)

CHECKING

Checking occurs naturally in timber when wood fibers dry. As the outer fibers lose moisture and attempt to shrink, they are restrained by the fiber in the inner portion of the beam, which loses moisture at a much slower rate. Rapid drying increases the difference in moisture content between the inner and outer fibers and thus the chances for checking in the timber member. To minimize the potential for checking, BOISE GLULAM® is produced from special grades of lumber specifically dried to less than 16% moisture content. Contact Boise Cascade EWP Engineering for technical guidance.

Example of Checking

HANDLING & STORAGE

Water-resistant wrapping is often specified to protect beams from moisture, soiling, and surface scratches during transit and job-site storage. Because exposure to sunlight can discolor beams, opaque wrappings are recommended. Beams can be wrapped individually or by the bundle. In applications where appearance is especially important, individual wrapping should be left intact until installation to minimize exposure to job-site conditions.

Beams are commonly loaded and unloaded with forklifts. For greater stability, the sides of the beams, rather than the bottoms, should rest on the forks. Supporting extremely long beams on their sides, however, can cause them to flex excessively, increasing the risk of damage. Use multiple forklifts to lift long beam members.

A level, well-drained, covered storage site is recommended. ***Keep beams off the ground, using lumber blocking, skids, or a rack system. Keep beams level.*** The wrapping on beams should be left in place to protect them from moisture, soiling, sunlight, and scratches. For long-term storage, cut slits in the bottom of the wrapping to allow ventilation and draining of any entrapped moisture. Proper ventilation and drainage will reduce the likelihood of water damage, staining, and the start of decay.

Technical Items

DIMENSIONAL TOLERANCES

The tolerances permitted at the time of manufacture per ANSI Standard A190.1-92 are as follows:

Width – Plus or minus 1/16" of the specified width.

Depth – Plus 1/8" per foot of depth. Minus 3/16", or 1/16" per foot of depth, whichever is larger.

Length – Up to 20 feet – Plus or minus 1/16"
Over 20 feet – Plus or minus 1/16" per 20 feet of length.

Tolerances do not apply to textured beams – see AITC 113-2001.

Camber or Straightness – Tolerances are intended for use with straight or slightly cambered beams. The tolerances permitted at the time of manufacture, without allowance for dead load deflection, are as follows:

Up to 20 feet – Plus or minus 1/4".

Over 20 feet – Add 1/8" per each additional 20 feet or fraction thereof, but not to exceed plus or minus 3/4".

Squareness – The tolerance of the cross section shall be within plus or minus 1/8" per foot of specified depth, unless a specially shaped beam is selected.

PRESERVATIVE TREATMENT REQUIREMENTS

BOISE GLULAM® beams are intended for applications where mold, decay, and/or insect attack are not concerns. For conditions where glulams are permanently exposed to the weather, have direct ground or concrete contact, or are exposed to significant moisture from condensation or other sources, preservative treatment is required as specified by applicable building codes. For information on different treatments for specific applications, please consult a wood treater or treating association. Please note that when glulams are treated, design values may be affected.

All field cuts – including notches, end cuts, and holes–- should be performed before the glulam beam is treated. All fasteners used with treated glulam beams must be resistant to corrosion from moisture. Consumer Information Sheets that detail proper use and handling of products with the specified treatments should be obtained from the treater for proper use and handling of products with the specified treatments. In addition, Material Safety Data Sheets (MSDS) and OSHA-required hazard labels provided with each preservative should be reviewed. Please note that when glulams are treated and installed in exterior applications, design values shall be adjusted per building code provisions.

FIRE RESISTANCE

BOISE GLULAM® beams, like many other wood products, have advantageous fire-endurance properties. Unlike steel that loses a large percentage of its strength when exposed to typical temperatures during a fire, wood beams char on the surface. Charring forms a self-insulating surface layer when wood is exposed to flame or relatively high temperatures. The wood below this layer retains its structural properties during a fire. Most solid wood members, including BOISE GLULAM® beams, char at a rate of approximately 1 1/2 inches per hour. BOISE GLULAM® may be special ordered to create a beam with a one-hour fire rating. In this beam specification, an additional high grade tension lamination replaces a core lamination in the manufacturing process. The project's design professional of record shall specify this type of fire-resistance requirement.

Larger glulam beams may be utilized in heavy timber construction, and a fire-resistance classification where exposed beams are designed to maintain a specified strength level for a specified duration during a fire. For further information on heavy timber construction, please refer to *Standard for Heavy Timber Construction*, AITC 108.

The adhesives used in BOISE GLULAM® beams do not reduce the fire-endurance properties of the wood material. When compared to wood, the adhesives have a higher ignition temperature and char in a very similar manner. When burned, the adhesives do not increase smoke toxicity. For further information on fire-resistance design, please contact Boise Cascade EWP Engineering.

FIELD NOTCHING & DRILLING

Glulam beams are generally designed for applications where they will be highly stressed under design loads. For this reason, field modifications such as notching, tapering, or drilling may only be made only after approval has been given by the project's design professional of record and/or Boise Cascade Engineered Wood Products representative. For the proper location of smaller holes, please refer to page 8. Analysis of notches and tapered end cuts on BOISE GLULAM® beams may be performed by a qualified user of BC CALC®, Boise Cascade EWP's engineered wood sizing software.

BOISE GLULAM® Manufacturing Standards

AITC Mill Number: 220

City of Los Angeles Fabricator License: 01365

Allowable Design Values & Stresses, Section Properties

BOISE GLULAM® 24F-V4 Design Values

Width (in)	Depth (in)	Weight (plf)	Allowable Shear (lbs)	Allowable Moment (ft-lbs)	Moment of Inertia (in^4)
3 1/8	6	4.6	3313	3750	56.3
	7½	5.7	4141	5859	109.9
	9	6.8	4969	8438	189.8
	10½	8.0	5797	11484	301.5
	12	9.1	6625	15000	450.0
	13½	10.3	7453	18984	640.7
	15	11.4	8281	23438	878.9
	16½	12.5	9109	28359	1169.8
	18	13.7	9938	33750	1518.8
3 1/2	4½	3.8	2783	2363	26.6
	6	5.1	3710	4200	63.0
	7½	6.4	4638	6563	123.0
	9	7.7	5565	9450	212.6
	10½	8.9	6493	12863	337.6
	12	10.2	7420	16800	504.0
	13½	11.5	8348	21263	717.6
	15	12.8	9275	26250	984.4
5 1/8	6	7.5	5433	6150	92.3
	7½	9.3	6791	9609	180.2
	9	11.2	8149	13838	311.3
	10½	13.1	9507	18834	494.4
	12	14.9	10865	24600	738.0
	13½	16.8	12223	30770	1050.8
	15	18.7	13581	37589	1441.4
	16½	20.6	14939	45052	1918.5
	18	22.4	16298	53151	2490.8
	19½	24.3	17656	61881	3166.8
	21	26.2	19014	71237	3955.2
	22½	28.0	20372	81215	4864.7
	24	29.9	21730	91810	5904.0

Width (in)	Depth (in)	Weight (plf)	Allowable Shear (lbs)	Allowable Moment (ft-lbs)	Moment of Inertia (in^4)
5 1/2	9	12.0	8745	14850	334.1
	10½	14.0	10203	20213	530.6
	12	16.0	11660	26214	792.0
	13½	18.0	13118	32789	1127.7
	15	20.1	14575	40056	1546.9
6 3/4	7 1/2	12.3	8944	12656	237.3
	9	14.8	10733	18225	410.1
	10 1/2	17.2	12521	24457	651.2
	12	19.7	14310	31520	972.0
	13 1/2	22.1	16099	39425	1384.0
	15	24.6	17888	48163	1898.4
	16 1/2	27.1	19676	57724	2526.8
	18	29.5	21465	68102	3280.5
	19 1/2	32.0	23254	79288	4170.9
	21	34.5	25043	91276	5209.3
	22 1/2	36.9	26831	104061	6407.2
	24	39.4	28620	117636	7776.0
8 3/4	9	19.1	13913	23048	531.6
	10 1/2	22.3	16231	30891	844.1
	12	25.5	18550	39812	1260.0
	13 1/2	28.7	20869	49798	1794.0
	15	31.9	23188	60834	2460.9
	16 1/2	35.1	25506	72911	3275.5
	18	38.3	27825	86018	4252.5
	19 1/2	41.5	30144	100147	5406.7
	21	44.7	32463	115290	6752.8
	22 1/2	47.9	34781	131438	8305.7
	24	51.0	37100	148585	10080.0

Notes:
1) Allowable moment calculated using glulam volume factor (C_v) with a span length of 21 ft. Allowable moment shall be multiplied by $(21/\text{Span Length [ft]})^{1/10}$ for longer spans.

BOISE GLULAM® 24F-V4 Allowable Design Stresses

Bending F_b [psi]		Horizontal Shear F_v [psi]	Modulus of Elasticity E [psi]	Tension Parallel to Grain F_t [psi]	Compression Parallel to Grain F_c [psi]	Compression Perpendicular to Grain F_c [psi]
Tension Zone in Tension	Compression Zone in Tension					
2400	**1850**	**265**	**1,800,000**	**1100**	**1650**	**650**

Notes:
The data is for stock beams. For information on sizes not listed, please use BC CALC® software or consult with Boise Cascade EWP Engineering.
Consult Boise Cascade EWP Engineering for additional design stresses for nonstandard applications and stability issues.

BOISE GLULAM® COLUMNS

Allowable Axial Load — Combination 3 Column Grade

Column Length [ft]	$3\frac{1}{8}$" Wide Column Allowable Axial Load (lb)						$5\frac{1}{8}$" Wide Column Allowable Axial Load (lb)								
	$3\frac{1}{8}$" x 6"			$3\frac{1}{8}$" x $7\frac{1}{2}$"			$5\frac{1}{8}$" x $5\frac{1}{8}$"			$5\frac{1}{8}$" x 6"			$5\frac{1}{8}$" x $7\frac{1}{2}$"		
	100%	**115%**	**125%**	**100%**	**115%**	**125%**	**100%**	**115%**	**125%**	**100%**	**115%**	**125%**	**100%**	**115%**	**125%**
4	20,200	22,160	23,340	25,260	27,710	29,180	31,380	35,530	38,170						
5	16,940	18,150	18,850	21,180	22,690	23,570	29,520	33,080	35,340	35,890	40,450	43,330			
6	13,890	14,650	15,090	17,370	18,320	18,860	27,360	30,300	32,110	33,760	37,640	39,950			
7	11,400	11,920	12,210	14,260	14,890	15,270	24,990	27,300	28,690	31,060	33,850	35,520	34,870	37,470	38,990
8	9,460	9,820	10,030	11,830	12,280	12,530	22,530	24,270	25,290	27,870	29,960	31,180	30,990	32,950	34,080
9	7,940	8,210	8,360	9,930	10,260	10,450	20,110	21,440	22,210	24,780	26,340	27,250	27,470	28,960	29,830
10	6,750	6,950	7,060	8,440	8,690	8,830	17,900	18,920	19,520	21,970	23,160	23,850	24,380	25,550	26,220
11	5,800	5,950	6,040	7,250	7,440	7,550	15,940	16,760	17,230	19,490	20,430	20,970	21,700	22,640	23,190
12	5,030	5,150	5,220	6,290	6,440	6,530	14,240	14,900	15,280	17,350	18,110	18,530	19,400	20,160	20,600
13	4,400	4,500	4,550	5,500	5,620	5,698	12,770	13,310	13,610	15,520	16,120	16,480	17,420	18,050	18,410
14							11,500	11,940	12,200	13,930	14,440	14,720	15,720	16,240	16,540
15							10,400	10,770	10,980	12,570	12,980	13,220	14,240	14,670	14,930
16							9,440	9,750	9,930	11,380	11,740	11,930	12,950	13,320	13,530
17							8,600	8,860	9,010	10,350	10,650	10,820	11,820	12,140	12,320
18							7,860	8,090	8,220	9,450	9,710	9,850	10,830	11,110	11,270
19							7,220	7,410	7,520	8,660	8,880	9,010	9,960	10,200	10,340
20							6,640	6,810	6,910	7,960	8,160	8,260	9,190	9,390	9,510
21							6,130	6,280	6,370	7,340	7,510	7,610	8,580	8,780	8,900
22															
23															
24															

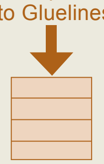
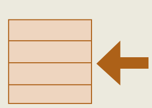
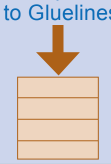
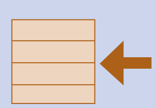
Column Length [ft]	$6\frac{3}{4}$" Wide Column Allowable Axial Load (lb)						$8\frac{3}{4}$" Wide Column Allowable Axial Load (lb)		
	$6\frac{3}{4}$" x 6"			$6\frac{3}{4}$" x $7\frac{1}{2}$"			$8\frac{3}{4}$" x 9"		
	100%	**115%**	**125%**	**100%**	**115%**	**125%**	**100%**	**115%**	**125%**
4									
5									
6									
7									
8									
9	35,920	38,870	40,620						
10	32,700	35,020	36,390						
11	29,620	31,470	32,540						
12	26,820	28,310	29,180	39,870	42,340	43,790			
13	24,310	25,530	26,240	36,390	38,420	39,600			
14	22,080	23,100	23,680	33,240	34,920	35,900			
15	20,100	20,960	21,460	30,410	31,830	32,640			
16	18,360	19,090	19,500	27,870	29,070	29,760			
17	16,820	17,440	17,800	25,620	26,650	27,230			
18	15,460	15,990	16,300	23,600	24,480	24,990			
19	14,250	14,710	14,970	21,800	22,570	23,000			
20	13,170	13,570	13,800	20,180	20,850	21,240			
21	12,200	12,550	12,750	18,730	19,320	19,650			
22	11,330	11,640	11,820	17,430	17,940	18,240	39,360	41,030	41,950
23	10,550	10,820	10,980	16,250	16,710	16,970	36,940	38,400	39,250
24	9,840	10,090	10,230	15,180	15,590	15,820	34,710	36,020	36,760
25							32,660	33,830	34,510
26							30,780	31,840	32,440
27							29,060	30,010	30,560
28							27,460	28,330	28,830
29							26,000	26,780	27,240
30							24,630	25,360	25,780

Notes:

1) Table assumes that the column is braced at column ends only. Effective column length is equal to actual column length.
2) Allowable loads are based on one-piece column members used in dry service conditions.
3) Allowable loads are based on an eccentricity value equal to 0.167 multiplied by the column thickness or width (worst case).
4) Allowable loads are based on axial loading columns using the design provisions of the National Design Specification for Wood Construction (NDS), 2001 edition. For side or other combined bending and axial loads, use BC COLUMN software to analyze such conditions.
5) See below for allowable design stresses.
6) Load values are not shown for short lengths due to loads exceeding common connector capacities. Load values are not shown for longer lengths if the controlling slenderness ratio exceeds 50 (per NDS).
7) It may be possible to exceed the limitations of the table by analyzing a specific application with the BC COLUMN software.

BOISE GLULAM® Column Allowable Design Stresses

Combination 3 Column Grade

Compression Parallel to Grain F_c [psi]	Bending F_b [psi]: Load Perpendicular to Glulines	Bending F_b [psi]: Load Parallel to Glulines	Modulus of Elasticity E [psi]: Load Perpendicular to Glulines	Modulus of Elasticity E [psi]: Load Parallel to Glulines	Compression Perpendicular to Grain (limiting direction F_c [psi]	Tension Parallel to Grain F_t [psi]
						
2300	**2000**	**2100**	**1,900,000**	**1,900,000**	**650**	**1450**

Equivalent specific gravity for fastener design: SG = 0.5.

For information about Boise Cascade's engineered wood products, including sales terms and conditions, warranties and disclaimers,

visit our website at www.BCewp.com

American Institute of Timber Construction

Documents:

ANSI/AITC Standards A190.1-2002 American National Standard for Structural Glued Laminated Timber

Guidelines for the Analysis of Drilled Holes or Notches in Structural Glued Laminated Timber Beams, TN-19

Evaluation of Checking in Glued Laminated Timbers, TN-18

Standard for Heavy Timber Construction, AITC 108

Your Dealer is:

If no dealer is listed, call 1-800-237-4013

WEBGLUPROD Feb 2010