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Abstract

Perma-Columns are typically used as a foundation option for conventional post-frame buildings, but can also be considered for tensioned fabric buildings. *Cover-All's Legend Building Series (LBS)* frames are often elevated on post foundations, similar to those used in post-frame construction. The follow document is a guide to the design process for the use of *Perma-Columns* with *LBS* post mount buildings.

Disclaimer

Perma-Column and wood post design methods presented herein are based on sample load cases provided by Cover-All, Inc. Specific building loads vary depending on **Cover-All** frame type, location, local building codes, and overall dimensions of the building. The load cases given in this document are based on site conditions for Oakland County, Michigan. This manual is a guide for preliminary design of **Cover-All LBS** post mount buildings on **Perma-Column** foundations located in the United States. Consult a Structural Engineer with experience in tensioned fabric buildings for final foundation design.

Introduction to Cover-All Legend Building Series (LBS)

LBS buildings are conventional tensioned fabric structures with arched frames that provide high interior clearances. The arch design also gives the building structural stability and good resistance to exterior forces, such as wind and snow loads. They can be placed on several different kinds of foundations including: concrete walls and footings, piers, and wood or steel posts. The frame widths available for the post mount application are 18, 19, 30, 32, 36, 40, 42, 50, 55, and 62 foot spans. The distance between frames (bay spacing) generally ranges from 6 to 16 feet in two (2) foot increments. Although 70 and 72 foot spans are available, they are not intended for post mount applications.



Fig. 1 Elevation of Cover-All LBS Building

LBS Post Mount Design

1. Design Analysis

Historically post frame buildings have been supported by rough sawn posts. However, because tensioned fabric buildings need support in both vertical and horizontal directions, Servinsky Engineering LLC recommends a stronger post. This requirement is because the semicircular or arched profile of a LBS frame does not have a horizontal chord common to that of a standard roof truss. Without this horizontal chord the post acts as a cantilever beam with a bending moment that occurs near the base. Bending moment is measured by multiplying the horizontal load by the length of the post acting as a lever arm as per **Figure 2**. The lever arm for the fabric building is roughly twice that of the post frame design. Since solid timber posts only have an allowable bending stress less than 1000 psi, the proper solution for providing the necessary support is either glue or nail laminated wooden posts. The glu-lam posts are rated with high allowable bending stress (typically in the rage of 1900 psi to 2400 psi). Nail-lams are also acceptable but are susceptible to corrosion of the nails and prying of the top plys.



Fig. 2 Bending Moment of LBS vs. Post Frame Building

Because the Perma-Column is able to with stand higher bending stress than most glu-lam posts, the building design is controlled by the required post size. However, it is important to consider the stability of the embedded part of the Perma-Column. Soil conditions and depth of embedment will determine the overall stability of the Perma-Column. The bending stress of a fabric building's post also transfers into an overturning force in the foundation. For this reason it most likely be required that the Perma-Column be in cased in hard packed soil or for larger loads, concrete. Embedding the Column in the site's existing soil usually will not provide enough resistance to the buildings overturning force. The example stability designs giving in Table A include the use of 24" diameter auger cast holes used to encase the Perma-Column in concrete. Extensions are available from Perma-Column Co. if the standard length does not meet depth requirements. The extensions come in 18", 24", and 36" sizes.

2. Design Procedure

There are four (4) steps for designing a post mount Cover-All LBS building using Perma-Column.

- 1. Calculate the Foundation Loads (Anchor Point Reactions)
- 2. Design of glu/nail-lam post for size
- 3. Determine the required Perma-Columns size
- 1. Calculate the Foundation Loads

The foundation loads are given by the building manufacturer as frame anchor loads. These loads are typically found by using a load calculator program supplied by the manufacturer. The following factors are used by Cover-All's calculator to determine the foundation "anchor point" loads.

- Wind, snow and live loads are automatically calculated using local building codes, depending on state and county conditions.
- Bay spacing: 5 feet to 16 feet for all LBS buildings.
- Number of ends that have fabric covering.
- A Thermal Factor (c_t) is chosen depending on if the building in heated of not.
- Wind exposure of the building
- Occupancy use

2. Design of glu/nail-lam post for size

The controlling factor in wooden post design is usually its capacity to resist bending moments. As mentioned before the bending moment equals the horizontal force multiplied by the lever arm of the post. The length of the lever arm is taken as the distance from the top of the post to the point of the post that is most likely to rotate when under stress. Since the post is connected to the top of the Perma-Column, the lever arm is assumed from top of the post to the steel U-bracket. The design in this report uses a lever arm of 6 feet for an 8-foot high post. The horizontal force is reported on Cover-All's load calculator for a given frame size and bay spacing. Once the anchor point loads are calculated, the post can be design to meet the stress requirements.

3. Determine the required Perma-Column size

The size of the Perma-Column for a given project is controlled by three things. First, the size of the column should match that of the post. This ensures the column will be able to withstand the building loads, and a proper connection will be made to the wooden post. Secondly, a stability analysis should be carried out to determine if the column will rotate in the soil. The depth of embedment and soil properties of the location will determine if the column will remain stable under load. Finally, an uplift calculation will determine if the column to help resist the uplift. As mentioned above most LBS buildings usually require the Perma-Column to be placed in compacted soil or in concrete to satisfy stability requirements.

Perma-Column Foundations For Cover-All® Buildings

Second Issue 30 July 2007

Prepared by: Chris Gates & Mark S. Servinsky, P.E. Principal, Servinsky Engineering, LLC



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 Table A1: Bending Moments for Perma-Columns and Posts of Cover-All Legend Series Buildings (LBS)
 Revised 7/19/06

 LBS Post Mount Building, 8' Overall Post Height
 Revised 7/19/06

Prepared by: Mark S. Servinsky, P.E.

Prepared for : Perma- Column, Inc., Ossian, Indiana

Cover-All	Building	D	esign Load	ds	Maximum Bay	Perma-Column	Post	Perma-Column	Post
Model No.	Width	Horiz.	Down	Up	Spacing	Lever Arm	Lever Arm	Moment	Moment
	(feet)	(kips)	(kips)	(kips)	(feet)	(feet)	(feet)	(ft⋅kips)	(ft⋅kips)
LBS-18	18	1.3	1.2	1.1	12*	8	6	10.40	7.80
LBS-19	19	1.1	1.7	1.0	16	8	6	8.80	6.60
LBS-30	30	1.8	2.8	1.6	16	8	6	14.40	10.80
LBS-32	32	2.0	3.2	1.5	16	8	6	16.00	12.00
LBS-36	36	2.0	3.0	1.9	16	8	6	16.00	12.00
LBS-40	40	3.1	4.0	2.1	16	8	6	24.80	18.60
LBS-42	42	2.1	3.3	1.9	14*	8	6	16.80	12.60
LBS-50	50	3.8	4.9	2.7	16	8	6	30.40	22.80
LBS-55	55	1.6	2.6	1.2	8*	8	6	12.80	9.60
LBS-62	62	2.4	3.8	2.1	10*	8	6	19.20	14.40

Design Criteria:

Loads based on LBS Cover-All building with both ends enclosed.

Loads are given for maximum allowed bay spacing of each LBS frame type

Wind Speed: 90 mph, Exposure C

Ground Snow Load 25 psf

Thermal Factor $C_t = 1.0$

Table is for Class A-4 Assembly Arenas, and Storage/Agriculture Buildings.

For other Building types consult Cover-All Engineer.

Notes:

The design follows IBC 2003 and ASCE-7-02

Exposure C is usually recommended for Cover-All Buildings; for Exposure B or D, consult Engineer

Perma-Column lever arm is taken from poimt of load (top of post) to grade.

Wood Post lever arm is taken from point of load to top of the Perma-Column's steel connection bracket.

⁶ Maximum allowed bay spacing, wind load exceeds frame ratings for bays any larger.

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 Table A2: Bending Moments for Perma-Columns and Posts of Cover-All Legend Series Buildings (LBS)
 Revised 7/19/06

 LBS Post Mount Building, 10' Overall Post Height
 Revised 7/19/06

Prepared by: Mark S. Servinsky, P.E.

Prepared for : Perma- Column, Inc., Ossian, Indiana

Cover-All	Building	D	esign Load	ds	Maximum Bay	Perma-Column	Wood Post	Perma Column	Post
Model No.	Width	Horiz.	Down	Up	Spacing	Lever Arm	Lever Arm	Moment	Moment
	(feet)	(kips)	(kips)	(kips)	(feet)	(feet)	(feet)	(ft⋅kips)	(ft⋅kips)
LBS-18	18	1.3	1.2	1.1	12*	10	8.5	13.00	11.05
LBS-19	19	1.1	1.7	1.0	16	10	8.5	11.00	9.35
LBS-30	30	1.8	2.8	1.6	16	10	8.5	18.00	15.30
LBS-32	32	2.0	3.2	1.5	16	10	8.5	20.00	17.00
LBS-36	36	2.0	3.0	1.9	16	10	8.5	20.00	17.00
LBS-40	40	3.1	4.0	2.1	16	10	8.5	31.00	26.35
LBS-42	42	2.1	3.3	1.9	14*	10	8.5	21.00	17.85
LBS-50	50	3.8	4.9	2.7	16	10	8.5	38.00	32.30
LBS-55	55	1.6	2.6	1.2	8*	10	8.5	16.00	13.60
LBS-62	62	2.4	3.8	2.1	10*	10	8.5	24.00	20.40

Design Criteria:

Loads based on LBS Cover-All building with both ends enclosed.

Loads are given for maximum allowed bay spacing of each LBS frame type

Wind Speed: 90 mph, Exposure C

Ground Snow Load 25 psf

Thermal Factor $C_t = 1.0$

Table is for Class A-4 Assembly Arenas, and Storage/Agriculture Buildings.

For other Building types consult Cover-All Engineer.

Notes:

The design follows IBC 2003 and ASCE-7-02

Exposure C is usually recommended for Cover-All Buildings; for Exposure B or D, consult Engineer

Perma-Column lever arm is taken from poimt of load (top of post) to grade.

Wood Post lever arm is taken from point of load to top of the Perma-Column's steel connection bracket.

⁶ Maximum allowed bay spacing, wind load exceeds frame ratings for bays any larger.

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Table: B1 LBS-18 Po	Recommost Mount	ended Buildi	Lamin ng, 8'	ated P Overal	ost and Perm I Post Height	na-Column	Sizes for	Cover-All I	_egend Bu	iilding Seri	es (LBS)		Revised 7/19/06
								Prop	erties				
						3-ply	y 2x8	4-ply	/ 2x8	5-ply	/ 2x8		
						Area (in ²)	27.84	Area (in ²)	37.13	Area (in ²)	46.41		
						S _y (in³)	31.30	S _x (in³)	34.03	S _x (in³)	53.17		
Cover-All	Bay	Des	sign Lo	ads	Glulam Post	Bending	Axial	Bending	Axial	Bending	Axial	Required	Required
Model No.	Spacing	Horiz.	Down	Up	Moment	Stress F_{b}	Stress F_c	Stress F_{b}	Stress F_c	Stress F_b	Stress F_c	Laminated Post	Perma-Column
	(feet)	(kips)	(kips)	(kips)	(ft·kips)	(psi)	(psi)	(psi)	(psi)	(psi)	(psi)	Size	Size
LBS-18	16					Bay Spa	cing Not A	llowed, Wi	ind Load E	xceeds Fr	ame Rating	g	
	14					Bay Spa	cing Not A	llowed, Wi	nd Load E	xceeds Fr	ame Ratin	g	•
	12	1.3	1.4	1.1	7.8	2990	50	2751	38	1760	30	5-ply 2x8	Special*
	10	1.1	1.0	0.9	6.6	2530	36	2327	27	1490	22	4-ply 2x8	PC8400
	8	0.9	0.8	0.8	5.4	2070	29	1904	22	1219	1/	4-ply 2x8	PC8400
	5	0.7	0.6	0.6	4.Z 3.0	1010	18	1481	10	948 677	13	3-piy 2x8	PC8300
Design Cr	iteria:	0.5	0.5	0.5	5.0	1150	10	1000	10	011	11	3-piy 2x0	
Loads bas	ed on LBS	Cover	-All bu	ildina v	vith both ends	enclosed.							Y
Loads are	given for r	naximu	im allo	wed ba	y spacing of e	each LBS fr	ame type						
Wind Spee	ed: 90 mp	h, Expo	osure C	;									
Ground Sr	now Load 2	25 psf											1
Thermal F	actor C _t = 1	0.1											
Table is fo	r Class A-	4 Assei	mbly A	renas,	and Storage/A	Agriculture	Buildings.					X	XIIIIA
For other E	Building ty	pes cor	nsult Co	over-Al	I Engineer.								
Notes:													
The desigr	n follows IE	3C 200	3 and /	ASCE-	7-02								
Laminated	post inclu	de Glu	-Lam a	nd Nai	I-Lam posts.								Ý
Allowable	Glulam Be	ending S	Stress	$F_{b} = 24$	00 psi bent at	pout the X-a	axis, and 1	750 psi ben	t about the	Y-axis. Se	e Figure B		
Allowable	Glulam Ax	ial Stre	ess F _c =	= 1600	psi for compre	ession.							
* Perma-C ** Small ov	Column ste verstress,	el conr check v	nection with En	bracke gineer	et is not yet av	ailable for	this size po	st.					

Table: B2 Recommended Laminated Post and Perma-Column Sizes for Cover-All Legend Building Series (LBS) LBS-19 Post Mount Building, 8' Overall Post Height

Prepared by: Mark S. Servinsky, P.E.

Prepared for : Perma- Column, Inc., Ossian, Indiana

												1	
								Prop	erties				
						3-ply	y 2x8	4-ply	/ 2x8	5-ply	/ 2x8		
						Area (in ²)	27.84	Area (in ²)	37.13	Area (in ²)	46.41		
						S _y (in³)	31.30	S _x (in³)	34.03	S _x (in³)	53.17		
Cover-All	Bay	Des	sign Lo	ads	Glulam Post	Bending	Axial	Bending	Axial	Bending	Axial	Required	Required
Model No.	Spacing	Horiz.	Down	Up	Moment	Stress F _b	Stress F_c	Stress F_{b}	Stress F_c	Stress F_{b}	Stress F_c	Laminated Post	Perma-Column
	(feet)	(kips)	(kips)	(kips)	(ft⋅kips)	(psi)	(psi)	(psi)	(psi)	(psi)	(psi)	Size	Size
LBS-19	16	1.1	1.7	1.0	6.6	2530	61	2327	46	1490	37	4-ply 2x8	PC8400
	14	0.9	1.5	0.9	5.4	2070	54	1904	40	1219	32	4-ply 2x8	PC8400
	12	0.8	1.3	0.8	4.8	1840	47	1693	35	1083	28	4-ply 2x8	PC8400
	10	0.7	1.0	0.6	4.2	1610	36	1481	27	948	22	3-ply 2x8	PC8300
	8	0.5	0.8	0.5	3.0	1150	29	1058	22	677	17	3-ply 2x8	PC8300
	6	0.4	0.6	0.4	2.4	920	22	846	16	542	13	3-ply 2x8	PC8300
	5	0.3	0.5	0.3	1.8	690	18	635	13	406	11	3-ply 2x8	PC8300
Design Cr Loads bas	iteria: ed on LBS	Cover	-All bui	lding w	vith both ends	enclosed.							FIG B Y
Loads are	given for r	naximu	Im allov	ved ba	y spacing of e	each LBS fr	ame type					V7777777	
Wind Spee	ed: 90 mp	h, Expo	osure C										<u>X//////</u>
Ground Sr	low Load 2	25 pst											
I hermal F	actor $C_t = 1$	0.1										v///////	X/////////////////////////////////////
Table is fo	r Class A-	4 Asse	mbly A	renas,	and Storage/A	Agriculture	Buildings.						X//////
For other E	Building typ	pes cor	nsult Co	over-Al	l Engineer.								
Notes:													X/////
The design	n follows IE	3C 200	3 and A	ASCE-	7-02								
Laminated	post inclu	de Glu	-Lam a	nd Nai	I-Lam posts.								Ý
Allowable	Glulam Be	ending \$	Stress I	$F_{b} = 24$	00 psi bent at	pout the X-a	axis, and 17	750 psi ben	t about the	Y-axis. Se	e Figure B		
Allowable	Glulam Ax	ial Stre	ess F _c =	1600	psi for compre	ession.							

Revised 7/19/06

* Perma-Column steel connection bracket is not yet available for this size post.
 ** Small overstress, check with Engineer

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Table: B3	Recomm	ended	Lamin	ated P	ost and Pern	na-Column	Sizes for	Cover-All I	_egend Bu	ilding Seri	ies (LBS)		Revised 7/19/06
LBS-30 P	ost Mount	Buildi	ng, 8'	Overal	I Post Height								
Prepared	by: Mark	S. Ser	vinsky	, P.E.	scian Indiana								
Frepareu	IOI . Fem	ia- 001	unn, i	nc., Os	55ian, muiana	1							
								Prop	erties				
						3-ply	/ 2x8	4-ply	/ 2x8	5-ply	y 2x8		
						Area (in ²)	27.84	Area (in ²)	37.13	Area (in ²)	46.41		
						S _y (in ³)	31.3	$S_x(in^3)$	34.03	S _x (in ³)	53.17		
Cover-All	Bay	Des	sign Lo	ads	Glulam Post	Bending	Axial	Bending	Axial	Bending	Axial	Required	Required
Model No.	Spacing	Horiz.	Down	Up	Moment	Stress F _b	Stress F _c	Stress F _b	Stress F _c	Stress F _b	Stress F _c	Laminated Post	Perma-Column
	(feet)	(kips)	(kips)	(kips)	(ft·kips)	(psi)	(psi)	(psi)	(psi)	(psi)	(psi)	Size	Size
LBS-30	16	1.8	2.8	1.6	10.8	4141	101	3808	75	2437	60	5-ply 2x8**	Special*
	14	1.6	2.5	1.4	9.6	3681	90	3385	67	2167	54	5-ply 2x8	Special*
	12	1.4	2.1	1.2	8.4	3220	75	2962	57	1896	45	5-ply 2x8	Special*
	10	1.1	1.8	1.0	6.6	2530	65	2327	48	1490	39	4-ply 2x8	PC8400
	8	0.9	1.4	0.8	5.4	2070	50	1904	38	1219	30	4-ply 2x8	PC8400
	6	0.7	1.1	0.7	4.2	1610	40	1481	30	948	24	3-ply 2x8	PC8300
	5	0.6	0.9	0.5	3.6	1380	32	1269	24	812	19	3-ply 2x8	PC8300
Design Cr	iteria:												FIG B
Loads bas	ed on LBS	Cover	-All bu	ilding v	vith both ends	enclosed.							Y
Loads are	given for r	naximu	im allo	wed ba	ly spacing of e	each LBS fr	ame type					7//////	
Wind Spee	ed: 90 mp	h, Expo	osure C	;									
Ground Sr	IOW LOAD	25 psr											XIIIIIX
i nermai F	actor $C_t = 1$	1.0										x//////	X///////
Table is fo	r Class A-	4 Assei	mbly A	renas,	and Storage/A	Agriculture	Buildings.						
For other I	Building typ	pes cor	nsult Co	over-Al	l Engineer.								
Notes:			•										XIIIIA
The design	n follows IL	3C 200	3 and /	ASCE-	7-02								
Laminated	l post inclu	ide Glu	-Lam a	Ind Nai	I-Lam posts.						- : -		Ý
Allowable	Glulam Be	ending S	stress	$F_{b} = 24$	00 psi bent at	bout the X-a	axis, and 1	(50 psi ben	t about the	Y-axis. Se	e Figure B	•	
Allowable	Glulam Ax	ial Stre	ss F _c =	= 1600	psi for compre	ession.							
^ Perma-C	Jolumn ste	el conr	nection	bracke	et is not yet av	vailable for	this size po	st.					
The Small ov	verstress,	cneck v	vith En	gineer									

Table: B4 Recommended Laminated Post and Perma-Column Sizes for Cover-All Legend Building Series (LBS)

LBS-32 Post Mount Building, 8' Overall Post Height

Prepared by: Mark S. Servinsky, P.E.

Prepared for : Perma- Column, Inc., Ossian, Indiana

									Prop	erties				1	
						3-pl	y 2x8	4-ply	y 2x8	5-pl	y 2x8	6-pl	y 2x8		
						Area (in ²)	27.84	Area (in ²)	37.13	Area (in ²)	46.41	Area (in ²)	55.69		
						S _y (in ³)	31.30	S _x (in ³)	34.03	S _x (in ³)	53.17	S _x (in ³)	76.57		
Cover-All	Bay	Des	sign Lo	ads	Glulam Post	Bending	Axial	Bending	Axial	Bending	Axial	Bending	Axial	Required	Required
Model No.	Spacing	Horiz.	Down	Up	Moment	Stress F _b	Stress F_c	Stress F _b	Stress F _c	Stress F _b	Stress F _c	Stress F _b	Stress F _c	Laminated Post	Perma-Column
	(feet)	(kips)	(kips)	(kips)	(ft-kips)	(psi)	(psi)	(psi)	(psi)	(psi)	(psi)	(psi)	(psi)	Size	Size
LBS-32	16	2.0	3.2	1.5	12.0	4601	115	4232	86	2708	69	1881	57	6-ply 2x8	Special*
	14	1.8	2.8	1.4	10.8	4141	101	3808	75	2437	60	1693	50	5-ply 2x8**	Special*
	12	1.5	2.4	1.2	9.0	3450	86	3174	65	2031	52	1410	43	5-ply 2x8	Special*
	10	1.3	2.0	1.0	7.8	2990	72	2751	54	1760	43	1222	36	5-ply 2x8	Special*
	8	1.0	1.6	0.8	6.0	2300	57	2116	43	1354	34	940	29	4-ply 2x8	PC8400
	6	0.8	1.2	0.6	4.8	1840	43	1693	32	1083	26	752	22	4-ply 2x8	PC8400
	5	0.6	1.0	0.8	3.6	1380	36	1269	27	812	22	564	18	3-ply 2x8	PC8300
Loads bas Loads are Wind Spee Ground Sr Thermal F	ed on LBS given for r ed: 90 mp now Load 2 actor Ct= 2	Cover maximu h, Expo 25 psf 1.0	-All bui m allow osure C	lding v ved ba	vith both ends y spacing of e	enclosed. each LBS fr	ame type							x	
Table is fo For other I Notes: The design Laminated Allowable * Perma	r Class A- Building ty n follows If I post inclu Glulam Be Glulam Ax Column ste	4 Asser pes cor BC 2003 Ide Glu- ending S cial Stre eel conr	mbly Ai isult Co 3 and A Lam a Stress F ss $F_c =$	Scerver-Al Scerver-Al ASCE- nd Nai $F_b = 24$ 1600 bracke	and Storage// I Engineer. 7-02 I-Lam posts. .00 psi bent at psi for compre et is not yet av	Agriculture boout the X-a ession. railable for	Buildings. axis, and 1 [°] this size pc	750 psi ben ost.	it about the	Y-axis. Se	e Figure B				Y

** Small overstress, check with Engineer

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Revised 7/19/06

Table: B5 Recommended Laminated Post and Perma-Column Sizes for Cover-All Legend Building Series (LBS)

LBS-36 Post Mount Building, 8' Overall Post Height Prepared by: Mark S. Servinsky, P.E. Prepared for : Perma- Column, Inc., Ossian, Indiana

									Prop	erties					
						3-ply	y 2x8	4-pl	y 2x8	5-ply	/ 2x8	6-ply	/ 2x8		
						Area (in ²)	27.84	Area (in ²)	37.13	Area (in ²)	46.41	Area (in ²)	55.69		
						S _y (in ³)	31.30	S _x (in ³)	34.03	S _x (in ³)	53.17	S _x (in ³)	76.57		
Cover-All	Bay	Des	sign Lo	ads	Glulam Post	Bending	Axial	Bending	Axial	Bending	Axial	Bending	Axial	Required	Required
Model No.	Spacing	Horiz.	Down	Up	Moment	Stress F _b	Stress F _c	Stress F _b	Stress F _c	Stress F _b	Stress F_c	Stress F _b	Stress F_c	Laminated Post	Perma-Column
	(feet)	(kips)	(kips)	(kips)	(ft·kips)	(psi)	(psi)	(psi)	(psi)	(psi)	(psi)	(psi)	(psi)	Size	Size
LBS-36	16	2.0	3.0	1.9	12.0	4601	108	4232	81	2708	65	1881	54	6-ply 2x8	Special*
	14	1.7	2.0	1.7	10.2	3911	72	3597	54	2302	43	1599	36	5-ply 2x8	Special*
	12	1.5	2.3	1.4	9.0	3450	83	3174	62	2031	50	1410	41	5-ply 2x8	Special*
	10	1.2	1.9	1.2	7.2	2760	68	2539	51	1625	41	1128	34	5-ply 2x8	Special*
	8	1.0	1.5	1.0	6.0	2300	54	2116	40	1354	32	940	27	4-ply 2x8	PC8400
	6	0.7	1.1	0.7	4.2	1610	40	1481	30	948	24	658	20	3-ply 2x8	PC8300
	5	0.6	0.9	0.6	3.6	1380	32	1269	24	812	19	564	16	3-ply 2x8	PC8300
Design Cr Loads bas Loads are Wind Spee Ground Sr Thermal Fa	ed on LBS given for r ed: 90 mp now Load 2 actor C _t = 1	S Cover maximu h, Expo 25 psf 1.0	-All bui Im allov osure C	lding w wed ba	vith both ends y spacing of e	enclosed. each LBS fr	ame type								FIG B
Table is fo For other E Notes: The desigr Laminated	r Class A- Building ty n follows II I post inclu	4 Assei pes cor BC 200 ide Glu	mbly Ai isult Co 3 and A -Lam a	renas, over-Al ASCE- ⁻ nd Nai	and Storage// I Engineer. 7-02 I-Lam posts.	Agriculture	Buildings.								×
Allowable	Glulam Be	ending §	Stress I	= _b = 24	00 psi bent at	bout the X-a	axis, and 1 [°]	750 psi ben	t about the	Y-axis. Se	e Figure B				
Allowable * Perma-C ** Small ov	Glulam Ax Column ste verstress.	kial Stre eel conr check v	ss F _c = nection vith En	1600 bracke gineer	psi for compre et is not yet av	ession. vailable for t	this size po	ost.							

FOR ESTIMATING ONLY-NOT FOR FINAL DESIGN

Servinsky Engineering PLLC Holland, MI is not the Engineer of record unless contracted for a specific project.

Revised 7/19/06

Table: B6	Recomm	ended	Lamin	ated P	ost and Perm	na-Column	Sizes for	Cover-All I	_egend Bu	ilding Seri	es (LBS)		Revised 7/19/06
LBS-40 Pe	ost Mount	S Sor	ng, 8' vincky		I Post Height								
Prepared	for · Perm	3. Jei Da- Col	vinsky umn li	,Γ.⊑. nc Ωs	sian Indiana								
repared			unn, n	no., oc		•							
								Prop	erties				
						4-ply	/ 2x8	5-ply	/ 2x8	6-ply	/ 2x8		
						Area (in ²)	37.13	Area (in ²)	46.41	Area (in ²)	55.69		
						S _x (in ³)	34.03	$S_x(in^3)$	53.17	$S_x(in^3)$	76.57		
Cover-All	Bay	De	sign Lo	ads	Glulam Post	Bending	Axial	Bending	Axial	Bending	Axial	Required	Required
Model No.	Spacing	Horiz.	Down	Up	Moment	Stress F _b	Stress F _c	Stress F _b	Stress F _c	Stress F _b	Stress F _c	Laminated Post	Perma-Column
	(feet)	(kips)	(kips)	(kips)	(ft⋅kips)	(psi)	(psi)	(psi)	(psi)	(psi)	(psi)	Size	Size
LBS-40	16				Bay	Spacing	Not Recom	nmended, l	Jnpractica	l Number o	of Plys Re	quired	
	14				Bay	Spacing	Not Recom	nmended, l	Jnpractica	I Number of	of Plys Re	quired	
	12	2.3	3.0	1.6	13.8	4866	81	3115	65	2163	54	6-ply 2x8	Special*
	10	1.9	2.5	1.3	11.4	4020	67	2573	54	1787	45	6-ply 2x8	Special*
	8	1.5	2.0	1.1	9.0	3174	54	2031	43	1410	36	5-ply 2x8	Special*
	6	1.1	1.5	0.8	6.6	2327	40	1490	32	1034	27	4-ply 2x8	PC8400
	5	1.0	1.2	0.7	6.0	2116	32	1354	26	940	22	4-ply 2x8	PC8400
Design Cr	riteria:												FIG B
Loads bas	ed on LBS	Cover	-All bu	ilding w	ith both ends	enclosed.							Y
Loads are	given for r	naximu	im allo	wed ba	y spacing of e	each LBS fr	ame type					7777777	
Wind Spee	ed: 90 mp	h, Expo	osure C	;									X//////
Ground Sr	how Load 2	25 pst											
Thermal F	actor $C_t = 2$	0.1										v	X///////
Table is fo	r Class A-	4 Asse	mbly A	renas,	and Storage/A	Agriculture	Buildings.					^ \///////	<u> </u>
For other I	Building ty	pes cor	nsult Co	over-Al	I Engineer.								
Notes:													
The desig	n follows II	3C 200	3 and /	ASCE-	7-02								
Laminated	l post inclu	de Glu	-Lam a	nd Nai	I-Lam posts.								Ý
Allowable	Glulam Be	ending \$	Stress	$F_{b} = 24$	00 psi bent at	bout the X-a	axis, and 17	750 psi ben	t about the	Y-axis. Se	e Figure B		
Allowable	Glulam Ax	ial Stre	ess F _c =	1600	psi for compre	ession.							
* Perma-0	Column ste	el coni	nection	bracke	et is not yet av	ailable for	this size po	st.					
** Small ov	verstress,	check \	with En	gineer	-								

Table: B7	Recommost Mount	ended	Lamin	ated P	ost and Perm	na-Column	Sizes for	Cover-All I	_egend Bu	ilding Seri	es (LBS)		Revised 7/19/06
Prenared	bv Mark	S Ser	vinskv		ir Fost Height								
Prepared	for : Perm	na- Col	umn. l	, <u>–</u> . nc Os	ssian. Indiana	1							
			·····, ··	,	,	-						_	
								Prop	erties				
						4-ply	/ 2x8	5-ply	/ 2x8	6-ply	y 2x8		
						Area (in ²)	37.13	Area (in ²)	46.41	Area (in ²)	55.69		
						$S_x(in^3)$	34.03	$S_x(in^3)$	53.17	$S_x(in^3)$	76.57		
Cover-All	Bay	Des	sign Lo	ads	Glulam Post	Bending	Axial	Bending	Axial	Bending	Axial	Required	Required
Model No.	Spacing	Horiz.	Down	Up	Moment	Stress F _b	Stress F_c	Stress F _b	Stress F_c	Stress F _b	Stress F_c	Laminated Post	Perma-Column
	(feet)	(kips)	(kips)	(kips)	(ft⋅kips)	(psi)	(psi)	(psi)	(psi)	(psi)	(psi)	Size	Size
LBS-42	16				•	Bay Spa	cing Not A	llowed, Wi	nd Load E	xceeds Fr	ame Ratin	g	
	14	2.1	4.2	1.9	12.6	4443	113	2844	90	1975	75	6-ply 2x8	Special*
	12	1.8	3.6	1.6	10.8	3808	97	2437	78	1693	65	5-ply 2x8**	Special*
	10	1.5	3.0	1.3	9.0	3174	81	2031	65	1410	54	5-ply 2x8	Special*
	8	1.2	2.4	1.1	7.2	2539	65	1625	52	1128	43	5-ply 2x8	Special*
	6	0.9	1.8	0.8	5.4	1904	48	1219	39	846	32	4-ply 2x8	PC8400
	5	0.8	1.5	0.7	4.8	1693	40	1083	32	752	27	4-ply 2x8	PC8400
Design Cr	riteria:	_											FIG B
Loads bas	ed on LBS	Cover	-All bu	ilding v	vith both ends	enclosed.							Y
Loads are	given for r	naximu	im allo	wed ba	iy spacing of e	each LBS fr	ame type					7777777	
Wind Spee	ed: 90 mp	h, Expo	osure C	;									
Ground Sr	now Load A	25 psr											X/////
i nermai F	actor $C_t =$	1.0										x	X/////////////////////////////////////
Table is fo	or Class A-	4 Asse	mbly A	renas,	and Storage/A	Agriculture	Buildings.						
For other I	Building ty	pes cor	nsult Co	over-Al	ll Engineer.								
Notes:	a falloura II		ا ممط		7.00								XIIIIA
The design	n IOIIOWS II Leost ieolu	30 200 de Clu	Jama /	ASCE-	/-UZ								
	Clulom Bo	ue Giu	-Lam a		I-Lam posis.	out the V	avia and 1 ⁻	750 nai han	t about the	V avia Sa	o Figuro P		Y
Allowable				r _b = 24			axis, anu n	rou poi ben	t about the	1-axis. Se	e rigule b	•	
Allowable	Giulam Ax	ial Stre	ess ⊦ _c =	= 1600	psi for compre	ession.							
* Perma-0	Column ste	el conr	nection	bracke	et is not yet av	ailable for	this size po	st.					
** Small ov	verstress,	check v	with En	gineer									

Table: B8	Recomm	ended	Lamin	ated P	ost and Perm	na-Column	Sizes for	Cover-All L	.egend Bu	ilding Seri	es (LBS)		Revised 7/19/06	
LBS-50 Po	ost Mount	Buildi	ng, 8' (Overal	l Post Height									
Prepared	by: Mark	S. Ser	vinsky	, P.E.										
Prepared	for : Perm	na- Col	umn, lı	nc., Os	sian, Indiana	1								
								Prop	ortios			1		
						4-nlv	1 2 8	5-nlv	1 2 2 8	6-nlv	1 2 8			
						4 pr	27 12		16 11	$\Delta rop (in2)$	55 60			
						$S(in^3)$	37.13	$S(in^3)$	40.41 52.47	$S(in^3)$	76.57			
0	5						34.03		55.17	O _x (iii)	10.57		.	
Cover-All	Bay	Des	sign Lo	ads	Glulam Post	Bending	Axial	Bending	Axial	Bending	Axial	Required	Required	
Model No.	Spacing	Horiz.	Down	Up	Moment	Stress F _b	Stress F _c	Stress F _b	Stress F _c	Stress F _b	Stress F _c	Laminated Post	Perma-Column	
	(feet)	(kips)	(kips)	(kips)	(ft-kips)	(psi)	(psi)	(psi)	(psi)	(psi)	(psi)	Size	Size	
LBS-50	16				Bay	/ Spacing I	Not Recom	mended, l	Inpractica	I Number of	of Plys Re	quired		
	14 Bay Spacing Not Recommended, Unpractical Number of Plys Required 12 Bay Spacing Not Recommended, Unpractical Number of Plys Required													
	12	2.4	2.0	47	Вау 144	5070		menaea, l	Jnpractica			quirea	Special*	
	10 8	2.4	3.0	1.7	14.4	3076 4020	65	3230	60 52	2237	04 /2	6-ply 2x8	Special Special*	
	6	1.9	2.4	1.3	11.4	4020	65	2573	52	1787	43	6-ply 2x8	Special*	
	8 1.9 2.4 1.3 11.4 4020 65 2573 52 1787 43 6-ply 2x8 Special* 6 1.9 2.4 1.3 11.4 4020 65 2573 52 1787 43 6-ply 2x8 Special* 5 1.9 2.4 1.3 11.4 4020 65 2573 52 1787 43 6-ply 2x8 Special*													
Desian Cr	iteria:											·		
Loads bas	ed on LBS	Cover	-All bui	ldina w	ith both ends	enclosed.							Y Y	
Loads are	given for r	naximu	um allov	wed ba	y spacing of e	each LBS fr	ame type							
Wind Spee	ed: 90 mp	h, Expo	osure C	;										
Ground Sr	now Load 2	25 psf											X///////	
Thermal F	actor C _t = 1	0.1												
Table is fo	r Class A-	4 Asse	mbly A	renas,	and Storage/A	Agriculture I	Buildings.					X //////	X//////X	
For other E	Building ty	pes cor	nsult Co	over-Al	l Engineer.	0	U							
Notes:					-								8//////	
The desigr	n follows IE	3C 200	3 and A	ASCE-7	7-02									
Laminated	post inclu	de Glu	-Lam a	nd Nai	I-Lam posts.								Ý	
Allowable	Glulam Be	ending \$	Stress I	F _b = 24	00 psi bent at	bout the X-a	axis, and 17	750 psi ben	t about the	Y-axis. Se	e Figure B			
Allowable	Glulam Ax	ial Stre	ess F _c =	1600	psi for compre	ession.								
* Perma-C	Column ste	el conr	nection	bracke	et is not vet av	ailable for t	this size po	st.						
** Small ov	verstress,	check v	with En	gineer	,									

Table: B9	Recomm	ended	Lamina	ated P	ost and Perm	na-Column	Sizes for	Cover-All L	_egend Bu	ilding Seri	es (LBS)		Revised 7/19/06	
LBS-55 Po	ost Mount	Buildi	ng, 8' (Overal	l Post Height									
Prepared	by: Mark	S. Serv	vinsky	, P.E.										
Prepared	for : Perm	na- Coli	umn, Ir	nc., Os	sian, Indiana	1								
								Prop	erties			1		
						4-ply	/ 2x8	5-plv	/ 2x8	6-ply	/ 2x8			
						Area (in ²)	37.13	Area (in ²)	46 41	Area (in ²)	55.69			
						$S_x(in^3)$	34.03	$S_x(in^3)$	53.17	$S_x(in^3)$	76.57			
Cover-All	Bay	Des	sign Lo	ads	Glulam Post	Bending	Axial	Bending	Axial	Bending	Axial	Required	Required	
Model No.	Spacing	Horiz.	Down	Up	Moment	Stress F _b	Stress F _c	Stress F _b	Stress F_c	Stress F _b	Stress F_c	Laminated Post	Perma-Column	
	(feet)	(kips)	(kips)	(kips)	(ft·kips)	(psi)	(psi)	(psi)	(psi)	(psi)	(psi)	Size	Size	
LBS-55	16					Bay Spa	cing Not A	llowed, Wi	nd Load E	xceeds Fra	ame Rating	g		
	14					Bay Spa	cing Not A	llowed, Wi	nd Load E	xceeds Fra	ame Rating	g		
12 Bay Spacing Not Allowed, Wind Load Exceeds Frame Rating 10 Bay Spacing Not Allowed, Wind Load Exceeds Frame Rating														
	10 Bay Spacing Not Allowed, Wind Load Exceeds Frame Rating 8 1.3 2.6 1.2 7.8 2751 70 1760 56 1222 47 5-ply 2x8 Special*													
	8 1.3 2.6 1.2 7.8 2751 70 1760 56 1222 47 5-ply 2x8 Special* 6 1.0 2.0 0.9 6.0 2116 54 1354 43 940 36 4-ply 2x8 PC8400													
8 1.3 2.6 1.2 7.8 2751 70 1760 56 1222 47 5-ply 2x8 Special* 6 1.0 2.0 0.9 6.0 2116 54 1354 43 940 36 4-ply 2x8 PC8400 5 0.0 4.0 0.7 4.0 4000 40 36 4-ply 2x8 PC8400														
	5	0.8	1.6	0.7	4.8	1693	43	1083	34	752	29	4-ply 2x8	PC8400	
Design Cr	iteria:	.	A II	المالية مرادا									FIG B	
Loads bas	ed on LBS		-All Dui	iaing w	lith both ends	enciosea.	ama tuna						Y 	
Luaus are	d: 00 mp	h Evno		veu ba	y spacing of e		ame type					<i>\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\</i>		
Ground Sr	ow Load 2	n, Expu 25 nsf	Sule C											
Thermal F	actor $C = 1$.0												
Table is fo	r Class A.	1 Δεερι		onae	and Storage//		Ruildinge					x {///////	X//////\ _X	
For other F	Ruilding tvi		nory 70	over-Al	l Engineer	griculture	Dullulligs.							
Notes:					gee									
The design	n follows IE	3C 200	3 and A	SCE-	7-02									
Laminated	post inclu	de Glu-	-Lam a	nd Nai	I-Lam posts.								Y	
Allowable	Glulam Be	nding S	Stress F	- b = 24	00 psi bent at	bout the X-a	axis, and 17	750 psi ben	t about the	Y-axis. Se	e Figure B		•	
Allowable	Glulam Ax	ial Stre	ss F _c =	1600	psi for compre	ession.		-			-			
* Perma-C	Column ste	el conr	nection	bracke	et is not vet av	ailable for	this size po	st.						
** Small ov	/erstress, (check v	vith Eng	gineer										

Table: B1 LBS-62 Po Prepared Prepared	0 Recomn ost Mount by: Mark for : Perm	nendeo Buildi S. Ser na- Col	d Lami ng, 8' vinsky umn, I	nated Overal , P.E. nc., Os	Post and Per I Post Height ssian, Indiana	ma-Colum	n Sizes for	[·] Cover-All	Legend B	uilding Se	ries (LBS)		Revised 7/19/06
								Prop	erties				
						4-ply	/ 2x8	5-ply	/ 2x8	6-ply	/ 2x8		
						Area (in ²)	37.13	Area (in ²)	46.41	Area (in ²)	55.69		
						S _x (in³)	34.03	S _x (in³)	53.17	S _x (in³)	76.57		
Cover-All	Bay	Des	sign Lo	ads	Glulam Post	Bending	Axial	Bending	Axial	Bending	Axial	Required	Required
Model No.	Spacing	Horiz.	Down	Up	Moment	Stress F _b	Stress F_c	Stress F _b	Stress F_c	Stress F _b	Stress F_c	Laminated Post	Perma-Column
	(feet)	(kips)	(kips)	(kips)	(ft·kips)	(psi)	(psi)	(psi)	(psi)	(psi)	(psi)	Size	Size
LBS-62	16					Bay Spa	cing Not A	llowed, Wi	nd Load E	xceeds Fr	ame Ratin	g	
	14					Bay Spa	cing Not A	llowed, Wi	nd Load E	xceeds Fr	ame Ratin	9	
	12	2.4	25	0.4	111	Eay Spa		110wed, WI		XCEEds Fr	ame Ratin		Special*
	10	2.4 1 0	3.5	2.1 17	14.4	2078	94 75	3230	75 60	2237	50 50	6-ply 2x8	Special*
	6	1.3	2.0	1.7	8.4	2962	57	1896	45	1316	38	5-ply 2x8	Special*
	5	1.2	1.7	1.0	7.2	2539	46	1625	37	1128	31	5-ply 2x8	Special*
Design Cr Loads bas Loads are Wind Spee Ground Sr Thermal F Table is fo For other I Notes: The design Laminated Allowable * Perma-C ** Small ov	riteria: eed on LBS given for r ed: 90 mp now Load 2 actor C _t = 1 or Class A Building typ n follows IE I post inclu Glulam Be Glulam Ax Column ster verstress	Cover naximu h, Expo 25 psf 1.0 4 Asser bes cor 3C 200 de Glu- nding S ial Stre eel conr check y	-All bui im allow osure C mbly A sult Co 3 and A -Lam a Stress I ss F _c = nection with Fn	Iding w wed ba renas, over-Al ASCE- nd Nai $F_b = 24$ 1600 bracke	vith both ends y spacing of e and Storage/A I Engineer. 7-02 I-Lam posts. 00 psi bent at psi for compre et is not yet av	enclosed. ach LBS fr Agriculture I bout the X-a ession. ailable for t	ame type Buildings. axis, and 17	750 psi ben st.	t about the	Y-axis. Se	e Figure B	x	FIG B

Table C1:	Perma-Co	lumn En	nbedment Dept	th for Cove	er-All Legend Bui	Iding Series (LBS)					Revised 7/18/06		
LBS-18 Pc	ost-Mount	Building	-		-									
Prepared	by: Mark	S. Servin	sky, P.E.											
For: Perm	a- Columr	n, Inc. Os	ssian, Indiana					_						
									Non-Co	onstrained	Cons	strained		
Cover-All	Bay	Horiz.	Augered hole	Assumed	Allowable lateral	Post Height	Lever	Α*	Calculated	Recommended	Calculated	Recommended		
Model No.	Spacing	Load	diameter	Depth	Soil Bearing	Above Grade	Arm		Ground Embedment	Perma-Column Length	Ground Embedment	Perma-Column Length		
	(feet)	(kips)	b (feet)	(feet)	Pressure S (psf)	(feet)	(feet)		(feet)	(feet)	(feet)	(feet)		
LBS-18	16					Bay Spacing	Not A	llowe	d, Wind Load Exceed	Is Frame Rating				
14 Bay Spacing Not Allowed, Wind Load Exceeds Frame Rating														
12 1.3 2 5 798 8 6.5 1.91 4.7 Standard 4.7 Standard														
	12 1.0 2 5 798 8 6.5 1.61 4.3 Standard 4.4 Standard													
	10 1.1 2 5 795 6 6.5 1.61 4.3 Standard 4.4 Standard 8 0.9 2 5 798 8 6.5 1.32 4 Standard 4 Standard													
	8 0.9 2 5 798 8 6.5 1.32 4 Standard 4 Standard 6 0.7 2 5 798 8 6.5 1.03 4 Standard 4 Standard													
	5	0.5	2	5	798	8	6.5	0.73	4	Standard	4	Standard		
Thermal Fa Table is for Minimum M Standard F Recommer Perma-Clo 18",24", an	Sround Snow Load 25 psf Thermal Factor Ct= 1.0 Table is for Class A-4 Assembly Arenas, and Storage/Agriculture Buildings. For other Building types consult Cover-All Engineer Vinimum hole diameter is 24 inches. Vinimum Ground Embedment should be no less than 4 feet unless otherwise specified. Standard Perma-Column length is 5' plus 3½" concrete base. Recommended Column length is based on standard Perma-Column with 8" above grade and a 4'-7½" embedment (including base). See Figure E. Perma-Cloumn requires an extension if Calculated Embedment exceeds 5'. 18",24", and 36" extensions are available													
The design Embedmer Allowable I For all othe S is increase * A is a cor	The design follows IBC 2003 and ASCE-7-02 nbedment formulas are per IBC 2003 Section 1805.7.2.1, and 1805.7.2.2; Constrained and Non-Constrained conditions lowable lateral Soil Bearing Pressure (S) is based on assumed depth and IBC Table 1804.2 for Sand, silt, and gravel conditions. or all other soil conditions, consult with Engineer. is increased by 33% for wind allowable per IBC Section 1804. A is a constant given by the equation (2.34 x Horz. load)/(S x b) BASE SUPPORT													

Table C2:	C2: Perma-Column Embedment Depth for Cover-All Legend Building Series (LBS) Revised 7/18/06													
LBS-19 Po	S-19 Post-Mount Building													
Prepared b	oy: Mark	S. Servin	sky, P.E.											
For: Perma	a- Columr	n, Inc. Os	sian, Indiana											
									Non-Co	onstrained	Cons	strained		
Cover-All	Bay	Horiz.	Augered hole	Assumed	Allowable lateral	Post Height	Lever	A *	Calculated	Recommended	Calculated	Recommended		
Model No.	Spacing	Load	diameter	Depth	Soil Bearing	Above Grade	Arm		Ground Embedment	Perma-Column Length	Ground Embedment	Perma-Column Length		
	(feet)	(kips)	b (feet)	(feet)	Pressure S (psf)	(feet)	(feet)		(feet)	(feet)	(feet)	(feet)		
LBS-19	16	1.1	2	5	798	8	6.5	1.61	4.3	Standard	4.4	Standard		
	14 0.9 2 5 798 8 6.5 1.32 4 Standard 4 Standard 12 0.8 2 5 798 8 6.5 1.12 4 Standard 4 Standard													
	12 0.8 2 5 798 8 6.5 1.17 4 Standard 4 Standard													
	12 0.0 2 3 790 6 0.3 1.17 4 Standard 4 Standard 10 0.7 2 5 798 8 6.5 1.03 4 Standard 4 Standard													
	10 0.7 2 5 798 8 6.5 1.03 4 Standard 4 Standard 8 0.5 2 5 798 8 6.5 0.73 4 Standard 4 Standard													
	6	0.4	2	5	798	8	6.5	0.59	4	Standard	4	Standard		
	5	0.3	2	5	798	8	6.5	0.44	4	Standard	4	Standard		
Ground Sn Thermal Fa Table is for	ow Load 2 actor Ct= 1 · Class A-4	:5 pst .0 L Assembl	v Arenas, and	Storage/Ac	riculture Buildings	For other Bui	ildina t	vnesi	consult Cover-All Engi	neer	STEEL BRACKI	ET - T		
Minimum h	ole diamet	er is 24 ir	nches	otorage//tg	neutrale Dunanigs		nung t	ypes						
Minimum (Ground Fm	bedment	should be no le	ess than 4 f	eet unless otherwi	se specified.								
Standard P	erma-Colu	umn lengt	h is 5' plus 3½"	concrete b	ase.									
Recommer	nded Colur	nn length	is based on sta	andard Per	ma-Column with 8	above grade	and a	4'-7½"	embedment (including	g base). See Figure E.				
Perma-Clo	umn requi	res an ext	ension if Calcu	lated Embe	dment exceeds 5					. , .	뉟	4 ^y F		
18",24", an	d 36" exte	nsions are	e available								PERMA-COLUMN	<u>ب</u> والم		
Notes:														
The design	follows IB	C 2003 a	nd ASCE-7-02											
Embedmer	nt formulas	are per l	BC 2003 Section	on 1805.7.2	.1, and 1805.7.2.2	2; Constrained	and N	on-Co	nstrained conditions					
Allowable I	lowable lateral Soil Bearing Pressure (S) is based on assumed depth and IBC Table 1804.2 for Sand, silt, and gravel conditions.													
For all othe	or all other soil conditions, consult with Engineer.													
S is increas	s is increased by 33% for wind allowable per IBC Section 1804.													
[•] A is a cor	istant give	n by the e	equation (2.34 x	Horz. load	i)/(S X b)						~	BASE SUPPORT		

Table C3:	Perma-Co	lumn Em	bedment Dep	th for Cove	er-All Legend Bui	Iding Series (LBS)					Revised 7/18/06	
LBS-30 Pc	st-Mount	Building	-		-		-						
Prepared I	oy: Mark	S. Servin	sky, P.E.										
For: Perma	a- Columr	n, Inc. Os	ssian, Indiana										
									Non-Co	onstrained	Cons	strained	
Cover-All	Bay	Horiz.	Augered hole	Assumed	Allowable lateral	Post Height	Lever	A *	Calculated	Recommended	Calculated	Recommended	
Model No.	Spacing	Load	diameter	Depth	Soil Bearing	Above Grade	Arm		Ground Embedment	Perma-Column Length	Ground Embedment	Perma-Column Length	
	(feet)	(kips)	b (feet)	(feet)	Pressure S (psf)	(feet)	(feet)		(feet)	(feet)	(feet)	(feet)	
LBS-30	16	1.8	2	5	798	8	6.5	2.64	5.8	Standard + 18" Ext.	5.6	Standard + 18" Ext.	
	14	1.6	2	5	798	8	6.5	2.35	5.4	Standard + 18" Ext.	5.3	Standard + 18" Ext.	
	12	1.4	2	5	798	8	6.5	2.05	5.0	Standard	4.9	Standard	
	10	1.1	2	5	798	8	6.5	1.61	4.3	Standard	4.4	Standard	
	8	0.9	2	5	798	8	6.5	1.32	4	Standard	4	Standard	
	6	0.7	2	5	798	8	6.5	1.03	4	Standard	4	Standard	
	5	0.6	2	5	798	8	6.5	0.88	4	Standard	4	Standard	
Thermal Fa Table is for Minimum h Minimum G Standard F	actor Ct= 1 Class A-4 ole diame Ground Em Perma-Colu	.0 Assembl ter is 24 ir bedment umn lengt	ly Arenas, and nches. should be no le h is 5' plus 3½"	Storage/Ag ess than 4 f concrete b	riculture Buildings eet unless otherwi ase.	. For other Bu	ilding t	ypes o	consult Cover-All Engi	neer	GR		
Recommer Perma-Clo 18",24", an	andard Perma-Column length is 5' plus 3½" concrete base. ecommended Column length is based on standard Perma-Column with 8" above grade and a 4'-7½" embedment (including base). See Figure E. erma-Cloumn requires an extension if Calculated Embedment exceeds 5'. 3",24", and 36" extensions are available												
Notes: The design Embedmer Allowable I For all othe	follows IE nt formulas ateral Soil er soil conc	C 2003 a are per l Bearing F litions, co	nd ASCE-7-02 BC 2003 Sectio Pressure (S) is nsult with Engi	on 1805.7.2 based on a	.1, and 1805.7.2.2 ssumed depth and	2; Constrained d IBC Table 18	and No 04.2 fc	on-Co or San	nstrained conditions d, silt, and gravel cond	litions.			
S is increas * A is a cor	sed by 33%	% for wind n by the e	l allowable per equation (2.34 >	IBC Section Horz. load	n 1804. I)/(S x b)							BASE SUPPORT	

Table C4:	Perma-Co	olumn Em	bedment Dept	h for Cove	er-All Legend Bui	ilding Series (LBS)					Revised 7/18/06		
LBS-32 Po	j-32 Post-Mount Building pared by: Mark S. Servinsky, P.E.													
Prepared I	oy: Mark	S. Servin	sky, P.E.											
For: Perma	a- Columr	n, Inc. Os	sian, Indiana					_						
									Non-Co	onstrained	Cons	strained		
Cover-All	Bay	Horiz.	Augered hole	Assumed	Allowable lateral	Post Height	Lever	A *	Calculated	Recommended	Calculated	Recommended		
Model No.	Spacing	Load	diameter	Depth	Soil Bearing	Above Grade	Arm		Ground Embedment	Perma-Column Length	Ground Embedment	Perma-Column Length		
	(feet)	(kips)	b (feet)	(feet)	Pressure S (psf)	(feet)	(feet)		(feet)	(feet)	(feet)	(feet)		
LBS-32	16	2	2	6	931	8	6.5	2.51	5.7	Standard + 18" Ext.	5.4	Standard + 18" Ext.		
	14	1.8	2	6	931	8	6.5	2.26	5.3	Standard + 18" Ext.	5.2	Standard + 18" Ext.		
	12	1.5	2	5	798	8	6.5	2.20	5.2	Standard + 18" Ext.	5.1	Standard + 18" Ext.		
	10	1.3	2	5	798	8	6.5	1.91	4.7	Standard	4.7	Standard		
	10 1.3 2 3 190 6 6.3 1.31 4.7 Standard 4.7 Standard 8 1 2 5 798 8 6.5 1.47 4.0 Standard 4.2 Standard													
	6	0.8	2	5	798	8	6.5	1.17	4	Standard	4	Standard		
	5	0.6	2	5	798	8	6.5	0.88	4	Standard	4	Standard		
Thermal Fa Table is for Minimum M Standard P Recommer Perma-Cloi 18",24", an Notes: The design Embedmer Allowable is	Streed So them, Exposure of Signal Source of Signal Source of Signal Source of Signal Source													
For all othe S is increased	er soil conc sed by 33%	litions, co % for wind	nsult with Engir allowable per	neer. IBC Sectior	ו 1804.									
* A is a cor	nstant give	n by the e	equation (2.34 x	Horz. load	l)/(S x b)							BASE SUPPORT		

Table C5:	Perma-Co	olumn Em	bedment Dept	th for Cove	er-All Legend Bui	Iding Series (LBS)					Revised 7/18/06		
LBS-36 Po	5-36 Post-Mount Building pared by: Mark S. Servinsky, P.E.													
Prepared I	oy: Mark	S. Servin	sky, P.E.											
For: Perma	a- Columr	n, Inc. Os	sian, Indiana					_						
									Non-Co	onstrained	Cons	strained		
Cover-All	Bay	Horiz.	Augered hole	Assumed	Allowable lateral	Post Height	Lever	A *	Calculated	Recommended	Calculated	Recommended		
Model No.	Spacing	Load	diameter	Depth	Soil Bearing	Above Grade	Arm		Ground Embedment	Perma-Column Length	Ground Embedment	Perma-Column Length		
	(feet)	(kips)	b (feet)	(feet)	Pressure S (psf)	(feet)	(feet)		(feet)	(feet)	(feet)	(feet)		
LBS-36	16	2	2	6	931	8	6.5	2.51	5.7	Standard + 18" Ext.	5.4	Standard + 18" Ext.		
	14	1.7	2	5	798	8	6.5	2.49	5.6	Standard + 18" Ext.	5.4	Standard + 18" Ext.		
	12	1.5	2	5	798	8	6.5	2.20	5.2	Standard + 18" Ext.	5.1	Standard + 18" Ext.		
	10	1.2	2	5	798	8	6.5	1.76	4.5	Standard	4.6	Standard		
	10 1.2 2 5 195 6 6.5 1.76 4.5 Standard 4.6 Standard 8 1.0 2 5 798 8 6.5 1.47 4.0 Standard 4.2 Standard													
	6	0.7	2	5	798	8	6.5	1.03	4	Standard	4	Standard		
	5	0.6	2	5	798	8	6.5	0.88	4	Standard	4	Standard		
Thermal Fa Table is for Minimum M Standard P Recommer Perma-Clo 18",24", an Notes: The design Embedmer	incund Snow Load 25 psf hermal Factor Ct= 1.0 'able is for Class A-4 Assembly Arenas, and Storage/Agriculture Buildings. For other Building types consult Cover-All Engineer finimum Ground Embedment should be no less than 4 feet unless otherwise specified. 'atandard Perma-Column length is 5' plus 3½" concrete base. 'accommended Column length is based on standard Perma-Column with 8" above grade and a 4'-7½" embedment (including base). See Figure E. 'erma-Cloumn requires an extension if Calculated Embedment exceeds 5'. 8",24", and 36" extensions are available Iotes: 'he design follows IBC 2003 and ASCE-7-02 Embedment formulas are per IBC 2003 Section 1805.7.2.1, and 1805.7.2.2; Constrained and Non-Constrained conditions													
For all othe	or all other soil conditions, consult with Engineer. is increased by 33% for wind allowable per IBC Section 1804.													
AISALUI	istant yive	ii by the e	yualion (2.34 X									DASE SUPPORI		

LBS-40 Post-Mount Building Prepared by: Mark S. Servinsky, P.E. For: Perma-Column, Inc. Ossian, Indiana Cover-All Bay Horiz. Augered hole Assumed Allowable lateral Post Height Lever A Calculated Recommended Calculated Model No. Spacing Load diameter Depth Allowable lateral Post Height Lever A Ground Embedment Perma-Column Length Ground Embedment Ferma-Column, Length Ferma-Column, Length Ferma-Colum Ferma-Colum Ferma-Colu	Table C6: Perma-Column Embedment Depth for Cover-All Legend Building Series (LBS) Revised 7/18/0 LBS-40 Post-Mount Building Revised 7/18/0											Revised 7/18/06		
Prepared by: Mark S. Servinsky, P.E. For: Perma-Column, Inc. Ossian, Indiana Cover-All Bay (feet) Horiz. Augered hole Assumed diameter Allowable lateral Pressure S (psf) Post Height Calculated (feet) Recommended (feet) Recommended (feet) Calculated (feet) Recommended (feet	LBS-40 Po	-40 Post-Mount Building ared by: Mark S. Servinsky, P.E.												
For: Perma- Column, Inc. Ossian, Indiana Non-Constrained Constrained Constrained Calculated Recommended Calculated Recommende Calculated Recommende Calculated <th< th=""><th>Prepared I</th><th>oy: Mark</th><th>S. Servin</th><th>sky, P.E.</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></th<>	Prepared I	oy: Mark	S. Servin	sky, P.E.										
Cover-All Model No. Bay Load Horiz. Load Augered hole diameter Allowable lateral Depth Post Height Above Grade Lever Above Grade A* Calculated Ground Embedment Recommended (feet) Calculated Ground Embedment Recommended Ferma-Column Length Calculated Ground Embedment Recommended Ferma-Column Length Calculated Ground Embedment Recommended Ferma-Column Length Calculated Ferma-Column Length Calculater Ferma-Column Length Calculater Ferma-Column Length Calculater Ferma-Column Length Calculater Ferma-Column Length Calculater Ferma-Column Length Calculater Ferma-Column Length	For: Perma	a- Columr	n, Inc. Os	sian, Indiana					I	Non-Co	onstrained	Cons	strained	
Outbody Total <	Cover-All	Bay	Horiz	Augered hole	Assumed	Allowable lateral	Post Height	Lever	Δ*	Calculated	Recommended	Calculated	Recommended	
Integration Log M Deferit Clearly Pressure S (psi) Pressure S (psi) Pressure S (psi) Deferit Clearly	Model No	Spacing	Load	diameter	Denth	Soil Bearing	Above Grade	Arm		Ground Embedment	Perma-Column Length	Ground Embedment	Perma-Column Length	
LBS-40 16 3.1 2 7 1064 8 6.5 3.41 6.9 Standard + 24" Ext. 6.3 14 2.7 2 7 1064 8 6.5 3.41 6.9 Standard + 18" Ext. 5.9 12 2.3 2 6 931 8 6.5 2.97 6.3 Standard + 18" Ext. 5.8 10 1.9 2 6 931 8 6.5 2.39 5.5 Standard + 18" Ext. 5.3 8 1.5 2 5 798 8 6.5 1.61 4.3 Standard 4.4 5 1.0 2 5 798 8 6.5 1.41 4.0 Standard 4.2 Loads based on LBS Cover-All building with both ends enclosed. Wind Speed: 90 mph, Exposure C Ground Snow Load 25 psf Standard Perma-Column length is 5 plus 3/x" correte base. Recommended Column length is based on standard Perma-Column with 8" above grade and a 4'-7/x" embedment (including base). See Figure E. Perma-Column requires an extension if Calcula	model No.	(feet)	(kips)	b (feet)	(feet)	Pressure S (psf)	(feet)	(feet)		(feet)	(feet)	(feet)	(feet)	
14 2.7 2 7 1064 8 6.5 2.97 6.3 Standard + 18" Ext. 5.9 12 2.3 2 6 931 8 6.5 2.89 6.2 Standard + 18" Ext. 5.8 10 1.9 2 6 931 8 6.5 2.89 6.2 Standard + 18" Ext. 5.3 8 1.5 2 5 798 8 6.5 1.61 4.3 Standard 4.4 6 1.1 2 5 798 8 6.5 1.61 4.3 Standard 4.4 10 2 5 798 8 6.5 1.47 4.0 Standard 4.2 B 1.0 2 5 798 8 6.5 1.47 4.0 Standard 4.2 Design Criteria: Loads based on LBS Cover-All building with both ends enclosed. Winimum Corout Embedment bould be no less than 4 feet unless otherwis	LBS-40	16	3.1	2	7	1064	8	6.5	3.41	6.9	Standard + 24" Ext.	6.3	Standard + 18" Ext.	
12 2.3 2 6 931 8 6.5 2.89 6.2 Standard + 18" Ext. 5.8 10 1.9 2 6 931 8 6.5 2.39 5.5 Standard + 18" Ext. 5.3 8 1.5 2 5 798 8 6.5 2.20 5.2 Standard + 18" Ext. 5.1 6 1.1 2 5 798 8 6.5 1.61 4.3 Standard 4.4 Loads based on LBS Cover-All building with both ends enclosed. Wind Speed: 90 mph, Exposure C Standard 25 psf Standard Pseudord 25 psf		14	2.7	2	7	1064	8	6.5	2.97	6.3	Standard + 18" Ext.	5.9	Standard + 18" Ext.	
10 1.9 2 6 931 8 6.5 2.39 5.5 Standard + 18" Ext. 5.3 8 1.5 2 5 798 8 6.5 2.20 5.2 Standard + 18" Ext. 5.1 6 1.1 2 5 798 8 6.5 1.61 4.3 Standard 4.4 10 2 5 798 8 6.5 1.47 4.0 Standard 4.2 Design Criteria: Loads based on LBS Cover-All building with both ends enclosed. Wind Speed: 90 mph, Exposure C Ground Snow Load 25 psf Standard + 18" Ext. 5.3 Thermal Factor Ct= 1.0 Table is for Class A-4 Assembly Arenas, and Storage/Agriculture Buildings. For other Building types consult Cover-All Engineer Minimum hole diameter is 24 inches. Standard Perma-Column length is 5' plus 3½" concrete base. Recommended Column length is 5's dus 3½" concrete base. Standard Perma-Column requires an extension if Calculated Embedment exceeds 5'. 18",24", and 36" extensions are available PERMA-COLUMN Notes: The design follows IBC 2003 Section 1805.7.2.1, and 1805.7.2.2;		12	2.3	2	6	931	8	6.5	2.89	6.2	Standard + 18" Ext.	5.8	Standard + 18" Ext.	
8 1.5 2 5 798 8 6.5 2.20 5.2 Standard + 18" Ext. 5.1 6 1.1 2 5 798 8 6.5 1.61 4.3 Standard 4.4 Design Criteria: Loads based on LBS Cover-All building with both ends enclosed. Wind Speed: 90 mph, Exposure C Standard 4.2 Standard 4.2 Design Criteria: Loads based on LBS Cover-All building with both ends enclosed. Standard 4.2 Standard 4.2 Usads based on LBS Cover-All building with both ends enclosed. Standard Para Standard Para Standard Para Standard Para Standard Para Minimum Ground Embedment should be no less than 4 feet unless otherwise specified. Standard Perma-Column length is 5 plus 3/2" concrete base. Standard Perma-Column length is based on standard Perma-Column with 8" above grade and a 4'-7/2" embedment (including base). See Figure E. PERMA-COLUMN Notes: It and 36" extensions are available Perma-Column length is based on assumed depth and IBC Table 1804.2 for Sand, silt, and gravel conditions. Perma-ColuMN Allowable lateral Soil Bearing Pressure (S) is based on assumed depth and IBC Table 1804.2 for Sand, silt, and gravel conditions. Si is incorcreased by 33% for wind allowable one. Secorcreas		10	1.9	2	6	931	8	6.5	2.39	5.5	Standard + 18" Ext.	5.3	Standard + 18" Ext.	
6 1.1 2 5 798 8 6.5 1.61 4.3 Standard 4.4 Design Criteria: 1.0 2 5 798 8 6.5 1.47 4.0 Standard 4.2 Design Criteria: Loads based on LBS Cover-All building with both ends enclosed. Wind Speed: 90 mph, Exposure C Ground Snow Load 25 psf Steel BRACKET Thermal Factor Ct= 1.0 Table is for Class A-4 Assembly Arenas, and Storage/Agriculture Buildings. For other Building types consult Cover-All Engineer Steel BRACKET Minimum Ground Embedment should be no less than 4 feet unless otherwise specified. Standard Perma-Column length is 5' plus 3/4'' concrete base. Stee Figure E. Recommended Column length is based on standard Perma-Column with 8'' above grade and a 4'-7/2'' embedment (including base). See Figure E. PERMA-COLUMN Notes: It and 36'' extensions are available PERMA-COLUMN Notes: It and 380''s concrete S'. Standard Perma-Colum and Perma-Colum Note S'. It be design follows IBC 2003 and ASCE-7-02 Embedment formulas are per IBC 2003 Section 1805.7.2.2; Constrained and Non-Constrained conditions. For all other soil conditions, consult with Engineer. Allowable lateral Soil Bearing Pressure (S) is		8	1.5	2	5	798	8	6.5	2.20	5.2	Standard + 18" Ext.	5.1	Standard + 18" Ext.	
5 1.0 2 5 798 8 6.5 1.47 4.0 Standard 4.2 Design Criteria: Loads based on LBS Cover-All building with both ends enclosed. Wind Speed: 90 mph, Exposure C Ground Snow Load 25 psf STEEL BRACKET Thermal Factor Ct= 1.0 Table is for Class A-4 Assembly Arenas, and Storage/Agriculture Buildings. For other Building types consult Cover-All Engineer STEEL BRACKET Minimum Ground Embedment should be no less than 4 feet unless otherwise specified. Standard Perma-Column length is 5 [°] plus 3½" concrete base. GRAD Recommended Column length is based on standard Perma-Column with 8" above grade and a 4'-7½" embedment (including base). See Figure E. PERMA-COLUMN Notes: The design follows IBC 2003 and ASCE-7-02 Embedment formulas are per IBC 2003 Section 1805.7.2.1, and 1805.7.2.2; Constrained and Non-Constrained conditions Allowable lateral Soil Bearing Pressure (\$) is based on assumed depth and IBC Table 1804.2 for Sand, silt, and gravel conditions. Allowable lateral Soil Bearing Pressure (\$) is based on assumed depth and IBC Table 1804.2 for Sand, silt, and gravel conditions. For all other soil conditions, consult with Engineer.		6	1.1	2	5	798	8	6.5	1.61	4.3	Standard	4.4	Standard	
Design Criteria: Loads based on LBS Cover-All building with both ends enclosed. Wind Speed: 90 mph, Exposure C Ground Snow Load 25 psf Thermal Factor Ct= 1.0 Table is for Class A-4 Assembly Arenas, and Storage/Agriculture Buildings. For other Building types consult Cover-All Engineer Minimum hole diameter is 24 inches. Minimum Ground Embedment should be no less than 4 feet unless otherwise specified. Standard Perma-Column length is 5' plus 3½" concrete base. Recommended Column length is based on standard Perma-Column with 8" above grade and a 4'-7½" embedment (including base). See Figure E. Perma-Cloumn requires an extension if Calculated Embedment exceeds 5'. 18",24", and 36" extensions are available Notes: The design follows IBC 2003 and ASCE-7-02 Embedment formulas are per IBC 2003 Section 1805.7.2.1, and 1805.7.2.2; Constrained and Non-Constrained conditions. Allowable lateral Soil Bearing Pressure (S) is based on assumed depth and IBC Table 1804.2 for Sand, silt, and gravel conditions. For all other soil conditions, consult with Engineer. Sis is increased by 33% for wind allowable per IBC. Section 1804.		5	1.0	2	5	798	8	6.5	1.47	4.0	Standard	4.2	Standard	
Allowable lateral Soil Bearing Pressure (S) is based on assumed depth and IBC Table 1804.2 for Sand, silt, and gravel conditions. For all other soil conditions, consult with Engineer. S is increased by 33% for wind allowable per IBC Section 1804	Thermal Fa Table is for Minimum M Standard P Recommer Perma-Clo 18",24", an Notes: The design Embedmer	iround Snow Load 25 psf hermal Factor Ct= 1.0 able is for Class A-4 Assembly Arenas, and Storage/Agriculture Buildings. For other Building types consult Cover-All Engineer linimum hole diameter is 24 inches. linimum Ground Embedment should be no less than 4 feet unless otherwise specified. itandard Perma-Column length is 5' plus 3½" concrete base. lecommended Column length is based on standard Perma-Column with 8" above grade and a 4'-7½" embedment (including base). See Figure E. Perma-Cloumn requires an extension if Calculated Embedment exceeds 5'. 8",24", and 36" extensions are available lotes: the design follows IBC 2003 and ASCE-7-02 imbedment formulas are per IBC 2003 Section 1805 7.2.21 and 1805 7.2.22 Constrained and Non-Constrained conditions												
A is a constant given by the equation (2.2.4 × Here, local) (6 × h)	Allowable la For all othe S is increas													

Table C7:	Perma-Co	olumn Em	bedment Dept	th for Cove	er-All Legend Bui	Iding Series (I	LBS)					Revised 7/18/06		
LBS-42 Po	BS-42 Post-Mount Building													
Prepared I	by: Mark	S. Servin	sky, P.E.											
For: Perma	a- Columr	n, Inc. Os	ssian, Indiana					_						
									Non-Co	onstrained	Cons	strained		
Cover-All	Bay	Horiz.	Augered hole	Assumed	Allowable lateral	Post Height	Lever	A *	Calculated	Recommended	Calculated	Recommended		
Model No.	Spacing	Load	diameter	Depth	Soil Bearing	Above Grade	Arm		Ground Embedment	Perma-Column Length	Ground Embedment	Perma-Column Length		
	(feet)	(kips)	b (feet)	(feet)	Pressure S (psf)	(feet)	(feet)		(feet)	(feet)	(feet)	(feet)		
LBS-42	16					Bay Spacing	Not A	llowe	d, Wind Load Exceed	Is Frame Rating				
	14	1.7	2	5	798	8	6.5	2.49	5.6	Standard + 18" Ext.	5.4	Standard + 18" Ext.		
	12	1.8	2	5	798	8	6.5	2.64	5.8	Standard + 18" Ext.	5.6	Standard + 18" Ext.		
	10	1.5	2	5	798	8	6.5	2.20	5.2	Standard + 18" Ext.	5.1	Standard + 18" Ext.		
	10 1.5 2 5 798 8 6.5 2.20 5.2 Standard + 18" Ext. 5.1 Standard + 18" Ext. 8 1.2 2 5 798 8 6.5 1.76 4.5 Standard + 18" Ext. 5.1 Standard + 18" Ext.													
	6	0.9	2	5	798	8	6.5	1.32	4	Standard	4	Standard		
	5	0.8	2	5	798	8	6.5	1.17	4	Standard	4	Standard		
Ground Sn Thermal Fa Table is for Minimum M Standard P Recommer Perma-Clo 18",24", an Notes: The design Embedmer Allowable Ite For all other	ow Load 2 actor Ct= 1 Class A-4 ole diamet Ground Em Perma-Colu nded Colur umn requil d 36" exte follows IB follows IB at formulas ateral Soil er soil conc	55 psf .0 I Assembliter is 24 ir Ibedment Jumn lengt mn length res an ext nsions are 3C 2003 a s are per l Bearing F ditions, co	ly Arenas, and a should be no let h is 5' plus 3½" is based on sta ension if Calcu e available nd ASCE-7-02 BC 2003 Sectio Pressure (S) is l nsult with Engir	Storage/Ag ess than 4 f concrete b andard Peri lated Embe on 1805.7.2 based on a heer.	riculture Buildings eet unless otherwi ase. ma-Column with 8 adment exceeds 5' 2.1, and 1805.7.2.2 ssumed depth and	. For other Bui se specified. " above grade : 2; Constrained d IBC Table 186	ilding t and a and No 04.2 fc	ypes o 4'-7∕₂" on-Col or Sand	consult Cover-All Engi embedment (including nstrained conditions d, silt, and gravel cond	neer g base). See Figure E. litions.	STEEL BRACK			
* A is a cor	s increased by 33% for wind allowable per IBC Section 1804.													

Table C8: Perma-Column Embedment Depth for Cover-All Legend Building Series (LBS) Revised 7/18/06 LBS-50 Post-Mount Building Revised 7/18/06											Revised 7/18/06	
LBS-50 Po	-50 Post-Mount Building bared by: Mark S. Servinsky, P.E.											
Prepared b	by: Mark	S. Servin	sky, P.E.									
For: Perma	a- Columr	n, Inc. Os	sian, Indiana									
									Non-Co	onstrained	Cons	strained
Cover-All	Bay	Horiz.	Augered hole	Assumed	Allowable lateral	Post Height	Lever	Α*	Calculated	Recommended	Calculated	Recommended
Model No.	Spacing	Load	diameter	Depth	Soil Bearing	Above Grade	Arm		Ground Embedment	Perma-Column Length	Ground Embedment	Perma-Column Length
	(feet)	(kips)	b (feet)	(feet)	Pressure S (psf)	(feet)	(feet)		(feet)	(feet)	(feet)	(feet)
LBS-50	16	3.8	2	8	1197	8	6.5	3.71	7.3	Standard + 36" Ext.	6.6	Standard + 24" Ext.
	14	3.4	2	7	1064	8	6.5	3.74	7.3	Standard + 36" Ext.	6.6	Standard + 24" Ext.
	12	2.9	2	7	1064	8	6.5	3.19	6.6	Standard + 24" Ext.	6.1	Standard + 18" Ext.
	10	2.4	2	6	931	8	6.5	3.02	6.4	Standard + 18" Ext.	6.0	Standard + 18" Ext.
	8	1.9	2	5	798	8	6.5	2.79	6.0	Standard + 18" Ext.	5.7	Standard + 18" Ext.
	6	1.9	2	5	798	8	6.5	2.79	6.0	Standard + 18" Ext.	5.7	Standard + 18" Ext.
	5	1.9	2	5	798	8	6.5	2.79	6.0	Standard + 18" Ext.	5.7	Standard + 18" Ext.
Ground Sn Thermal Fa Table is for Minimum h Minimum G Standard P Recommer Perma-Clo 18",24", an	ow Load 2 actor Ct= 1 Class A-4 ole diame Ground Em Perma-Colu nded Colur umn requi d 36" exte	5 psf .0 4 Assembl ter is 24 ir bedment umn lengt mn length res an ext nsions are	y Arenas, and nches. should be no le h is 5' plus 3½" is based on sta ension if Calcu e available	Storage/Ag ess than 4 f concrete b andard Peri lated Embe	riculture Buildings eet unless otherwi ase. ma-Column with 8 dment exceeds 5	. For other Bu ise specified. " above grade	ilding t and a	ypes (4'-7½"	consult Cover-All Engin embedment (including	neer g base). See Figure E.	STEEL BRACK	
The design Embedmer Allowable I For all othe S is increas * A is a cor	a follows IE at formulas ateral Soil er soil cond sed by 339 astant give	C 2003 a are per l Bearing F ditions, co % for wind n by the e	nd ASCE-7-02 BC 2003 Sectio Pressure (S) is Insult with Engir allowable per equation (2.34 >	on 1805.7.2 based on a neer. IBC Section (Horz. load	.1, and 1805.7.2.2 ssumed depth and 1804.)/(S × b)	2; Constrained d IBC Table 18	and No 04.2 fc	on-Co or San	nstrained conditions d, silt, and gravel conc	litions.		BASE SUPPORT

Table C9:	Perma-Co	olumn En	nbedment Dept	th for Cove	er-All Legend Bui	Iding Series (I	_BS)					Revised 7/18/06		
LBS-55 Po	st-Mount	Building	l											
Prepared	by: Mark	S. Servin	isky, P.E.											
For: Perm	a- Columr	n, Inc. Os	ssian, Indiana											
									Non-Co	onstrained	Cons	strained		
Cover-All	Bay	Horiz.	Augered hole	Assumed	Allowable lateral	Post Height	Lever	A *	Calculated	Recommended	Calculated	Recommended		
Model No.	Spacing	Load	diameter	Depth	Soil Bearing	Above Grade	Arm		Ground Embedment	Perma-Column Length	Ground Embedment	Perma-Column Length		
	(feet)	(kips)	b (feet)	(feet)	Pressure S (psf)	(feet)	(feet)		(feet)	(feet)	(feet)	(feet)		
LBS-55	16					Bay Spacing	Not A	llowe	d, Wind Load Exceed	ds Frame Rating				
	14					Bay Spacing	Not A	llowe	d, Wind Load Exceed	ds Frame Rating				
	12					Bay Spacing	Not A	llowe	d, Wind Load Exceed	ds Frame Rating				
10 Bay Spacing Not Allowed, Wind Load Exceeds Frame Rating														
	8 1.3 2 5 798 8 6.5 1.91 4.7 Standard 4.7 Standard 6 1.4 2 5 798 8 6.5 1.91 4.7 Standard 4.7 Standard													
	6 1.0 2 5 798 8 6.5 1.47 4.0 Standard 4.2 Standard 6 1.0 2 5 798 8 6.5 1.47 4.0 Standard 4.2 Standard													
	5	0.8	2	5	798	8	6.5	1.17	4	Standard	4	Standard		
Ground Sn Thermal Fa Table is fo Minimum f Minimum C Standard F Recommen Perma-Clo 18",24", an Notes: The design Embedmen	Vind Speed: 90 mph, Exposure C For and Snow Load 25 psf Thermal Factor Ct= 1.0 Table is for Class A-4 Assembly Arenas, and Storage/Agriculture Buildings. For other Building types consult Cover-All Engineer Alinimum Ground Embedment should be no less than 4 feet unless otherwise specified. Standard Perma-Column length is 5' plus 3%" concrete base. Recommended Column length is 5' plus 3%" concrete base. Recommended Column length is based on standard Perma-Column with 8" above grade and a 4'-7%" embedment (including base). See Figure E. Perma-Cloumn requires an extension if Calculated Embedment exceeds 5'. 8",24", and 36" extensions are available Notes: The design follows IBC 2003 and ASCE-7-02 The design follows IBC 2003 Section 1805 7.2.21, and 1805 7.2.22. Constrained and Non-Constrained conditions.													
Allowable I For all othe S is increa * A is a co	ateral Soil er soil cond sed by 33%	Bearing I ditions, co % for winc on by the e	Pressure (S) is lonsult with Engired allowable per equation (2.34 >	based on a neer. IBC Sectior (Horz. load	n 1804.	BC Table 18)4.2 fc	r San	d, silt, and gravel conc	ditions.	_	BASE SUPPORT		

Table C10:	Perma-C	olumn Ei	mbedment Dep	oth for Cov	/er-All Legend Βι	uilding Series	(LBS)					Revised 7/18/06		
LBS-62 Po	BS-62 Post-Mount Building													
Prepared b	by: Mark S	S. Servin	sky, P.E.											
For: Perma	a- Column	i, Inc. Os	ssian, Indiana					_						
									Non-Co	onstrained	Cons	strained		
Cover-All	Bay	Horiz.	Augered hole	Assumed	Allowable lateral	Post Height	Lever	Α*	Calculated	Recommended	Calculated	Recommended		
Model No.	Spacing	Load	diameter	Depth	Soil Bearing	Above Grade	Arm		Ground Embedment	Perma-Column Length	Ground Embedment	Perma-Column Length		
	(feet)	(kips)	b (feet)	(feet)	Pressure S (psf)	(feet)	(feet)		(feet)	(feet)	(feet)	(feet)		
LBS-62	16					Bay Spacing	Not A	llowe	d, Wind Load Exceed	Is Frame Rating				
	14					Bay Spacing	Not A	llowe	d, Wind Load Exceed	Is Frame Rating				
12 Bay Spacing Not Allowed, Wind Load Exceeds Frame Rating														
10 2.4 2 6 931 8 6.5 3.02 6.4 Standard + 18" Ext 6.0 Standard + 18" Ext 0 4.4 0 5 700 8 6.5 9.27 9.4 5 9.7 9.4 5 9.7 9.4 9.4 5 9.7 9.4 <t< td=""></t<>														
	8 1.9 2 5 798 8 6.5 2.79 6.0 Standard + 18" Ext 5.7 Standard + 18" Ext													
	6 1.4 2 5 798 8 6.5 2.05 5.0 Standard + 18" Ext 4.9 Standard + 18" Ext 5 1.4 2 5 798 8 6.5 2.05 5.0 Standard + 18" Ext 4.9 Standard + 18" Ext													
	5	1.2	2	5	798	8	6.5	1.76	4.5	Standard	4.6	Standard		
Ground Spee Ground Sne Thermal Fa Table is for Minimum h Minimum G Standard P Recommen Perma-Clou 18",24", an Notes: The design Embedmen Allowable la For all othe S is increas	Loads based on LBS Cover-All building with both ends enclosed. Wind Speed: 90 mph, Exposure C Ground Snow Load 25 psf Thermal Factor Ct= 1.0 Table is for Class A-4 Assembly Arenas, and Storage/Agriculture Buildings. For other Building types consult Cover-All Engineer Minimum Ground Embedment should be no less than 4 feet unless otherwise specified. Standard Perma-Column length is 5' plus 3½" concrete base. Recommended Column length is 5 based on standard Perma-Column with 8" above grade and a 4'-7½" embedment (including base). See Figure E. Perma-Cloumn requires an extension if Calculated Embedment exceeds 5'. 18",24", and 36" extensions are available Notes: The design follows IBC 2003 and ASCE-7-02 Embedment formulas are per IBC 2003 Section 1805.7.2.1, and 1805.7.2.2; Constrained and Non-Constrained conditions. Allowable lateral Soil Bearing Pressure (S) is based on assumed depth and IBC Table 1804.2 for Sand, silt, and gravel conditions.													
* A is a con	stant give	n by the e	equation (2.34 x	Horz. load)/(S × b)						\sim	BASE SUPPORT		