HAYDEN ENGINEERS
STRUCTURAL | CIVIL

12480 SW 68th Ave.
Tigard, Oregon 97223
Phone: 503-968-9994
Fax: 503-968-8444

June 15, 2017

David Tarries
City of Portland
Bureau of Development Services
1900 SW 4th Ave #5000
Portland, OR 97201

Re: Loomis Residence
4550 NE Shaver St
Portland, OR

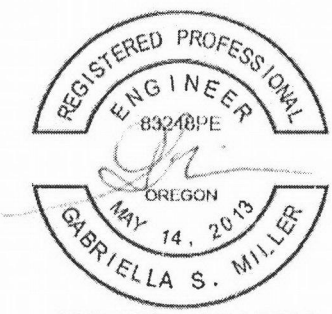
Project #17128

David,

~~This letter~~ is meant to address concerns you raised in the comments we received dated 6/12/17.

1. Sheets A40 and A70 appear to match the design intent of our calculations.
2. Holdowns have been added to the plans.
3. Page 16 of the calculations show diaphragm loading, including that of the offset shearwall. Reactions from this model were considered in the shearwall calculations.

If you have any questions, please do not hesitate to call.



EXPIRES: 12/31/2018

Sincerely,

Hayden Consulting Engineers, Inc.

By:
Shelby McKenna
Structural Designer

By:
Gabi Miller, P.E.
Principal

2

Structural Calculations
for
Addition at
4550 NE Shaver St
Portland, OR
April 19, 2017

17-105448 RS

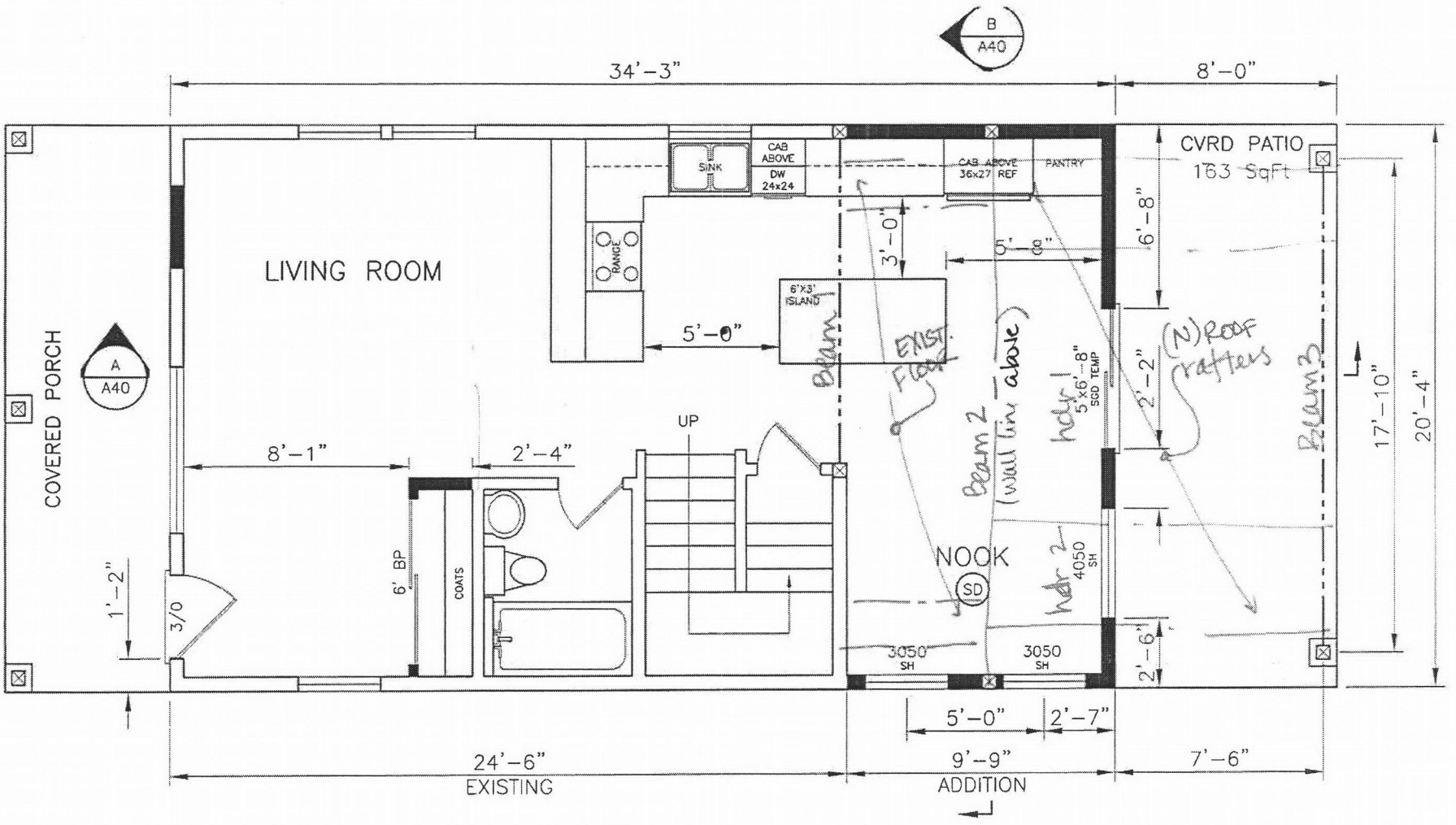
DESIGN CODE
2014 Oregon Residential Specialty Code

EXPIRES: 12/31/2018

SCOPE OF WORK
The attached calculations pertain to a new 9'-9" addition to the back of the existing house and a covered patio. This scope of work does not include any analysis of any other portions of structure to remain.

HAYDEN ENGINEERS
STRUCTURAL | CIVIL
(503) 968-9994 p (503) 968-8444 f

BY sm DATE
REV DATE
JOB NO 17128
SHEET OF



N PROPOSED FLOOR PLAN 696 SqFt

ADDITIONAL 198 SqFt

DENOTES NEW WALL

3/16"

1/16

(N) Rafters

$l_{max} = 8'-0"$

$W = (15+25\,psf)(2')$

$= 30^{D} + 50^{S}$ plf

$M_{max} = 640$ ft#

⟹ 2x6 @ 24" OC

Beam 1: $l = 12'$

$W = (15+40\,psf)(\frac{19'}{2})$ (assumed worst case)

$= 143^{D} + 380^{L}$

$M_{max} = 9414$ ft#

$P = 855^{*D} + 2280^{*L}$ ⟹ 3½ x 12 glulam w/ 4x4 post min

Beam 2: $l = 20'$

$W = (15+40psf)(\frac{6}{2}) + (15+25)(4'\pm)$

$= 105^{D} + 120^{L} + 100^{S}$ plf

$M_{max} = 13500$ ft#

$P = 1050^{*D} + 1200^{*L} + 1000^{*S}$ ⟹ 5½ x 12 min w/ 4x6 min post

HAYDEN ENGINEERS
STRUCTURAL | CIVIL
(503) 968-9994 p (503) 968-8444 f

4550 NE Shaver St.

BY SM DATE

REV DATE

JOB NO 17128

SHEET 2 OF

Beam 3: $\ell = 18' \pm$

$w = (15+25)(8'/2)$

$= 60 + 100$ plf

$M_{max} = 6480$ ft#

$P = 540^{\#} + 900^{\#}$ $\Rightarrow$ 6x10 min. w/ 6x6 min. post

Header 1: $\ell = 5'-0"$

$w = (15+25)(5/8)(12')$

$= 1113^{\#} + 188^{\#}$ plf

$M_{max} = 938$ ft#

$\Rightarrow$ 4x6 min. hdr

use for header 2 as well

HAYDEN ENGINEERS
STRUCTURAL | CIVIL
(503) 968-9994 p (503) 968-8444 f

4550 NE Shaver St

BY SM DATE

REV DATE

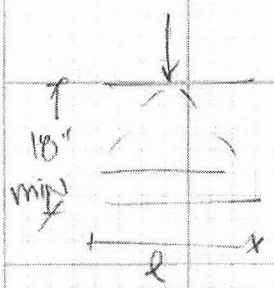
JOB NO 17128

SHEET 3 OF

FOOTINGS:

B1: Pmax = 3135#

$\frac{3135\#}{1500 psf}$ = 2.09 sf rqd



$\frac{2.09 sf}{\ell = 3'}$ = ~8" min. wall rqd

⇒ EXIST ftg OK

B2: Pmax = 2700# < B1

⇒ EXIST footing OK

B3: Pmax = 1440#

$\frac{1440\#}{1500 psf}$ = 0.96 sf rqd

⇒ 1'-0" sq min.

HAYDEN ENGINEERS
STRUCTURAL | CIVIL
(503) 968-9994 p (503) 968-8444 f

4550 NE Shaver St

BY SM DATE

REV DATE

JOB NO 17128

SHEET 4 OF

HAYDEN ENGINEERS
STRUCTURAL | CIVIL

Project Title:
Engineer:
Project Descr:

Project ID:

Wood Beam

File = z:\projects\2017PR~1\171284~1\SHAVER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.3.17, Ver:6.17.3.17
Lic. # : KW-06005543 — Licensee : HAYDEN CONSULTING ENGINEERS

Description : rafters

CODE REFERENCES

Calculations per NDS 2012, IBC 2012, CBC 2013, ASCE 7-10
Load Combination Set : ASCE 7-10

Material Properties

Analysis Method : Allowable Stress Design
Load Combination ASCE 7-10

Wood Species : DouglasFir-Larch
Wood Grade : No.2

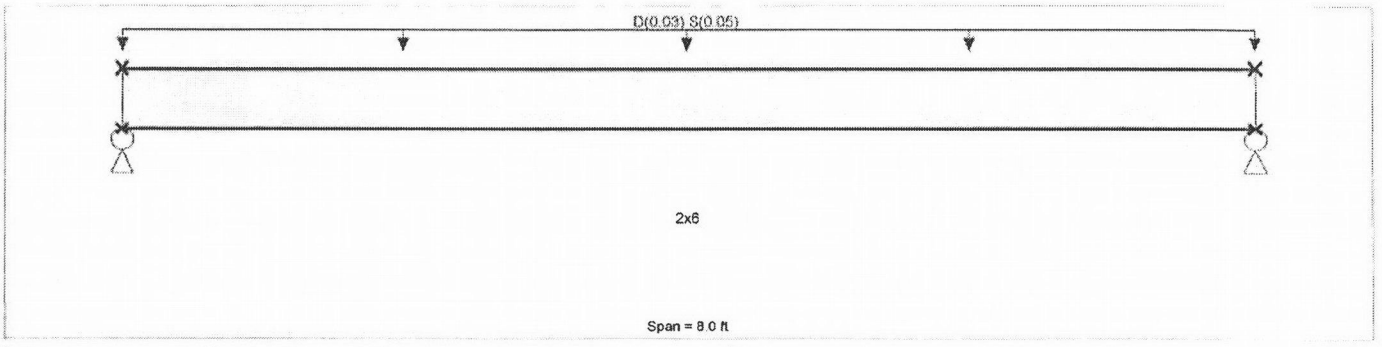
Fb - Tension	900.0 psi
Fb - Compr	900.0 psi
Fc - Prll	1,350.0 psi
Fc - Perp	625.0 psi
Fv	180.0 psi
Ft	575.0 psi

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.20 pcf

Repetitive Member Stress Increase

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 2.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.656 : 1	Maximum Shear Stress Ratio	=	0.250 : 1
Section used for this span		2x6	Section used for this span		2x6
fb : Actual	=	1,015.54 psi	fv : Actual	=	51.81 psi
FB : Allowable	=	1,547.33 psi	Fv : Allowable	=	207.00 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	4.000 ft	Location of maximum on span	=	7.562 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.139 in	Ratio =	689 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.223 in	Ratio =	430 >=240.
Max Upward Total Deflection	0.000 in	Ratio =	0 <240.0

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.200	0.200
Overall MINimum	0.120	0.120
D Only	0.120	0.120
L Only		
S Only	0.200	0.200

HAYDEN ENGINEERS
STRUCTURAL | CIVIL

Project Title:
Engineer:
Project Descr:

Project ID:

Wood Beam

File = z:\projects\2017PR~1\171284~1\SHAVER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.3.17, Ver:6.17.3.17

Lic. # : KW-06005543 — Licensee : HAYDEN CONSULTING ENGINEERS

Description : beam 1

CODE REFERENCES

Calculations per NDS 2012, IBC 2012, CBC 2013, ASCE 7-10
Load Combination Set : ASCE 7-10

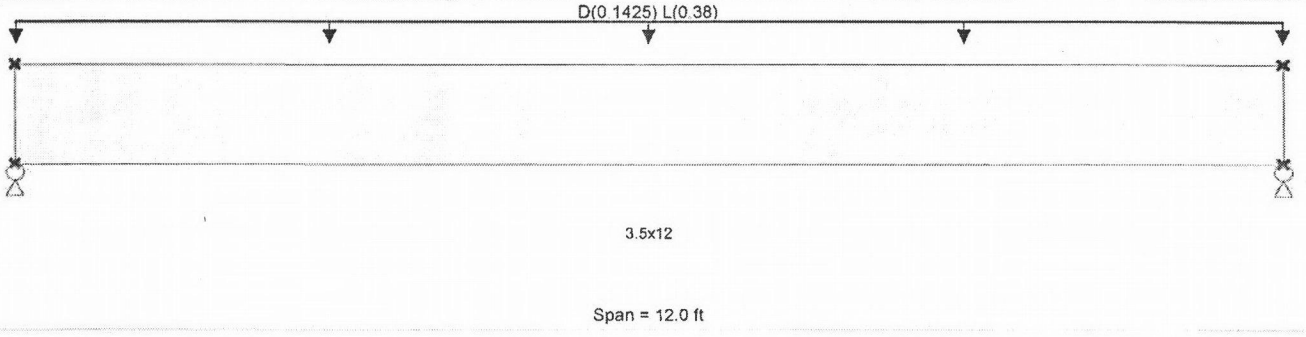
Material Properties

Analysis Method : Allowable Stress Design
Load Combination ASCE 7-10

Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Completely Unbraced

Fb - Tension	2400 psi	*E : Modulus of Elasticity*	
Fb - Compr	1850 psi	Ebend- xx	1800 ksi
Fc - Prll	1650 psi	Eminbend - xx	950 ksi
Fc - Perp	650 psi	Ebend- yy	1600 ksi
Fv	265 psi	Eminbend - yy	850 ksi
Ft	1100 psi	Density	31.2 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 9.50 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.599 : 1	Maximum Shear Stress Ratio	=	0.355 : 1
Section used for this span		3.5x12	Section used for this span		3.5x12
fb : Actual	=	1,343.57 psi	fv : Actual	=	93.98 psi
FB : Allowable	=	2,243.08 psi	Fv : Allowable	=	265.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	6.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.197 in	Ratio =	732 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.270 in	Ratio =	532 >=240.
Max Upward Total Deflection	0.000 in	Ratio =	0 <240.0

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.280	2.280
Overall MINimum	0.855	0.855
D Only	0.855	0.855
L Only	2.280	2.280
S Only		

6

HAYDEN ENGINEERS
STRUCTURAL | CIVIL

Project Title:
Engineer:
Project Descr:

Project ID:

Wood Column

File = z:\projects\2017PR~1\171284~1\SHAVER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.3.17, Ver:6.17.3.17
Lic. # : KW-06005543 — Licensee : HAYDEN CONSULTING ENGINEERS

Description : b1 post

Code References

Calculations per 2012 NDS, IBC 2012, CBC 2013, ASCE 7-10
Load Combinations Used : ASCE 7-10

General Information

Analysis Method :	Allowable Stress Design		
End Fixities	Top & Bottom Pinned		
Overall Column Height	8.0 ft		
(Used for non-slender calculations)			
Wood Species	Douglas Fir - Larch		
Wood Grade	No.2		
Fb +	750 psi	Fv	170 psi
Fb -	750 psi	Ft	475 psi
Fc - Prll	700 psi	Density	31.2 pcf
Fc - Perp	625 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1300	1300	1300 ksi
Minimum	470	470	

Wood Section Name	**4x4**		
Wood Grading/Manuf.	Graded Lumber		
Wood Member Type	Sawn		
Exact Width	**3.50** in	Allow Stress Modification Factors	
Exact Depth	**3.50** in	Cf or Cv for Bending	1.50
Area	12.250 in^2	Cf or Cv for Compression	1.150
Ix	12.505 in^4	Cf or Cv for Tension	1.50
Iy	12.505 in^4	Cm : Wet Use Factor	1.0
		Ct : Temperature Factor	1.0
		Cfu : Flat Use Factor	1.0
		Kf : Built-up columns	1.0 *NDS 15.3.2*
		Use Cr : Repetitive ?	No

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for X-X Axis buckling = 8.0 ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for X-X Axis buckling = 8.0 ft, K = 1.0

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 21.233 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 8.0 ft, D = 0.8550, L = 2.280 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS	Max. Axial+Bending Stress Ratio =	**0.6118 : 1**
	Load Combination	+D+L
	Governing NDS Forumla	Comp Only, fc/Fc'
	Location of max.above base	0.0 ft
	At maximum location values are . . .	
	Applied Axial	3.156 k
	Applied Mx	0.0 k-ft
	Applied My	0.0 k-ft
	Fc : Allowable	421.127 psi
PASS	Maximum Shear Stress Ratio =	**0.0 : 1**
	Load Combination	+0.60D
	Location of max.above base	8.0 ft
	Applied Design Shear	0.0 psi
	Allowable Shear	272.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y 0.0 in at 0.0 ft above base
for load combination : n/a

Along X-X 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

HAYDEN ENGINEERS
STRUCTURAL | CIVIL

Project Title:
Engineer:
Project Descr:

Project ID:

Wood Beam

File = z:\projects\2017PR~1\171284~1\SHAVER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.3.17, Ver:6.17.3.17
Lic. # : KW-06005543 — Licensee : HAYDEN CONSULTING ENGINEERS

Description : beam 2

CODE REFERENCES

Calculations per NDS 2012, IBC 2012, CBC 2013, ASCE 7-10
Load Combination Set : ASCE 7-10

Material Properties

Analysis Method : Allowable Stress Design
Load Combination ASCE 7-10

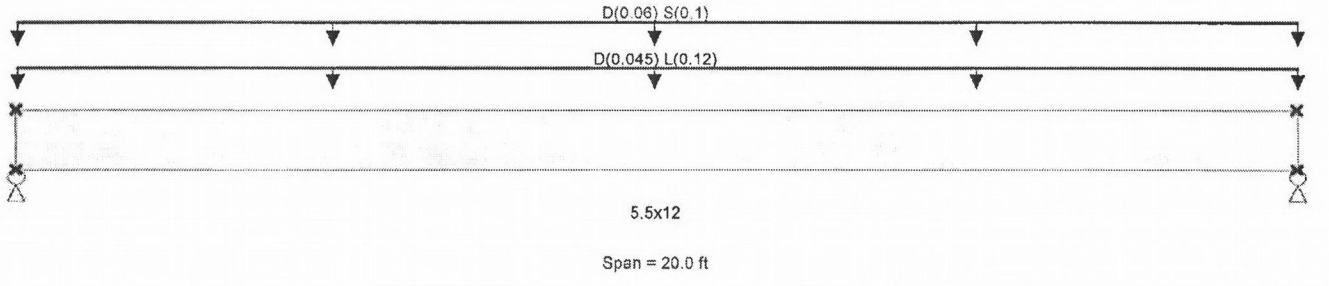
Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Completely Unbraced

Fb - Tension	2,400.0 psi
Fb - Compr	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.20 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 3.0 ft
Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 4.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.463 : 1	Maximum Shear Stress Ratio	=	0.182 : 1
Section used for this span		5.5x12	Section used for this span		5.5x12
fb : Actual	=	1,227.27 psi	fv : Actual	=	55.54 psi
FB : Allowable	=	2,649.40 psi	Fv : Allowable	=	304.75 psi
Load Combination		+D+0.750L+0.750S+H	Load Combination		+D+0.750L+0.750S+H
Location of maximum on span	=	10.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.305 in	Ratio =	787 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.686 in	Ratio =	349 >=240.
Max Upward Total Deflection	0.000 in	Ratio =	0 <240.0

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.200	1.200
Overall MINimum	1.000	1.000
D Only	1.050	1.050
L Only	1.200	1.200
S Only	1.000	1.000

HAYDEN ENGINEERS
STRUCTURAL | CIVIL

Project Title:
Engineer:
Project Descr:
Project ID:

Wood Column

File = z:\projects\2017PR~1\171284~1\SHAVER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.3.17, Ver:6.17.3.17
Lic. # : KW-06005543 — Licensee : HAYDEN CONSULTING ENGINEERS

Description : b2 post

Code References

Calculations per 2012 NDS, IBC 2012, CBC 2013, ASCE 7-10
Load Combinations Used : ASCE 7-10

General Information

Analysis Method :	Allowable Stress Design		
End Fixities	Top & Bottom Pinned		
Overall Column Height	8.0 ft		
(Used for non-slender calculations)			
Wood Species	Douglas Fir - Larch		
Wood Grade	No.2		
Fb +	750.0 psi	Fv	170.0 psi
Fb -	750.0 psi	Ft	475.0 psi
Fc - Prll	700.0 psi	Density	31.20 pcf
Fc - Perp	625.0 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1,300.0	1,300.0	1,300.0 ksi
Minimum	470.0	470.0	

Wood Section Name	4x4		
Wood Grading/Manuf.	Graded Lumber		
Wood Member Type	Sawn		
Exact Width	3.50 in	Allow Stress Modification Factors	
Exact Depth	3.50 in	Cf or Cv for Bending	1.50
Area	12.25 in^2	Cf or Cv for Compression	1.150
Ix	12.505 in^4	Cf or Cv for Tension	1.50
Iy	12.505 in^4	Cm : Wet Use Factor	1.0
		Ct : Temperature Factor	1.0
		Cfu : Flat Use Factor	1.0
		Kf : Built-up columns	1.0 *NDS 15.3.2*
		Use Cr : Repetitive ?	No

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for X-X Axis buckling = 8.0 ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for X-X Axis buckling = 8.0 ft, K = 1.0

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 21.233 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 8.0 ft, D = 1.050, L = 1.20, S = 1.0 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.5096 : 1**

Load Combination	+D+0.750L+0.750S
Governing NDS Forumla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are . . .	
Applied Axial	2.721 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	435.932 psi

PASS Maximum Shear Stress Ratio = **0.0 : 1**

Load Combination	+0.60D
Location of max.above base	8.0 ft
Applied Design Shear	0.0 psi
Allowable Shear	272.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y 0.0 in at 0.0 ft above base
for load combination : n/a
Along X-X 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

HAYDEN ENGINEERS
STRUCTURAL | CIVIL

Project Title:
Engineer:
Project Descr:

Project ID:

Wood Beam

File = z:\projects\2017PR~1\171284~1\SHAVER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.3.17, Ver:6.17.3.17

Lic. # : KW-06005543 — Licensee : HAYDEN CONSULTING ENGINEERS

Description : beam 3

CODE REFERENCES

Calculations per NDS 2012, IBC 2012, CBC 2013, ASCE 7-10
Load Combination Set : ASCE 7-10

Material Properties

Analysis Method : Allowable Stress Design
Load Combination ASCE 7-10

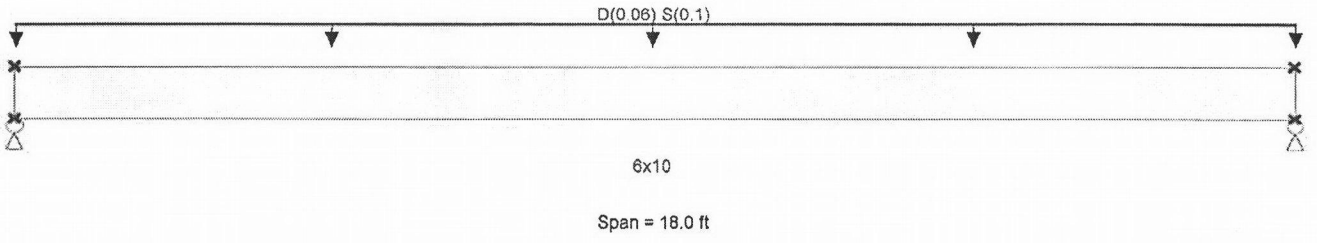
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

Beam Bracing : Completely Unbraced

Fb - Tension	875 psi
Fb - Compr	875 psi
Fc - Prll	600 psi
Fc - Perp	625 psi
Fv	170 psi
Ft	425 psi

E : Modulus of Elasticity

Ebend- xx	1300 ksi
Eminbend - xx	470 ksi
Density	31.2 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 4.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.947 : 1	Maximum Shear Stress Ratio	=	0.193 : 1
Section used for this span		6x10	Section used for this span		6x10
fb : Actual	=	939.93 psi	fv : Actual	=	37.72 psi
FB : Allowable	=	992.29 psi	Fv : Allowable	=	195.50 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	9.000 ft	Location of maximum on span	=	17.212 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.465 in	Ratio =	464 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.744 in	Ratio =	290 >=240.
Max Upward Total Deflection	0.000 in	Ratio =	0 <240.0

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.900	0.900
Overall MINimum	0.540	0.540
D Only	0.540	0.540
L Only		
S Only	0.900	0.900

HAYDEN ENGINEERS
STRUCTURAL | CIVIL

Project Title:
Engineer:
Project Descr:

Project ID:

Wood Column

File = z:\projects\2017PR~1\171284~1\SHAVER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.3.17, Ver:6.17.3.17
Lic. # : KW-06005543 — Licensee : HAYDEN CONSULTING ENGINEERS

Description : b3 post

Code References

Calculations per 2012 NDS, IBC 2012, CBC 2013, ASCE 7-10
Load Combinations Used : ASCE 7-10

General Information

Analysis Method :	Allowable Stress Design		
End Fixities	Top & Bottom Pinned		
Overall Column Height	8.0 ft		
(Used for non-slender calculations)			
Wood Species	Hem Fir		
Wood Grade	No.2		
Fb +	575 psi	Fv	140 psi
Fb -	575 psi	Ft	375 psi
Fc - Prll	575 psi	Density	26.83 pcf
Fc - Perp	405 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1100	1100	1100 ksi
Minimum	400	400	

Wood Section Name	**4x4**		
Wood Grading/Manuf.	Graded Lumber		
Wood Member Type	Sawn		
Exact Width	**3.50** in	Allow Stress Modification Factors	
Exact Depth	**3.50** in	Cf or Cv for Bending	1.50
Area	12.25 in^2	Cf or Cv for Compression	1.150
Ix	12.505 in^4	Cf or Cv for Tension	1.50
Iy	12.505 in^4	Cm : Wet Use Factor	1.0
Incising Factors :		Ct : Temperature Factor	1.0
for Bending	0.80	Cfu : Flat Use Factor	1.0
for Elastic Modulus	0.95	Kf : Built-up columns	1.0 *NDS 15.3.2*
		Use Cr : Repetitive ?	No

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for X-X Axis buckling = 8.0 ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for X-X Axis buckling = 8.0 ft, K = 1.0

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 18.259 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 8.0 ft, D = 0.540, S = 0.90 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.3442 : 1**

Load Combination	+D+S
Governing NDS Forumla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are . . .	
Applied Axial	1.458 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	345.883 psi

PASS Maximum Shear Stress Ratio = **0.0 : 1**

Load Combination	+0.60D
Location of max.above base	8.0 ft
Applied Design Shear	0.0 psi
Allowable Shear	179.20 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y 0.0 in at 0.0 ft above base
for load combination : n/a
Along X-X 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

HAYDEN ENGINEERS
STRUCTURAL | CIVIL

Project Title:
Engineer:
Project Descr:

Project ID:

Wood Beam

File = z:\projects\2017PR~1\171284~1\SHAVER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.3.17, Ver:6.17.3.17

Lic. # : KW-06005543 — Licensee : HAYDEN CONSULTING ENGINEERS

Description : header 1

CODE REFERENCES

Calculations per NDS 2012, IBC 2012, CBC 2013, ASCE 7-10
Load Combination Set : ASCE 7-10

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10

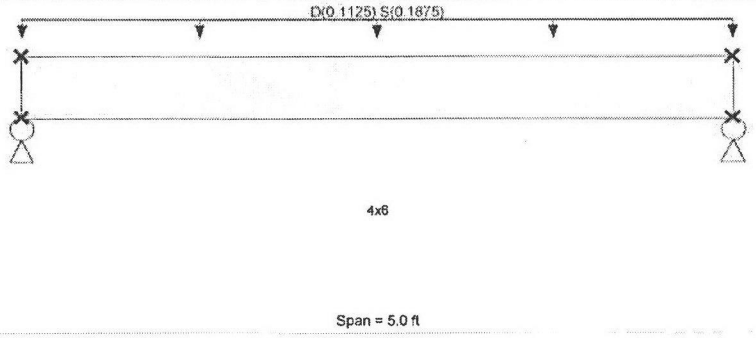
Wood Species : DouglasFir-Larch
Wood Grade : No.2

Beam Bracing : Completely Unbraced

Fb - Tension	900.0 psi
Fb - Compr	900.0 psi
Fc - Prll	1,350.0 psi
Fc - Perp	625.0 psi
Fv	180.0 psi
Ft	575.0 psi

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.20 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 7.50 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.475 : 1	Maximum Shear Stress Ratio	=	0.231 : 1
Section used for this span		4x6	Section used for this span		4x6
fb : Actual	=	637.54 psi	fv : Actual	=	47.78 psi
FB : Allowable	=	1,342.40 psi	Fv : Allowable	=	207.00 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	2.500 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.034 in	Ratio =	1756 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.055 in	Ratio =	1097 >=240.
Max Upward Total Deflection	0.000 in	Ratio =	0 <240.0

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.469	0.469
Overall MINimum	0.281	0.281
D Only	0.281	0.281
L Only		
S Only	0.469	0.469

Lateral Design

Seismic:

$V = \frac{S_{DS} W}{R/I}$

$= \frac{0.721 W}{6.5/1.0}$

$= 0.11 W$

$= 0.08 W$ (ASD)

WIND:

$ps = \lambda K_{zt} ps30$

$= (1.0)(1.0)\left(\begin{matrix}31.6 \text{ psf walls} \\ 10.3 \text{ psf roof}\end{matrix}\right)$

= 19 psf walls
5 psf roof
(ASD)

Diaphragm Loading:

ROOF:

$w = 0.08(15+5)(20.5)$
$= 33$ plf

$w = 19\text{psf}\left(\frac{7}{2}\right) + 5(9')$
$= 112$ plf

FLOOR:

$w = 0.08(15+10)(20.5)$
$= 41$ plf

$w = 19\text{psf}(16/2)$
$= 152$ plf

HAYDEN ENGINEERS
STRUCTURAL | CIVIL
(503) 968-9994 p (503) 968-8444 f

4550 NE Shaver St

BY SM DATE
REV DATE
JOB NO 17128
SHEET 13 OF

USGS Design Maps Summary Report

User–Specified Input

Building Code Reference Document ASCE 7-10 Standard
(which utilizes USGS hazard data available in 2008)

Site Coordinates 45.55186°N, 122.61608°W

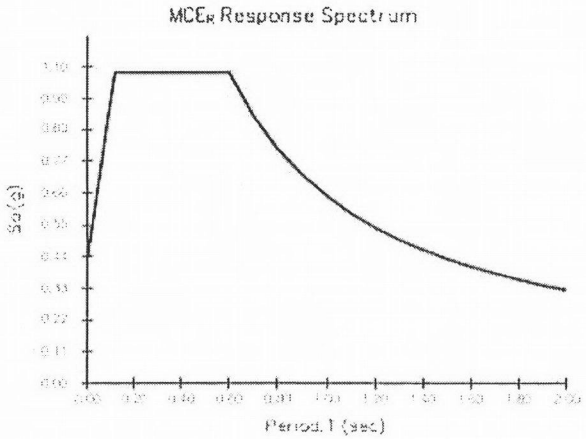
Site Soil Classification Site Class D – "Stiff Soil"

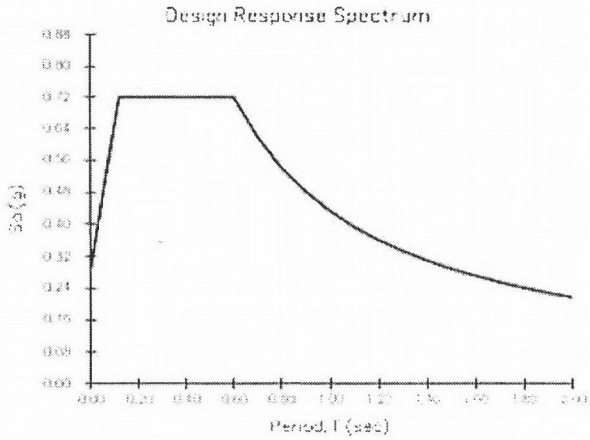
Risk Category I/II/III

USGS–Provided Output

S_S =	0.974 g	S_{MS} =	1.082 g	S_{DS} =	0.721 g
S_1 =	0.409 g	S_{M1} =	0.651 g	S_{D1} =	0.434 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.





For PGA_M, T_L, C_{RS}, and C_{R1} values, please view the detailed report.

Shearwalls (short direction only, minimal change in long direction)

EXISTING WALL LINE: $V = 152\,plf\left(\frac{24.5}{2}\right) + 1473^{\#}$

$= 3335^{\#}$

$\Sigma l = 8'$

$v = 417\,plf \Rightarrow$ ½" ply w/ 8d @ 4" oc.

$T = \frac{417(8')(8') - (0.6)\left(\frac{8^2}{2}\right)[8(8) + 15(133)]}{8'}$

$T = 3134^{\#}$

⇒ POST INSTALLED FOUNDATION STRAP.

NEW WALL LINE: $V = 152\left(\frac{9.75}{2}\right) + 1689^{\#} + 19\,plf(2')(8')$

$= 2734^{\#}$

$\Sigma l = 6'\text{-}8"$

$v = 410\,plf \Rightarrow$ ½" ply w/ 8d @ 4" oc.

$T = \frac{400(8')(6.67) - (0.6)\left(\frac{6.67^2}{2}\right)[8(6) + 15(4')]}{6.67'}$

$T = 2952^{\#}$

⇒ HDU2 each end

HAYDEN ENGINEERS
STRUCTURAL | CIVIL

Project Title:
Engineer:
Project Descr:

Project ID:

General Beam Analysis

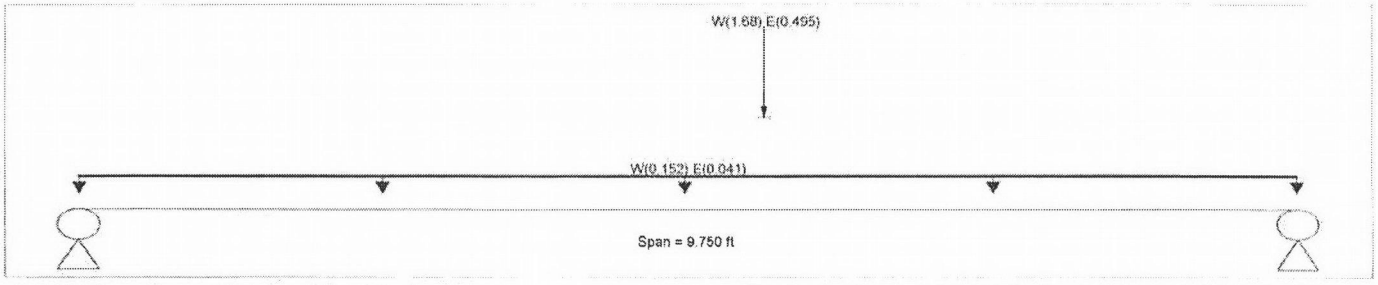
File = z:\projects\2017PR~1\171284~1\SHAVER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.3.17, Ver:6.17.3.17
Lic. # : KW-06005543 Licensee : HAYDEN CONSULTING ENGINEERS

Description : --None--

General Beam Properties

Elastic Modulus 29,000.0 ksi

Span #1 Span Length = 9.750 ft Area = 10.0 in^2 Moment of Inertia = 100.0 in^4



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : W = 0.1520, E = 0.0410 k/ft, Tributary Width = 1.0 ft
Point Load : W = 1.680, E = 0.4950 k @ 5.50 ft

DESIGN SUMMARY

Maximum Bending =	3.477 k-ft	Maximum Shear =	1.013 k
Load Combination	+D+0.60W+H	Load Combination	+D+0.60W+H
Location of maximum on span	5.509 ft	Location of maximum on span	9.750 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Maximum Deflection			
Max Downward Transient Deflection	0.030 in	3928	
Max Upward Transient Deflection	0.000 in	0	
Max Downward Total Deflection	0.018 in	6548	
Max Upward Total Deflection	0.000 in	0	

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.473	1.689
Overall MINimum	0.416	0.479
W Only	1.473	1.689
E Only	0.416	0.479

EXIST wall line

(N) wall line

11/6/16