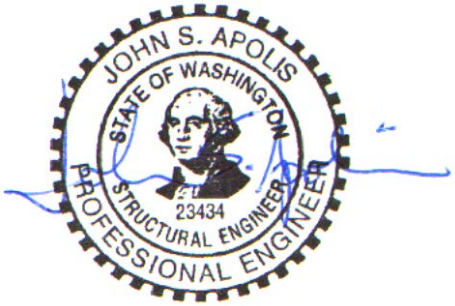
Structural Calculations Cover Sheet

Project Number:	**2022.039**	**Date:**	**March 23, 2022**
Project Name:	**Ross Parks Residence**	**Architect:**	**Suzanne Zahr**

Structural Design For: Structural design for an addition and remodel.
Construction Type: Conventional wood framing with conventional concrete foundation.

CODES

2018 International Building Code (IBC)
2018 NDS
ASCE 7-16



LOADS

Dead Loads	As required
Floor Load	40 psf, 60 psf decks
Roof Load	25 psf
Wind	110 mph, Exposure C, Per ASCE 7-16 Section 28, Kzt = 1.00
Seismic	Per ASCE 7-16 Section 12

Peak Ground Accelerations (PGA) based on USGS Hazards Program 2003, by Lat/Lon.
PGA 1 sec = 0.503 PGA .2 sec = 1.454 %V = .149 * DL

Material Design Values

Soils (assumed)	Minimum 1,500 psf allowed bearing (subject to field verification)	
Concrete	f'c=2,500 psi; 5-1/2 sack mix, or alternate mix pre-approved by bldg. dept.	
Reinforcing	Grade 60; Fy=60,000 psi minimum	
Sawn Lumber	Joists, Rafters:	Hem-Fir #2 and better
	Beams, Posts:	DF-L #2
	Studs & Plates:	Hem-Fir Standard
Parallam Beams	2.2E PSL, Fb=2,900 psi, Fv=290 psi, E=2.0*10^6 psi (minimum)	
Anchor Bolts	ASTM A325 hold down bolts, F1554 Anchor Bolts, A307 other bolts	

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Structural Engineering Consulting and Design

John S. Apolis, P.E.	**CSES, Inc.**	Job number:	**2022.039**
Project:	**Ross Parks Residence**	Date:	23-Mar-22
Architect:	**Suzanne Zahr**	Page number:	R1

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: Porch Joists

Fully Supported:	1	Snow Load:	1	Wind Load:	
Repetitive Member:		P.T. Lumber:		Wet Use:	

Geometry and Loads:

Span:	3 ft	Tributary Width:	2 ft	P Location:	1.75 ft
Add'l uniform DL:		DL unit load:	15 psf	Concentrated DL:	
Add'l uniform LL:		LL unit load:		Concentrated LL:	
Add'l uniform SL:		SL unit load:	25 psf	Concentrated SL:	
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	45 lbs	DL Reaction 2:	45 lbs	Note: Design automatically uses
LL Reaction 1:	0 lbs	LL Reaction 2:	0 lbs	ASD load combinations
SL Reaction 1:	75 lbs	SL Reaction 2:	75 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**120 lbs**	Total Reaction 2:	**120 lbs**	

Material Properties:

E	1.3 msi	E'	1.3 msi
Fb	850 psi	Fb'	1271 psi
Fv	150 psi	Fv'	173 psi
Fc perp	405 psi	Fc perp'	405 psi
Emin	0.47 msi	Emin'	0.47 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/			240	
For LL only: Allowed deflection criteria, span/			480	
Max. allowed total defl:	0.15 in	Max LL defl:		0.08 in
Total defl. * I:	0.11 in^4	Required I:		0.75 in^4
LL defl. * I:	0.07 in^4	Required I:		0.93 in^4
Actual deflections:	TOTAL:	0.01 in		0. in

Force analysis:

Max. moment:	90 ft-lb	Max Shear:	120 lbs

Selected Member:	(1) HF#2	**1.5**	**x**	**5.5**

Member properties:	**Provided:**		**Required:**
Moment of inertia:	20.8 in^4		0.93 in^4
Section Modulus:	7.56 in^3		0.85 in^3
Section Area:	8.25 in^2		1.04 in^2
Bearing Area:			0.3 in^2
Minimum bearing dimensions:	1.5 in	x	0.2 in

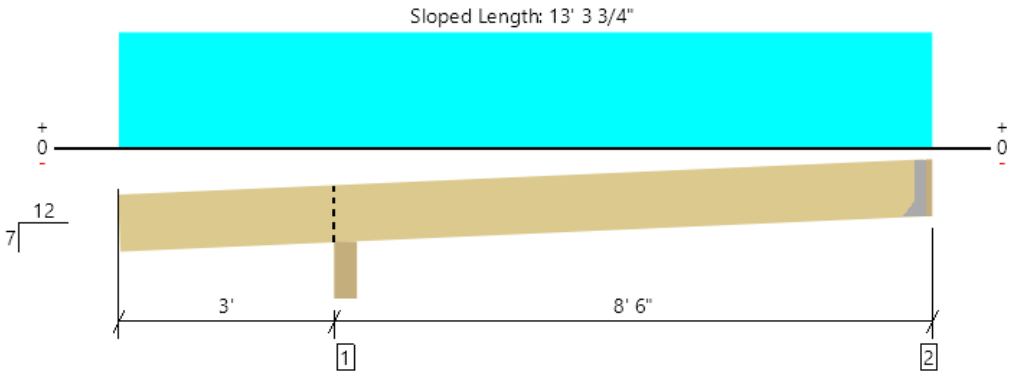
FORTE WEB

MEMBER REPORT

PASSED

Roof, R2: New Cantilever Roof Joist

1 piece(s) 2 x 8 HF No.2 @ 24" OC



All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Member Length : 13' 6 1/4"

System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 7/12

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	307 @ 11' 4 1/2"	911 (1.50")	Passed (34%)	--	1.0 D + 1.0 S (Alt Spans)
Shear (lbs)	336 @ 3' 11 3/4"	1251	Passed (27%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	556 @ 7' 9 1/16"	1477	Passed (38%)	1.15	1.0 D + 1.0 S (Alt Spans)
Live Load Defl. (in)	0.087 @ 7' 5 3/16"	0.314	Passed (L/999+)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.134 @ 7' 5 15/16"	0.472	Passed (L/846)	--	1.0 D + 1.0 S (Alt Spans)

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Beveled Plate - HF	5.50"	5.50"	1.50"	276	397	673	Blocking
2 - Hanger on 7 1/4" HF ledgerOnMasonry	1.50"	Hanger[1]	1.50"	123	194	317	See note [1]

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	13' 2" o/c	
Bottom Edge (Lu)	13' 2" o/c	

- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	LRU26Z	1.94"	N/A	4-10dx1.5	5-10d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 11' 6"	24"	15.0	25.0	Default Load

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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
William Nocka CSES (978) 503-9935 11wnocka@gmail.com	

Weyerhaeuser

R2

John S. Apolis, P.E.	**CSES, Inc.**	Job number:	**2022.039**
Project:	**Ross Parks Residence**	Date:	23-Mar-22
Architect:	**Suzanne Zahr**	Page number:	M1

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: West Flush Beam

Fully Supported:	1	Snow Load:		Wind Load:	
Repetitive Member:		P.T. Lumber:		Wet Use:	

Geometry and Loads:

Span:	14 ft	Tributary Width:	11.5 ft	P Location:	1.75 ft
Add'l uniform DL:		DL unit load:	12 psf	Concentrated DL:	
Add'l uniform LL:		LL unit load:	40 psf	Concentrated LL:	
Add'l uniform SL:		SL unit load:		Concentrated SL:	
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	966 lbs	DL Reaction 2:	966 lbs	Note: Design automatically uses
LL Reaction 1:	3220 lbs	LL Reaction 2:	3220 lbs	ASD load combinations
SL Reaction 1:	0 lbs	SL Reaction 2:	0 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**4186 lbs**	Total Reaction 2:	**4186 lbs**	

Material Properties:

E	2 msi	E'	2 msi
Fb	2900 psi	Fb'	2985 psi
Fv	290 psi	Fv'	290 psi
Fc perp	625 psi	Fc perp'	625 psi
Emin	0.914 msi	Emin'	0.914 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/		240	
For LL only: Allowed deflection criteria, span/		360	
Max. allowed total defl:	0.7 in	Max LL defl:	0.47 in
Total defl. * I:	258.44 in^4	Required I:	369.21 in^4
LL defl. * I:	198.8 in^4	Required I:	426.01 in^4
Actual deflections:	TOTAL: 0.56 in		0.43 in

Force analysis:

Max. moment:	14651 ft-lb	Max Shear:	4186 lbs

Selected Member:	(1) PSL	**7**	**x**	**9.25**

Member properties:	**Provided:**		**Required:**
Moment of inertia:	461.68 in^4		426.01 in^4
Section Modulus:	99.82 in^3		58.9 in^3
Section Area:	64.75 in^2		21.65 in^2
Bearing Area:			6.7 in^2
Minimum bearing dimensions:	7. in	x	0.96 in

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BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: West Flush Beam

Fully Supported:	1	Snow Load:		Wind Load:	
Repetitive Member:		P.T. Lumber:		Wet Use:	

Geometry and Loads:

Span:	20.5 ft	Tributary Width:	6.75 ft	P Location:	1.75 ft
Add'l uniform DL:	350.5 lbs/ft	DL unit load:	12 psf	Concentrated DL:	
Add'l uniform LL:		LL unit load:	40 psf	Concentrated LL:	
Add'l uniform SL:	472 lbs/ft	SL unit load:		Concentrated SL:	
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	4423 lbs	DL Reaction 2:	4423 lbs	Note: Design automatically uses
LL Reaction 1:	2768 lbs	LL Reaction 2:	2768 lbs	ASD load combinations
SL Reaction 1:	4838 lbs	SL Reaction 2:	4838 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**10127 lbs**	Total Reaction 2:	**10127 lbs**	

Material Properties:

E	2.2 msi	E'	2.2 msi
Fb	2900 psi	Fb'	2772 psi
Fv	290 psi	Fv'	290 psi
Fc perp	625 psi	Fc perp'	625 psi
Emin	0.914 msi	Emin'	0.914 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/ 240

For LL only: Allowed deflection criteria, span/ 360

Max. allowed total defl:	1.03 in	Max LL defl:	0.68 in
Total defl. * I:	2119.62 in^4	Required I:	2067.92 in^4
LL defl. * I:	1340.23 in^4	Required I:	1961.31 in^4
Actual deflections:	TOTAL: 0.83 in		0.53 in

Force analysis:

Max. moment:	51901 ft-lb	Max Shear:	10127 lbs

Selected Member:	(1) PSL	**5.25**	**x**	**18**

Member properties:	**Provided:**		**Required:**
Moment of inertia:	2551.5 in^4		2067.92 in^4
Section Modulus:	283.5 in^3		224.65 in^3
Section Area:	94.5 in^2		52.38 in^2
Bearing Area:			16.2 in^2
Minimum bearing dimensions:	5.25 in	x	3.09 in

John S. Apolis, P.E.	**CSES, Inc.**	Job number:	**2022.039**
Project:	**Ross Parks Residence**	Date:	23-Mar-22
Architect:	**Suzanne Zahr**	Page number:	M3

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: East Door Header

Fully Supported:	1	Snow Load:	1	Wind Load:	
Repetitive Member:		P.T. Lumber:		Wet Use:	

Geometry and Loads:

Span:	6.5 ft	Tributary Width:	1.33 ft	P Location:	1.75 ft
Add'l uniform DL:	138 lbs/ft	DL unit load:		Concentrated DL:	
Add'l uniform LL:		LL unit load:		Concentrated LL:	
Add'l uniform SL:	198.5 lbs/ft	SL unit load:		Concentrated SL:	
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	449 lbs	DL Reaction 2:	449 lbs	Note: Design automatically uses
LL Reaction 1:	0 lbs	LL Reaction 2:	0 lbs	ASD load combinations
SL Reaction 1:	645 lbs	SL Reaction 2:	645 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**1094 lbs**	Total Reaction 2:	**1094 lbs**	

Material Properties:

E	1.3 msi	E'	1.3 msi
Fb	850 psi	Fb'	1173 psi
Fv	150 psi	Fv'	173 psi
Fc perp	405 psi	Fc perp'	405 psi
Emin	0.47 msi	Emin'	0.47 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/ 240

For LL only: Allowed deflection criteria, span/ 480

Max. allowed total defl:	0.33 in	Max LL defl:	0.16 in
Total defl. * I:	10.4 in^4	Required I:	31.99 in^4
LL defl. * I:	6.13 in^4	Required I:	37.74 in^4
Actual deflections:	TOTAL: 0.11 in		0.06 in

Force analysis:

Max. moment:	1777 ft-lb	Max Shear:	1094 lbs

Selected Member:	(2) HF#2	**1.5**	**x**	**7.25**

Member properties:	**Provided:**		**Required:**
Moment of inertia:	95.27 in^4		37.74 in^4
Section Modulus:	26.28 in^3		18.18 in^3
Section Area:	21.75 in^2		9.51 in^2
Bearing Area:			2.7 in^2
Minimum bearing dimensions:	3. in	x	0.9 in

John S. Apolis, P.E.	**CSES, Inc.**	Job number:	**2022.039**
Project:	**Ross Parks Residence**	Date:	23-Mar-22
Architect:	**Suzanne Zahr**	Page number:	M4

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: East Door Header

Fully Supported:	1	Snow Load:	1	Wind Load:	
Repetitive Member:		P.T. Lumber:		Wet Use:	

Geometry and Loads:

Span:	10.25 ft	Tributary Width:	1.33 ft	P Location:	1.75 ft
Add'l uniform DL:	138 lbs/ft	DL unit load:		Concentrated DL:	
Add'l uniform LL:		LL unit load:		Concentrated LL:	
Add'l uniform SL:	198.5 lbs/ft	SL unit load:		Concentrated SL:	
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	707 lbs	DL Reaction 2:	707 lbs	Note: Design automatically uses
LL Reaction 1:	0 lbs	LL Reaction 2:	0 lbs	ASD load combinations
SL Reaction 1:	1017 lbs	SL Reaction 2:	1017 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**1725 lbs**	Total Reaction 2:	**1725 lbs**	

Material Properties:

E	1.6 msi	E'	1.6 msi
Fb	900 psi	Fb'	1242 psi
Fv	180 psi	Fv'	207 psi
Fc perp	625 psi	Fc perp'	625 psi
Emin	0.58 msi	Emin'	0.58 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/			240	
For LL only: Allowed deflection criteria, span/			480	
Max. allowed total defl:	0.51 in	Max LL defl:		0.26 in
Total defl. * I:	52.23 in^4	Required I:		101.92 in^4
LL defl. * I:	30.81 in^4	Required I:		120.24 in^4
Actual deflections:	TOTAL: 0.23 in			0.13 in

Force analysis:

Max. moment:	4419 ft-lb	Max Shear:	1725 lbs

Selected Member:	(1) DF #2	**3.5**	**x**	**9.25**

Member properties:	**Provided:**		**Required:**
Moment of inertia:	230.84 in^4		120.24 in^4
Section Modulus:	49.91 in^3		42.7 in^3
Section Area:	32.38 in^2		12.5 in^2
Bearing Area:			2.76 in^2
Minimum bearing dimensions:	3.5 in	x	0.79 in

John S. Apolis, P.E.	**CSES, Inc.**	Job number:	**2022.039**
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Architect:	**Suzanne Zahr**	Page number:	M5

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: South Window Header

Fully Supported:	1	Snow Load:	1	Wind Load:	
Repetitive Member:		P.T. Lumber:		Wet Use:	

Geometry and Loads:

Span:	7 ft	Tributary Width:	3 ft	P Location:	1.75 ft
Add'l uniform DL:	64 lbs/ft	DL unit load:	27 psf	Concentrated DL:	
Add'l uniform LL:		LL unit load:	40 psf	Concentrated LL:	
Add'l uniform SL:		SL unit load:	25 psf	Concentrated SL:	
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	508 lbs	DL Reaction 2:	508 lbs	Note: Design automatically uses
LL Reaction 1:	420 lbs	LL Reaction 2:	420 lbs	ASD load combinations
SL Reaction 1:	263 lbs	SL Reaction 2:	263 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**1019 lbs**	Total Reaction 2:	**1019 lbs**	

Material Properties:

E	1.3 msi	E'	1.3 msi
Fb	850 psi	Fb'	1173 psi
Fv	150 psi	Fv'	173 psi
Fc perp	405 psi	Fc perp'	405 psi
Emin	0.47 msi	Emin'	0.47 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/ 240

For LL only: Allowed deflection criteria, span/ 480

Max. allowed total defl:	0.35 in	Max LL defl:	0.18 in
Total defl. * I:	14.13 in^4	Required I:	40.37 in^4
LL defl. * I:	8.1 in^4	Required I:	46.31 in^4
Actual deflections:	TOTAL: 0.15 in		0.09 in

Force analysis:

Max. moment:	1784 ft-lb	Max Shear:	1019 lbs

Selected Member:	(2) HF #2	**1.5**	**x**	**7.25**

Member properties:	**Provided:**		**Required:**
Moment of inertia:	95.27 in^4		46.31 in^4
Section Modulus:	26.28 in^3		18.25 in^3
Section Area:	21.75 in^2		8.86 in^2
Bearing Area:			2.52 in^2
Minimum bearing dimensions:	3. in	x	0.84 in

John S. Apolis, P.E.	**CSES, Inc.**	Job number:	**2022.039**
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Architect:	**Suzanne Zahr**	Page number:	M6

Post Design (Combined Axial and Moment Loading)

2018 International Building Code (IBC) **2018 NDS**

Post Description: Posts for beam M1

Snow Load:	1	Wind Load:	
Repetitive Member:		P.T. Lumber:	

Geometry and loads:

Height	8 ft	w(d)	0 plf	M(d)	0 ft-lbs
Axial Load	4186 lbs	w(b)	0 plf	M(b)	0 ft-lbs
Le(d)	8 ft	Le(b)	0.5 ft		

Material Properties:

Fb1	900 psi	Fb(d)'	1035 psi
Fb2	900 psi	Fb(b)'	1035 psi
Fc	1350 psi	Fc'	568.13 psi
E	1.6 msi	E'	1.6 msi
Emin	0.58 msi	Emin'	0.58 msi

Selected Member: DF #2 — 3.5 (b) x 3.5 (d)

Member properties:		**Variables:**	
Section Modulus (d):	7.1 in^3	Rb(d)	5.24
Section Modulus (b):	7.1 in^3	Rb(b)	1.31
Section Area:	12.3 in^2	c	0.8

Member stresses:	Provided			Required		
FcE(d)	634 psi	>	fc	342 psi	OK
FcE(b)	162231 psi	>	fc	342 psi	OK
FbE	25375 psi	>	fb(d)	0 psi	OK
FbE	25375 psi	>	fb(b)	0 psi	OK

Bending and Axial Compression Check:

NDS 2018 EQ 3.9-3 — 0.36 < 1.0 **OK**

John S. Apolis, P.E.	**CSES, Inc.**	Job number:	**2022.039**
Project:	**Ross Parks Residence**	Date:	4-Apr-22
Architect:	**Suzanne Zahr**	Page number:	M7

Post Design (Combined Axial and Moment Loading)

2018 International Building Code (IBC) **2018 NDS**

Post Description: Posts for beam M2

Snow Load:	1	Wind Load:	
Repetitive Member:		P.T. Lumber:	

Geometry and loads:

Height	8 ft	w(d)	0 plf	M(d)	0 ft-lbs
Axial Load	10127 lbs	w(b)	0 plf	M(b)	0 ft-lbs
Le(d)	0.5 ft	Le(b)	8 ft		

Material Properties:

Fb1	900 psi	Fb(d)'	1035 psi
Fb2	900 psi	Fb(b)'	1035 psi
Fc	1350 psi	Fc'	568.13 psi
E	1.6 msi	E'	1.6 msi
Emin	0.58 msi	Emin'	0.58 msi

Selected Member: DF #2 3.5 (b) x 9.25 (d)

Member properties:		**Variables:**	
Section Modulus (d):	49.9 in^3	Rb(d)	0.50
Section Modulus (b):	18.9 in^3	Rb(b)	8.51
Section Area:	32.4 in^2	c	0.8

Member stresses:	Provided			Required		
FcE(d)	1133133 psi	>	fc	313 psi	OK
FcE(b)	634 psi	>	fc	313 psi	OK
FbE	9601 psi	>	fb(d)	0 psi	OK
FbE	9601 psi	>	fb(b)	0 psi	OK

Bending and Axial Compression Check:

NDS 2018 EQ 3.9-3	0.30	<	1.0	**OK**

John S. Apolis, P.E.	**CSES, Inc.**	Job number:	**2022.039**
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Architect:	**Suzanne Zahr**	Page number:	M8

Post Design (Combined Axial and Moment Loading)

2018 International Building Code (IBC) **2018 NDS**

Post Description: SE Corner Post

Snow Load:	1	Wind Load:	
Repetitive Member:		P.T. Lumber:	

Geometry and loads:

Height	8 ft	w(d)	0 plf	M(d)	0 ft-lbs
Axial Load	2744 lbs	w(b)	0 plf	M(b)	0 ft-lbs
Le(d)	8 ft	Le(b)	8 ft		

Material Properties:

Fb1	850 psi	Fb(d)'	977.5 psi
Fb2	850 psi	Fb(b)'	977.5 psi
Fc	1300 psi	Fc'	355.15 psi
E	1.3 msi	E'	1.3 msi
Emin	0.47 msi	Emin'	0.47 msi

Selected Member: HF #2 3 x 3.5

b d

Member properties:		**Variables:**	
Section Modulus (d):	6.1 in^3	Rb(d)	4.85
Section Modulus (b):	5.3 in^3	Rb(b)	6.11
Section Area:	10.5 in^2	c	0.8

Member stresses:	Provided			Required	
FcE(d)	514 psi	>	fc	261 psi	OK
FcE(b)	377 psi	>	fc	261 psi	OK
FbE	15107 psi	>	fb(d)	0 psi	OK
FbE	15107 psi	>	fb(b)	0 psi	OK

Bending and Axial Compression Check:

NDS 2018 EQ 3.9-3 0.54 < 1.0 **OK**

BEAM DESCRIPTION FOR M2 - CONNECTION DESIGN

Loading @ Beam M2

$d_1 = \underbrace{15' \times 15\,psf}_{\text{EXIST. ROOF}} + \underbrace{8' \times 8\,psf}_{\text{EXIST. WALL}} + \underbrace{6.75' \times 12\,psf}_{\text{EXIST. FLOOR}} + \underbrace{62\,plf}_{\text{NEW ROOF}} = 432\,plf$

$l = \underbrace{6.75' \times 40'}_{\text{EXIST. FLOOR}} = 270\,plf$

$s = \underbrace{15' \times 25\,psf}_{\text{EXIST. ROOF}} + \underbrace{97\,plf}_{\text{NEW ROOF}} = 472\,plf$

$d + .75(l + s) = 989\,plf$ (loading from existing wall / floor system to new beam)

→ ADD NEW "POCKET BEAM" BELOW EXISTING WALL AND BOLT TO STRUCTURAL BEAM FOR 989 plf.

→ SEE M10 FOR BOLTED CONNECTION DESIGN

$P_{max} = 887\#$ FOR A 3/4"Ø BOLT

(2) 3/4" Ø BOLTS @ 16" o.c. max = 1,334 plf capacity OK

CONSULTING STRUCTURAL ENGINEERING SERVICES
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John S. Apolis, P.E.	**CSES, Inc.**	Job number:	**2022.039**
Project:	**Ross Parks**	Date:	4-Apr-22
Architect:	**Suzanne Zahr**	Page number:	M10

Dowel-Type Fastener Design (single shear)

2018 International Building Code (IBC) **2018 NDS**

Connection Description: Built Up Beam Bolts

Dowel Properties:

D	0.75	in	Dowel Diameter	Fyb	45000 psi	dowel bending yield strength

Member Properties:

	Main member	Side Member		Single Shear
L	5.25	3.5	in	dowel bearing length
Fell	5600	5600	psi	dowel bearing strength
FeT	2578	2578	psi	dowel bearing strength
Feθ	2578	2578	psi	dowel bearing strength
Cd	1.15	1.15		Load Duration Factor
Ctn	1	1		Toenail Factor
CΔ	1	1		Geometry Factor
θ	90	90		maximum angle of load to grain (0 to 90)
Rd1	5.0	5.0		reduction term (see table 11.3.1B NDS)
Rd2	4.5	4.5		reduction term (see table 11.3.1B NDS)
Rd3	4.0	4.0		reduction term (see table 11.3.1B NDS)
k1	0.54	0.54		NDS pg. 71
k2	1.17	1.17		NDS pg. 71
k3	1.37	1.37		NDS pg. 71
Re	1.00	1.00		Fem/Fs
Rt	1.50	1.50		Lm/Ls
NDS EQ.				Failure mechanism (NDS fig. I1)
11.3-1	2335	2335	lbs	Im
11.3-2	1557	1557	lbs	Is
11.3-3	926	926	lbs	II
11.3-4	1139	1139	lbs	IIIm
11.3-5	887	887	lbs	IIIs
11.3-6	1006	1006	lbs	IV
Z	887	887	lbs	

Shear Capacity:	Main Member: 887 #	Side Member: 887 #

John S. Apolis, P.E.	**CSES, Inc.**	Job number:	**2022.039**
Project:	**Ross Parks Residence**	Date:	23-Mar-22
Architect:	**Suzanne Zahr**	Page number:	D1

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: Addition Floor Joists

Fully Supported:	1	Snow Load:		Wind Load:	
Repetitive Member:	1	P.T. Lumber:		Wet Use:	

Geometry and Loads:

Span:	9 ft	Tributary Width:	1.33 ft	P Location:	1.75 ft
Add'l uniform DL:		DL unit load:	12 psf	Concentrated DL:	
Add'l uniform LL:		LL unit load:	40 psf	Concentrated LL:	
Add'l uniform SL:		SL unit load:		Concentrated SL:	
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	72 lbs	DL Reaction 2:	72 lbs	Note: Design automatically uses
LL Reaction 1:	239 lbs	LL Reaction 2:	239 lbs	ASD load combinations
SL Reaction 1:	0 lbs	SL Reaction 2:	0 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**311 lbs**	Total Reaction 2:	**311 lbs**	

Material Properties:

E	1.3 msi	E'	1.3 msi
Fb	850 psi	Fb'	1173 psi
Fv	150 psi	Fv'	150 psi
Fc perp	405 psi	Fc perp'	405 psi
Emin	0.47 msi	Emin'	0.47 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/			240	
For LL only: Allowed deflection criteria, span/			480	
Max. allowed total defl:	0.45 in	Max LL defl:		0.23 in
Total defl. * I:	7.85 in^4	Required I:		17.45 in^4
LL defl. * I:	6.04 in^4	Required I:		26.85 in^4
Actual deflections:	TOTAL: 0.16 in			0.13 in

Force analysis:

Max. moment:	700 ft-lb	Max Shear:	311 lbs

Selected Member:	(1) HF #2	**1.5**	**x**	**7.25**

Member properties:	**Provided:**		**Required:**
Moment of inertia:	47.63 in^4		26.85 in^4
Section Modulus:	13.14 in^3		7.16 in^3
Section Area:	10.88 in^2		3.11 in^2
Bearing Area:			0.77 in^2
Minimum bearing dimensions:	1.5 in	x	0.51 in

John S. Apolis, P.E.	**CSES, Inc.**	Job number:	**2022.039**
Project:	**Ross Parks Residence**	Date:	23-Mar-22
Architect:	**Suzanne Zahr**	Page number:	D2

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: Deck Joists Below Hot Tub

Fully Supported:	1	Snow Load:		Wind Load:	
Repetitive Member:	1	P.T. Lumber:		Wet Use:	1

Geometry and Loads:

Span:	5.5 ft	Tributary Width:	1 ft	P Location:	1.75 ft
Add'l uniform DL:		DL unit load:	200 psf	Concentrated DL:	
Add'l uniform LL:		LL unit load:	60 psf	Concentrated LL:	
Add'l uniform SL:		SL unit load:		Concentrated SL:	
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	550 lbs	DL Reaction 2:	550 lbs	Note: Design automatically uses
LL Reaction 1:	165 lbs	LL Reaction 2:	165 lbs	ASD load combinations
SL Reaction 1:	0 lbs	SL Reaction 2:	0 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**715 lbs**	Total Reaction 2:	**715 lbs**	

Material Properties:

E	1.3 msi	E'	1.17 msi
Fb	850 psi	Fb'	997 psi
Fv	150 psi	Fv'	146 psi
Fc perp	405 psi	Fc perp'	271 psi
Emin	0.47 msi	Emin'	0.423 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/		240	
For LL only: Allowed deflection criteria, span/		480	
Max. allowed total defl:	0.28 in	Max LL defl:	0.14 in
Total defl. * I:	4.58 in^4	Required I:	16.64 in^4
LL defl. * I:	1.06 in^4	Required I:	7.68 in^4
Actual deflections:	TOTAL: 0.1 in		0.02 in

Force analysis:

Max. moment:	983 ft-lb	Max Shear:	715 lbs

Selected Member:	(1) HF #2	**1.5**	**x**	**7.25**

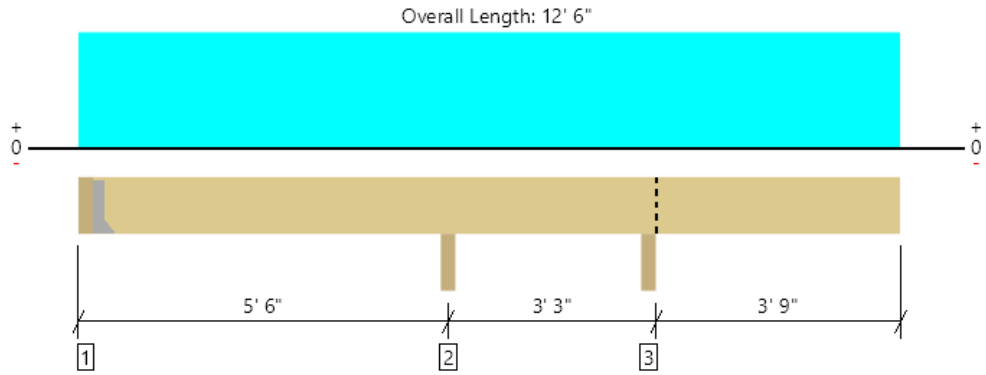
Member properties:	**Provided:**		**Required:**
Moment of inertia:	47.63 in^4		16.64 in^4
Section Modulus:	13.14 in^3		11.83 in^3
Section Area:	10.88 in^2		7.37 in^2
Bearing Area:			2.63 in^2
Minimum bearing dimensions:	1.5 in	x	1.76 in

FORTE WEB

MEMBER REPORT

PASSED

Main, D3: Deck Joists
1 piece(s) 2 x 8 HF No.2 @ 16" OC



All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	777 @ 8' 7 1/4"	2126 (3.50")	Passed (37%)	--	1.0 D + 1.0 L (Adj Spans)
Shear (lbs)	331 @ 7' 10 1/4"	979	Passed (34%)	0.90	1.0 D + 1.0 L (Adj Spans)
Moment (Ft-lbs)	-729 @ 8' 7 1/4"	1156	Passed (63%)	0.90	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.136 @ 12' 6"	0.200	Passed (2L/688)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.161 @ 12' 6"	0.390	Passed (2L/580)	--	1.0 D + 1.0 L (Alt Spans)
TJ-Pro™ Rating	N/A	N/A	N/A	--	N/A

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (2L/0.2") and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.
- No composite action between deck and joist was considered in analysis.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Hanger on 7 1/4" SPF ledgerOnMasonry	3.50"	Hanger[1]	1.50"	43	221	264	See note [1]
2 - Beam - SPF	3.50"	3.50"	1.50"	37	438/-111	475/-111	None
3 - Beam - SPF	3.50"	3.50"	1.50"	120	656	776	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	12' 3" o/c	
Bottom Edge (Lu)	11' o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	Connector not found	N/A	N/A	N/A	N/A	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (0.90)	Comments
1 - Uniform (PSF)	0 to 12' 6"	16"	12.0	60.0	Default Load

ForteWEB Software Operator	Job Notes
William Nocka CSES (978) 503-9935 11wnocka@gmail.com	

Weyerhaeuser

John S. Apolis, P.E.	**CSES, Inc.**	Job number:	**2022.039**
Project:	**Ross Parks Residence**	Date:	23-Mar-22
Architect:	**Suzanne Zahr**	Page number:	D4

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: 8' Max Deck Joists

Fully Supported:	1	Snow Load:		Wind Load:	
Repetitive Member:	1	P.T. Lumber:	1	Wet Use:	

Geometry and Loads:

Span:	8 ft	Tributary Width:	1.33 ft	P Location:	1.75 ft
Add'l uniform DL:		DL unit load:	12 psf	Concentrated DL:	
Add'l uniform LL:		LL unit load:	60 psf	Concentrated LL:	
Add'l uniform SL:		SL unit load:		Concentrated SL:	
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	64 lbs	DL Reaction 2:	64 lbs	Note: Design automatically uses
LL Reaction 1:	319 lbs	LL Reaction 2:	319 lbs	ASD load combinations
SL Reaction 1:	0 lbs	SL Reaction 2:	0 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**383 lbs**	Total Reaction 2:	**383 lbs**	

Material Properties:

E	1.3 msi	E'	1.235 msi
Fb	850 psi	Fb'	938 psi
Fv	150 psi	Fv'	120 psi
Fc perp	405 psi	Fc perp'	405 psi
Emin	0.47 msi	Emin'	0.4465 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/			240		
For LL only: Allowed deflection criteria, span/			480		
Max. allowed total defl:	0.4 in		Max LL defl:	0.2 in	
Total defl. * I:	7.15 in^4		Required I:	17.86 in^4	
LL defl. * I:	5.95 in^4		Required I:	29.77 in^4	
Actual deflections:	TOTAL:	0.15 in		0.13 in	

Force analysis:

Max. moment:	766 ft-lb	Max Shear:	383 lbs

Selected Member:	(1) HF #2	**1.5**	**x**	**7.25**

Member properties:	**Provided:**		**Required:**
Moment of inertia:	47.63 in^4		29.77 in^4
Section Modulus:	13.14 in^3		9.8 in^3
Section Area:	10.88 in^2		4.79 in^2
Bearing Area:			0.95 in^2
Minimum bearing dimensions:	1.5 in	x	0.63 in

John S. Apolis, P.E.	**CSES, Inc.**	Job number:	**2022.039**
Project:	**Ross Parks Residence**	Date:	23-Mar-22
Architect:	**Suzanne Zahr**	Page number:	D5

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: Drop Beam @ Hot Tub

Fully Supported:	1	Snow Load:		Wind Load:	
Repetitive Member:		P.T. Lumber:	1	Wet Use:	

Geometry and Loads:

Span:	4 ft	Tributary Width:	2.75 ft	P Location:	1.75 ft
Add'l uniform DL:	33 lbs/ft	DL unit load:	200 psf	Concentrated DL:	
Add'l uniform LL:	165 lbs/ft	LL unit load:	60 psf	Concentrated LL:	
Add'l uniform SL:		SL unit load:		Concentrated SL:	
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	1166 lbs	DL Reaction 2:	1166 lbs	Note: Design automatically uses
LL Reaction 1:	660 lbs	LL Reaction 2:	660 lbs	ASD load combinations
SL Reaction 1:	0 lbs	SL Reaction 2:	0 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**1826 lbs**	Total Reaction 2:	**1826 lbs**	

Material Properties:

E	1.6 msi	E'	1.52 msi
Fb	900 psi	Fb'	936 psi
Fv	180 psi	Fv'	144 psi
Fc perp	625 psi	Fc perp'	625 psi
Emin	0.58 msi	Emin'	0.551 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/			240	
For LL only: Allowed deflection criteria, span/			480	
Max. allowed total defl:	0.2 in	Max LL defl:		0.1 in
Total defl. * I:	3.46 in^4	Required I:		17.3 in^4
LL defl. * I:	1.25 in^4	Required I:		12.51 in^4
Actual deflections:	TOTAL: 0.03 in			0.01 in

Force analysis:

Max. moment:	1826 ft-lb	Max Shear:	1826 lbs

Selected Member:	(1) DF #2	**3.5**	**x**	**7.25**

Member properties:	**Provided:**		**Required:**
Moment of inertia:	111.15 in^4		17.3 in^4
Section Modulus:	30.66 in^3		23.41 in^3
Section Area:	25.38 in^2		19.02 in^2
Bearing Area:			2.92 in^2
Minimum bearing dimensions:	3.5 in	x	0.83 in

John S. Apolis, P.E.	**CSES, Inc.**	Job number:	**2022.039**
Project:	**Ross Parks Residence**	Date:	23-Mar-22
Architect:	**Suzanne Zahr**	Page number:	D6

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: Typical Drop Beam

Fully Supported:	1	Snow Load:		Wind Load:	
Repetitive Member:		P.T. Lumber:	1	Wet Use:	

Geometry and Loads:

Span:	12 ft	Tributary Width:	2.75 ft	P Location:	1.75 ft
Add'l uniform DL:		DL unit load:	12 psf	Concentrated DL:	
Add'l uniform LL:		LL unit load:	60 psf	Concentrated LL:	
Add'l uniform SL:		SL unit load:		Concentrated SL:	
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	198 lbs	DL Reaction 2:	198 lbs	Note: Design automatically uses
LL Reaction 1:	990 lbs	LL Reaction 2:	990 lbs	ASD load combinations
SL Reaction 1:	0 lbs	SL Reaction 2:	0 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**1188 lbs**	Total Reaction 2:	**1188 lbs**	

Material Properties:

E	1.6 msi	E'	1.52 msi
Fb	900 psi	Fb'	792 psi
Fv	180 psi	Fv'	144 psi
Fc perp	625 psi	Fc perp'	625 psi
Emin	0.58 msi	Emin'	0.551 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/ 240

For LL only: Allowed deflection criteria, span/ 480

Max. allowed total defl:	0.6 in	Max LL defl:	0.3 in
Total defl. * I:	60.78 in^4	Required I:	101.29 in^4
LL defl. * I:	50.65 in^4	Required I:	168.82 in^4
Actual deflections:	TOTAL: 0.15 in		0.12 in

Force analysis:

Max. moment:	3564 ft-lb	Max Shear:	1188 lbs

Selected Member: (1) DF #2 **3.5** **x** **11.25**

Member properties:	**Provided:**		**Required:**
Moment of inertia:	415.28 in^4		168.82 in^4
Section Modulus:	73.83 in^3		54. in^3
Section Area:	39.38 in^2		12.38 in^2
Bearing Area:			1.9 in^2
Minimum bearing dimensions:	3.5 in	x	0.54 in

John S. Apolis, P.E.	**CSES, Inc.**	Job number:	**2022.039**
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Architect:	**Suzanne Zahr**	Page number:	D7

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: Deck Drop Beam @ Arc Interior

Fully Supported:	1	Snow Load:		Wind Load:	
Repetitive Member:		P.T. Lumber:	1	Wet Use:	

Geometry and Loads:

Span:	8 ft	Tributary Width:	0 ft	P Location:	1.75 ft
Add'l uniform DL:	32.33 lbs/ft	DL unit load:	12 psf	Concentrated DL:	
Add'l uniform LL:	166.2 lbs/ft	LL unit load:	60 psf	Concentrated LL:	
Add'l uniform SL:		SL unit load:		Concentrated SL:	
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	129 lbs	DL Reaction 2:	129 lbs	Note: Design automatically uses
LL Reaction 1:	665 lbs	LL Reaction 2:	665 lbs	ASD load combinations
SL Reaction 1:	0 lbs	SL Reaction 2:	0 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**794 lbs**	Total Reaction 2:	**794 lbs**	

Material Properties:

E	1.6 msi	E'	1.52 msi
Fb	900 psi	Fb'	792 psi
Fv	180 psi	Fv'	144 psi
Fc perp	625 psi	Fc perp'	625 psi
Emin	0.58 msi	Emin'	0.551 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/			240		
For LL only: Allowed deflection criteria, span/			480		
Max. allowed total defl:	0.4 in		Max LL defl:	0.2 in	
Total defl. * I:	12.04 in^4		Required I:	30.09 in^4	
LL defl. * I:	10.07 in^4		Required I:	50.37 in^4	
Actual deflections:	TOTAL:	0.03 in		0.02 in	

Force analysis:

Max. moment:	1588 ft-lb	Max Shear:	794 lbs

Selected Member:	(1) DF #2	**3.5**	**x**	**11.25**

Member properties:	**Provided:**		**Required:**
Moment of inertia:	415.28 in^4		50.37 in^4
Section Modulus:	73.83 in^3		24.06 in^3
Section Area:	39.38 in^2		8.27 in^2
Bearing Area:			1.27 in^2
Minimum bearing dimensions:	3.5 in	x	0.36 in

John S. Apolis, P.E.	**CSES, Inc.**	Job number:	**2022.039**
Project:	**Ross Parks Residence**	Date:	5-May-22
Architect:	**Suzanne Zahr**	Page number:	D8

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: Deck Drop Beam @ Arc Rim

Fully Supported:	1	Snow Load:		Wind Load:	
Repetitive Member:		P.T. Lumber:	1	Wet Use:	

Geometry and Loads:

Span:	8 ft	Tributary Width:	0 ft	P Location:	1.75 ft
Add'l uniform DL:	90.23 lbs/ft	DL unit load:	12 psf	Concentrated DL:	
Add'l uniform LL:	493.2 lbs/ft	LL unit load:	60 psf	Concentrated LL:	
Add'l uniform SL:		SL unit load:		Concentrated SL:	
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	361 lbs	DL Reaction 2:	361 lbs	Note: Design automatically uses
LL Reaction 1:	1973 lbs	LL Reaction 2:	1973 lbs	ASD load combinations
SL Reaction 1:	0 lbs	SL Reaction 2:	0 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**2334 lbs**	Total Reaction 2:	**2334 lbs**	

Material Properties:

E	1.6 msi	E'	1.52 msi
Fb	900 psi	Fb'	792 psi
Fv	180 psi	Fv'	144 psi
Fc perp	625 psi	Fc perp'	625 psi
Emin	0.58 msi	Emin'	0.551 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/ 240

For LL only: Allowed deflection criteria, span/ 480

Max. allowed total defl:	0.4 in	Max LL defl:	0.2 in
Total defl. * I:	35.38 in^4	Required I:	88.44 in^4
LL defl. * I:	29.91 in^4	Required I:	149.53 in^4
Actual deflections:	TOTAL: 0.09 in		0.07 in

Force analysis:

Max. moment:	4668 ft-lb	Max Shear:	2334 lbs

Selected Member:	(1) DF #2	**3.5**	**x**	**11.25**

Member properties:	**Provided:**		**Required:**
Moment of inertia:	415.28 in^4		149.53 in^4
Section Modulus:	73.83 in^3		70.72 in^3
Section Area:	39.38 in^2		24.31 in^2
Bearing Area:			3.73 in^2
Minimum bearing dimensions:	3.5 in	x	1.07 in

John S. Apolis, P.E.	**CSES, Inc.**	Job number:	**2022.039**
Project:	**Ross Parks Residence**	Date:	23-Mar-22
Architect:	**Suzanne Zahr**	Page number:	D9

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: Deck Drop Beam @ South Catwalk

Fully Supported:	1	Snow Load:		Wind Load:	
Repetitive Member:		P.T. Lumber:	1	Wet Use:	

Geometry and Loads:

Span:	4 ft	Tributary Width:	8 ft	P Location:	1.75 ft
Add'l uniform DL:		DL unit load:	12 psf	Concentrated DL:	
Add'l uniform LL:		LL unit load:	60 psf	Concentrated LL:	
Add'l uniform SL:		SL unit load:		Concentrated SL:	
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	192 lbs	DL Reaction 2:	192 lbs	Note: Design automatically uses
LL Reaction 1:	960 lbs	LL Reaction 2:	960 lbs	ASD load combinations
SL Reaction 1:	0 lbs	SL Reaction 2:	0 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**1152 lbs**	Total Reaction 2:	**1152 lbs**	

Material Properties:

E	1.6 msi	E'	1.52 msi
Fb	900 psi	Fb'	936 psi
Fv	180 psi	Fv'	144 psi
Fc perp	625 psi	Fc perp'	625 psi
Emin	0.58 msi	Emin'	0.551 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/ 240

For LL only: Allowed deflection criteria, span/ 480

Max. allowed total defl:	0.2 in	Max LL defl:	0.1 in
Total defl. * I:	2.18 in^4	Required I:	10.91 in^4
LL defl. * I:	1.82 in^4	Required I:	18.19 in^4
Actual deflections:	TOTAL: 0.02 in		0.02 in

Force analysis:

Max. moment:	1152 ft-lb	Max Shear:	1152 lbs

Selected Member:	(1) DF #2	**3.5**	**x**	**7.25**

Member properties:	**Provided:**		**Required:**
Moment of inertia:	111.15 in^4		18.19 in^4
Section Modulus:	30.66 in^3		14.77 in^3
Section Area:	25.38 in^2		12. in^2
Bearing Area:			1.84 in^2
Minimum bearing dimensions:	3.5 in	x	0.53 in

FOUNDATION DESIGN

ISOLATED FOOTING IN CRAWL SPACE

$P = 4{,}186\#$

$q = 1{,}500\ psf$

$A_{req} = 2.79\ ft^2$

$s = 2' \Rightarrow A = 4\ ft^2 > 2.79\ ft^2$ OK

$\Rightarrow$ 24x24x12" FOOTING w/ (3) #4 BARS EACH WAY

PIN PILES @ NEW FOUNDATION

Loading:

$d = 8' \times 8\ psf + 138\ plf + 32\ plf + 488\ plf + 40\ plf$

WALL ROOF DECK FOUNDATION FLOOR

$s = 2000\ plf$ ROOF $\quad l = 160\ plf + 166\ plf$ FLOOR DECK

MAX LOADING: 1,165 plf

PIN PILE CAPACITY: 6,000# per Geotech Report

$SPACING = \frac{6{,}000\#}{1{,}165\ plf} = 5.15\ ft$

$\Rightarrow$ PIN PILES @ 5' o.c. MAX

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Project No. 2022.039 Date 5-5-22
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FOUNDATION DESIGN

PIN PILES @ NORTH INTERNAL DECK BEAM LINE

Loading: $d = 28\,plf_{\text{DECK}} + 2.25ft^2 \times 150\,pcf_{\text{GRADE BEAM}}$ $\quad l = 329\,plf_{\text{DECK}}$

MAX LOADING: 695 plf

SPACING: $\frac{6{,}000\#}{695\,plf} = 8.63\,ft$

⇒ PIN PILES @ 8' o.c. MAX

PIN PILES @ NORTH EXTERNAL DECK BEAM LINE

Loading: $d = 90\,plf_{\text{DECK}} + 2.25ft^2 \times 150\,pcf_{\text{GRADE BEAM}}$ $\quad l = 493\,plf_{\text{DECK}}$

MAX LOADING: 921 plf

SPACING: $\frac{6{,}000\#}{921\,plf} = 6.51\,ft$

⇒ PIN PILES @ 6' o.c. MAX

PIN PILES @ EAST DECK BEAM LINE

Loading: $d = 3' \times 12\,psf_{\text{DECK}} + 2.25ft^2 \times 150\,pcf$

$l = 3' \times 60\,psf_{\text{DECK}}$

MAX LOADING: 554 plf

SPACING: $\frac{6{,}000\#}{554\,plf} = 10.83\,ft$

⇒ PIN PILES @ 10' o.c. MAX

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2022.039 Ross Parks

7010 93rd Ave SE, Mercer Island, WA 98040, USA

Latitude, Longitude: 47.53937699999999, -122.2148216

Date	3/22/2022, 3:21:51 PM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	D - Default (See Section 11.4.3)

Type	Value	Description
S_S	1.454	MCE_R ground motion. (for 0.2 second period)
S_1	0.503	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.744	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	1.163	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

John S. Apolis, P.E. **CSES, Inc.** Job number: **2022.039**
Project: **Ross Parks Residence** Date: 23-Mar-22
Architect: **Suazanne Zahr** Page number: **L 1**

Lateral Loads Design per ASCE 7-16, Wind: Section 28 Seismic: Section 12

(Simplified Envelope Procedure Part 2) 2015 & 2018 International Building Code (IBC)

WIND LOADS **110** mph Basic Wind Speed 2018 NDS

Ps = lambda * Kzt * Ps(30) * 0.6 Exposure C Roof Slope: **3.00** : 12 = 14.0

Least Horizontal Dimension, feet: **60** Mean Roof Ht, feet: **10** (degrees)

lambda = 1.21 a = 4.0 ft, 2a = 8.0 ft

Iw = 1.00 KzT = **1.00**

Tabulated Ps(30): (Refer to ASCE 7-16, Figure 28.6-1)	**Zone**	**Tabulated Wind Pressure**		**Calc'd Design Pressure** (*lambda*KzT*0.6)	**Min Design Pressure**
(horizontal)	A	23.6	psf	**17.1**	**17.1**
"	B	-8.2	psf	**-5.9**	**5.9**
"	C	15.7	psf	**11.4**	**11.6**
"	D	-4.7	psf	**-3.4**	**5.8**
(vertical)	E	-23.1	psf	**-16.8**	
"	F	-14.9	psf	**-10.8**	
"	G	-16.0	psf	**-11.6**	
"	H	-11.4	psf	**-8.3**	
(uplift on overhangs)	E(oh)	-32.3	psf	**-23.4**	
"	G(oh)	-25.3	psf	**-18.4**	

(Per section 28.6.4 minimum tabulated wind pressure is 16 PSF for zonesA,C, and 8 PSF for zones B, D)

(Equivalent Lateral Force Procedure, Section 12.8)

SEISMIC LOADS Ie 1.0 R = 6.5 ASCE 7-16, Table 12.2.1

Seismic Parameters per ASCE 7-16) Group I Site Class: **D**

PGA (.2 sec) 1.4540 Fa = 1.00 ASCE 7-16 Table 11.4-1

PGA (1 sec) 0.5030 Fv = 1.50 ASCE 7-16 Table 11.4-2

Seismic Design Categories per ASCE 7-16 Tables 11.6-1, 11.6-2

Based on Sds: **D** Based on Sd1: **D**

PGA's based on peak ground accelerations per latest USGS Hazards Program (based on lat/lon).

Ss = 1.4540 Sms = Fa * Ss = 1.45 Equation 11.4-1

S1 = 0.5030 Sm1 = Fv * S1 = 0.75 Equation 11.4-2

Equations 11.4-3, 11.4-4 Sds = 2/3 * Sms = 0.97 Sd1 = 2/3 * Sm1 = 0.50

Equation 12.14-11 Cs (%V) = (Sds / (R/I)) = 0.149 **Building period < 0.5 s per IBC eq 12.8-7**

Base Shear = %V * W * 0.7 = 4.28 psf, uniformly distributed over floor area

(0.7 reduction factor per ASCE 7-16, Section 2.4.1, Eq (seismic vertical distribution per IBC eqs 12.8-11 & 12)

Base = top of foundation	**Roof DL (psf)**	**Wall DL (psf) dist. over floor area**	**Story Height Above Base (ft)**	**Lateral Load (psf)**
Roof	**15**	**6**	**19**	**2.85**
Main Floor	**12**	**8**	**10**	**1.43**
Lower Floor				**0.00**
Total Seismic DL:	**41**		Sum	**4.28**

LATERAL DESIGN - UPPER FLOOR

SOUTH SHEAR WALL - L = 7.5' + 4'

$P_W = 27' \times (9' + 5') \times 11.6\ psf + 27' \times 2.5' \times 5.8\ psf$

$P_W = 4,776\ \#$ //

$P_E = 30' \times 27' \times 2.85\ psf + 40' \times 33' \times 1.43\ psf$

$P_E = 4,196\ \#$

$v = \frac{4,776\#}{11.375'} = 420\ plf < 550\ plf \Rightarrow$ SW3

$H = 420\ plf \times 9' = 3,780\ \# < 4,340\ \# \Rightarrow$ HDU5

EAST SHEAR WALL - L = 4' + 3'

$P_W = 8' \times (9' + 5') \times 17.1\ psf + 5' \times (9' + 5') \times 11.6\ psf + 13' \times 2.5' \times 5.9\ psf$

$P_W = 2,919\ \#$

$P_E = 13' \times 54' \times 2.85\ psf + 16' \times 66' \times 1.43\ psf$

$P_E = 3,511\ \#$ //

$v = \frac{3,511\#}{3.875' + 2.91'} = 517\ plf < 550\ plf \Rightarrow$ SW3

$H = 517\ plf \times 9' = 4,653\# < 5,645\# \Rightarrow$ HDU5 w/ DF studs

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