

Structural Calculations Cover Sheet

Project Number: 2021.071
Project Name: Lloyd Residence

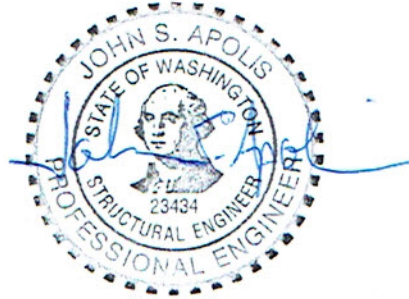
Date: July 26, 2021
Architect: Suzanne Zahr

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
Roof snow Load 25 psf
Floor Load 40 psf
Deck Load 60 psf
Wind 110 mph, Exposure B, Per ASCE 7-16 Section 28, $K_{zt} = 1.60$
Seismic Per ASCE 7-10 Section 12
Peak Ground Accelerations (PGA) based on USGS Hazards Program (by address).
PGA 1 sec = .486 PGA .2 sec = 1.397 %V = .143 * 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; $F_y=60,000$ psi minimum
Sawn Lumber Joists, Rafters: DF-L #2 and better
Beams: 4x_: DF-L #2
6x_: DF-L #2
Posts: DF-L #2
Studs & Plates: Hem-Fir Standard
Glu-Lam Beams 24F-V4 for simple span beams, 24F-V8 for cantilevered beams
Parallam Beams 2.0E PSL, $F_b=2,900$ psi, $F_v=290$ psi, $E=2.0 \times 10^6$ psi (minimum)
Microllam Beams 1.9E LVL, $F_b=2,600$ psi, $F_v=285$ psi, $E=1.9 \times 10^6$ psi (minimum)
Timberstrand Bms 1.7E LSL, $F_b=2,600$ psi, $F_v=400$ psi, $E=1.7 \times 10^6$ psi (minimum)
Structural Steel ASTM A36, $F_y=36$ ksi Plates
Steel Pipe ASTM A53, Grade B, $F_y=35$ ksi Pipe
Anchor Bolts F1554 Anchor Bolts, A307 other bolts

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BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC)

2018 NDS

Beam Description: RIDGE BEAM (PARALLEL BEAMS SIM)

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

Geometry and Loads:

Span:	19 ft	Tributary Width:	7 ft	P Location:	19 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:	998 lbs	DL Reaction 2:	998 lbs	Note: Design automatically uses ASD load combinations
LL Reaction 1:	0 lbs	LL Reaction 2:	0 lbs	
SL Reaction 1:	1663 lbs	SL Reaction 2:	1663 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	2660 lbs	Total Reaction 2:	2660 lbs	

Material Properties:

E	1.8 msi	E'	1.8 msi
Fb	2400 psi	Fb'	2400 psi
Fv	265 psi	Fv'	265 psi
Fc perp	650 psi	Fc perp'	650 psi
Emin	0.95 msi	Emin'	0.95 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/	240		
For LL only: Allowed deflection criteria, span/	360		
Max. allowed total defl:	0.95 in	Max LL defl:	0.63 in
Total defl. * I:	456.12 in^4	Required I:	480.13 in^4
LL defl. * I:	285.08 in^4	Required I:	450.12 in^4
Actual deflections: TOTAL:	0.91 in		0.57 in

Force analysis:

Max. moment:	12635 ft-lb	Max Shear:	2660 lbs
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Selected Member: (1) GLB 3.5 x 12

Member properties:	Provided:	Required:
Moment of inertia:	504. in^4	480.13 in^4
Section Modulus:	84. in^3	63.18 in^3
Section Area:	42. in^2	15.06 in^2
Bearing Area:		4.09 in^2
Minimum bearing dimensions:	3.5 in x	1.17 in

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BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC)

2018 NDS

Beam Description: NORTH WINDOW HEADER

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

Geometry and Loads:

Span:	12 ft	Tributary Width:	2 ft	P Location:	REFRI 6 ft
Add'l uniform DL:		DL unit load:	15 psf	Concentrated DL:	998 lbs
Add'l uniform LL:		LL unit load:		Concentrated LL:	
Add'l uniform SL:		SL unit load:	25 psf	Concentrated SL:	1633 lbs
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	679 lbs	DL Reaction 2:	679 lbs	Note: Design automatically uses ASD load combinations
LL Reaction 1:	0 lbs	LL Reaction 2:	0 lbs	
SL Reaction 1:	1117 lbs	SL Reaction 2:	1117 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	1796 lbs	Total Reaction 2:	1796 lbs	

Material Properties:

E	1.8 msi	E'	1.8 msi
Fb	2400 psi	Fb'	2400 psi
Fv	265 psi	Fv'	265 psi
Fc perp	650 psi	Fc perp'	650 psi
Emin	0.95 msi	Emin'	0.95 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/		240	
For LL only: Allowed deflection criteria, span/		360	
Max. allowed total defl:	0.6 in	Max LL defl:	0.4 in
Total defl. * I:	111.66 in ⁴	Required I:	186.11 in ⁴
LL defl. * I:	69.4 in ⁴	Required I:	173.49 in ⁴
Actual deflections:	TOTAL: 0.53 in		0.33 in

Force analysis:

Max. moment:	9333 ft-lb	Max Shear:	1796 lbs
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Selected Member: (1) GLB 3.5 x 9

Member properties:	Provided:	Required:
Moment of inertia:	212.63 in ⁴	186.11 in ⁴
Section Modulus:	47.25 in ³	46.67 in ³
Section Area:	31.5 in ²	10.16 in ²
Bearing Area:		2.76 in ²
Minimum bearing dimensions:	3.5 in x	0.79 in

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BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC)

2018 NDS

Beam Description: NORTH BEDROOM HEADER

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

Geometry and Loads:

Span:	9 ft	Tributary Width:	16 ft	P Location:	9 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:	1080 lbs	DL Reaction 2:	1080 lbs	Note: Design automatically uses ASD load combinations
LL Reaction 1:	0 lbs	LL Reaction 2:	0 lbs	
SL Reaction 1:	1800 lbs	SL Reaction 2:	1800 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	2880 lbs	Total Reaction 2:	2880 lbs	

Material Properties:

E	1.8 msi	E'	1.8 msi
Fb	2400 psi	Fb'	2760 psi
Fv	265 psi	Fv'	305 psi
Fc perp	650 psi	Fc perp'	650 psi
Emin	0.95 msi	Emin'	0.95 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/		240	
For LL only: Allowed deflection criteria, span/		360	
Max. allowed total defl:	0.45 in	Max LL defl:	0.3 in
Total defl. * I:	52.49 in^4	Required I:	116.64 in^4
LL defl. * I:	32.81 in^4	Required I:	109.35 in^4
Actual deflections:	TOTAL: 0.43 in		0.27 in

Force analysis:

Max. moment:	6480 ft-lb	Max Shear:	2880 lbs
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Selected Member: (1) GLB 3.5 x 7.5

Member properties:	Provided:	Required:
Moment of inertia:	123.05 in^4	116.64 in^4
Section Modulus:	32.81 in^3	28.17 in^3
Section Area:	26.25 in^2	14.18 in^2
Bearing Area:		4.43 in^2
Minimum bearing dimensions:	3.5 in x	1.27 in

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BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC)

2018 NDS

Beam Description: ENTRY HALL / LIVING BEAM

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

Geometry and Loads:

Span:	7 ft	Tributary Width:	6 ft	P Location:	7 ft
Add'l uniform DL:	48 lbs/ft	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:	483 lbs	DL Reaction 2:	483 lbs	Note: Design automatically uses ASD load combinations
LL Reaction 1:	0 lbs	LL Reaction 2:	0 lbs	
SL Reaction 1:	525 lbs	SL Reaction 2:	525 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	1008 lbs	Total Reaction 2:	1008 lbs	

Material Properties:

E	1.6 msi	E'	1.6 msi
Fb	900 psi	Fb'	1346 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/		360	
Max. allowed total defl:	0.35 in	Max LL defl:	0.23 in
Total defl. * I:	9.72 in^4	Required I:	27.78 in^4
LL defl. * I:	5.06 in^4	Required I:	21.71 in^4
Actual deflections:	TOTAL: 0.09 in		0.05 in

Force analysis:

Max. moment:	1764 ft-lb	Max Shear:	1008 lbs
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Selected Member: (1) DF #2 3.5 x 7.25

Member properties:	Provided:	Required:
Moment of inertia:	111.15 in^4	27.78 in^4
Section Modulus:	30.66 in^3	15.73 in^3
Section Area:	25.38 in^2	7.3 in^2
Bearing Area:		1.61 in^2
Minimum bearing dimensions:	3.5 in x	0.46 in

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BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC)

2018 NDS

Beam Description: LIVING/KITCHEN BEAM

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

Geometry and Loads:

Span:	14.5 ft	Tributary Width:	9 ft	P Location:	R4 11 ft
Add'l uniform DL:		DL unit load:	15 psf	Concentrated DL:	483 lbs
Add'l uniform LL:		LL unit load:		Concentrated LL:	
Add'l uniform SL:		SL unit load:	25 psf	Concentrated SL:	525 lbs
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	1345 lbs	DL Reaction 2:	1095 lbs	Note: Design automatically uses ASD load combinations
LL Reaction 1:	0 lbs	LL Reaction 2:	0 lbs	
SL Reaction 1:	2030 lbs	SL Reaction 2:	1758 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	3375 lbs	Total Reaction 2:	2853 lbs	

Material Properties:

E	1.8 msi	E'	1.8 msi
Fb	2400 psi	Fb'	2760 psi
Fv	265 psi	Fv'	305 psi
Fc perp	650 psi	Fc perp'	650 psi
Emin	0.95 msi	Emin'	0.95 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/	240		
For LL only: Allowed deflection criteria, span/	360		
Max. allowed total defl:	0.73 in	Max LL defl:	0.48 in
Total defl. * I:	240.67 in^4	Required I:	331.96 in^4
LL defl. * I:	146.07 in^4	Required I:	302.21 in^4
Actual deflections: TOTAL:	0.48 in		0.29 in

Force analysis:

Max. moment:	11307 ft-lb	Max Shear:	3375 lbs
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Selected Member: (1) GLB 3.5 x 12

Member properties:	Provided:	Required:
Moment of inertia:	504. in^4	331.96 in^4
Section Modulus:	84. in^3	49.16 in^3
Section Area:	42. in^2	16.61 in^2
Bearing Area:		5.19 in^2
Minimum bearing dimensions:	3.5 in x	1.48 in

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BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC)

2018 NDS

Beam Description: *DINING NOVA HEADER*

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

Geometry and Loads:

Span:	9 ft	Tributary Width:	13 ft	P Location:	9 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:	878 lbs	DL Reaction 2:	878 lbs	Note: Design automatically uses ASD load combinations
LL Reaction 1:	0 lbs	LL Reaction 2:	0 lbs	
SL Reaction 1:	1463 lbs	SL Reaction 2:	1463 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	2340 lbs	Total Reaction 2:	2340 lbs	

Material Properties:

E	1.8 msi	E'	1.8 msi
Fb	2400 psi	Fb'	2760 psi
Fv	265 psi	Fv'	305 psi
Fc perp	650 psi	Fc perp'	650 psi
Emin	0.95 msi	Emin'	0.95 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/	240		
For LL only: Allowed deflection criteria, span/	360		
Max. allowed total defl:	0.45 in	Max LL defl:	0.3 in
Total defl. * I:	42.65 in^4	Required I:	94.77 in^4
LL defl. * I:	26.65 in^4	Required I:	88.85 in^4
Actual deflections: TOTAL:	0.35 in		0.22 in

Force analysis:

Max. moment:	5265 ft-lb	Max Shear:	2340 lbs
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Selected Member: (1) GLB 3.5 x 7.5

Member properties:	Provided:	Required:
Moment of inertia:	123.05 in^4	94.77 in^4
Section Modulus:	32.81 in^3	22.89 in^3
Section Area:	26.25 in^2	11.52 in^2
Bearing Area:		3.6 in^2
Minimum bearing dimensions:	3.5 in x	1.03 in

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BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC)

2018 NDS

Beam Description: ENTRY HEADER

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

Geometry and Loads:

Span:	7 ft	Tributary Width:	10 ft	P Location:	7 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:	525 lbs	DL Reaction 2:	525 lbs	Note: Design automatically uses ASD load combinations
LL Reaction 1:	0 lbs	LL Reaction 2:	0 lbs	
SL Reaction 1:	875 lbs	SL Reaction 2:	875 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	1400 lbs	Total Reaction 2:	1400 lbs	

Material Properties:

E	1.6 msi	E'	1.6 msi
Fb	900 psi	Fb'	1346 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/		360	
Max. allowed total defl:	0.35 in	Max LL defl:	0.23 in
Total defl. * I:	13.51 in^4	Required I:	38.59 in^4
LL defl. * I:	8.44 in^4	Required I:	36.18 in^4
Actual deflections:	TOTAL: 0.12 in		0.08 in

Force analysis:

Max. moment:	2450 ft-lb	Max Shear:	1400 lbs
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Selected Member: (1) DF #2 3.5 x 7.25

Member properties:	Provided:	Required:
Moment of inertia:	111.15 in^4	38.59 in^4
Section Modulus:	30.66 in^3	21.85 in^3
Section Area:	25.38 in^2	10.14 in^2
Bearing Area:		2.24 in^2
Minimum bearing dimensions:	3.5 in x	0.64 in

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BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC)

2018 NDS

Beam Description: MULTIPURPOSE SOUTH HEADER

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

Geometry and Loads:

Span:	7.5 ft	Tributary Width:	11 ft	P Location:	7.5 ft
Add'l uniform DL:		DL unit load:	15 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:	619 lbs	DL Reaction 2:	619 lbs	Note: Design automatically uses ASD load combinations
LL Reaction 1:	1650 lbs	LL Reaction 2:	1650 lbs	
SL Reaction 1:	0 lbs	SL Reaction 2:	0 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	2269 lbs	Total Reaction 2:	2269 lbs	

Material Properties:

E	1.6 msi	E'	1.6 msi
Fb	900 psi	Fb'	1080 psi
Fv	180 psi	Fv'	180 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/		360	
Max. allowed total defl:	0.38 in	Max LL defl:	0.25 in
Total defl. * I:	26.92 in^4	Required I:	71.78 in^4
LL defl. * I:	19.58 in^4	Required I:	78.31 in^4
Actual deflections:	TOTAL: 0.12 in		0.08 in

Force analysis:

Max. moment:	4254 ft-lb	Max Shear:	2269 lbs
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Selected Member: (1) DF #2 3.5 x 9.25

Member properties:	Provided:	Required:
Moment of inertia:	230.84 in^4	78.31 in^4
Section Modulus:	49.91 in^3	47.27 in^3
Section Area:	32.38 in^2	18.91 in^2
Bearing Area:		3.63 in^2
Minimum bearing dimensions:	3.5 in x	1.04 in

John S. Apolis, P.E.

CSES, Inc.

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BEAM DESIGN (Cantilever, Uniform Load+Concentrated Load)

2018 International Building Code (IBC)(concentrated load at tip of cantilever 2018 NDS

Beam Description: CLASSET BEAMS

Enter '1' for snow load:
Enter '1' for repetitive member:
Enter '1' for wet use:

Geometry and Loads:

Span:	3 ft	Tributary Width:	1.33 ft
DL unit load:	15 psf	LL unit load:	40 psf
Add'l unif. DL:	lb/ft	Add'l unif. LL:	lb/ft
Concentrated DL:	630 lbs	Concentrated LL:	1680 lbs
Cantilever a:	0.5 ft		
		Total point load:	2310 lbs
DL uniform load:	20 lb/ft	Max DL reaction:	776 lbs
LL uniform load:	53 lb/ft	Max LL reaction:	2,069 lbs
Total load:	73 lb/ft	Max Total reaction:	2,844 lbs
		Rsmall	-278 lbs

Material Properties:

E	1.6 x 10 ⁶ psi	E'	1.6 x 10 ⁶ psi
Fb	900 psi	Fb'	1075 psi
Fv	180 psi	Fv'	180 psi
Fc perp	625 psi	Fc perp'	625 psi
Emin	0.58 x 10 ⁶ psi	Emin'	0.58 x 10 ⁶ psi

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:	0.075 in
Cantilever Deflections, TL:	0.05 in	LL:	0.025 in
Total Required I:	9 in ⁴	LL Required I:	21 in ⁴
Actual midspan δ:	TOTAL: 0.001 inches	LL	0.000 inches
Actual Cantilever δ:	TOTAL: 0.002 inches	LL	0.002 inches

Force analysis:

Max. moment:	1164 ft-lb	Max Shear:	2347 lbs
		Shear @ d =	2290 lbs

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

Member properties:	Provided:	Required:
Moment of inertia:	230.8 in ⁴	21.3 in ⁴
Section Modulus:	49.9 in ³	13.0 in ³
Section Area:	32.4 in ²	19.1 in ²
Bearing Area:		4.6 in ²
Minimum bearing dimensions:	3.5 x	1.3 inches

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CSES, Inc.

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Date: 26-Jul-21

Architect:

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BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC)

2018 NDS

Beam Description: MULTIPURPOSE EXIT HEADER

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

Geometry and Loads:

Span:	6 ft	Tributary Width:	2 ft	P Location:	4 ft
Add'l uniform DL:		DL unit load:	15 psf	Concentrated DL:	549 lbs
Add'l uniform LL:		LL unit load:	40 psf	Concentrated LL:	2743 lbs
Add'l uniform SL:		SL unit load:		Concentrated SL:	
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	456 lbs	DL Reaction 2:	273 lbs	Note: Design automatically uses ASD load combinations
LL Reaction 1:	2069 lbs	LL Reaction 2:	1154 lbs	
SL Reaction 1:	0 lbs	SL Reaction 2:	0 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	2525 lbs	Total Reaction 2:	1427 lbs	

Material Properties:

E	1.8 msi	E'	1.8 msi
Fb	2400 psi	Fb'	2400 psi
Fv	265 psi	Fv'	265 psi
Fc perp	650 psi	Fc perp'	650 psi
Emin	0.95 msi	Emin'	0.95 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/	240		
For LL only: Allowed deflection criteria, span/	360		
Max. allowed total defl:	0.3 in	Max LL defl:	0.2 in
Total defl. * I:	14.01 in^4	Required I:	46.72 in^4
LL defl. * I:	11.49 in^4	Required I:	57.44 in^4
Actual deflections: TOTAL:	0.11 in		0.09 in

Force analysis:

Max. moment:	4829 ft-lb	Max Shear:	2525 lbs
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Selected Member: (1) GLB 3.5 x 7.5

Member properties:	Provided:	Required:
Moment of inertia:	123.05 in^4	57.44 in^4
Section Modulus:	32.81 in^3	24.15 in^3
Section Area:	26.25 in^2	14.29 in^2
Bearing Area:		3.88 in^2
Minimum bearing dimensions:	3.5 in x	1.11 in

John S. Apolis, P.E.

CSES, Inc.

Job number: 2021.071

Project: Lloyd

Date: 26-Jul-21

Architect:

Page number: D1

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC)

2018 NDS

Beam Description: DECK JOISTS

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

Geometry and Loads:

Span:	7 ft	Tributary Width:	1.33 ft	P Location:	7 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:	56 lbs	DL Reaction 2:	56 lbs	Note: Design automatically uses ASD load combinations
LL Reaction 1:	279 lbs	LL Reaction 2:	279 lbs	
SL Reaction 1:	0 lbs	SL Reaction 2:	0 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	335 lbs	Total Reaction 2:	335 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/		600	
Max. allowed total defl:	0.35 in	Max LL defl:	0.14 in
Total defl. * I:	3.98 in^4	Required I:	11.37 in^4
LL defl. * I:	3.32 in^4	Required I:	23.69 in^4
Actual deflections:	TOTAL: 0.08 in		0.07 in

Force analysis:

Max. moment:	587 ft-lb	Max Shear:	335 lbs
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Selected Member: (1) HF #2 1.5 x 7.25 (2x10 USED)

Member properties:	Provided:	Required:
Moment of inertia:	47.63 in^4	23.69 in^4
Section Modulus:	13.14 in^3	6. in^3
Section Area:	10.88 in^2	3.35 in^2
Bearing Area:		0.83 in^2
Minimum bearing dimensions:	1.5 in x	0.55 in

John S. Apolis, P.E.

CSES, Inc.

Job number: 2021.071

Project: Lloyd

Date: 26-Jul-21

Architect:

Page number: 02

BEAM DESIGN (Cantilever, Uniform Load+Concentrated Load)

2018 International Building Code (IBC)(concentrated load at tip of cantilever) 2018 NDS

Beam Description: DECK JOISTS, CANTILEVERED

Enter '1' for snow load:
Enter '1' for repetitive member: 1
Enter '1' for wet use:

Geometry and Loads:

Span:	7 ft	Tributary Width:	1.33 ft
DL unit load:	12 psf	LL unit load:	60 psf
Add'l unif. DL:	lb/ft	Add'l unif. LL:	lb/ft
Concentrated DL:	lbs	Concentrated LL:	lbs
Cantilever a:	5 ft		
		Total point load:	0 lbs
DL uniform load:	16 lb/ft	Max DL reaction:	164 lbs
LL uniform load:	80 lb/ft	Max LL reaction:	821 lbs
Total load:	96 lb/ft	Max Total reaction:	985 lbs
		Rsmall	164 lbs

Material Properties:

E	1.3 x 10 ⁶ psi	E'	1.495 x 10 ⁶ psi
Fb	850 psi	Fb'	716 psi
Fv	150 psi	Fv'	150 psi
Fc perp	405 psi	Fc perp'	405 psi
Emin	0.47 x 10 ⁶ psi	Emin'	0.47 x 10 ⁶ psi

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:	0.175 in
Cantilever Deflections, TL:	0.5 in	LL:	0.25 in
Total Required I:	55 in ⁴	LL Required I:	95 in ⁴
Actual midspan δ:	TOTAL: 0.040 inches	LL	0.029 inches
Actual Cantilever δ:	TOTAL: 0.278 inches	LL	0.240 inches

Force analysis:

Max. moment:	1197 ft-lb	Max Shear:	506 lbs
		Shear @ d =	432 lbs

Selected Member: (1) HF #2 1.5 x 9.25

Member properties:	Provided:	Required:
Moment of inertia:	98.9 in ⁴	95.0 in ⁴
Section Modulus:	21.4 in ³	20.1 in ³
Section Area:	13.9 in ²	4.3 in ²
Bearing Area:		2.4 in ²
Minimum bearing dimensions:	1.5 x	1.6 inches

John S. Apolis, P.E.
 Project: Lloyd
 Architect:

CSES, Inc.

Job number: 2021.071
 Date: 26-Jul-21
 Page number: 03

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC)

2018 NDS

Beam Description: *NE DECK BEAM*

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

Geometry and Loads:

Span:	7 ft	Tributary Width:	10.5 ft	P Location:	7 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:	441 lbs	DL Reaction 2:	441 lbs	Note: Design automatically uses ASD load combinations
LL Reaction 1:	2205 lbs	LL Reaction 2:	2205 lbs	
SL Reaction 1:	0 lbs	SL Reaction 2:	0 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	2646 lbs	Total Reaction 2:	2646 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:	0.35 in	Max LL defl:	0.18 in
Total defl. * I:	26.87 in ⁴	Required I:	76.77 in ⁴
LL defl. * I:	22.39 in ⁴	Required I:	127.95 in ⁴
Actual deflections:	TOTAL: 0.06 in		0.05 in

Force analysis:

Max. moment:	4631 ft-lb	Max Shear:	2646 lbs
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Selected Member: (1) DF #2 3.5 x 11.25

Member properties:	Provided:	Required:
Moment of inertia:	415.28 in ⁴	127.95 in ⁴
Section Modulus:	73.83 in ³	70.16 in ³
Section Area:	39.38 in ²	27.56 in ²
Bearing Area:		4.23 in ²
Minimum bearing dimensions:	3.5 in x	1.21 in

John S. Apolis, P.E.

CSES, Inc.

Job number: 2021.071

Project: Lloyd

Date: 26-Jul-21

Architect:

Page number: D4

BEAM DESIGN (Cantilever, Uniform Load+Concentrated Load)

2018 International Building Code (IBC)(concentrated load at tip of cantilever) 2018 NDS

Beam Description: 2nd TO NE DECK BEAM

Enter '1' for snow load:

Enter '1' for repetitive member: 1

Enter '1' for wet use:

Geometry and Loads:

Span:	14 ft	Tributary Width:	5 ft
DL unit load:	12 psf	LL unit load:	60 psf
Add'l unif. DL:	lb/ft	Add'l unif. LL:	lb/ft
Concentrated DL:	lbs	Concentrated LL:	lbs
Cantilever a:	2 ft		
		Total point load:	0 lbs
DL uniform load:	60 lb/ft	Max DL reaction:	549 lbs
LL uniform load:	300 lb/ft	Max LL reaction:	2,743 lbs
Total load:	360 lb/ft	Max Total reaction:	3,291 lbs
		Rsmall	2469 lbs

Material Properties:

E	1.6 x 10 ⁶ psi	E'	1.84 x 10 ⁶ psi
Fb	900 psi	Fb'	981 psi
Fv	180 psi	Fv'	180 psi
Fc perp	625 psi	Fc perp'	625 psi
Emin	0.58 x 10 ⁶ psi	Emin'	0.58 x 10 ⁶ psi

Deflection analysis:

	For total load: Allowed deflection criteria, span/	240	
	For LL only: Allowed deflection criteria, span/	480	
Max. allowed total defl:	0.7 in	Max LL defl:	0.35 in
Cantilever Deflections, TL:	0.2 in	LL:	0.1 in
Total Required I:	243 in ⁴	LL Required I:	403 in ⁴
Actual midspan δ:	TOTAL: 0.261 inches	LL	0.216 inches
Actual Cantilever δ:	TOTAL: -0.003 inches	LL	0.010 inches

Force analysis:

Max. moment:	8780 ft-lb	Max Shear:	2571 lbs
		Shear @ d =	2234 lbs

Selected Member: (1) DF #2 5.5 x 11.25

Member properties:	Provided:	Required:
Moment of inertia:	652.6 in ⁴	402.7 in ⁴
Section Modulus:	116.0 in ³	107.5 in ³
Section Area:	61.9 in ²	18.6 in ²
Bearing Area:		5.3 in ²
Minimum bearing dimensions:	5.5 x	1.0 inches

John S. Apolis, P.E.
 Project: Lloyd
 Architect:

CSES, Inc.

Job number: 2021.071
 Date: 26-Jul-21
 Page number: 05

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC)

2018 NDS

Beam Description: *NW DECK BEAM*

Fully Supported:	<input type="text" value="1"/>	Snow Load:	<input type="text"/>	Wind Load:	<input type="text"/>
Repetitive Member:	<input type="text"/>	P.T. Lumber:	<input type="text" value="1"/>	Wet Use:	<input type="text"/>

Geometry and Loads:

Span:	<input type="text" value="9 ft"/>	Tributary Width:	<input type="text" value="3 ft"/>	P Location:	<input type="text" value="9 ft"/>
Add'l uniform DL:	<input type="text"/>	DL unit load:	<input type="text" value="12 psf"/>	Concentrated DL:	<input type="text"/>
Add'l uniform LL:	<input type="text"/>	LL unit load:	<input type="text" value="60 psf"/>	Concentrated LL:	<input type="text"/>
Add'l uniform SL:	<input type="text"/>	SL unit load:	<input type="text"/>	Concentrated SL:	<input type="text"/>
Add'l uniform WL:	<input type="text"/>	WL unit load:	<input type="text"/>	Concentrated WL:	<input type="text"/>

DL Reaction 1:	162 lbs	DL Reaction 2:	162 lbs	Note: Design automatically uses ASD load combinations
LL Reaction 1:	810 lbs	LL Reaction 2:	810 lbs	
SL Reaction 1:	0 lbs	SL Reaction 2:	0 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	972 lbs	Total Reaction 2:	972 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:	0.45 in	Max LL defl:	0.23 in
Total defl. * I:	20.98 in ⁴	Required I:	46.62 in ⁴
LL defl. * I:	17.48 in ⁴	Required I:	77.7 in ⁴
Actual deflections:	TOTAL: 0.19 in		0.16 in

Force analysis:

Max. moment:	2187 ft-lb	Max Shear:	972 lbs
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Selected Member:	(1) DF #2	3.5	x	7.25
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Member properties:	Provided:	Required:
Moment of inertia:	111.15 in ⁴	77.7 in ⁴
Section Modulus:	30.66 in ³	28.04 in ³
Section Area:	25.38 in ²	10.13 in ²
Bearing Area:		1.56 in ²
Minimum bearing dimensions:	3.5 in x	0.44 in

06

the time of permit application. The calculations shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.

- 5.6 The design and construction of the deck supported by the deck bracket and the supporting construction of the deck bracket, including framing members and foundations, are outside the scope of this report and shall comply with the applicable code.
- 5.7 The compatibility of the bracket with preservative-pressure-treated or fire-retardant-treated wood is outside the scope of this report.
- 5.8 Rim joists shall be constructed with continuous fastening and support in accordance with Table 2304.10.1 for the 2018 and 2015 IBC (Table 2304.9.1 for the 2012, 2009, and 2006 IBC), or Table R602.3(1) of the IRC. Details to resist the effects of torsion in the rim joist shall be submitted to the code official.

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Joist Hangers and Similar Devices (AC13), dated October 2018.

7.0 IDENTIFICATION

- 7.1 The Maine Deck Bracket described in this report shall be identified with the manufacturer's name (Maine Deck Bracket) and/or trademark, the product name and the evaluation report number (ESR-1331).
- 7.2 The report holder's contact information is the following:

MAINE DECK BRACKET CO.
 176 GRANGE AVENUE
 MINOT, MAINE 04258
 (207) 345-8501
www.deckbracket.com
bracket@megalink.net

TABLE 1—MAXIMUM ALLOWABLE DESIGN CAPACITIES PER BRACKET^{1,2,3,4}

RIM BOARD AND LEDGER THICKNESS (inches)	VERTICAL DOWNLOAD CAPACITY (PARALLEL TO WEB FACE) (lbf)	LATERAL CAPACITY (PERPENDICULAR TO WEB FACE) (lbf)
1 1/2	1000	1115
3	1160	1115

For SI: 1 inch = 25.4 mm, 1 lbf = 4.4N, 1 in-lbf = 0.112 N-m.

¹Allowable capacities are based on four 1/2-inch-diameter-by-4 1/2-inch-long hex head bolts through the rim board and four 1/2-inch-diameter-by-3-inch-long hex head bolts through the deck/balcony header complying with ASTM A307 Grade A or SAE Grade 2, with 1-inch-diameter washers on all wood surfaces. If longer length bolts are required, calculations shall be submitted to the code official to verify compliance with the allowable design loads shown above.

²Capacities shall be multiplied by the applicable wet service factor for dowel-type fasteners in accordance with the *National Design Specification® for Wood Construction (NDS)*.

³Capacities are based on deck joist spacing not exceeding 24 inches (610 mm) on center.

⁴Capacities are limited to No. 2 Southern pine or Douglas fir-larch solid sawn lumber with a specific gravity of 0.50 or greater.

LEDGER DEMAND = 262.5 plf

1,000 # / 262.5 plf = 3.8 SAY 3.5' O.C.

John S. Apolis, P.E. CSES, Inc.

Job number: 2021.071

Project: Lloyd Residence

Date: 25-Aug-21

Architect: Suzanne Zahr

Page number: D7

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC)

2018 NDS

Beam Description: Entry Deck Joists

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

Geometry and Loads:

Span:	6 ft	Tributary Width:	1.33 ft	P Location:	6 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:	25 psf	Concentrated SL:	
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	48 lbs	DL Reaction 2:	48 lbs	Note: Design automatically uses
LL Reaction 1:	239 lbs	LL Reaction 2:	239 lbs	ASD load combinations
SL Reaction 1:	100 lbs	SL Reaction 2:	100 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	302 lbs	Total Reaction 2:	302 lbs	

Material Properties:

E	1.3 msi	E'	1.235 msi
Fb	850 psi	Fb'	1169 psi
Fv	150 psi	Fv'	138 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:	0.3 in	Max LL defl:	0.15 in
Total defl. * I:	3.05 in^4	Required I:	10.15 in^4
LL defl. * I:	2.67 in^4	Required I:	17.8 in^4
Actual deflections:	TOTAL: 0.15 in		0.13 in

Force analysis:

Max. moment:	453 ft-lb	Max Shear:	302 lbs
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Selected Member: (1) HF#2 1.5 x 5.5

Member properties:	Provided:	Required:
Moment of inertia:	20.8 in^4	17.8 in^4
Section Modulus:	7.56 in^3	4.65 in^3
Section Area:	8.25 in^2	3.29 in^2
Bearing Area:		0.75 in^2
Minimum bearing dimensions:	1.5 in x	0.5 in

John S. Apolis, P.E. CSES, Inc.

Job number: 2021.071

Project: Lloyd Residence

Date: 25-Aug-21

Architect: Suzanne Zahr

Page number: D8

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC)

2018 NDS

Beam Description: Deck Joists Below Planter

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

Geometry and Loads:

Span:	6 ft	Tributary Width:	1.33 ft	P Location:	6 ft
Add'l uniform DL:		DL unit load:	150 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:	599 lbs	DL Reaction 2:	599 lbs	Note: Design automatically uses
LL Reaction 1:	0 lbs	LL Reaction 2:	0 lbs	ASD load combinations
SL Reaction 1:	100 lbs	SL Reaction 2:	100 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	698 lbs	Total Reaction 2:	698 lbs	

Material Properties:

E	1.3 msi	E'	1.235 msi
Fb	850 psi	Fb'	1017 psi
Fv	150 psi	Fv'	138 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:	0.3 in	Max LL defl:	0.15 in
Total defl. * I:	5.5 in^4	Required I:	18.32 in^4
LL defl. * I:	0.79 in^4	Required I:	5.23 in^4
Actual deflections:	TOTAL: 0.13 in		0.02 in

Force analysis:

Max. moment:	1047 ft-lb	Max Shear:	698 lbs
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Selected Member: (2) HF#2 1.5 x 5.5

Member properties:	Provided:	Required:
Moment of inertia:	41.59 in^4	18.32 in^4
Section Modulus:	15.13 in^3	12.36 in^3
Section Area:	16.5 in^2	7.59 in^2
Bearing Area:		1.72 in^2
Minimum bearing dimensions:	3. in x	0.57 in

John S. Apolis, P.E. CSES, Inc.

Job number: 2021.071

Project: Lloyd Residence

Date: 25-Aug-21

Architect: Suzanne Zahr

Page number: D9

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC)

2018 NDS

Beam Description: 2x Decking Below Planter

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

Geometry and Loads:

Span:	1.33 ft	Tributary Width:	1 ft	P Location:	1.33 ft
Add'l uniform DL:		DL unit load:	150 psf	Concentrated DL:	
Add'l uniform LL:		LL unit load:	60 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:	100 lbs	DL Reaction 2:	100 lbs	Note: Design automatically uses
LL Reaction 1:	40 lbs	LL Reaction 2:	40 lbs	ASD load combinations
SL Reaction 1:	17 lbs	SL Reaction 2:	17 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	142 lbs	Total Reaction 2:	142 lbs	

Material Properties:

E	1.1 msi	E'	1.045 msi
Fb	675 psi	Fb'	994 psi
Fv	140 psi	Fv'	129 psi
Fc perp	405 psi	Fc perp'	405 psi
Emin	0.4 msi	Emin'	0.38 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/	240		
For LL only: Allowed deflection criteria, span/	480		
Max. allowed total defl:	0.07 in	Max LL defl:	0.03 in
Total defl. * I:	0.02 in^4	Required I:	0.24 in^4
LL defl. * I:	0.01 in^4	Required I:	0.17 in^4
Actual deflections:	TOTAL: 0. in		0. in

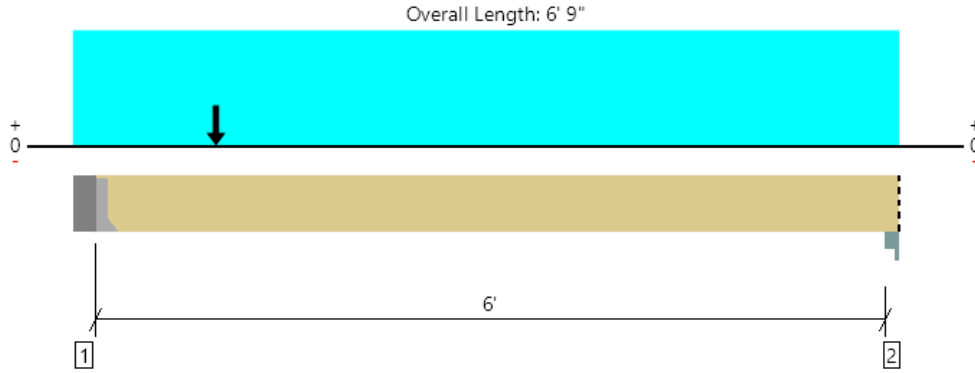
Force analysis:

Max. moment:	47 ft-lb	Max Shear:	142 lbs
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Selected Member: (1) HF#2 12 x 1.5

Member properties:	Provided:	Required:
Moment of inertia:	3.38 in^4	0.24 in^4
Section Modulus:	4.5 in^3	0.57 in^3
Section Area:	18. in^2	1.66 in^2
Bearing Area:		0.35 in^2
Minimum bearing dimensions:	12. in x	0.03 in

Deck, D10: Flush Beam
1 piece(s) 4 x 8 DF No.2



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)	2567 @ 5 1/2"	3281 (1.50")	Passed (78%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	2105 @ 1' 3/4"	2741	Passed (77%)	0.90	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2614 @ 3' 1 9/16"	2691	Passed (97%)	0.90	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.071 @ 3' 6"	0.153	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.108 @ 3' 5 1/8"	0.306	Passed (L/678)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

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

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Hanger on concrete	5.50"	Hanger ¹	1.50"	1300	1268	700	3268	See note ¹
2 - Column Cap - steel	3.50"	3.50"	1.50"	424	1163	513	2100	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)	6' 4" o/c	
Bottom Edge (Lu)	6' 4" 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 Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	5 1/2" to 6' 9"	N/A	6.4	--	--	
1 - Uniform (PSF)	0 to 6' 9" (Top)	6'	12.0	60.0	25.0	Default Load
2 - Point (lb)	1' 4" (Front)	N/A	599	-	100	
3 - Point (lb)	1' 4" (Front)	N/A	599	-	100	

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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	



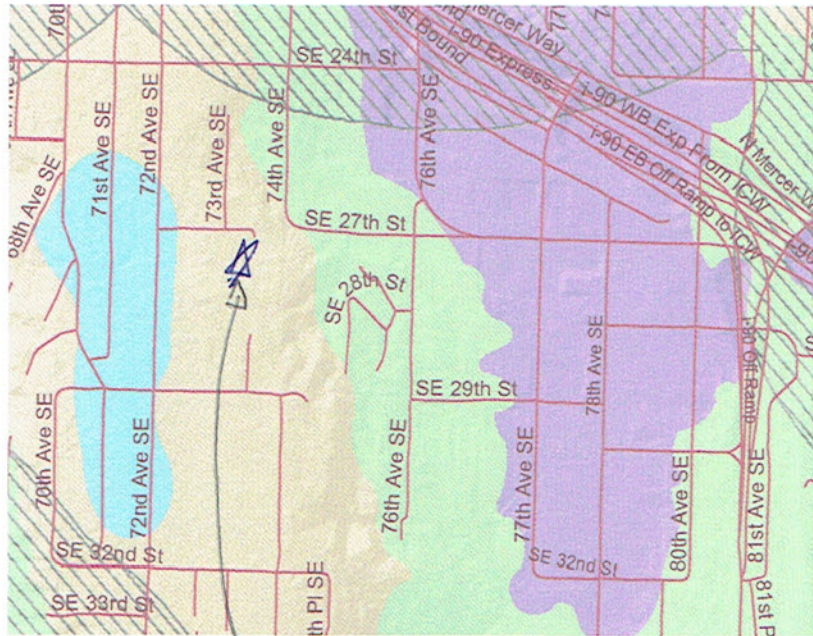
2723 74th Ave SE, Mercer Island, WA 98040, USA

Latitude, Longitude: 47.58610239999999, -122.2407844



Date	7/20/2021, 3:39:54 PM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	D - Default (See Section 11.4.3)

Type	Value	Description
S_S	1.397	MCE_R ground motion. (for 0.2 second period)
S_1	0.486	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.677	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	1.118	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



Exp B
 $K_{zc} = 1.6$

John S. Apolis, P.E.

CSES, Inc.

Job number: 2021.071

Project: Lloyd

Date: 20-Jul-21

Designer: Suzanne Zahr

Page number: L 1

Lateral Loads Design per ASCE 7-10, Wind: Section 28 Seismic: Section 12

(Simplified Envelope Procedure Part 2)

2018 International Building Code (IBC)

WIND LOADS 110 mph Basic Wind Speed 2015 NDS
 $P_s = \lambda * K_{zt} * P_s(30) * 0.6$ Exposure **B** Roof Slope: **4.00** : 12 = 18.4
 Least Horizontal Dimension, feet: **41** Mean Roof Ht, feet: **20** (degrees)
 $\lambda = 1.00$ $a = 4.1$ ft, $2a = 8.2$ ft
 $I_w = 1.00$ $K_{zT} = 1.60$

<u>Tabulated Ps(30):</u> (Refer to ASCE 7-10, Figure 28.6-1)	<u>Zone</u>	<u>Tabulated Wind Pressure</u>		<u>Calc'd Design Pressure</u>	<u>Min Design Pressure</u>	(Per section 28.6.4 minimum wind pressure is 16 PSF for zones A,C, and 8 PSF for zones B, D)
(horizontal)	A	25.8	psf	24.8	24.8	
"	B	-7.3	psf	-7.0	7.7	
"	C	17.2	psf	16.5	16.5	
"	D	-4.1	psf	-4.0	7.7	
(vertical)	E	-23.1	psf	-22.2		
"	F	-15.7	psf	-15.1		
"	G	-16.0	psf	-15.4		
"	H	-12.0	psf	-11.5		
(uplift on overhangs)	E(oh)	-32.3	psf	-31.0		
"	G(oh)	-25.3	psf	-24.3		

(Equivalent Lateral Force Procedure, Section 12.8)

SEISMIC LOADS $I_e = 1.0$ $R = 6.5$ ASCE 7-10, Table 12.2.1
 Seismic Parameters Group I Site Class: **D**
 per ASCE 7-10) PGA (.2 sec) 1.397 $F_a = 1.00$ ASCE 7-10 Table 11.4-1
 PGA (1 sec) 0.486 $F_v = 1.60$ ASCE 7-10 Table 11.4-2
 Seismic Design Categories per ASCE 7-10 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).

$S_s = 1.3970$ $S_{ms} = F_a * S_s = 1.40$ Equation 11.4-1
 $S_1 = 0.4860$ $S_{m1} = F_v * S_1 = 0.78$ Equation 11.4-2

Equations 11.4-3, 11.4-4 $S_{ds} = 2/3 * S_{ms} = 0.93$ $S_{d1} = 2/3 * S_{m1} = 0.52$
 Equation 12.14-11 C_s (or %V) = $(S_{ds} / (R/I)) = 0.143$ **Building period < 0.5 s per IBC eq 12.8-7**

Base Shear = %V * W * 0.7 = 9.93 psf, uniformly distributed over floor area
 (0.7 reduction factor per ASCE 7-10, Section 2.4.1, Eq 5 (seismic vertical distribution per IBC eqs 12.8-11 & 12)

	<u>Roof or Floor DL (psf)</u>	<u>Wall DL (psf)</u>	<u>Story Height Above Base (ft)</u>	<u>Lateral Load (psf)</u>
Base = top of foundation	<u>DL (psf)</u>	<u>dist. over floor area</u>	<u>Above Base (ft)</u>	
Top Framing	15	24	16	5.61
Main Floor	12	48	8	4.32
Lower Floor				0.00
Total Seismic DL:	99		Sum	9.93

BEDROOM NORTH WALL - MAIN FLOOR - SHEAR WALL DESIGN L = 5'

$$P_w = 8.2' \times 4' \times 24.8_{psf} + 11.3' \times 4' \times 16.5_{psf} + 21.5' \times 6' \times 7.7_{psf} = 2,553^{\#}$$

$$P_E = (14' \times 44' + 6' \times 15') \times 5.61_{psf} = 3,961^{\#}$$

$$V = \frac{3,961^{\#}}{5} = 793^{\#} < 910_{plf} \text{ SW5}$$

$$UPLIFT = 793^{\#} \times 8' = 6,338^{\#} = 9,055^{\#} \text{ LRFD SEE PAGES L3-L7}$$

SOUTH WALL - L = 16'

$$P_w = 15' \times 4' \times 16.5_{psf} + 15' \times 4' \times 7.7_{psf} = 1,452^{\#}$$

$$P_E = (14' \times 44' + 4' \times 24') \times 5.61_{psf} = 3,994^{\#}$$

$$V = \frac{3,994^{\#}}{16'} = 249_{plf} < 350_{plf} \text{ SW2}$$

$$UPLIFT = 249_{plf} \times 8' = 1,997^{\#} < 4,065^{\#} \text{ HRUS}$$

SOUTH ENTRY WALL - SW1 BY INSPECTION

L3

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Phone:			
E-mail:			

1. Project information

Customer company:
 Customer contact name:
 Customer e-mail:
 Comment:

Project description:
 Location:
 Fastening description:

2. Input Data & Anchor Parameters

General

Design method: ACI 318-14
 Units: Imperial units

Anchor Information:

Anchor type: Bonded anchor
 Material: F1554 Grade 36
 Diameter (inch): 0.625
 Effective Embedment depth, h_{ef} (inch): 5.000
 Code report: ICC-ES ESR-2508
 Anchor category: -
 Anchor ductility: Yes
 h_{min} (inch): 8.13
 c_{ac} (inch): 9.82
 c_{min} (inch): 1.75
 s_{min} (inch): 3.00

Base Material

Concrete: Normal-weight
 Concrete thickness, h (inch): 9.00
 State: Cracked
 Compressive strength, f_c (psi): 2500
 $\Psi_{c,v}$: 1.0
 Reinforcement condition: B tension, B shear
 Supplemental reinforcement: Not applicable
 Reinforcement provided at corners: No
 Ignore concrete breakout in tension: No
 Ignore concrete breakout in shear: No
 Hole condition: Dry concrete
 Inspection: Continuous
 Temperature range, Short/Long: 150/110°F
 Ignore 6do requirement: Not applicable
 Build-up grout pad: No

Base Plate

Length x Width x Thickness (inch): 18.00 x 3.00 x 0.25

Recommended Anchor

Anchor Name: SET-XP® - SET-XP w/ 5/8"Ø F1554 Gr. 36
 Code Report: ICC-ES ESR-2508



$HOLD\ DOWN\ CAP = 9,055^{\#} \quad LRFD = 6,338^{\#} \quad ASD$

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C4

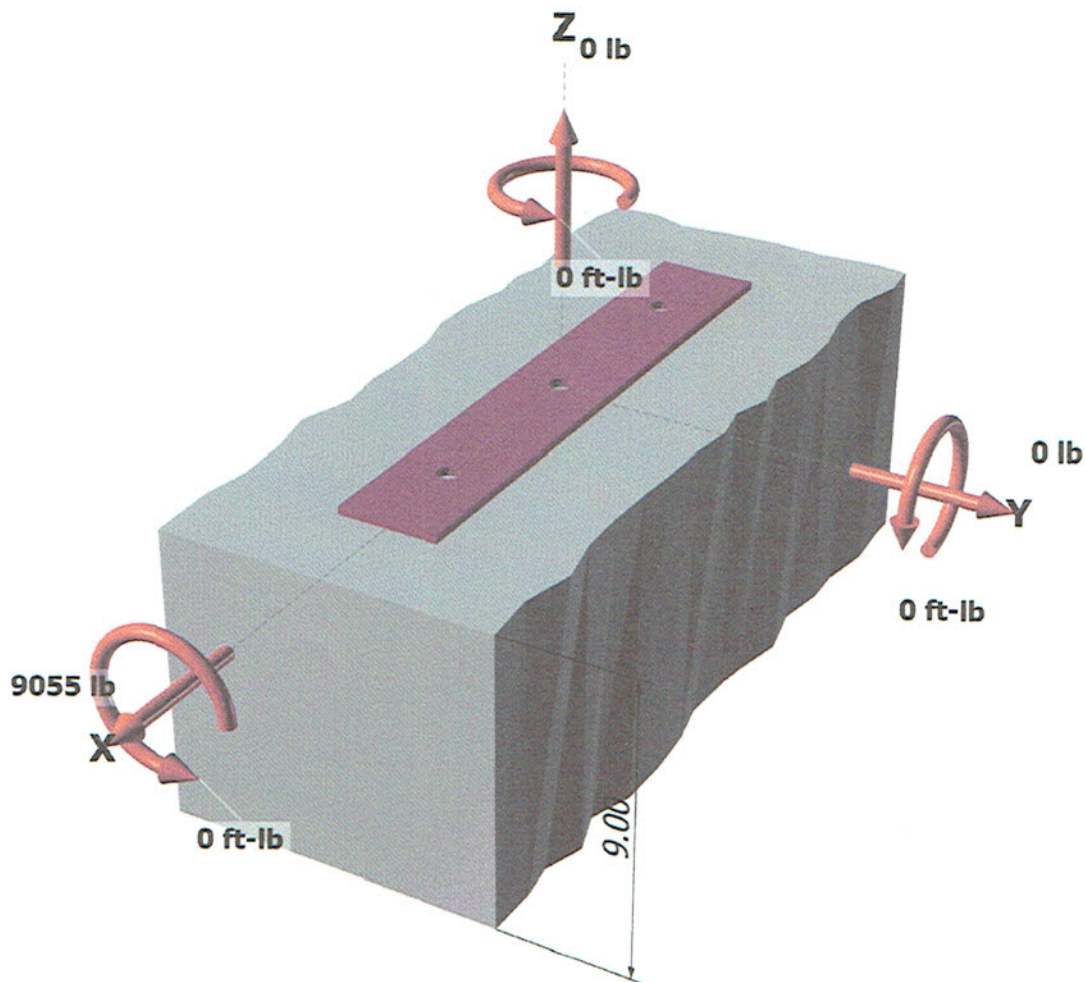
Load and Geometry

Load factor source: ACI 318 Section 5.3
 Load combination: not set
 Seismic design: Yes
 Anchors subjected to sustained tension: No
 Ductility section for tension: 17.2.3.4.2 not applicable
 Ductility section for shear: 17.2.3.5.2 not applicable
 Ω_o factor: not set
 Apply entire shear load at front row: No
 Anchors only resisting wind and/or seismic loads: Yes

Strength level loads:

N_{ua} [lb]: 0
 V_{uax} [lb]: 9055
 V_{uay} [lb]: 0
 M_{ux} [ft-lb]: 0
 M_{uy} [ft-lb]: 0
 M_{uz} [ft-lb]: 0

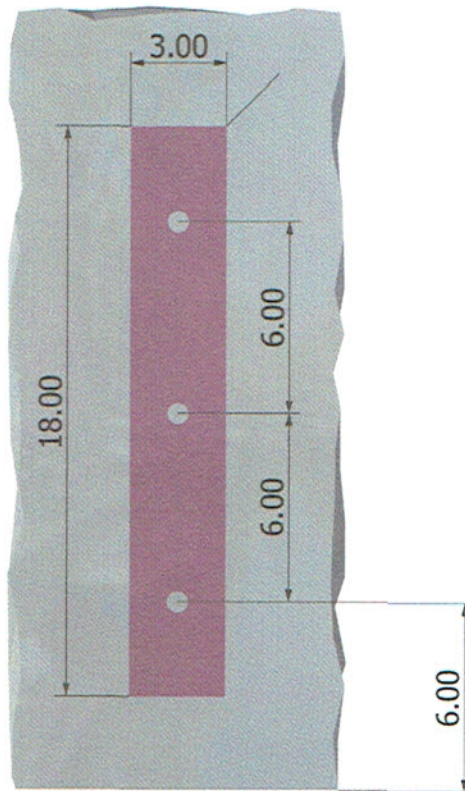
<Figure 1>



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<Figure 2>



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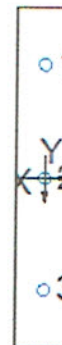
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3. Resulting Anchor Forces

Anchor	Tension load, N _{ua} (lb)	Shear load x, V _{uax} (lb)	Shear load y, V _{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2 + (V_{uay})^2}$ (lb)
1	0.0	3018.3	0.0	3018.3
2	0.0	3018.3	0.0	3018.3
3	0.0	3018.3	0.0	3018.3
Sum	0.0	9055.0	0.0	9055.0

Maximum concrete compression strain (%): 0.00
 Maximum concrete compression stress (psi): 0
 Resultant tension force (lb): 0
 Resultant compression force (lb): 0
 Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
 Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
 Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
 Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



8. Steel Strength of Anchor in Shear (Sec. 17.5.1)

V _{sa} (lb)	ϕ_{grout}	ϕ	$\alpha_{V,seis}$	$\phi_{grout} \alpha_{V,seis} \phi V_{sa}$ (lb)
7865	1.0	0.65	0.68	3476

9. Concrete Breakout Strength of Anchor in Shear (Sec. 17.5.2)

Shear perpendicular to edge in x-direction:

$V_{bx} = \min[7(l_e/d_a)^{0.2} d_a \lambda_a \sqrt{f_c} C_{at}^{1.5}; 9 \lambda_a \sqrt{f_c} C_{at}^{1.5}]$ (Eq. 17.5.2.2a & Eq. 17.5.2.2b)

l _e (in)	d _a (in)	λ_a	f _c (psi)	C _{at} (in)	V _{bx} (lb)
5.00	0.625	1.00	2500	6.00	6164

$\phi V_{cbx} = \phi (A_{Vc} / A_{Vco}) \psi_{ed,V} \psi_{c,V} \psi_{h,V} V_{bx}$ (Sec. 17.3.1 & Eq. 17.5.2.1a)

A _{Vc} (in ²)	A _{Vco} (in ²)	$\psi_{ed,V}$	$\psi_{c,V}$	$\psi_{h,V}$	V _{bx} (lb)	ϕ	ϕV_{cbx} (lb)
162.00	162.00	1.000	1.000	1.000	6164	0.70	4315

10. Concrete Pryout Strength of Anchor in Shear (Sec. 17.5.3)

$\phi V_{cp} = \phi \min[K_{cp} N_{ag}; K_{cp} N_{cb}] = \phi \min[K_{cp} (A_{Na} / A_{Na0}) \psi_{ec,Na} \psi_{ed,Na} \psi_{c,Na} N_{ba}; K_{cp} (A_{Nc} / A_{Nco}) \psi_{ec,N} \psi_{ed,N} \psi_{c,N} \psi_{cp,N} N_b]$ (Sec. 17.3.1 & Eq. 17.5.3.1b)

K _{cp}	A _{Na} (in ²)	A _{Na0} (in ²)	$\psi_{ed,Na}$	$\psi_{ec,Na}$	$\psi_{c,Na}$	N _{ba} (lb)	N _a (lb)
2.0	419.16	258.98	0.924	1.000	1.000	7345	10982

A _{Nc} (in ²)	A _{Nco} (in ²)	$\psi_{ec,N}$	$\psi_{ed,N}$	$\psi_{c,N}$	$\psi_{cp,N}$	N _b (lb)	N _{cb} (lb)	ϕ
382.50	225.00	1.000	0.940	1.000	1.000	9503	15186	0.70



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ϕV_{cpd} (lb)
 15374

11. Results

11. Interaction of Tensile and Shear Forces (Sec. D.7)?

Shear	Factored Load, V_{us} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status
Steel	3018	3476	0.87	Pass (Governs)
T Concrete breakout x+	3018	4315	0.70	Pass
Pryout	9055	15374	0.59	Pass

SET-XP w/ 5/8"Ø F1554 Gr. 36 with hef = 5.000 inch meets the selected design criteria.

12. Warnings

- When cracked concrete is selected, concrete compressive strength used in concrete breakout strength in tension, adhesive strength in tension and concrete pryout strength in shear for SET-XP adhesive anchor is limited to 2,500 psi per ICC-ES ESR-2508 Section 5.3.
- Per designer input, the tensile component of the strength-level earthquake force applied to anchors does not exceed 20 percent of the total factored anchor tensile force associated with the same load combination. Therefore the ductility requirements of ACI 318 17.2.3.4.2 for tension need not be satisfied – designer to verify.
- Per designer input, the shear component of the strength-level earthquake force applied to anchors does not exceed 20 percent of the total factored anchor shear force associated with the same load combination. Therefore the ductility requirements of ACI 318 17.2.3.5.2 for shear need not be satisfied – designer to verify.
- Designer must exercise own judgement to determine if this design is suitable.
- Refer to manufacturer's product literature for hole cleaning and installation instructions.