



22002 64TH AVE W - SUITE 2C, MOUNTLAKE TERRACE, WA 98043
SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

STRUCTURAL CALCULATIONS

Client: 4D ARCHITECTS
Project Name: DHALIWAL-KLAR RESIDENCE
Scope of Work: STRUCTURAL DESIGN OF A (3)-STORY SFR
Upstate Job#: 1651
Date: 3/2/2023
Location: 7024 SE 20th STREET, MERCER ISLAND



JOB # 1651
Andrew M. Gahan, PE

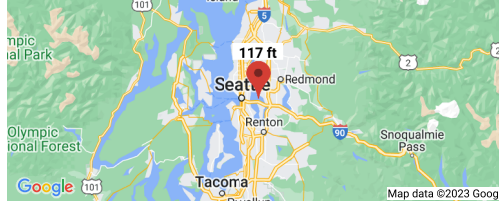
⚠ This is a beta release of the new ATC Hazards by Location website. Please [contact us](#) with feedback.

🔗 The ATC Hazards by Location website will not be updated to support ASCE 7-22. [Find out why.](#)

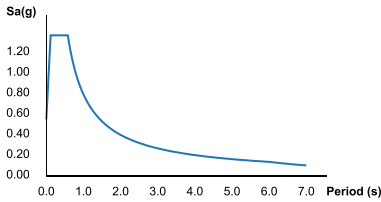
ATC Hazards by Location

Search Information

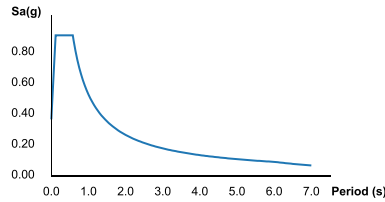
Address: 7024 SE 20th St, Mercer Island, WA 98040, USA
Coordinates: 47.5933717, -122.2439532
Elevation: 117 ft
Timestamp: 2023-03-02T03:22:00.044Z
Hazard Type: Seismic
Reference Document: ASCE7-10
Risk Category: II
Site Class: D



MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S _S	1.362	MCE _R ground motion (period=0.2s)
S ₁	0.524	MCE _R ground motion (period=1.0s)
S _{MS}	1.362	Site-modified spectral acceleration value
S _{M1}	0.787	Site-modified spectral acceleration value
S _{DS}	0.908	Numeric seismic design value at 0.2s SA
S _{D1}	0.524	Numeric seismic design value at 1.0s SA

Additional Information

Name	Value	Description
SDC	D	Seismic design category
F _a	1	Site amplification factor at 0.2s
F _v	1.5	Site amplification factor at 1.0s
CR _S	0.966	Coefficient of risk (0.2s)
CR ₁	0.938	Coefficient of risk (1.0s)
PGA	0.559	MCE _G peak ground acceleration
F _{PGA}	1	Site amplification factor at PGA
PGA _M	0.559	Site modified peak ground acceleration
T _L	6	Long-period transition period (s)
SsRT	1.362	Probabilistic risk-targeted ground motion (0.2s)
SsUH	1.41	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.341	Factored deterministic acceleration value (0.2s)
S1RT	0.524	Probabilistic risk-targeted ground motion (1.0s)
S1UH	0.559	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	0.954	Factored deterministic acceleration value (1.0s)
PGAd	0.891	Factored deterministic acceleration value (PGA)

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

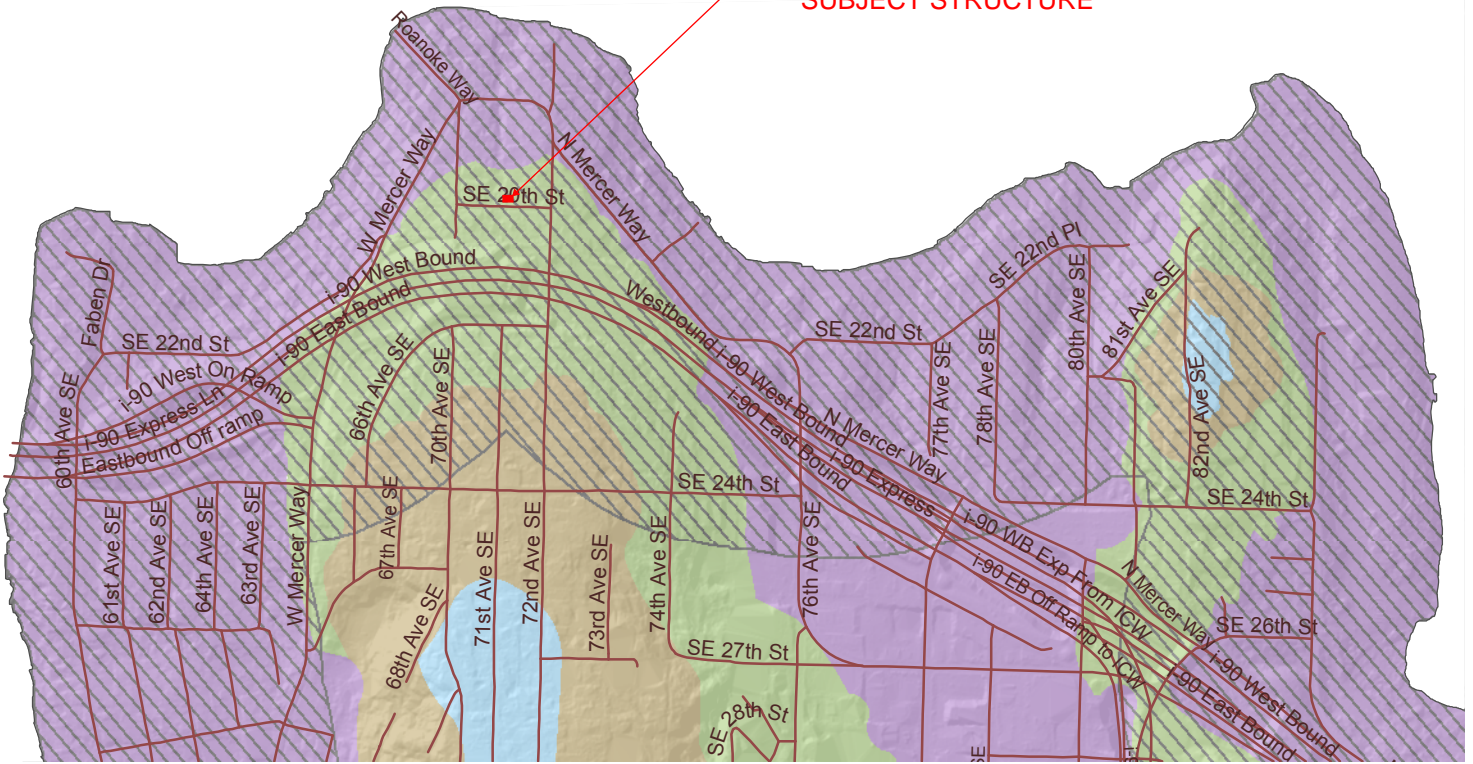
Please note that the ATC Hazards by Location website will not be updated to support ASCE 7-22. [Find out why.](#)

Disclaimer

Hazard loads are provided by the U.S. Geological Survey [Seismic Design Web Services](#).

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APPROXIMATE LOCATION OF THE
SUBJECT STRUCTURE

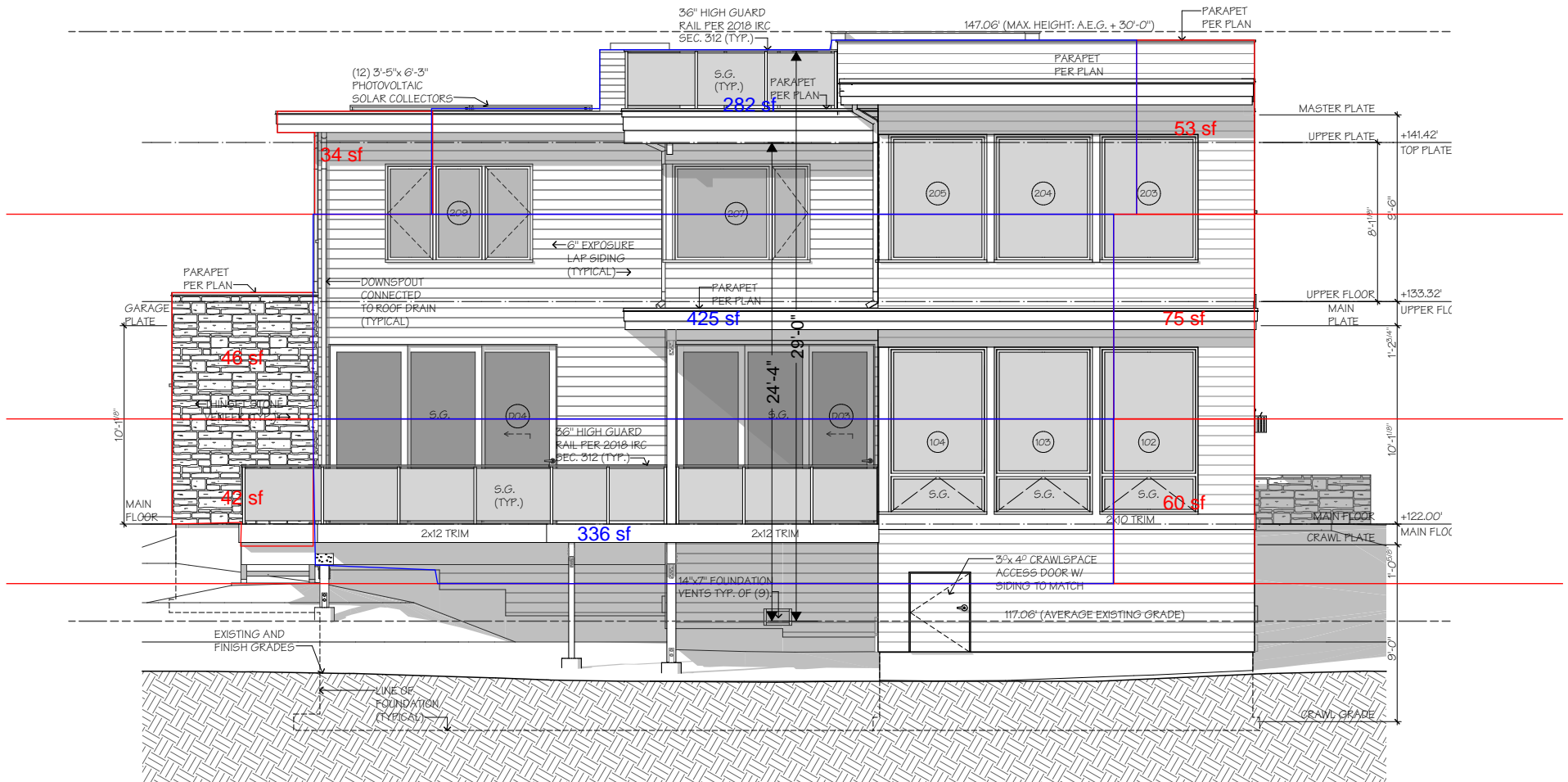


WIND EXPOSURE CATEGORIES:

Wind Exposure Category	Exposure 'C' (1500 feet from Lake)	Exposure 'B' (all other areas)

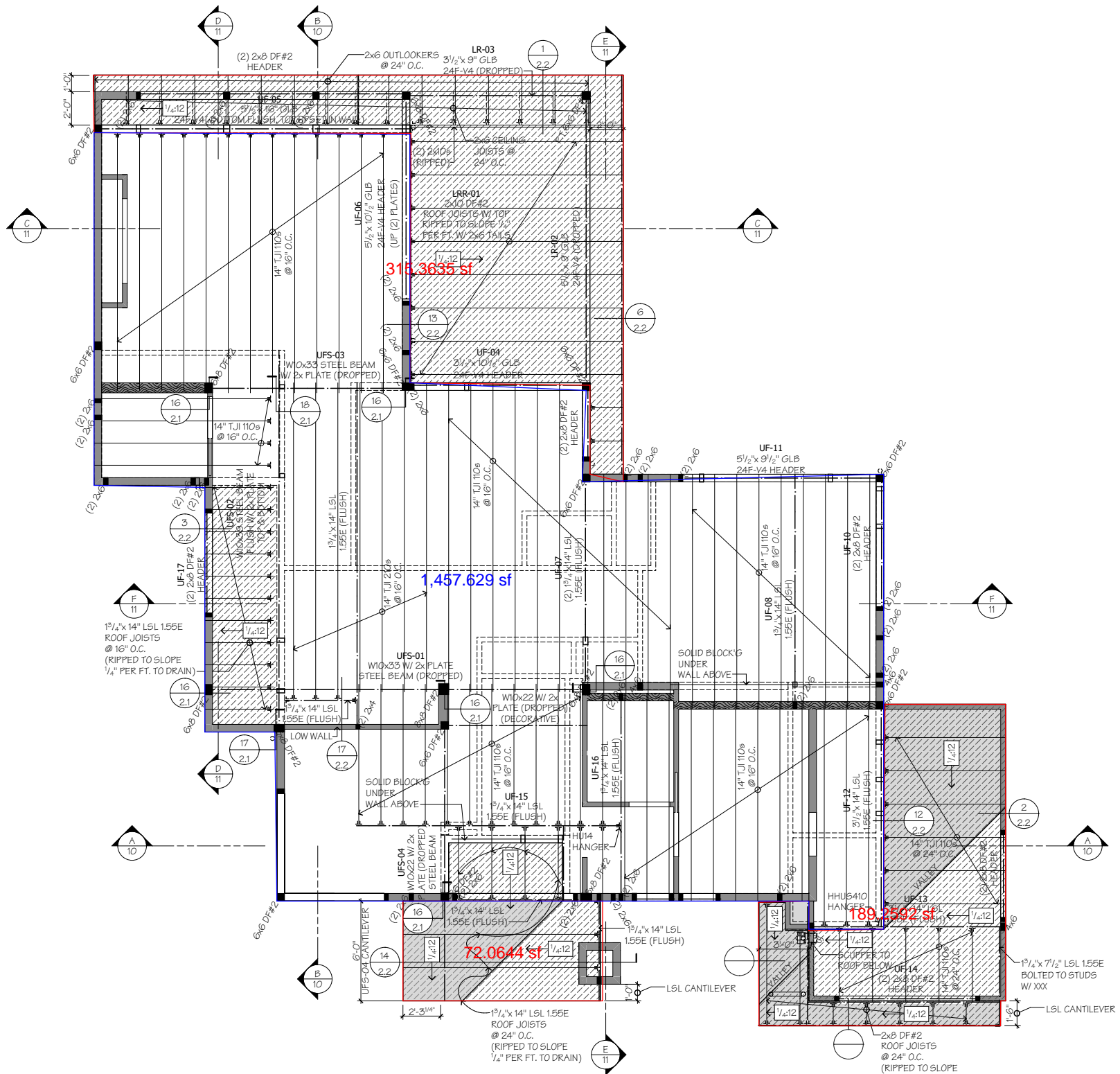
WIND SPEED-UP (TOPOGRAPHIC EFFECT) - K_2t Factor :

K_2t Factor	$K_2t = 1.0$	$K_2t = 1.3$	$K_2t = 1.6$	$K_2t = 1.9$



NORTH ELEVATION

SCALE: 1/4" = 1'-0"



LR-03
3 1/2" x 9" GLB
24F-V4 (DROPPED)

LRR-01
2x6 DF#2
ROOF JOISTS W/ 10F
RIPPED TO SLOPE 1/4"
PER FT. W/ 2x6 TAILS

UF-04
3 1/2" x 10 1/2" GLB
24F-V4 HEADER

UF-06
5 1/2" x 10 1/2" GLB
24F-V4 HEADER
(UP (2) PLATES)

UF-07
1 3/4" x 14" LSL
1.55E (FLUSH)

UF-08
1 3/4" x 14" LSL
1.55E (FLUSH)

UF-15
1 3/4" x 14" LSL
1.55E (FLUSH)

UF-16
1 3/4" x 14" LSL
1.55E (FLUSH)

UF-17
1 3/4" x 14" LSL
1.55E (FLUSH)

UF-18
1 3/4" x 14" LSL
1.55E (FLUSH)

UF-11
5 1/2" x 9 1/2" GLB
24F-V4 HEADER

UF-10
(2) 2x8 DF#2
HEADER

UF-12
3 1/2" x 14" LSL
1.55E (FLUSH)

UF-13
3 1/2" x 14" LSL
1.55E (FLUSH)

UF-14
(2) 2x8 DF#2
HEADER

UF-19
1 3/4" x 14" LSL
1.55E (FLUSH)

UF-20
1 3/4" x 14" LSL
1.55E (FLUSH)

UF-02
W10x30.5 STEEL BEAM
FLUSH W/ PLATE
TOP & BOTTOM

UF-03
W10x33 STEEL BEAM
W/ 2x PLATE (DROPPED)

UF-05
W10x22 W/ 2x
PLATE (DROPPED)

UF-09
W10x22 W/ 2x
PLATE (DROPPED)

UF-10
W10x22 W/ 2x
PLATE (DROPPED)

(2) 2x8 DF#2
HEADER

2x6 OUTLOOKERS
@ 24" O.C.

14" TJI 110s
@ 16" O.C.

14" TJI 110s
@ 16" O.C.

14" TJI 110s
@ 16" O.C.

14" TJI 110s
@ 16" O.C.

14" TJI 110s
@ 16" O.C.

14" TJI 110s
@ 16" O.C.

14" TJI 110s
@ 16" O.C.

14" TJI 110s
@ 16" O.C.

14" TJI 110s
@ 16" O.C.

1
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13
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2x8 DF#2
ROOF JOISTS
@ 24" O.C.
(RIPPED TO SLOPE
1/4" PER FT. TO DRAIN)

1 3/4" x 7 1/2" LSL 1.55E
BOLTED TO STUDS
W/ XXX

LSL CANTILEVER

6'-0" UFS-04 CANTILEVER

2'-3 1/4" LSL CANTILEVER

LSL CANTILEVER

LOW WALL

SOLID BLOCK G
UNDER
WALL ABOVE

SOLID BLOCK G
UNDER
WALL ABOVE

HHUS410
HANGERS

HHU4
HANGER

SCUPPER TO
ROOF BELOW UF-14

1 3/4" x 14" LSL 1.55E
ROOF JOISTS
@ 24" O.C.
(RIPPED TO SLOPE
1/4" PER FT. TO DRAIN)

D
11

B
10

1
2.2

E
11

C
11

C
11

F
11

F
11

A
10

A
10

B
10

E
11

F
11

F
11

Lateral Analysis IBC 2018

UPSTATE JOB#: 1651

Description: DHALIWAL-KLAR RESIDENCE

Engineer: amg

Governing Code: 2018 International Building Code all references in right margin are 2018 IBC unless specifically noted otherwise.

1603.1 General Design Criteria

	Roof	Walls	Floors	Snow	Partitions	
Live Load (psf)	25		40	25		
Dead Load (psf)	19	10	10	0	10	4 PSF SOLAR INCL'D

1603.1.4 Wind Design Criteria

- | | | | | |
|--|-------------|----------|-----|-------------------------|
| 1. Basic /ASD Wind Speed | V/V_{asd} | 110/85 | mph | <i>F 1609.3(1)</i> |
| 2. Risk Category | II | 1.00 | | <i>ASCE 7 T 1.5-1</i> |
| 3. Wind Exposure Category | | "C" | | <i>1609.4</i> |
| 4. Internal Pressure Coefficient | | +/- 0.55 | | <i>ASCE 7 F 26.13-1</i> |
| 5. Components and Cladding design pressure | | +/- 16 | psf | <i>ASCE 7 30.2.2</i> |

1603.1.5 Earthquake Design Data

- | | | | | |
|----------------------------------|----------|--------------------------|-----|---------------------------------------|
| 1. Risk Category | | II | | <i>ASCE 7 T 1.5-1</i> |
| 2. Seismic Importance Factor | I_e | 1.00 | | <i>ASCE 7 T 1.5-2</i> |
| 3. Short Period Acceleration | S_S | 1.362 | | <i>USGS Seismic Design Map Online</i> |
| 1-Second Acceleration | S_1 | 0.524 | | <i>USGS Seismic Design Map Online</i> |
| 4. Site Class | | D | | <i>ASCE 7 T 20.3-1</i> |
| 5. Spectral response coefficient | S_{DS} | 0.91 | | <i>EQ 16-38</i> |
| Spectral response coefficient | S_{D1} | NA | | <i>EQ 16-39</i> |
| 6. Seismic Design Category | | D | | <i>T1613.2.3(1) and (2)</i> |
| 7. Seis. Force Resisting System | | A.15. | | <i>ASCE 7 T 12.2-1</i> |
| 8. Design Base Shear | | 17195 | lbs | <i>See Page 3.0</i> |
| 9. Seismic Response Coefficient | C_S | 0.14 | | <i>ASCE 7 EQ 12.8-2</i> |
| 10. Response Modification Factor | R | 6.5 | | <i>ASCE 7 T 12.2-1</i> |
| 11. Analysis Procedure | | Equivalent Lateral Force | | <i>ASCE 7 12.8</i> |

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3.0	Allowable Stress Design Loads
4.0	Shear walls in the Front to Rear Direction
5.0	Shear walls in the Side to Side Direction
6.0	Shear flow calculations
7.0	Appendix

1

2

3

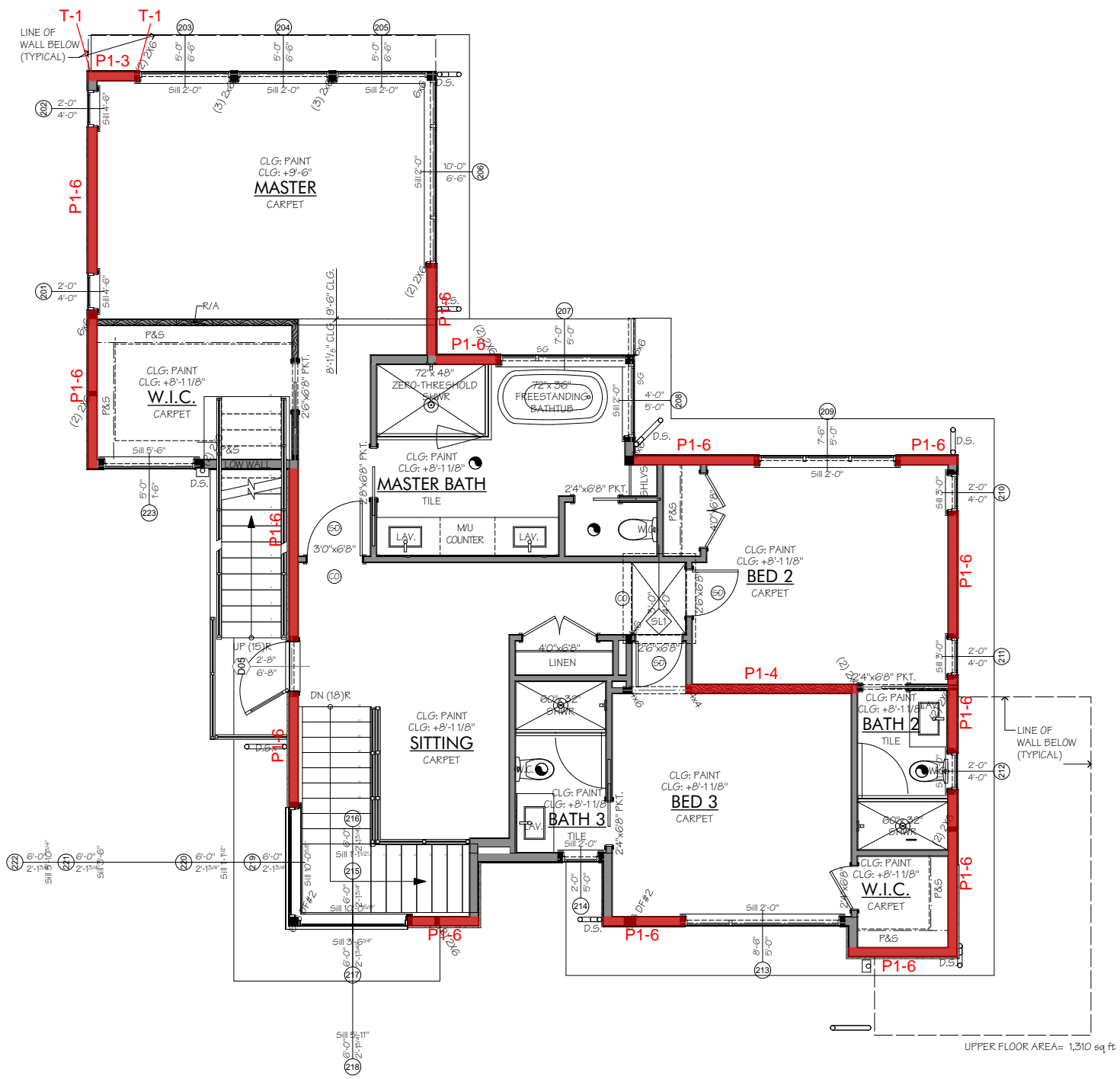
4

D

C

B

A



UPPER FLOOR AREA= 1,310 sq ft

Wind Design (MWFRS - Simplified Envelope Procedure) IBC 2018

Part 2 Wind Load Method ASCE 7 28.1.1 Part 2

ASD/Basic Wind Speed	85/ 110	mph	1609.3, F 1609.3(1)
Wind Exposure Category	C		1609.4
Height & Exposure Adjustment	l = 1.37		ASCE 7 F 28.5-1
Topographic Factor	K _{zt} = 1.30		ASCE 7 F 26.8-1

Wind Pressures ASCE 7 28.5.3

$$p_s = 1 K_{zt} p_{s30} \quad \text{ASCE 7 EQ 28.5-1}$$

Minimum pressures shall not be less than assuming the pressures for zones A and C equal +16 psf, B & D equal +8 psf, while zones E, F, G, & H all equal zero. ASCE 7 28.5.4

Roof Pitch	1.25 :12	or	5.9469 degrees
Ridge Elevation	29 ft		
Eave Height	24.333 ft		
Mean Roof Height, h	26.667 ft		ASCE 7 26.2

Zone Pressures, (λ)(ps30) ASCE 7 F 28.5-1

110	Horizontal Pressures				Vertical Pressures				Overhangs	
	A	B	C	D	E	F	G	H	EOH	GOH
0										
1	30.17	-12.04	-11.81	-6.95	-31.57	-19.53	-21.87	-14.94	-44.14	-34.58
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Horizontal Zone Areas & Forces, F_x ASCE 7 F 28.5-1

End zone distance, 2a, where "a" equals the smaller of 10 percent of least horizontal dimension (l.h.d.) or 0.4h, but not less than either 4 percent of lhd or 3 feet.

$$F_x = \left[\sum_{x=A}^D (p_{sx} \cdot X) \right]$$

Diaphragm (x = 3)

l.h.d. (ft) = 19
 a (ft) = 3 Areas
 2a (ft) = 6 Forces

Front to Rear			
A	B	C	D
87	0	282	0
F _x = -707		F _{xmin} = 3690	

Side to Side			
A	B	C	D
95	0	309	0
F _x = -784		F _{xmin} = 4040	

Diaphragm (x = 2)

l.h.d. (ft) = 35.83
 a (ft) = 3.583 Areas
 2a (ft) = 7.166 Forces

Front to Rear			
A	B	C	D
121	0	425	0
F _x = -1370		F _{xmin} = 5460	

Side to Side			
A	B	C	D
132	0	423	0
F _x = -1015		F _{xmin} = 5550	

Diaphragm (x = 1)

l.h.d. (ft) = 35.83
 a (ft) = 3.583 Areas
 2a (ft) = 7.166 Forces

Front to Rear			
A	B	C	D
102	0	336	0
F _x = -892		F _{xmin} = 4380	

Side to Side			
A	B	C	D
98	0	327	0
F _x = -906		F _{xmin} = 4250	

Seismic Design IBC 2018

Site Classification, Criteria Selection, & Minimum Design Lateral Force

Risk Category		II	ASCE 7 T 1.5-1
Seismic Importance Factor	I_E	1.00	ASCE 7 T 1.5-2
Seismic Design Category		D	T1613.2.3(1) and (2)
Site Class		D	ASCE 7 T 20.3-1
Short Period Acceleration	S_S	1.362	USGS Seismic Design Maps Online
1-Second Acceleration	S_1	0.524	USGS Seismic Design Maps Online
Seis. Force Resisting System		A.15.	ASCE 7 T 12.2-1
Response Modification Factor	R	6.5	ASCE 7 T 12.2-1

Design Spectral Response Acceleration Parameters

Site Coefficient, F_a	1.0	T1613.2.3(1)
Site Coefficient, F_v	1.5	T1613.2.3(2)

Substitute equations 16-36 & 16-37 into 16-38 & 16-39, respectively.

$$S_{DS} = \frac{2}{3} \cdot F_a \cdot S_S \quad S_{DS} = 0.91 \quad \text{EQ 16-38}$$

$$S_{D1} = \frac{2}{3} \cdot F_v \cdot S_1 \quad S_{D1} = \text{NA} \quad \text{EQ 16-39}$$

Seismic base shear ASCE 7 12.14.8.1

$$V = (F S_{DS}/R) W \quad \text{Where: } F=1.2 \text{ for (3+)-story} \quad \text{ASCE 7 EQ 12.14-12}$$

Vertical Distribution, Forces at each level ASCE 7 12.14.8.2

$$F_x = (w_x/W) V \quad F_x = 0.168 \times w_x \quad \text{ASCE 7 EQ 12.14-13}$$

Effective seismic weight & Forces (lbs) at Level x

Diaphragm (x = 3)		roof area (ft ²)	floor area (ft ²)	story height (ft)	wall length (ft)	w_x
			1015	710	12.5	
$F_x = 6141$	weight (lbs)	19285	7100	10250		36635

Diaphragm (x = 2)		roof area (ft ²)	floor area (ft ²)	story height (ft)	wall length (ft)	w_x
			577	1458	10.1	
$F_x = 7168$	weight (lbs)	10963	14580	6969		42762

Diaphragm (x = 1)		roof area (ft ²)	floor area (ft ²)	story height (ft)	wall length (ft)	w_x
			0	1915	9	
$F_x = 5208$	weight (lbs)	0	19150	4950		31069

Allowable Stress Design Loads For Wood IBC 2018

Design shall be in accordance with Sections 2304-2306. 2302.1
 Structures using wood shear walls and diaphragms to resist wind, seismic and other lateral loads shall be designed and constructed in accordance with AF&PA SDPWS and provisions of Sections 2305 - 2306.

Design per Alternative Basic Load Combinations 1605.3.2

For worse case effect with wind load, L & S shall be zero. 1605.3.2
 Equations 16-18, 16-19 and 16-20 become,

$$D + \omega W * 0.6$$

Where ω equals 1.3, W equals F_x of the respective diaphragm, and D shall be multiplied by two-thirds. 1605.3.2

For worse case effect with seismic load, L & S shall be zero. 1605.1
 Equation 16-22 controls,

$$0.9 D + E/1.4 \quad , \text{ substitute ASCE 7 EQ 12.14-6 for E} \quad \text{ASCE 7 12.14.3.2 (2), EQ 12.14-6}$$

$$0.9 D + \frac{(\rho Q_E - 0.2 S_{DS} D)}{1.4} \quad , \text{ simplify \& arrange variables} \quad \text{EQ 16-22}$$

$$(0.9 - 0.14 S_{DS}) D + \frac{\rho}{1.4} Q_E$$

Where Q_E equals F_x of the respective diaphragm.

Principle of Mechanics

Sum the forces in the horizontal direction, diaphragms and shearwalls shall resist,

Wind Design Loads, 1.3 F_x

Diaphragm	For $K_{zt} = 1.30$	
	Front to Rear Force (lbs)	Side to Side Force (lbs)
x = 3	3742	4097
x = 2	5536	5628
x = 1	4441	4310

Seismic Design Loads, $(\rho/1.4) F_x$

$\rho = 1.3$ ASCE 7 12.3.4.2

Diaphragm	Force (lbs)
x = 3	5702
x = 2	6656
x = 1	4836

Allowable Stress Design Loads For Wood - cont.

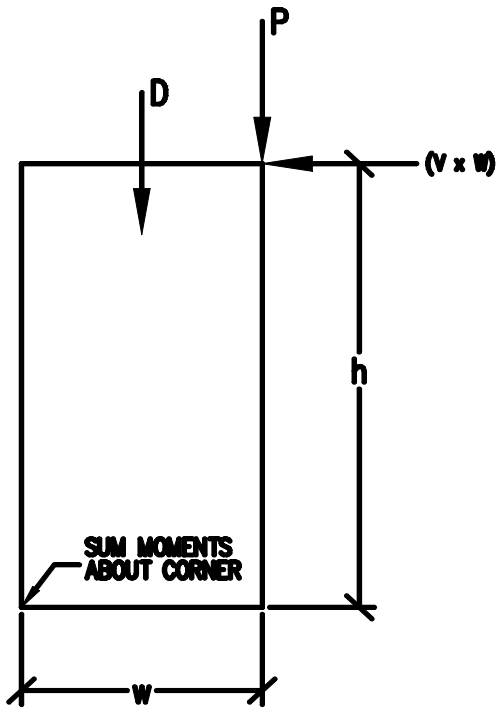
Sum the moments about the base of a shearwall, overturning shall resist,

$$(v \cdot w) \cdot h - \frac{2}{3} \left(D \cdot \frac{w}{2} + P \cdot w \right) \quad \text{for wind}$$

$$(v \cdot w) \cdot h - (0.9 - 0.14 S_{DS}) \left(D \cdot \frac{w}{2} + P \cdot w \right) \quad \text{for seismic}$$

- Where,
- v = shear per linear foot of shearwall
 - w = width of shearwall
 - h = height of shearwall
 - D = resisting dead load centered over shearwall
 - P = resisting dead load at end of shearwall

Free Body Diagram of a ShearWall



Wall Line	Level (x)	Direction	Segment		Tributary loads				Wind		Seismic		Seis max
			Width	Height	wr	wra	wf	wfa	T(x)	T(x+1)	T(x)	T(x+1)	
1	3	F-R											
		Wind											
		Seis											
$V_{D(x+1)}$ [lbs]													
%	16%	16%											
$V_{D(x)}$ [lbs]	598.666	912.4	8.00	12.5				-405		-308			
$V_{T(x)}$ [lbs]	598.666	912.4	8.50	12.5				-426		-333			
L	16.50	16.50											
n	36	55											
2015 SDPWS		SEISMIC MAX											
$T_{MAX(x)}$ [lbs]													
2	3	F-R											
		Wind											
		Seis											
$V_{D(x+1)}$ [lbs]													
%	50%	50%											
$V_{D(x)}$ [lbs]	1870.83	2851.25	5.00	12.5	9	1		42		459		174	
$V_{T(x)}$ [lbs]	1870.83	2851.25	9.25	12.5	9	1		-379		-31			
L	20.50	20.50	6.25	12.5	9	1		-82		315			
n	91	139											
2015 SDPWS		SEISMIC MAX											
$T_{MAX(x)}$ [lbs]	42	459											
3	3	F-R											
		Wind											
		Seis											
$V_{D(x+1)}$ [lbs]													
%	0%	0%											
$V_{D(x)}$ [lbs]													
$V_{T(x)}$ [lbs]													
L													
n													
2015 SDPWS		SEISMIC MAX											
$T_{MAX(x)}$ [lbs]													
4	3	F-R											
		Wind											
		Seis											
$V_{D(x+1)}$ [lbs]													
%	34%	34%											
$V_{D(x)}$ [lbs]	1272.16	1938.85	6.75	12.5	3	5		-528		-324			
$V_{T(x)}$ [lbs]	1272.16	1938.85	4.00	12.5	3	5		-360		-129		153	
L	19.75	19.75	9.00	12.5	3	5		-665		-484			
n	64	98											
2015 SDPWS		SEISMIC MAX											
$T_{MAX(x)}$ [lbs]		153											

Wall Line	Level (x)	Direction	Segment		Tributary loads				Wind		Seismic		Seis max
			Width	Height	wr	wra	wf	wfa	T(x)	T(x+1)	T(x)	T(x+1)	
5	3	F-R											
Wind													
Seis													
$V_{D(x+1)}$ [lbs]													
%			0%	0%									
$V_{D(x)}$ [lbs]													
$V_{T(x)}$ [lbs]													
L													
n													
2015 SDPWS			SEISMIC MAX										
$T_{MAX(x)}$ [lbs]													
	3	F-R											
Wind													
Seis													
$V_{D(x+1)}$ [lbs]													
%													
$V_{D(x)}$ [lbs]													
$V_{T(x)}$ [lbs]													
L													
n													
2015 SDPWS			SEISMIC MAX										
$T_{MAX(x)}$ [lbs]													
	3	F-R											
Wind													
Seis													
$V_{D(x+1)}$ [lbs]													
%			0%	0%									
$V_{D(x)}$ [lbs]													
$V_{T(x)}$ [lbs]													
L													
n													
2015 SDPWS			SEISMIC MAX										
$T_{MAX(x)}$ [lbs]													
	3	F-R											
Wind													
Seis													
$V_{D(x+1)}$ [lbs]													
%			0%	0%									
$V_{D(x)}$ [lbs]													
$V_{T(x)}$ [lbs]													
L													
n													
2015 SDPWS			SEISMIC MAX										
$T_{MAX(x)}$ [lbs]													

Wall Line	Level (x)	Direction	Segment		Tributary loads				Wind		Seismic		Seis max
			Width	Height	wr	wra	wf	wfa	T(x)	T(x+1)	T(x)	T(x+1)	
1	2	F-R											
	Wind	Seis											
$V_{D(x+1)}$ [lbs]	598.666	912.4											
%	17%	17%											
$V_{D(x)}$ [lbs]	941.195	1131.56	23.50	10.1			2		-784		-830		
$V_{T(x)}$ [lbs]	1539.86	2043.96	7.00	10.1			2		-116		-51		
L	30.50	30.50											
n	50	67											
2015 SDPWS	SEISMIC MAX												
$T_{MAX(x)}$ [lbs]													
2	2	F-R											
	Wind	Seis											
$V_{D(x+1)}$ [lbs]	1870.83	2851.25											
%	24%	24%											
$V_{D(x)}$ [lbs]	1328.75	1597.49	5.00	10.1			1.3 7		3001	42	4748	459	518
$V_{T(x)}$ [lbs]	3199.58	4448.74	3.67	10.1			1.3 7		3052	42	4807	459	707
L	8.67	8.67											
n	369	513											
2015 SDPWS	SEISMIC MAX	707											
$T_{MAX(x)}$ [lbs]	3052	4807											
3	2	F-R											
	Wind	Seis											
$V_{D(x+1)}$ [lbs]													
%	27%	27%											
$V_{D(x)}$ [lbs]	1494.84	1797.18	7.50	10.1			1.3 7		1148		1413		
$V_{T(x)}$ [lbs]	1494.84	1797.18											
L	7.50	7.50											
n	199	240											
2015 SDPWS	SEISMIC MAX												
$T_{MAX(x)}$ [lbs]	1148	1413											
4	2	F-R											
	Wind	Seis											
$V_{D(x+1)}$ [lbs]	1272.16	1938.85											
%	23%	23%											
$V_{D(x)}$ [lbs]	1273.38	1530.93	6.33	10.1			1.3 6		764		1198		
$V_{T(x)}$ [lbs]	2545.55	3469.78	6.00	10.1			1.3 6		777		1213		
L	16.58	16.58	4.25	10.1			1.3 6		844		1291		249
n	154	209											
2015 SDPWS	SEISMIC MAX	249											
$T_{MAX(x)}$ [lbs]	844	1291											

Wall Line	Level (x)	Direction	Segment		Tributary loads				Wind		Seismic		Seis max
			Width	Height	wr	wra	wf	wfa	T(x)	T(x+1)	T(x)	T(x+1)	
5	2	F-R											
		Wind											
		Seis											
$V_{D(x+1)}$ [lbs]													
%	9%	9%											
$V_{D(x)}$ [lbs]	498.28	599.059	7.75	10.1					-209		-229		
$V_{T(x)}$ [lbs]	498.28	599.059	5.00	10.1					-116		-120		47
L	12.75	12.75											
<i>n</i>	39	47											
2015 SDPWS	SEISMIC MAX	47											
$T_{MAX(x)}$ [lbs]													
	2	F-R											
		Wind											
		Seis											
$V_{D(x+1)}$ [lbs]													
%													
$V_{D(x)}$ [lbs]													
$V_{T(x)}$ [lbs]													
L													
<i>n</i>													
2015 SDPWS	SEISMIC MAX												
$T_{MAX(x)}$ [lbs]													
	2	F-R											
		Wind											
		Seis											
$V_{D(x+1)}$ [lbs]													
%	0%	0%											
$V_{D(x)}$ [lbs]													
$V_{T(x)}$ [lbs]													
L													
<i>n</i>													
2015 SDPWS	SEISMIC MAX												
$T_{MAX(x)}$ [lbs]													
	2	F-R											
		Wind											
		Seis											
$V_{D(x+1)}$ [lbs]													
%													
$V_{D(x)}$ [lbs]													
$V_{T(x)}$ [lbs]													
L													
<i>n</i>													
2015 SDPWS	SEISMIC MAX												
$T_{MAX(x)}$ [lbs]													

Wall Line	Level (x)	Direction	Segment		Tributary loads				Wind		Seismic		Seis max
			Width	Height	wr	wra	wf	wfa	T(x)	T(x+1)	T(x)	T(x+1)	
1	1	F-R											
	Wind	Seis											
$V_{D(x+1)}$ [lbs]	1539.86	2043.96											
%	18%	18%											
$V_{D(x)}$ [lbs]	799.438	870.5	23.50	9				-428		-454			
$V_{T(x)}$ [lbs]	2339.3	2914.46	14.67	9				-162		-144			
L	38.17	38.17											
n	61	76											
2015 SDPWS	SEISMIC MAX												
$T_{MAX(x)}$ [lbs]													
2	1	F-R											
	Wind	Seis											
$V_{D(x+1)}$ [lbs]	3199.58	4448.74											
%	24%	24%											
$V_{D(x)}$ [lbs]	1065.92	1160.67	17.50	9				3789	3052	5896	4807		
$V_{T(x)}$ [lbs]	4265.49	5609.41	7.50	5				3696	3052	5685	4807		
L	25.00	25.00											
n	171	224											
2015 SDPWS	SEISMIC MAX												
$T_{MAX(x)}$ [lbs]	3789	5896											
3	1	F-R											
	Wind	Seis											
$V_{D(x+1)}$ [lbs]	1494.84	1797.18											
%	25%	25%											
$V_{D(x)}$ [lbs]	1110.33	1209.03	5.50	5				2343	1148	2791	1413		
$V_{T(x)}$ [lbs]	2605.17	3006.2	4.00	9				3224	1148	3805	1413	356	
L	9.50	9.50											
n	274	316											
2015 SDPWS	SEISMIC MAX												
$T_{MAX(x)}$ [lbs]	3224	3805											
4	1	F-R											
	Wind	Seis											
$V_{D(x+1)}$ [lbs]	2545.55	3469.78											
%	24%	24%											
$V_{D(x)}$ [lbs]	1065.92	1160.67	13.83	9				1193	844	1819	1291		
$V_{T(x)}$ [lbs]	3611.46	4630.45	17.50	FND									
L	31.33	31.33											
n	115	148											
2015 SDPWS	SEISMIC MAX												
$T_{MAX(x)}$ [lbs]	1193	1819											

Wall Line	Level (x)	Direction	Segment		Tributary loads				Wind		Seismic		Seis max
			Width	Height	wr	wra	wf	wfa	T(x)	T(x+1)	T(x)	T(x+1)	
5	1	F-R											
	Wind	Seis											
$V_{D(x+1)}$ [lbs]	498.28	599.059											
%	9%	9%											
$V_{D(x)}$ [lbs]	399.719	435.25	17.83	FND									
$V_{T(x)}$ [lbs]	897.998	1034.31											
L	17.83	17.83											
n	50	58											
2015 SDPWS	SEISMIC MAX												
$T_{MAX(x)}$ [lbs]													
	1	F-R											
	Wind	Seis											
$V_{D(x+1)}$ [lbs]													
%													
$V_{D(x)}$ [lbs]													
$V_{T(x)}$ [lbs]													
L													
n													
2015 SDPWS	SEISMIC MAX												
$T_{MAX(x)}$ [lbs]													
	1	F-R											
	Wind	Seis											
$V_{D(x+1)}$ [lbs]													
%													
$V_{D(x)}$ [lbs]													
$V_{T(x)}$ [lbs]													
L													
n													
2015 SDPWS	SEISMIC MAX												
$T_{MAX(x)}$ [lbs]													
	1	F-R											
	Wind	Seis											
$V_{D(x+1)}$ [lbs]													
%													
$V_{D(x)}$ [lbs]													
$V_{T(x)}$ [lbs]													
L													
n													
2015 SDPWS	SEISMIC MAX												
$T_{MAX(x)}$ [lbs]													

Wall Line	Level (x)	Direction	Segment		Tributary loads				Wind		Seismic		Seis max
			Width	Height	wr	wra	wf	wfa	T(x)	T(x+1)	T(x)	T(x+1)	
A	3	S-S											
		Wind											
		Seis											
$V_{D(x+1)}$ [lbs]													
%	14%	14%											
$V_{D(x)}$ [lbs]	573.518	798.35	3.75	12.5					-177		-92		93
$V_{T(x)}$ [lbs]	573.518	798.35	4.50	12.5					-209		-128		78
L	14.25	14.25	6.00	12.5					-272		-202		58
<i>n</i>	40	56											
2015 SDPWS	SEISMIC MAX	93											
$T_{MAX(x)}$ [lbs]													
B	3	S-S											
		Wind											
		Seis											
$V_{D(x+1)}$ [lbs]													
%	28%	28%											
$V_{D(x)}$ [lbs]	1147.04	1596.7	9.00	12.5			12	4	163		553		
$V_{T(x)}$ [lbs]	1147.04	1596.7											
L	9.00	9.00											
<i>n</i>	127	177											
2015 SDPWS	SEISMIC MAX												
$T_{MAX(x)}$ [lbs]	163	553											
C	3	S-S											
		Wind											
		Seis											
$V_{D(x+1)}$ [lbs]													
%	36%	36%											
$V_{D(x)}$ [lbs]	1474.76	2052.9	5.00	12.5			8.3	4	190		502		171
$V_{T(x)}$ [lbs]	1474.76	2052.9	6.67	12.5			8.3	4	74		367		
L	15.00	15.00	3.33	12.5			8.3	4	307		637		257
<i>n</i>	98	137											
2015 SDPWS	SEISMIC MAX	257											
$T_{MAX(x)}$ [lbs]	307	637											
D	3	S-S											
		Wind											
		Seis											
$V_{D(x+1)}$ [lbs]													
%	22%	22%											
$V_{D(x)}$ [lbs]	901.243	1254.55	2.75	8.1			3	4	2224		3194		672
$V_{T(x)}$ [lbs]	901.243	1254.55											
L	2.75	2.75											
<i>n</i>	328	456											
2015 SDPWS	SEISMIC MAX	672											
$T_{MAX(x)}$ [lbs]	2224	3194											

Wall Line	Level (x)	Direction	Segment		Tributary loads				Wind		Seismic		Seis max
			Width	Height	wr	wra	wf	wfa	T(x)	T(x+1)	T(x)	T(x+1)	
A	2	S-S											
	Wind	Seis											
$V_{D(x+1)}$ [lbs]	573.518	798.35											
%	19%	19%											
$V_{D(x)}$ [lbs]	1069.26	1264.68	4.00	10.1			6	1	385		537		153
$V_{T(x)}$ [lbs]	1642.78	2063.03	3.50	10.1			6	1	412		569		175
L	17.00	17.00	6.00	10.1			6	1	277		412		
<i>n</i>	97	121	1.75	6			6	1	369		482		208
2015 SDPWS	SEISMIC MAX	208	1.75	6			6	1	369		482		208
$T_{MAX(x)}$ [lbs]	412	569											
B	2	S-S											
	Wind	Seis											
$V_{D(x+1)}$ [lbs]	1147.04	1596.7											
%	26%	26%											
$V_{D(x)}$ [lbs]	1463.2	1730.61	4.00	10.1			1	7	367	163	893	553	148
$V_{T(x)}$ [lbs]	2610.24	3327.31	5.00	10.1			1	7	330	163	850	553	119
L	28.33	28.33	12.00	10.1			12	2	-204	163	229	553	
<i>n</i>	92	117	7.33	10.1			12	2	142	163	631	553	
2015 SDPWS	SEISMIC MAX	148											
$T_{MAX(x)}$ [lbs]	367	893											
C	2	S-S											
	Wind	Seis											
$V_{D(x+1)}$ [lbs]	1474.76	2052.9											
%	33%	33%											
$V_{D(x)}$ [lbs]	1857.14	2196.55	6.50	10.1			1	5	2358	307	3337	637	
$V_{T(x)}$ [lbs]	3331.9	4249.45	5.50	10.1			7	2	2386	307	3370	637	
L	12.00	12.00											
<i>n</i>	278	354											
2015 SDPWS	SEISMIC MAX												
$T_{MAX(x)}$ [lbs]	2386	3370											
D	2	S-S											
	Wind	Seis											
$V_{D(x+1)}$ [lbs]	901.243	1254.55											
%	22%	22%											
$V_{D(x)}$ [lbs]	1238.09	1464.37	2.75	10.1	2	4			7130		9140		1356
$V_{T(x)}$ [lbs]	2139.34	2718.92											
L	2.75	2.75											
<i>n</i>	778	989											
2015 SDPWS	SEISMIC MAX	1356											
$T_{MAX(x)}$ [lbs]	7130	9140											

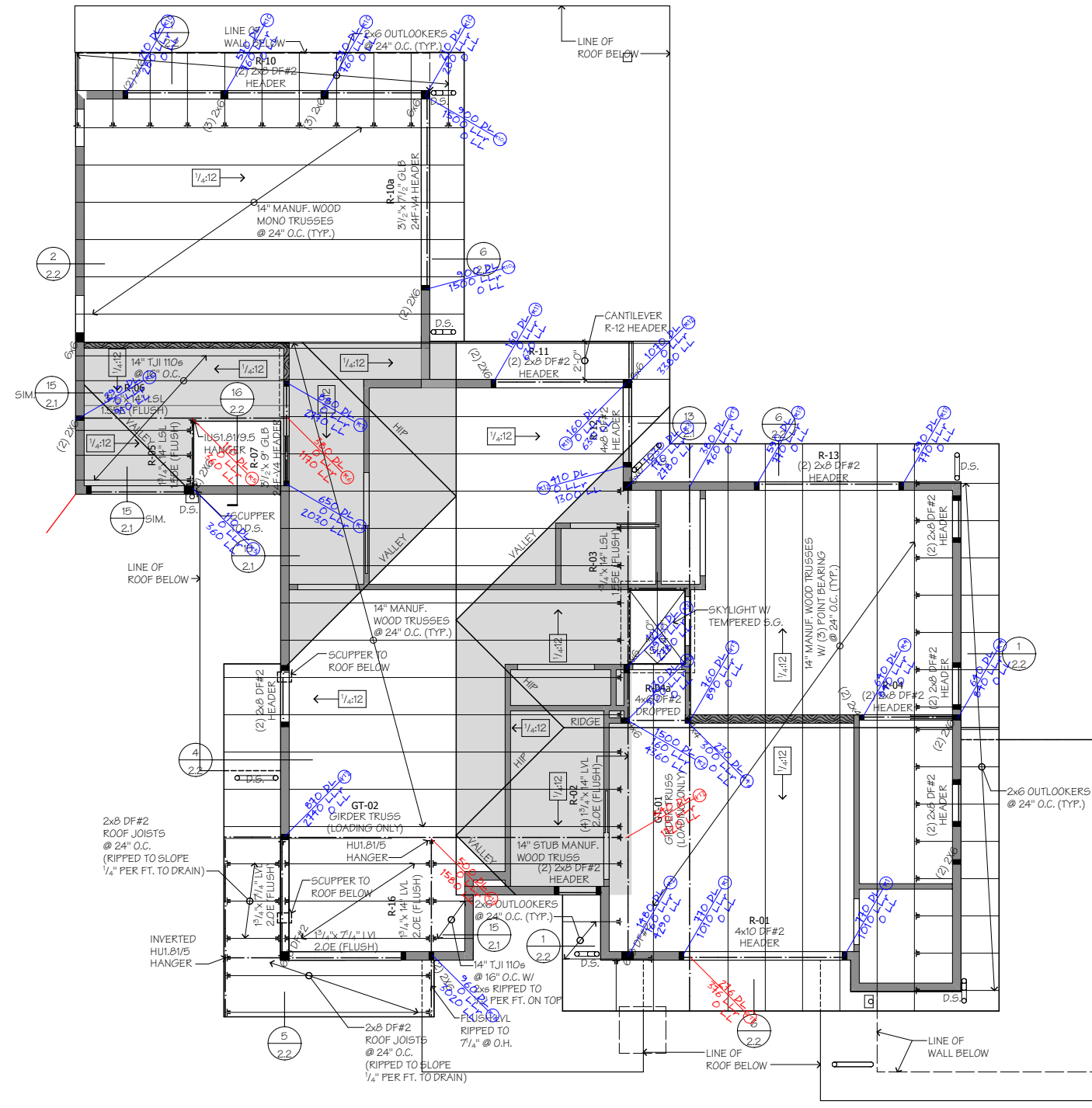
Wall Line	Level (x)	Direction	Segment		Tributary loads				Wind		Seismic		Seis max
			Width	Height	wr	wra	wf	wfa	T(x)	T(x+1)	T(x)	T(x+1)	
A	1	S-S											
	Wind	Seis											
$V_{D(x+1)}$ [lbs]	1642.78	2063.03											
%	19%	19%											
$V_{D(x)}$ [lbs]	818.805	918.861	FND	9									
$V_{T(x)}$ [lbs]	2461.59	2981.89											
L													
n													
2015 SDPWS	SEISMIC MAX												
$T_{MAX(x)}$ [lbs]													
B	1	S-S											
	Wind	Seis											
$V_{D(x+1)}$ [lbs]	2610.24	3327.31											
%	28%	28%											
$V_{D(x)}$ [lbs]	1206.66	1354.11	4.50	9				1422	367	2212	893		
$V_{T(x)}$ [lbs]	3816.9	4681.43	7.00	9				1346	367	2124	893		
L	23.50	23.50	12.00	FND									
n	162	199											
2015 SDPWS	SEISMIC MAX												
$T_{MAX(x)}$ [lbs]	1422	2212											
C	1	S-S											
	Wind	Seis											
$V_{D(x+1)}$ [lbs]	3331.9	4249.45											
%	34%	34%											
$V_{D(x)}$ [lbs]	1465.23	1644.28	6.67	9				3177	2386	4372	3370		
$V_{T(x)}$ [lbs]	4797.13	5893.73	10.50	9				3062	2386	4238	3370		
L	34.17	34.17	17.00	9				2866	2386	4010	3370		
n	140	172											
2015 SDPWS	SEISMIC MAX												
$T_{MAX(x)}$ [lbs]	3177	4372											
D	1	S-S											
	Wind	Seis											
$V_{D(x+1)}$ [lbs]	2139.34	2718.92											
%	19%	19%											
$V_{D(x)}$ [lbs]	818.805	918.861	14.00	9				8338	7130	10671	9140		
$V_{T(x)}$ [lbs]	2958.14	3637.78											
L	14.00	14.00											
n	211	260											
2015 SDPWS	SEISMIC MAX												
$T_{MAX(x)}$ [lbs]	8338	10671											

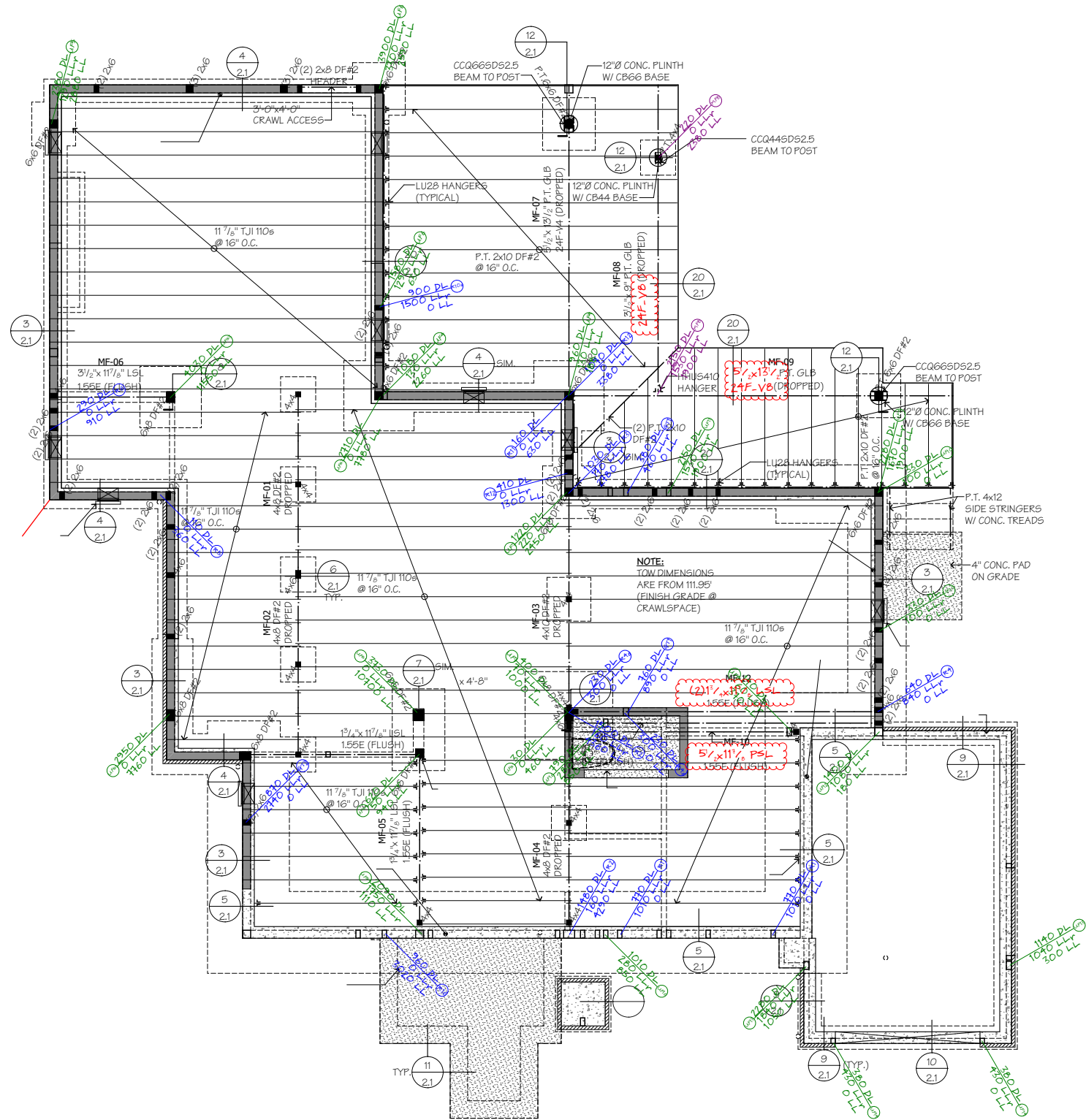
Shear wall Summary

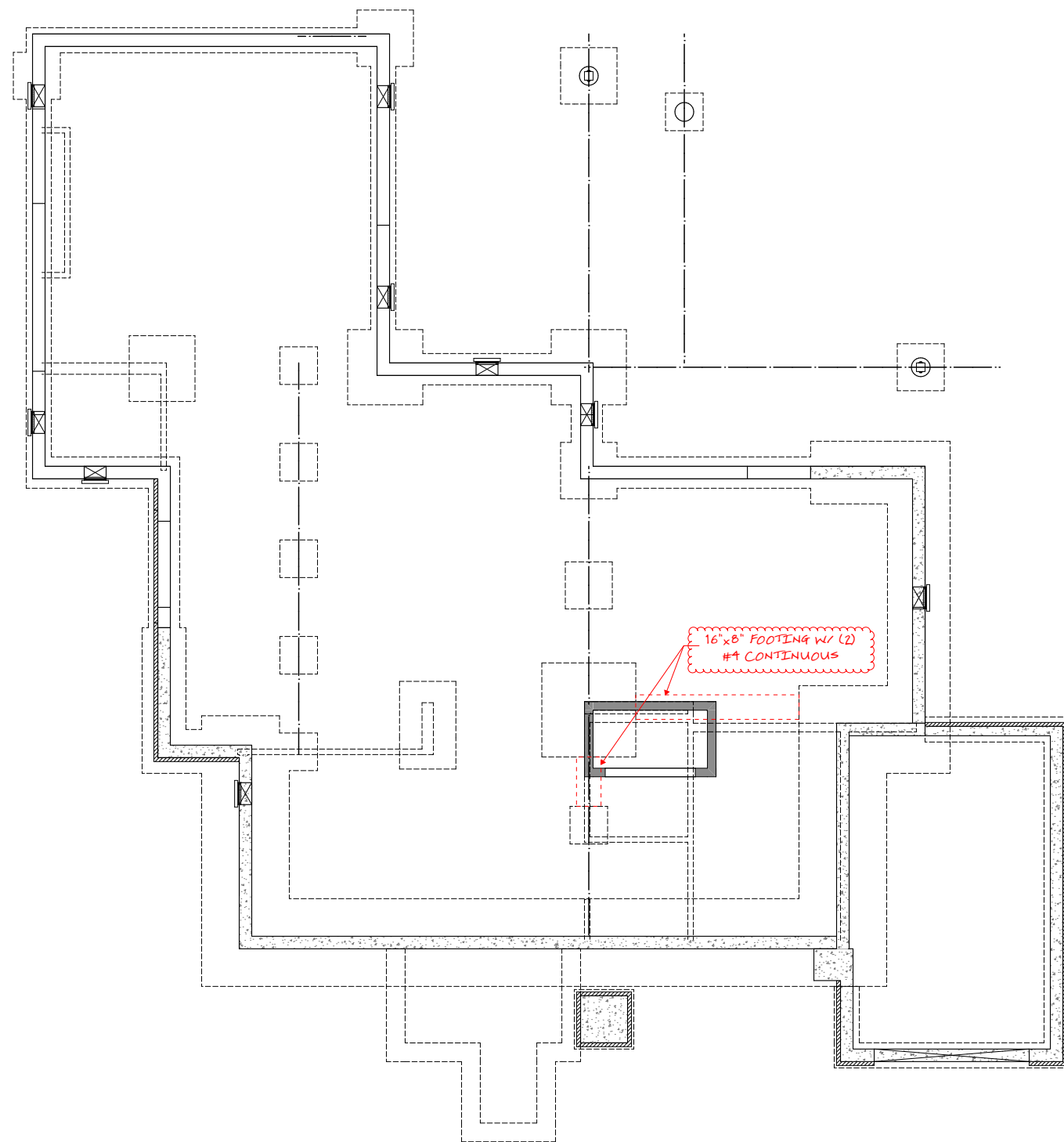
	Sheeting Reqmts				Shear Transfer		Overturning Values	
	Wind	Seis Max			Wind	Seismic	Wind	Seismic
1 - 3rd	26	55	1	1	36	55		
2 - 3rd	65	174	1	1	91	139		
3 - 3rd								
4 - 3rd	46	153	1	1	64	98		
A - 3rd	29	93	1	1	40	56		
B - 3rd	91	177	1	2	127	177		
C - 3rd	70	257	2	1	98	137		
D - 3rd	234	672	5	7	328	456	2224	3194
1 - 2nd	36	67	1	1	50	67		
2 - 2nd	264	707	6	7	369	513	3052	4807
3 - 2nd	142	240	1	3	199	240	1148	1413
4 - 2nd	110	249	2	2	154	209		1291
A - 2nd	69	208	1	1	97	121		
B - 2nd	66	148	1	1	92	117		
C - 2nd	198	354	3	6	278	354	2386	3370
D - 2nd	556	1356	8	8	778	989	7130	9140
1 - 1st	44	76	1	1	61	76		
2 - 1st	122	224	1	2	171	224	3789	5896
3 - 1st	196	356	3	4	274	316	3224	3805
4 - 1st	82	148	1	1	115	148	1193	1819
A - 1st								
B - 1st	116	199	1	2	162	199	1422	2212
C - 1st	100	172	1	2	140	172	3177	4372
D - 1st	151	260	2	4	211	260	8338	10671
	P1-6	P1-4	P1-3	P1-2	P2-2	RSW		
Sheathing	260	350	511	679	1356	350	(plf)	
Shear Flow	150	320	456	675	989	320	(plf)	

Shear Transfer Connectors - $C_D = 1.6$, Hem-Fir

Connector	Z (lbs)						
16d Nails (Common: 3.5"x0.162")	195.2 lbs						2018 NDS T12N
	15.6	7.3	5.1	3.5	2.4	7.3	
Simpson A35 Clip	510 lbs						Current Simpson Guide
	40.8	19.1	13.4	9.1	6.2	19.1	
Simpson H1 Truss Connector	440 lbs						Current Simpson Guide
	35.2	16.5	11.6	7.8	5.3	16.5	
Simpson LTP4 Clip (8d COMMON NAILS REQUIRED)	450 lbs						Current Simpson Guide
	36.0	16.9	11.8	8.0	5.5	16.9	
1/2" Diameter Anchor Bolts (2x)	944 lbs						2018 NDS T12E
	75.5	35.4	24.8	16.8	11.5	35.4	
5/8" Diameter Anchor Bolts (2x)	1376 lbs						2018 NDS T12E
	110.1	51.6	36.2	24.5	16.7	51.6	
5/8" Diameter Anchor Bolts (3x)	1712 lbs						2018 NDS T12E
	137.0	64.2	45.1	30.4	20.8	64.2	







Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.22.12.28

Upstate Engineering, Inc.

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DESCRIPTION: GT-01 (FOR REACTIONS ONLY)

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,600.0 psi	<i>E : Modulus of Elasticity</i>	
Load Combination : IBC 2018	Fb -	2,600.0 psi	Ebend- xx	1,900.0ksi
	Fc - Prll	2,510.0 psi	Eminbend - xx	965.71 ksi
Wood Species : iLevel Truss Joist	Fc - Perp	750.0 psi		
Wood Grade : MicroLam LVL 1.9 E	Fv	285.0 psi		
	Ft	1,555.0 psi	Density	42.010pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling				

Applied Loads

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

Beam self weight NOT internally calculated and added
 Load for Span Number 1
 Uniform Load : D = 0.0190, Lr = 0.0250 ksf, Tributary Width = 2.0 ft, (RF)
 Load for Span Number 2
 Uniform Load : D = 0.0190, Lr = 0.0250 ksf, Tributary Width = 2.0 ft, (RF)
 Load for Span Number 3
 Uniform Load : D = 0.0190, Lr = 0.0250 ksf, Tributary Width = 2.0 ft, (RF)
 Uniform Load : D = 0.010 ksf, Extent = 3.0 -->> 7.0 ft, Tributary Width = 3.50 ft, (WALL)
 Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Extent = 3.0 -->> 7.0 ft, Tributary Width = 2.0 ft, (RF)
 Load for Span Number 4
 Uniform Load : D = 0.0190, Lr = 0.0250 ksf, Tributary Width = 2.0 ft, (RF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.069 : 1	Maximum Shear Stress Ratio	=	0.075 : 1
Section used for this span		2-1.75x14	Section used for this span		2-1.75x14
fb: Actual	=	218.55psi	fv: Actual	=	26.59 psi
F'b	=	3,182.57psi	F'v	=	356.25 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	12.500ft	Location of maximum on span	=	12.500 ft
Span # where maximum occurs	=	Span # 2	Span # where maximum occurs	=	Span # 2
Maximum Deflection					
Max Downward Transient Deflection		0.012 in Ratio = 12356 >=240	Span: 3 : Lr Only		
Max Upward Transient Deflection		-0.008 in Ratio = 8342 >=240	Span: 4 : Lr Only		
Max Downward Total Deflection		0.025 in Ratio = 6117 >=180	Span: 3 : +D+Lr		
Max Upward Total Deflection		-0.016 in Ratio = 4130 >=180	Span: 4 : +D+Lr		

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only																			
	Length = 2.750 ft	1	0.007	0.015	0.90	1.00	1.00	1.00	0.979	1.00	1.00	1.00	0.14	15.1	2,291.5	0.13	4.0	256.5	
	Length = 12.50 ft	2	0.044	0.050	0.90	1.00	1.00	1.00	0.979	1.00	1.00	1.00	0.97	101.8	2,291.5	0.42	12.8	256.5	

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.22.12.28

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DESCRIPTION: GT-01 (FOR REACTIONS ONLY)

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
	Length = 12.50 ft	3	0.044	0.050	0.90	1.00	1.00	1.00	0.979	1.00	1.00	1.00	0.97	101.8	2,291.5	0.42	12.8	256.5
	Length = 2.750 ft	4	0.007	0.050	0.90	1.00	1.00	1.00	0.979	1.00	1.00	1.00	0.14	15.1	2,291.5	0.06	12.8	256.5
+D+Lr															0.0	0.00	0.0	0.0
	Length = 2.750 ft	1	0.011	0.027	1.25	1.00	1.00	1.00	0.979	1.00	1.00	1.00	0.33	34.9	3,182.6	0.31	9.6	356.3
	Length = 12.50 ft	2	0.069	0.075	1.25	1.00	1.00	1.00	0.979	1.00	1.00	1.00	2.08	218.5	3,182.6	0.87	26.6	356.3
	Length = 12.50 ft	3	0.069	0.075	1.25	1.00	1.00	1.00	0.979	1.00	1.00	1.00	2.08	218.5	3,182.6	0.87	26.6	356.3
	Length = 2.750 ft	4	0.011	0.075	1.25	1.00	1.00	1.00	0.979	1.00	1.00	1.00	0.33	34.9	3,182.6	0.14	26.6	356.3
+D+0.750Lr															0.0	0.00	0.0	0.0
	Length = 2.750 ft	1	0.009	0.023	1.25	1.00	1.00	1.00	0.979	1.00	1.00	1.00	0.29	30.0	3,182.6	0.27	8.2	356.3
	Length = 12.50 ft	2	0.059	0.065	1.25	1.00	1.00	1.00	0.979	1.00	1.00	1.00	1.80	189.4	3,182.6	0.76	23.1	356.3
	Length = 12.50 ft	3	0.059	0.065	1.25	1.00	1.00	1.00	0.979	1.00	1.00	1.00	1.80	189.4	3,182.6	0.76	23.1	356.3
	Length = 2.750 ft	4	0.009	0.065	1.25	1.00	1.00	1.00	0.979	1.00	1.00	1.00	0.29	30.0	3,182.6	0.12	23.1	356.3
+0.60D															0.0	0.00	0.0	0.0
	Length = 2.750 ft	1	0.002	0.005	1.60	1.00	1.00	1.00	0.979	1.00	1.00	1.00	0.09	9.0	4,073.7	0.08	2.4	456.0
	Length = 12.50 ft	2	0.015	0.017	1.60	1.00	1.00	1.00	0.979	1.00	1.00	1.00	0.58	61.1	4,073.7	0.25	7.7	456.0
	Length = 12.50 ft	3	0.015	0.017	1.60	1.00	1.00	1.00	0.979	1.00	1.00	1.00	0.58	61.1	4,073.7	0.25	7.7	456.0
	Length = 2.750 ft	4	0.002	0.017	1.60	1.00	1.00	1.00	0.979	1.00	1.00	1.00	0.09	9.0	4,073.7	0.04	7.7	456.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+Lr	-0.0038	0.000
+D+Lr	2	0.0060	4.747	+D+Lr	-0.0014	11.234
+D+Lr	3	0.0245	6.646		0.0000	11.234
	4	0.0000	6.646	+D+Lr	-0.0160	2.750

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3	Support 4	Support 5
Max Upward from all Load Conditions		0.652	1.656	0.836	
Max Upward from Load Combinations		0.652	1.656	0.836	
Max Upward from Load Cases		0.376	0.893	0.456	
D Only		0.276	0.763	0.380	
+D+Lr		0.652	1.656	0.836	
+D+0.750Lr		0.558	1.433	0.722	
+0.60D		0.166	0.458	0.228	
Lr Only		0.376	0.893	0.456	

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: GT-02 (FOR REACTIONS ONLY)

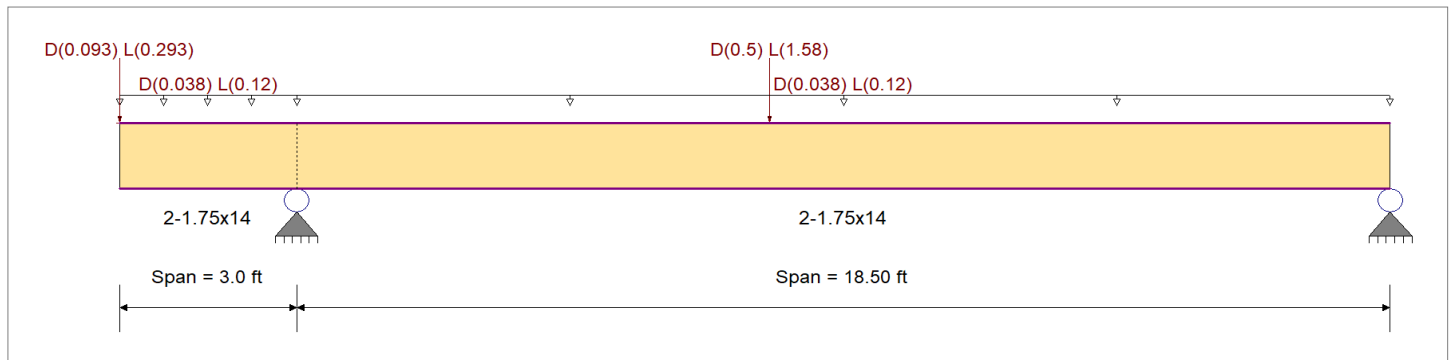
CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,600.0 psi	E : Modulus of Elasticity
Load Combination : IBC 2018	Fb -	2,600.0 psi	Ebend- xx
	Fc - Prll	2,510.0 psi	Eminbend - xx
Wood Species : iLevel Truss Joist	Fc - Perp	750.0 psi	
Wood Grade : MicroLam LVL 1.9 E	Fv	285.0 psi	
	Ft	1,555.0 psi	Density
			42.010pcf

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



Applied Loads

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

Beam self weight NOT internally calculated and added
 Load for Span Number 1

Uniform Load : D = 0.0190, L = 0.060 ksf, Tributary Width = 2.0 ft, (RF DECK)
 Point Load : D = 0.0930, L = 0.2930 k @ 0.0 ft, (EAVE BM)

Load for Span Number 2

Uniform Load : D = 0.0190, L = 0.060 ksf, Tributary Width = 2.0 ft, (RF DECK)
 Point Load : D = 0.50, L = 1.580 k @ 8.0 ft, (R-16)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio = 0.618 < 1	Maximum Shear Stress Ratio = 0.275 < 1
Section used for this span = 2-1.75x14	Section used for this span = 2-1.75x14
fb: Actual = 1,572.49psi	fv: Actual = 78.47 psi
F'b = 2,546.06psi	F'v = 285.00 psi
Load Combination = +D+L	Load Combination = +D+L
Location of maximum on span = 8.061ft	Location of maximum on span = 3.000ft
Span # where maximum occurs = Span # 2	Span # where maximum occurs = Span # 1
Maximum Deflection	
Max Downward Transient Deflection = 0.408 in Ratio = 544 >=240	Span: 2 : L Only
Max Upward Transient Deflection = -0.192 in Ratio = 374 >=240	Span: 1 : L Only
Max Downward Total Deflection = 0.537 in Ratio = 413 >=180	Span: 2 : +D+L
Max Upward Total Deflection = -0.253 in Ratio = 284 >=180	Span: 1 : +D+L

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values				
			M	V	CD	CM	C _t	CL _x	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only																			
	Length = 3.0 ft	1	0.021	0.074	0.90	1.00	1.00	1.00	0.979	1.00	1.00	1.00	0.45	47.2	2,291.5	0.62	18.9	256.5	0.0
	Length = 18.50 ft	2	0.165	0.074	0.90	1.00	1.00	1.00	0.979	1.00	1.00	1.00	3.60	378.0	2,291.5	0.62	18.9	256.5	0.0
+D+L																			
	Length = 3.0 ft	1	0.077	0.275	1.00	1.00	1.00	1.00	0.979	1.00	1.00	1.00	1.87	196.2	2,546.1	2.56	78.5	285.0	0.0
	Length = 18.50 ft	2	0.618	0.275	1.00	1.00	1.00	1.00	0.979	1.00	1.00	1.00	14.98	1,572.5	2,546.1	2.56	78.5	285.0	0.0

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: GT-02 (FOR REACTIONS ONLY)

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F _b	V	fv	F _v
+D+0.750L						1.00	1.00	1.00	0.979	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 3.0 ft	1		0.050	0.178	1.25	1.00	1.00	1.00	0.979	1.00	1.00	1.00	1.51	158.9	3,182.6	2.08	63.6	356.3
Length = 18.50 ft	2		0.400	0.178	1.25	1.00	1.00	1.00	0.979	1.00	1.00	1.00	12.14	1,273.9	3,182.6	2.08	63.6	356.3
+0.60D						1.00	1.00	1.00	0.979	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 3.0 ft	1		0.007	0.025	1.60	1.00	1.00	1.00	0.979	1.00	1.00	1.00	0.27	28.3	4,073.7	0.37	11.3	456.0
Length = 18.50 ft	2		0.056	0.025	1.60	1.00	1.00	1.00	0.979	1.00	1.00	1.00	2.16	226.8	4,073.7	0.37	11.3	456.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+L	-0.2526	0.000
+D+L	2	0.5366	9.198		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions		3.603	2.260
Max Upward from Load Combinations		3.603	2.260
Max Upward from Load Cases		2.736	1.717
D Only		0.867	0.543
+D+L		3.603	2.260
+D+0.750L		2.919	1.831
+0.60D		0.520	0.326
L Only		2.736	1.717

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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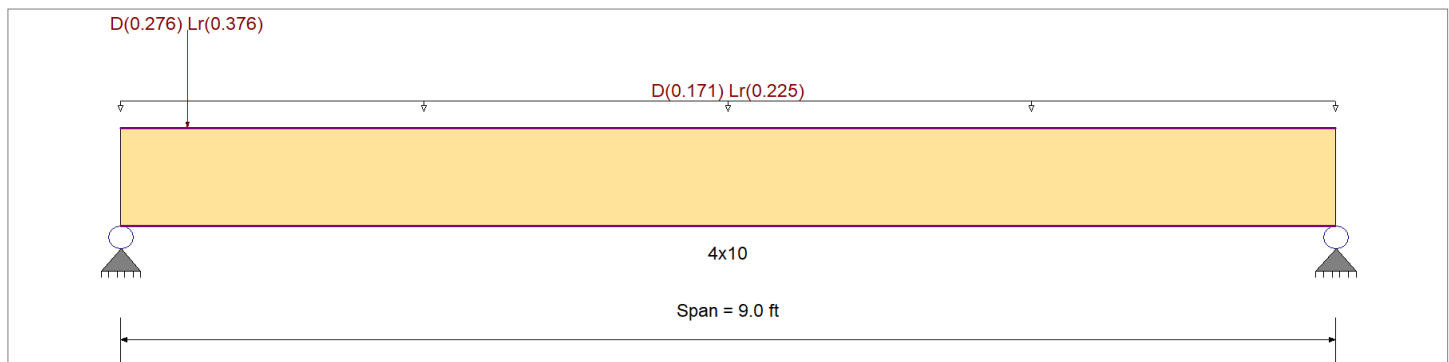
DESCRIPTION: R-01

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	900.0 psi	<i>E : Modulus of Elasticity</i>
Load Combination : IBC 2018	Fb -	900.0 psi	Ebend- xx 1,600.0ksi
Wood Species : DouglasFir-Larch	Fc - Prll	1,350.0 psi	Eminbend - xx 580.0ksi
Wood Grade : No.2	Fc - Perp	625.0 psi	Fv
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling	Ft	575.0 psi	Density 31.210pcf



Applied Loads

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

Beam self weight NOT internally calculated and added
 Uniform Load : D = 0.0190, Lr = 0.0250 ksf, Tributary Width = 9.0 ft, (RF)
 Point Load : D = 0.2760, Lr = 0.3760 k @ 0.50 ft, (GT-01)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.743 < 1	Maximum Shear Stress Ratio	=	0.313 < 1
Section used for this span		4x10	Section used for this span		4x10
fb: Actual	=	1,003.57psi	fv: Actual	=	70.38 psi
F'b	=	1,350.00psi	F'v	=	225.00 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	4.401ft	Location of maximum on span	=	8.245ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.095 in	Ratio = 1137 >=240	Span: 1 : Lr Only		
Max Upward Transient Deflection	0 in	Ratio = 0 <240	n/a		
Max Downward Total Deflection	0.167 in	Ratio = 646 >=180	Span: 1 : +D+Lr		
Max Upward Total Deflection	0 in	Ratio = 0 <180	n/a		

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v		
D Only	Length = 9.0 ft	1	0.445	0.188	0.90	1.00	1.00	1.00	1.200	1.00	1.00	1.00	1.80	433.0	972.0	0.00	0.00	0.0	0.0	0.0
+D+Lr	Length = 9.0 ft	1	0.743	0.313	1.25	1.00	1.00	1.00	1.200	1.00	1.00	1.00	4.17	1,003.6	1,350.0	1.52	70.4	225.0	0.0	0.0
+D+0.750Lr	Length = 9.0 ft	1	0.638	0.268	1.25	1.00	1.00	1.00	1.200	1.00	1.00	1.00	3.58	860.9	1,350.0	1.30	60.4	225.0	0.0	0.0
+0.60D	Length = 9.0 ft	1	0.150	0.063	1.60	1.00	1.00	1.00	1.200	1.00	1.00	1.00	1.08	259.8	1,728.0	0.39	18.2	288.0	0.0	0.0

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: R-01

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.1670	4.500		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	2.398	1.818
Max Upward from Load Combinations	2.398	1.818
Max Upward from Load Cases	1.368	1.033
D Only	1.030	0.785
+D+Lr	2.398	1.818
+D+0.750Lr	2.056	1.560
+0.60D	0.618	0.471
Lr Only	1.368	1.033

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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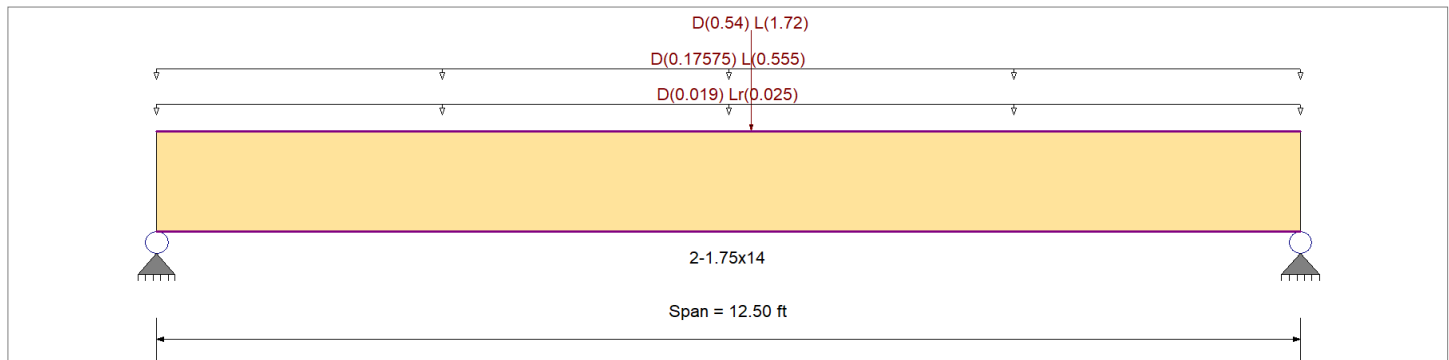
DESCRIPTION: R-02

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,600.0 psi	E : Modulus of Elasticity
Load Combination : IBC 2018	Fb -	2,600.0 psi	Ebend- xx
	Fc - Prll	2,510.0 psi	Eminbend - xx
Wood Species : iLevel Truss Joist	Fc - Perp	750.0 psi	
Wood Grade : MicroLam LVL 1.9 E	Fv	285.0 psi	
	Ft	1,555.0 psi	Density
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling			42.010pcf



Applied Loads

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

Beam self weight NOT internally calculated and added
 Uniform Load : D = 0.0190, Lr = 0.0250 ksf, Tributary Width = 1.0 ft, (RF)
 Uniform Load : D = 0.0190, L = 0.060 ksf, Tributary Width = 9.250 ft, (RF)
 Point Load : D = 0.540, L = 1.720 k @ 6.50 ft, (GT-02)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.893 : 1	Maximum Shear Stress Ratio	=	0.538 : 1
Section used for this span		2-1.75x14	Section used for this span		2-1.75x14
fb: Actual	=	2,272.46psi	fv: Actual	=	153.25 psi
F'b	=	2,546.06psi	F'v	=	285.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	6.478ft	Location of maximum on span	=	11.359 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.281 in	Ratio =	532 >=360	Span: 1 : L Only
Max Upward Transient Deflection		0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection		0.377 in	Ratio =	397 >=240	Span: 1 : +D+L
Max Upward Total Deflection		0 in	Ratio =	0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values			
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only	Length = 12.50 ft	1	0.251	0.152	0.90	1.00	1.00	1.00	0.979	1.00	1.00	1.00	5.48	574.9	2,291.5	0.0	0.00	0.0	0.0
+D+L	Length = 12.50 ft	1	0.893	0.538	1.00	1.00	1.00	1.00	0.979	1.00	1.00	1.00	21.65	2,272.5	2,546.1	5.01	153.2	285.0	0.0
+D+Lr	Length = 12.50 ft	1	0.197	0.121	1.25	1.00	1.00	1.00	0.979	1.00	1.00	1.00	5.97	626.1	3,182.6	1.40	43.0	356.3	0.0
+D+0.750Lr+0.750L	Length = 12.50 ft	1	0.593	0.358	1.25	1.00	1.00	1.00	0.979	1.00	1.00	1.00	17.97	1,886.5	3,182.6	4.17	127.6	356.3	0.0
+D+0.750L	Length = 12.50 ft	1				1.00	1.00	1.00	0.979	1.00	1.00	1.00			0.0	0.00	0.0	0.0	0.0

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: R-02

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F ^b	V	f _v	F ^v
Length = 12.50 ft	1	0.631	0.380	1.15	1.00	1.00	1.00	0.979	1.00	1.00	1.00	17.61	1,848.1	2,928.0	4.07	124.7	327.8	
+0.60D							1.00	1.00	1.00	0.979	1.00	1.00	1.00		0.0	0.0	0.0	
Length = 12.50 ft	1	0.085	0.051	1.60	1.00	1.00	1.00	0.979	1.00	1.00	1.00	3.29	345.0	4,073.7	0.77	23.4	456.0	

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.3773	6.296		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	5.771	5.861
Max Upward from Load Combinations	5.771	5.861
Max Upward from Load Cases	4.294	4.363
D Only	1.476	1.498
+D+L	5.771	5.861
+D+Lr	1.633	1.654
+D+0.750Lr+0.750L	4.814	4.888
+D+0.750L	4.697	4.770
+0.60D	0.886	0.899
Lr Only	0.156	0.156
L Only	4.294	4.363

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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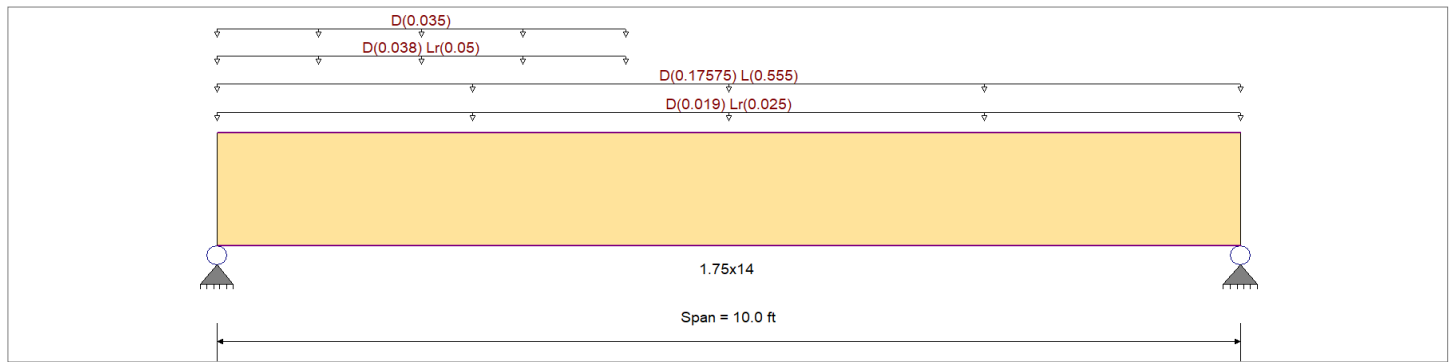
DESCRIPTION: R-03

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,325.0 psi	<i>E : Modulus of Elasticity</i>
Load Combination : IBC 2018	Fb -	2,325.0 psi	Ebend- xx 1,550.0ksi
Wood Species : iLevel Truss Joist	Fc - Prll	2,050.0 psi	Eminbend - xx 787.82ksi
Wood Grade : TimberStrand LSL 1.55E	Fc - Perp	800.0 psi	
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling	Fv	310.0 psi	
	Ft	1,070.0 psi	Density 45.010pcf



Applied Loads

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

Beam self weight NOT internally calculated and added

- Uniform Load : D = 0.0190, Lr = 0.0250 ksf, Tributary Width = 1.0 ft, (RF)
- Uniform Load : D = 0.0190, L = 0.060 ksf, Tributary Width = 9.250 ft, (RF DECK)
- Uniform Load : D = 0.0190, Lr = 0.0250 ksf, Extent = 0.0 --> 4.0 ft, Tributary Width = 2.0 ft, (RF)
- Uniform Load : D = 0.010 ksf, Extent = 0.0 --> 4.0 ft, Tributary Width = 3.50 ft, (WALL)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio = 0.885 1	Maximum Shear Stress Ratio = 0.603 : 1
Section used for this span = 1.75x14	Section used for this span = 1.75x14
fb: Actual = 2,029.04psi	fv: Actual = 186.83 psi
F'b = 2,292.26psi	F'v = 310.00 psi
Load Combination = +D+L	Load Combination = +D+L
Location of maximum on span = 4.927ft	Location of maximum on span = 0.000ft
Span # where maximum occurs = Span # 1	Span # where maximum occurs = Span # 1
Maximum Deflection	
Max Downward Transient Deflection = 0.203 in Ratio = 592 >=360	Span: 1 : L Only
Max Upward Transient Deflection = 0 in Ratio = 0 <360	n/a
Max Downward Total Deflection = 0.283 in Ratio = 424 >=240	Span: 1 : +D+L
Max Upward Total Deflection = 0 in Ratio = 0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v		
D Only																				
Length = 10.0 ft	1		0.278	0.198	0.90	1.00	1.00	1.00	0.986	1.00	1.00	1.00	2.74	574.1	2,063.0	0.00	0.00	0.00	0.00	0.00
+D+L																				
Length = 10.0 ft	1		0.885	0.603	1.00	1.00	1.00	1.00	0.986	1.00	1.00	1.00	9.67	2,029.0	2,292.3	3.05	186.8	310.0	0.00	0.00
+D+Lr																				
Length = 10.0 ft	1		0.239	0.175	1.25	1.00	1.00	1.00	0.986	1.00	1.00	1.00	3.26	684.5	2,865.3	1.10	67.6	387.5	0.00	0.00
+D+0.750Lr+0.750L																				
Length = 10.0 ft	1		0.610	0.421	1.25	1.00	1.00	1.00	0.986	1.00	1.00	1.00	8.32	1,746.5	2,865.3	2.66	163.2	387.5	0.00	0.00

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: R-03

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F _b	V	fv	F _v
+D+0.750L						1.00	1.00	1.00	0.986	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1		0.632	0.432	1.15	1.00	1.00	1.00	0.986	1.00	1.00	1.00	7.93	1,665.1	2,636.1	2.51	154.0	356.5
+0.60D						1.00	1.00	1.00	0.986	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1		0.094	0.067	1.60	1.00	1.00	1.00	0.986	1.00	1.00	1.00	1.64	344.5	3,667.6	0.54	33.2	496.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.2827	5.000		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	3.982	3.807
Max Upward from Load Combinations	3.982	3.807
Max Upward from Load Cases	2.775	2.775
D Only	1.207	1.032
+D+L	3.982	3.807
+D+Lr	1.492	1.197
+D+0.750Lr+0.750L	3.502	3.237
+D+0.750L	3.289	3.113
+0.60D	0.724	0.619
Lr Only	0.285	0.165
L Only	2.775	2.775

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

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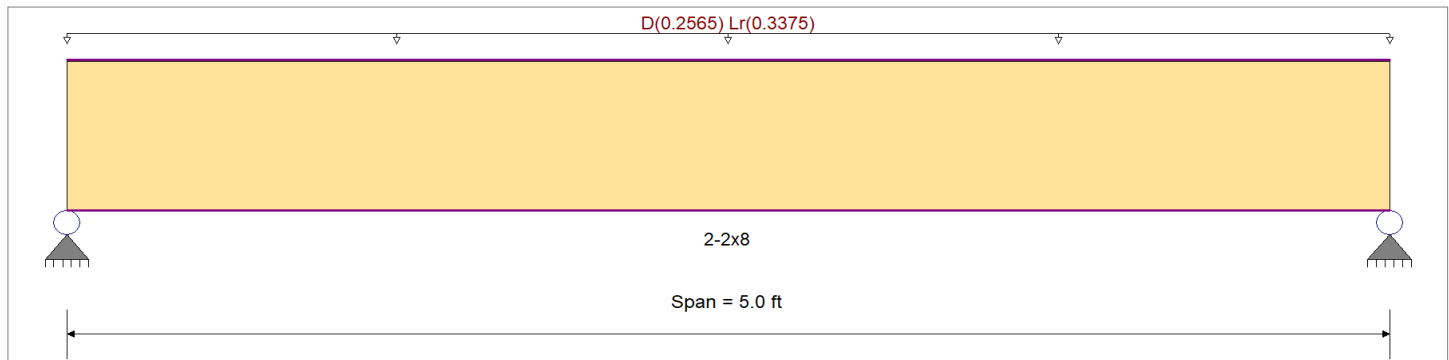
DESCRIPTION: R-04

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	900.0 psi	E : Modulus of Elasticity	
Load Combination : IBC 2018	Fb -	900.0 psi	Ebend- xx	1,600.0ksi
	Fc - Prll	1,350.0 psi	Eminbend - xx	580.0ksi
Wood Species : Douglas Fir-Larch	Fc - Perp	625.0 psi		
Wood Grade : No.2	Fv	180.0 psi		
	Ft	575.0 psi	Density	31.210pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

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

Beam self weight NOT internally calculated and added

Uniform Load : D = 0.0190, Lr = 0.0250 ksf, Tributary Width = 13.50 ft, (RF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.628 < 1	Maximum Shear Stress Ratio	=	0.346 < 1
Section used for this span		2-2x8	Section used for this span		2-2x8
fb: Actual	=	847.56psi	fv: Actual	=	77.74 psi
F'b	=	1,350.00psi	F'v	=	225.00 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	2.500ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.031 in	Ratio = 1915 >=240	Span: 1 : Lr Only		
Max Upward Transient Deflection	0 in	Ratio = 0 <240	n/a		
Max Downward Total Deflection	0.055 in	Ratio = 1088 >=180	Span: 1 : +D+Lr		
Max Upward Total Deflection	0 in	Ratio = 0 <180	n/a		

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v		
D Only	Length = 5.0 ft	1	0.377	0.207	0.90	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.80	366.0	972.0	0.00	0.00	0.0	0.0	162.0
+D+Lr	Length = 5.0 ft	1	0.628	0.346	1.25	1.00	1.00	1.00	1.200	1.00	1.00	1.00	1.86	847.6	1,350.0	0.00	0.00	0.0	0.0	225.0
+D+0.750Lr	Length = 5.0 ft	1	0.539	0.296	1.25	1.00	1.00	1.00	1.200	1.00	1.00	1.00	1.59	727.2	1,350.0	0.00	0.00	0.0	0.0	225.0
+0.60D	Length = 5.0 ft	1	0.127	0.070	1.60	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.48	219.6	1,728.0	0.00	0.00	0.0	0.0	288.0

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

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DESCRIPTION: R-04

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.0551	2.518		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.485	1.485
Max Upward from Load Combinations	1.485	1.485
Max Upward from Load Cases	0.844	0.844
D Only	0.641	0.641
+D+Lr	1.485	1.485
+D+0.750Lr	1.274	1.274
+0.60D	0.385	0.385
Lr Only	0.844	0.844

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

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DESCRIPTION: R-04a

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.0083	1.511		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.528	0.528
Max Upward from Load Combinations	0.528	0.528
Max Upward from Load Cases	0.300	0.300
D Only	0.228	0.228
+D+Lr	0.528	0.528
+D+0.750Lr	0.453	0.453
+0.60D	0.137	0.137
Lr Only	0.300	0.300

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

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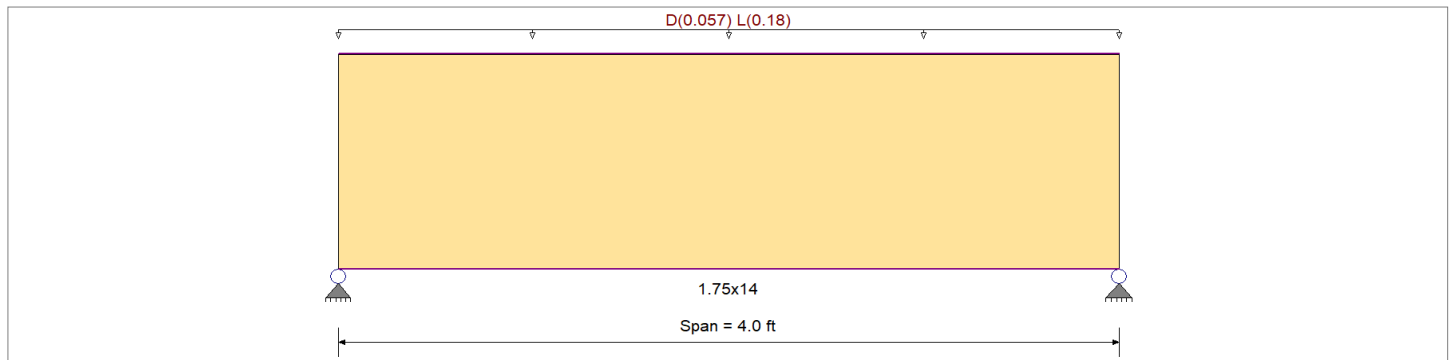
DESCRIPTION: R-05

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,325.0 psi	<i>E : Modulus of Elasticity</i>
Load Combination : IBC 2018	Fb -	2,325.0 psi	Ebend- xx 1,550.0ksi
	Fc - Prll	2,050.0 psi	Eminbend - xx 787.82ksi
Wood Species : iLevel Truss Joist	Fc - Perp	800.0 psi	
Wood Grade : TimberStrand LSL 1.55E	Fv	310.0 psi	
	Ft	1,070.0 psi	Density 45.010pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling			



Applied Loads

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

Beam self weight NOT internally calculated and added

Uniform Load : D = 0.0190, L = 0.060 ksf, Tributary Width = 3.0 ft, (RF DECK)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio = 0.043 : 1	Maximum Shear Stress Ratio = 0.040 : 1
Section used for this span = 1.75x14	Section used for this span = 1.75x14
fb: Actual = 99.50psi	fv: Actual = 12.29 psi
F'b = 2,292.26psi	F'v = 310.00 psi
Load Combination = +D+L	Load Combination = +D+L
Location of maximum on span = 2.000ft	Location of maximum on span = 2.847 ft
Span # where maximum occurs = Span # 1	Span # where maximum occurs = Span # 1
Maximum Deflection	
Max Downward Transient Deflection 0.002 in Ratio = 28548 >=360	Span: 1 : L Only
Max Upward Transient Deflection 0 in Ratio = 0 <360	n/a
Max Downward Total Deflection 0.002 in Ratio = 21682 >=240	Span: 1 : +D+L
Max Upward Total Deflection 0 in Ratio = 0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values			
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only	Length = 4.0 ft	1	0.012	0.011	0.90	1.00	1.00	1.00	0.986	1.00	1.00	1.00	0.11	23.9	2,063.0	0.0	0.00	0.0	0.0
+D+L	Length = 4.0 ft	1	0.043	0.040	1.00	1.00	1.00	1.00	0.986	1.00	1.00	1.00	0.47	99.5	2,292.3	0.20	12.3	310.0	0.0
+D+0.750L	Length = 4.0 ft	1	0.028	0.026	1.25	1.00	1.00	1.00	0.986	1.00	1.00	1.00	0.38	80.6	2,865.3	0.16	10.0	387.5	0.0
+0.60D	Length = 4.0 ft	1	0.004	0.004	1.60	1.00	1.00	1.00	0.986	1.00	1.00	1.00	0.07	14.4	3,667.6	0.03	1.8	496.0	0.0

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: R-05

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0022	2.015		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.474	0.474
Max Upward from Load Combinations	0.474	0.474
Max Upward from Load Cases	0.360	0.360
D Only	0.114	0.114
+D+L	0.474	0.474
+D+0.750L	0.384	0.384
+0.60D	0.068	0.068
L Only	0.360	0.360

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

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DESCRIPTION: R-06

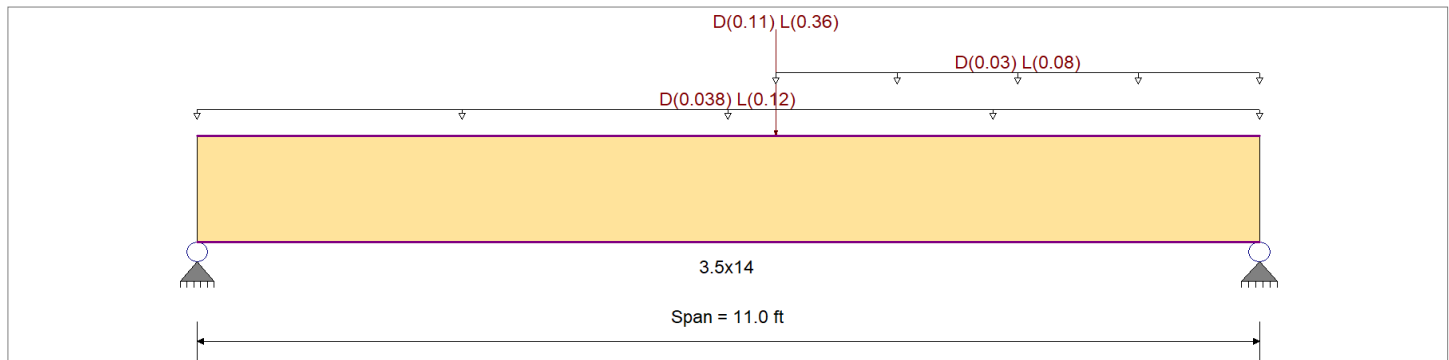
CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,325.0 psi	E : Modulus of Elasticity
Load Combination : IBC 2018	Fb -	2,325.0 psi	Ebend- xx
	Fc - Prll	2,050.0 psi	Eminbend - xx
Wood Species : iLevel Truss Joist	Fc - Perp	800.0 psi	
Wood Grade : TimberStrand LSL 1.55E	Fv	310.0 psi	
	Ft	1,070.0 psi	Density
			45.010pcf

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



Applied Loads

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

Beam self weight NOT internally calculated and added
 Uniform Load : D = 0.0190, L = 0.060 ksf, Tributary Width = 2.0 ft, (RF DECK)
 Point Load : D = 0.110, L = 0.360 k @ 6.0 ft, (D-05)
 Uniform Load : D = 0.0150, L = 0.040 ksf, Extent = 6.0 --> 11.0 ft, Tributary Width = 2.0 ft, (STAIRS)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.201 : 1	Maximum Shear Stress Ratio =	0.122 : 1
Section used for this span	3.5x14	Section used for this span	3.5x14
fb: Actual =	461.51 psi	fv: Actual =	37.91 psi
F'b =	2,292.26 psi	F'v =	310.00 psi
Load Combination	+D+L	Load Combination	+D+L
Location of maximum on span =	6.022ft	Location of maximum on span =	9.836 ft
Span # where maximum occurs =	Span # 1	Span # where maximum occurs =	Span # 1
Maximum Deflection			
Max Downward Transient Deflection	0.055 in Ratio =	2398 >=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in Ratio =	0 <360	n/a
Max Downward Total Deflection	0.073 in Ratio =	1812 >=240	Span: 1 : +D+L
Max Upward Total Deflection	0 in Ratio =	0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values			
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only	Length = 11.0 ft	1	0.055	0.034	0.90	1.00	1.00	1.00	0.986	1.00	1.00	1.00	1.07	112.7	2,063.0	0.0	0.00	0.0	0.0
+D+L	Length = 11.0 ft	1	0.201	0.122	1.00	1.00	1.00	1.00	0.986	1.00	1.00	1.00	4.40	461.5	2,292.3	1.24	37.9	310.0	0.0
+D+0.750L	Length = 11.0 ft	1	0.131	0.079	1.25	1.00	1.00	1.00	0.986	1.00	1.00	1.00	3.57	374.3	2,865.3	1.01	30.8	387.5	0.0
+0.60D	Length = 11.0 ft	1	0.018	0.011	1.60	1.00	1.00	1.00	0.986	1.00	1.00	1.00	0.64	67.6	3,667.6	0.18	5.6	496.0	0.0

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

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DESCRIPTION: R-06

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0728	5.661		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.208	1.550
Max Upward from Load Combinations	1.208	1.550
Max Upward from Load Cases	0.915	1.165
D Only	0.293	0.385
+D+L	1.208	1.550
+D+0.750L	0.979	1.259
+0.60D	0.176	0.231
L Only	0.915	1.165

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

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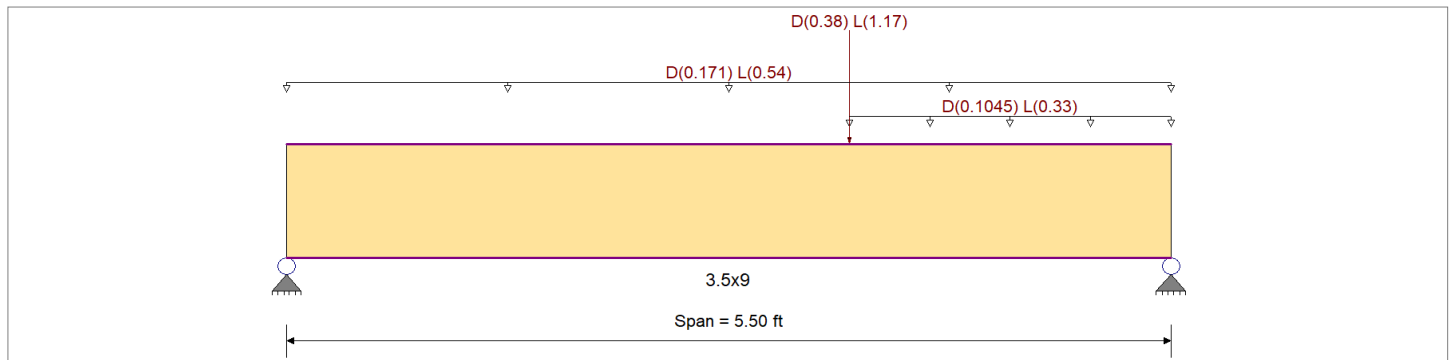
DESCRIPTION: R-07

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,400.0 psi	E : Modulus of Elasticity	
Load Combination : IBC 2018	Fb -	1,850.0 psi	Ebend- xx	1,800.0ksi
Wood Species : DF/DF	Fc - Prll	1,650.0 psi	Eminbend - xx	950.0ksi
Wood Grade : 24F-V4	Fc - Perp	650.0 psi	Ebend- yy	1,600.0ksi
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling	Fv	265.0 psi	Eminbend - yy	850.0ksi
	Ft	1,100.0 psi	Density	31.210pcf



Applied Loads

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

Beam self weight NOT internally calculated and added
 Load for Span Number 1

Uniform Load : D = 0.0190, L = 0.060 ksf, Extent = 3.50 --> 5.50 ft, Tributary Width = 5.50 ft, (RF DECK)
 Uniform Load : D = 0.0190, L = 0.060 ksf, Tributary Width = 9.0 ft, (RF DECK)
 Point Load : D = 0.380, L = 1.170 k @ 3.50 ft, (R-06)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.530 : 1	Maximum Shear Stress Ratio	=	0.503 : 1
Section used for this span		3.5x9	Section used for this span		3.5x9
fb: Actual	=	1,273.10psi	fv: Actual	=	133.42 psi
F'b	=	2,400.00psi	F'v	=	265.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	3.493ft	Location of maximum on span	=	4.757 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.051 in	Ratio = 1294 >=360	Span: 1 : L Only		
Max Upward Transient Deflection	0 in	Ratio = 0 <360	n/a		
Max Downward Total Deflection	0.067 in	Ratio = 980 >=240	Span: 1 : +D+L		
Max Upward Total Deflection	0 in	Ratio = 0 <240	n/a		

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v		
D Only																				
Length = 5.50 ft	1		0.143	0.135	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.21	308.5	2,160.0	0.00	0.00	0.0	0.0	0.0
+D+L																				
Length = 5.50 ft	1		0.530	0.503	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	5.01	1,273.1	2,400.0	2.80	133.4	265.0	0.0	0.0
+D+0.750L																				
Length = 5.50 ft	1		0.344	0.326	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.06	1,032.0	3,000.0	2.27	108.1	331.3	0.0	0.0
+0.60D																				
Length = 5.50 ft	1		0.048	0.046	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.73	185.1	3,840.0	0.41	19.4	424.0	0.0	0.0

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: R-07

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0673	2.870		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	2.677	3.653
Max Upward from Load Combinations	2.677	3.653
Max Upward from Load Cases	2.030	2.770
D Only	0.646	0.883
+D+L	2.677	3.653
+D+0.750L	2.169	2.960
+0.60D	0.388	0.530
L Only	2.030	2.770

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

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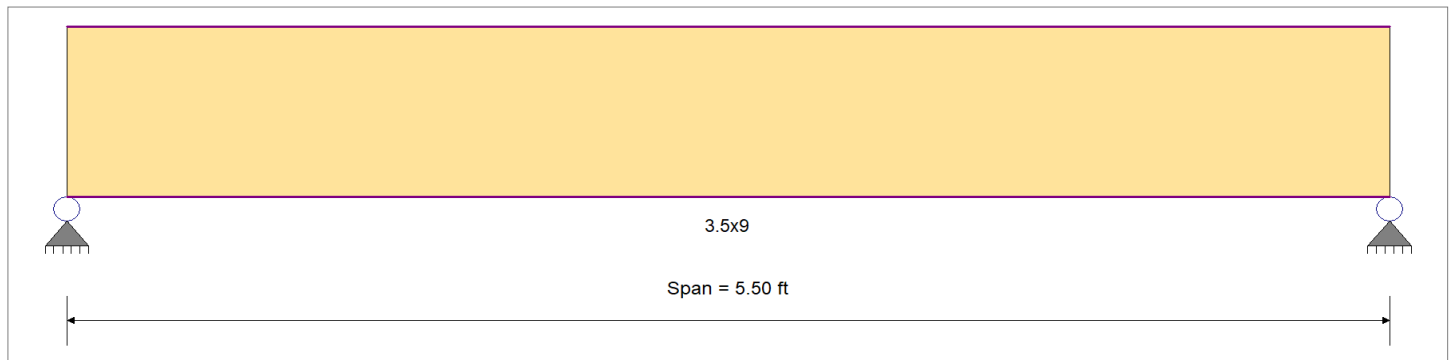
DESCRIPTION: R-08 (UNUSED)

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,400.0 psi	<i>E : Modulus of Elasticity</i>	
Load Combination : IBC 2018	Fb -	1,850.0 psi	Ebend- xx	1,800.0ksi
Wood Species : DF/DF	Fc - Prll	1,650.0 psi	Eminbend - xx	950.0ksi
Wood Grade : 24F-V4	Fc - Perp	650.0 psi	Ebend- yy	1,600.0ksi
	Fv	265.0 psi	Eminbend - yy	850.0ksi
	Ft	1,100.0 psi	Density	31.210pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

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

Beam self weight NOT internally calculated and added

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.000 : 1	Maximum Shear Stress Ratio	=	0.000 : 1
Section used for this span		3.5x9	Section used for this span		3.5x9
fb: Actual	=	0.00psi	fv: Actual	=	0.00 psi
F'b	=	0.00psi	F'v	=	0.00 psi
Load Combination			Load Combination		
Location of maximum on span	=	0.000ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0 in Ratio =	0 <360 n/a			
Max Upward Transient Deflection	0 in Ratio =	0 <360 n/a			
Max Downward Total Deflection	0 in Ratio =	0 <240 n/a			
Max Upward Total Deflection	0 in Ratio =	0 <240 n/a			

Maximum Forces & Stresses for Load Combinations

Load Combination	Max Stress Ratios	Moment Values										Shear Values								
		Segment Length	Span #	M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
Length = 5.50 ft	1			0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			2,160.0	0.0	0.0	0.00	0.0	238.5

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: R-09 (UNUSED)

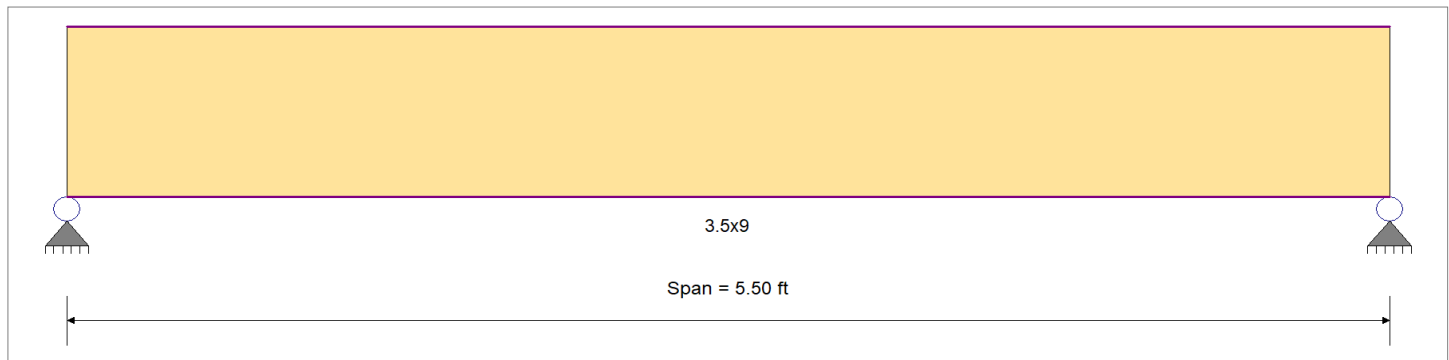
CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,400.0 psi	<i>E : Modulus of Elasticity</i>	
Load Combination : IBC 2018	Fb -	1,850.0 psi	Ebend- xx	1,800.0ksi
Wood Species : DF/DF	Fc - Prll	1,650.0 psi	Eminbend - xx	950.0ksi
Wood Grade : 24F-V4	Fc - Perp	650.0 psi	Ebend- yy	1,600.0ksi
	Fv	265.0 psi	Eminbend - yy	850.0ksi
	Ft	1,100.0 psi	Density	31.210pcf

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



Applied Loads

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

Beam self weight NOT internally calculated and added

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.000 : 1	Maximum Shear Stress Ratio	=	0.000 : 1
Section used for this span		3.5x9	Section used for this span		3.5x9
fb: Actual	=	0.00psi	fv: Actual	=	0.00 psi
F'b	=	0.00psi	F'v	=	0.00 psi
Load Combination			Load Combination		
Location of maximum on span	=	0.000ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0 in	Ratio =	0	<240	n/a
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination	Max Stress Ratios	Moment Values										Shear Values								
		Segment Length	Span #	M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
Length = 5.50 ft	1			0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			2,160.0	0.0	0.0	0.00	0.0	238.5

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

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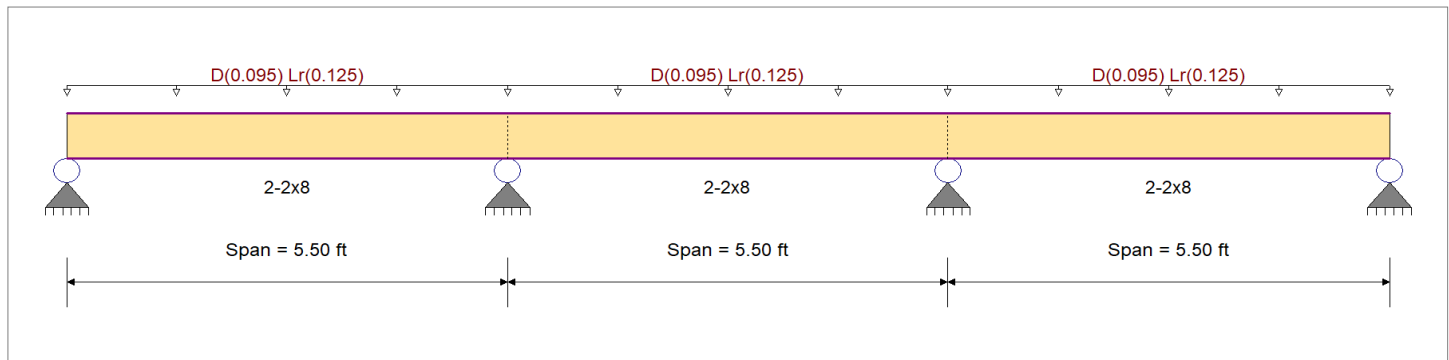
DESCRIPTION: R-10

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	900 psi	E : Modulus of Elasticity	
Load Combination : IBC 2018	Fb -	900 psi	Ebend- xx	1600ksi
	Fc - Prll	1350 psi	Eminbend - xx	580ksi
Wood Species : Douglas Fir-Larch	Fc - Perp	625 psi		
Wood Grade : No.2	Fv	180 psi		
	Ft	575 psi	Density	31.21 pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

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

Beam self weight NOT internally calculated and added
 Load for Span Number 1
 Uniform Load : D = 0.0190, Lr = 0.0250 ksf, Tributary Width = 5.0 ft, (RF)
 Load for Span Number 2
 Uniform Load : D = 0.0190, Lr = 0.0250 ksf, Tributary Width = 5.0 ft, (RF)
 Load for Span Number 3
 Uniform Load : D = 0.0190, Lr = 0.0250 ksf, Tributary Width = 5.0 ft, (RF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.225	1	Maximum Shear Stress Ratio	=	0.182	1
Section used for this span		2-2x8		Section used for this span		2-2x8	
fb: Actual	=	303.87 psi		fv: Actual	=	40.95 psi	
F'b	=	1,350.00 psi		F'v	=	225.00 psi	
Load Combination		+D+Lr		Load Combination		+D+Lr	
Location of maximum on span	=	5.500ft		Location of maximum on span	=	5.500 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 2	
Maximum Deflection							
Max Downward Transient Deflection		0.009 in	Ratio = 7282	>=360		Span: 3 : Lr Only	
Max Upward Transient Deflection		0 in	Ratio = 0	<360		n/a	
Max Downward Total Deflection		0.016 in	Ratio = 4137	>=240		Span: 3 : +D+Lr	
Max Upward Total Deflection		-0.001 in	Ratio = 63931	>=240		Span: 2 : +D+Lr	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values				
			M	V	CD	CM	C _t	CL _x	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only																			
	Length = 5.50 ft	1	0.135	0.109	0.90	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.29	131.2	972.0	0.00	0.00	0.0	0.0
	Length = 5.50 ft	2	0.135	0.109	0.90	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.29	131.2	972.0	0.26	17.7	162.0	162.0
	Length = 5.50 ft	3	0.135	0.109	0.90	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.29	131.2	972.0	0.26	17.7	162.0	162.0
+D+Lr																			
	Length = 5.50 ft	1	0.225	0.182	1.25	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.67	303.9	1,350.0	0.59	41.0	225.0	225.0

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: R-10

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values			
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
Length = 5.50 ft		2	0.225	0.182	1.25	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.67	303.9	1,350.0	0.59	41.0	225.0
Length = 5.50 ft		3	0.225	0.182	1.25	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.67	303.9	1,350.0	0.59	41.0	225.0
+D+0.750Lr										1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 5.50 ft		1	0.193	0.156	1.25	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.57	260.7	1,350.0	0.51	35.1	225.0
Length = 5.50 ft		2	0.193	0.156	1.25	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.57	260.7	1,350.0	0.51	35.1	225.0
Length = 5.50 ft		3	0.193	0.156	1.25	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.57	260.7	1,350.0	0.51	35.1	225.0
+0.60D										1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 5.50 ft		1	0.046	0.037	1.60	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.17	78.7	1,728.0	0.15	10.6	288.0
Length = 5.50 ft		2	0.046	0.037	1.60	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.17	78.7	1,728.0	0.15	10.6	288.0
Length = 5.50 ft		3	0.046	0.037	1.60	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.17	78.7	1,728.0	0.15	10.6	288.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.0160	2.496		0.0000	0.000
+D+Lr	2	0.0011	2.773	+D+Lr	-0.0010	0.647
+D+Lr	3	0.0158	3.050		0.0000	0.647

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3	Support 4
Max Upward from all Load Conditions	0.484	1.331	1.331	0.484
Max Upward from Load Combinations	0.484	1.331	1.331	0.484
Max Upward from Load Cases	0.275	0.756	0.756	0.275
D Only	0.209	0.575	0.575	0.209
+D+Lr	0.484	1.331	1.331	0.484
+D+0.750Lr	0.415	1.142	1.142	0.415
+0.60D	0.125	0.345	0.345	0.125
Lr Only	0.275	0.756	0.756	0.275

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

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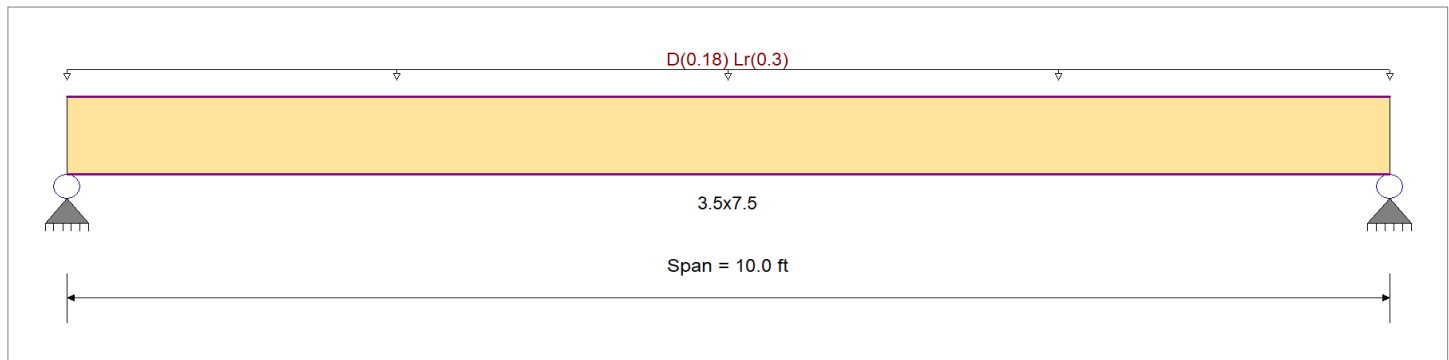
DESCRIPTION: R-10a

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2400 psi	<i>E : Modulus of Elasticity</i>	
Load Combination : IBC 2018	Fb -	1850 psi	Ebend- xx	1800ksi
Wood Species : DF/DF	Fc - Prll	1650 psi	Eminbend - xx	950ksi
Wood Grade : 24F-V4	Fc - Perp	650 psi	Ebend- yy	1600ksi
	Fv	265 psi	Eminbend - yy	850ksi
	Ft	1100 psi	Density	31.21 pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

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

Beam self weight NOT internally calculated and added
 Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Tributary Width = 12.0 ft, (RF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.731 : 1	Maximum Shear Stress Ratio	=	0.363 : 1
Section used for this span		3.5x7.5	Section used for this span		3.5x7.5
fb: Actual	=	2,194.29psi	fv: Actual	=	120.13 psi
F'b	=	3,000.00psi	F'v	=	331.25 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	5.000ft	Location of maximum on span	=	0.000ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.307 in	Ratio =	391 >=360	Span: 1 : Lr Only	
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a	
Max Downward Total Deflection	0.490 in	Ratio =	244 >=240	Span: 1 : +D+Lr	
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values			
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only	Length = 10.0 ft	1	0.381	0.189	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.25	822.9	2,160.0	0.0	0.00	0.0	0.0
+D+Lr	Length = 10.0 ft	1	0.731	0.363	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	6.00	2,194.3	3,000.0	2.10	120.1	331.3	0.0
+D+0.750Lr	Length = 10.0 ft	1	0.617	0.306	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	5.06	1,851.4	3,000.0	1.77	101.4	331.3	0.0
+0.60D	Length = 10.0 ft	1	0.129	0.064	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.35	493.7	3,840.0	0.47	27.0	424.0	0.0

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

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DESCRIPTION: R-10a

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.4905	5.036		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	2.400	2.400
Max Upward from Load Combinations	2.400	2.400
Max Upward from Load Cases	1.500	1.500
D Only	0.900	0.900
+D+Lr	2.400	2.400
+D+0.750Lr	2.025	2.025
+0.60D	0.540	0.540
Lr Only	1.500	1.500

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

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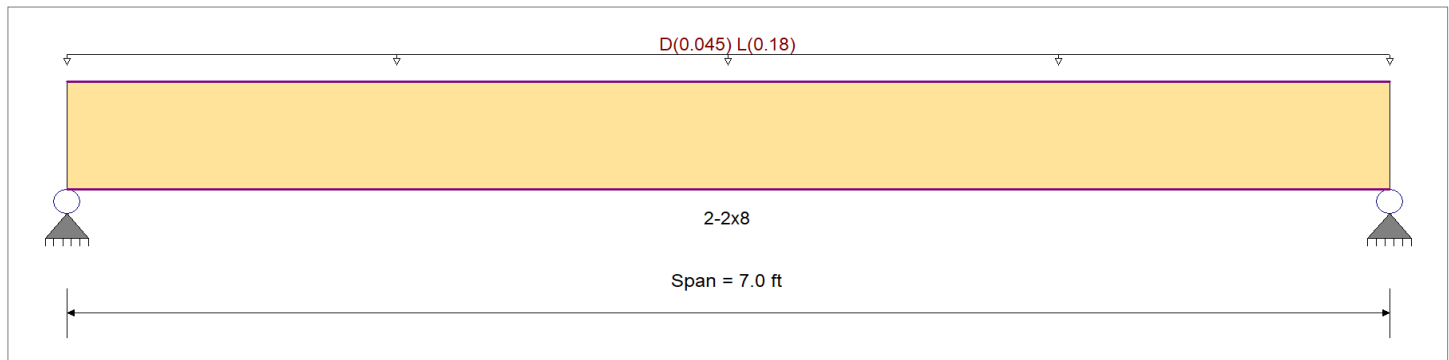
DESCRIPTION: R-11

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	900.0 psi	<i>E : Modulus of Elasticity</i>
Load Combination : IBC 2018	Fb -	900.0 psi	Ebend- xx 1,600.0ksi
	Fc - Prll	1,350.0 psi	Eminbend - xx 580.0ksi
Wood Species : Douglas Fir-Larch	Fc - Perp	625.0 psi	
Wood Grade : No.2	Fv	180.0 psi	
	Ft	575.0 psi	Density 31.210pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling			



Applied Loads

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

Beam self weight NOT internally calculated and added
 Uniform Load : D = 0.0150, L = 0.060 ksf, Tributary Width = 3.0 ft, (RF DECK)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.583 : 1	Maximum Shear Stress Ratio	=	0.251 : 1
Section used for this span		2-2x8	Section used for this span		2-2x8
fb: Actual	=	629.25psi	fv: Actual	=	45.19 psi
F'b	=	1,080.00psi	F'v	=	180.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	3.500ft	Location of maximum on span	=	6.412 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.064 in	Ratio = 1309 >=360	Span: 1 : L Only		
Max Upward Transient Deflection	0 in	Ratio = 0 <360	n/a		
Max Downward Total Deflection	0.080 in	Ratio = 1047 >=240	Span: 1 : +D+L		
Max Upward Total Deflection	0 in	Ratio = 0 <240	n/a		

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v		
D Only	Length = 7.0 ft	1	0.129	0.056	0.90	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.28	125.9	972.0	0.00	0.00	0.0	0.0	162.0
+D+L	Length = 7.0 ft	1	0.583	0.251	1.00	1.00	1.00	1.00	1.200	1.00	1.00	1.00	1.38	629.3	1,080.0	0.00	0.00	0.0	0.0	180.0
+D+0.750L	Length = 7.0 ft	1	0.373	0.161	1.25	1.00	1.00	1.00	1.200	1.00	1.00	1.00	1.10	503.4	1,350.0	0.00	0.00	0.0	0.0	225.0
+0.60D	Length = 7.0 ft	1	0.044	0.019	1.60	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.17	75.5	1,728.0	0.00	0.00	0.0	0.0	288.0

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

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DESCRIPTION: R-11

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0802	3.526		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.788	0.788
Max Upward from Load Combinations	0.788	0.788
Max Upward from Load Cases	0.630	0.630
D Only	0.158	0.158
+D+L	0.788	0.788
+D+0.750L	0.630	0.630
+0.60D	0.095	0.095
L Only	0.630	0.630

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: R-12

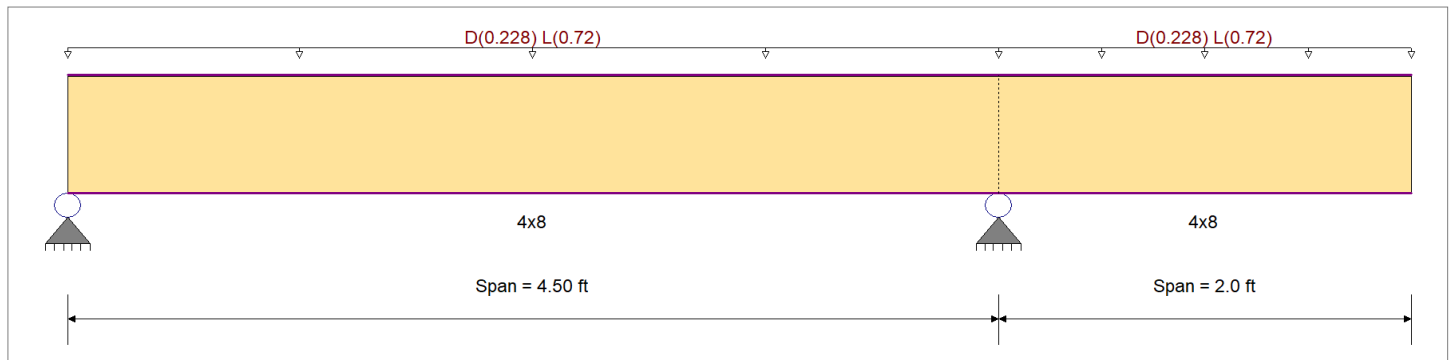
CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	900.0 psi	E : Modulus of Elasticity
Load Combination : IBC 2018	Fb -	900.0 psi	Ebend- xx
	Fc - Prll	1,350.0 psi	Eminbend - xx
Wood Species : Douglas Fir-Larch	Fc - Perp	625.0 psi	
Wood Grade : No.2	Fv	180.0 psi	
	Ft	575.0 psi	Density
			31.210pcf

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



Applied Loads

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

Beam self weight NOT internally calculated and added

Load for Span Number 1

Uniform Load : D = 0.0190, L = 0.060 ksf, Tributary Width = 12.0 ft, (RF DECK)

Load for Span Number 2

Uniform Load : D = 0.0190, L = 0.060 ksf, Tributary Width = 12.0 ft, (RF DECK)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.634 : 1	Maximum Shear Stress Ratio	=	0.651 : 1
Section used for this span		4x8	Section used for this span		4x8
fb: Actual	=	742.04psi	fv: Actual	=	117.18 psi
F'b	=	1,170.00psi	F'v	=	180.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	4.500ft	Location of maximum on span	=	3.897 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.020 in	Ratio =	2678 >=360	Span: 2 : L Only
Max Upward Transient Deflection		-0.001 in	Ratio =	35682 >=360	Span: 2 : L Only
Max Downward Total Deflection		0.027 in	Ratio =	2034 >=240	Span: 2 : +D+L
Max Upward Total Deflection		-0.002 in	Ratio =	27100 >=240	Span: 2 : +D+L

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values			
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only																			
	Length = 4.50 ft	1	0.169	0.174	0.90	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.46	178.5	1,053.0	0.00	0.00	0.0	0.0
	Length = 2.0 ft	2	0.169	0.174	0.90	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.46	178.5	1,053.0	0.32	28.2	162.0	162.0
+D+L																			
	Length = 4.50 ft	1	0.634	0.651	1.00	1.00	1.00	1.00	1.300	1.00	1.00	1.00	1.90	742.0	1,170.0	1.98	117.2	180.0	180.0
	Length = 2.0 ft	2	0.634	0.651	1.00	1.00	1.00	1.00	1.300	1.00	1.00	1.00	1.90	742.0	1,170.0	1.32	117.2	180.0	180.0
+D+0.750L																			
	Length = 4.50 ft	1	0.411	0.422	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.00	1.54	601.1	1,462.5	1.61	94.9	225.0	225.0

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: R-12

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
Length = 2.0 ft +0.60D	2		0.411	0.422	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.00	1.54	601.1	1,462.5	1.07	94.9	225.0
															0.0	0.00	0.0	0.0
Length = 4.50 ft	1		0.057	0.059	1.60	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.27	107.1	1,872.0	0.29	16.9	288.0
Length = 2.0 ft	2		0.057	0.059	1.60	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.27	107.1	1,872.0	0.19	16.9	288.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0265	2.036		0.0000	0.000
+D+L	2	0.0037	2.000	+D+L	-0.0018	0.525

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	1.712	4.450	
Max Upward from Load Combinations	1.712	4.450	
Max Upward from Load Cases	1.300	3.380	
D Only	0.412	1.070	
+D+L	1.712	4.450	
+D+0.750L	1.387	3.605	
+0.60D	0.247	0.642	
L Only	1.300	3.380	

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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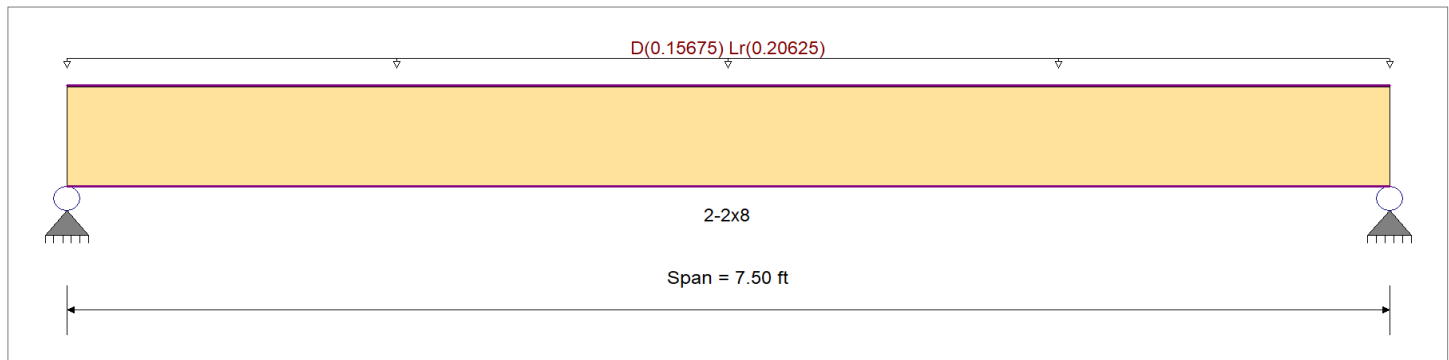
DESCRIPTION: R-13

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	900.0 psi	E : Modulus of Elasticity	
Load Combination : IBC 2018	Fb -	900.0 psi	Ebend- xx	1,600.0ksi
	Fc - Prll	1,350.0 psi	Eminbend - xx	580.0ksi
Wood Species : Douglas Fir-Larch	Fc - Perp	625.0 psi		
Wood Grade : No.2	Fv	180.0 psi		
	Ft	575.0 psi	Density	31.210pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

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

Beam self weight NOT internally calculated and added

Uniform Load : D = 0.0190, Lr = 0.0250 ksf, Tributary Width = 8.250 ft, (RF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.863 < 1	Maximum Shear Stress Ratio	=	0.350 < 1
Section used for this span		2-2x8	Section used for this span		2-2x8
fb: Actual	=	1,165.40psi	fv: Actual	=	78.80 psi
F'b	=	1,350.00psi	F'v	=	225.00 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	3.750ft	Location of maximum on span	=	6.898 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.097 in	Ratio = 928 >=360	Span: 1 : Lr Only		
Max Upward Transient Deflection	0 in	Ratio = 0 <360	n/a		
Max Downward Total Deflection	0.171 in	Ratio = 527 >=240	Span: 1 : +D+Lr		
Max Upward Total Deflection	0 in	Ratio = 0 <240	n/a		

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values			
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only	Length = 7.50 ft	1	0.518	0.210	0.90	1.00	1.00	1.00	1.200	1.00	1.00	1.00	1.10	503.2	972.0	0.0	0.00	0.0	0.0
+D+Lr	Length = 7.50 ft	1	0.863	0.350	1.25	1.00	1.00	1.00	1.200	1.00	1.00	1.00	2.55	1,165.4	1,350.0	1.14	78.8	225.0	0.0
+D+0.750Lr	Length = 7.50 ft	1	0.741	0.300	1.25	1.00	1.00	1.00	1.200	1.00	1.00	1.00	2.19	999.9	1,350.0	0.98	67.6	225.0	0.0
+0.60D	Length = 7.50 ft	1	0.175	0.071	1.60	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.66	301.9	1,728.0	0.30	20.4	288.0	0.0

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: R-13

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.1705	3.777		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.361	1.361
Max Upward from Load Combinations	1.361	1.361
Max Upward from Load Cases	0.773	0.773
D Only	0.588	0.588
+D+Lr	1.361	1.361
+D+0.750Lr	1.168	1.168
+0.60D	0.353	0.353
Lr Only	0.773	0.773

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: R-14 (UNUSED)

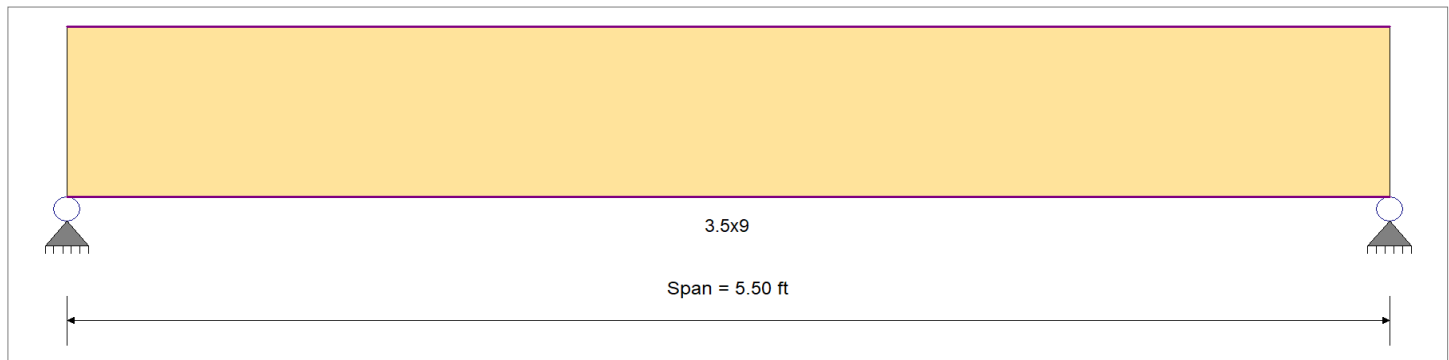
CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,400.0 psi	<i>E : Modulus of Elasticity</i>	
Load Combination : IBC 2018	Fb -	1,850.0 psi	Ebend- xx	1,800.0ksi
Wood Species : DF/DF	Fc - Prll	1,650.0 psi	Eminbend - xx	950.0ksi
Wood Grade : 24F-V4	Fc - Perp	650.0 psi	Ebend- yy	1,600.0ksi
	Fv	265.0 psi	Eminbend - yy	850.0ksi
	Ft	1,100.0 psi	Density	31.210pcf

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



Applied Loads

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

Beam self weight NOT internally calculated and added

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.000 : 1	Maximum Shear Stress Ratio	=	0.000 : 1
Section used for this span		3.5x9	Section used for this span		3.5x9
fb: Actual	=	0.00psi	fv: Actual	=	0.00 psi
F'b	=	0.00psi	F'v	=	0.00 psi
Load Combination			Load Combination		
Location of maximum on span	=	0.000ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0 in Ratio =	<360	n/a	
Max Upward Transient Deflection		0 in Ratio =	<360	n/a	
Max Downward Total Deflection		0 in Ratio =	<240	n/a	
Max Upward Total Deflection		0 in Ratio =	<240	n/a	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v		
	Length = 5.50 ft	1			0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00			2,160.0	0.0	0.00	0.0	0.0	238.5

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

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DESCRIPTION: R-15 (UNUSED)

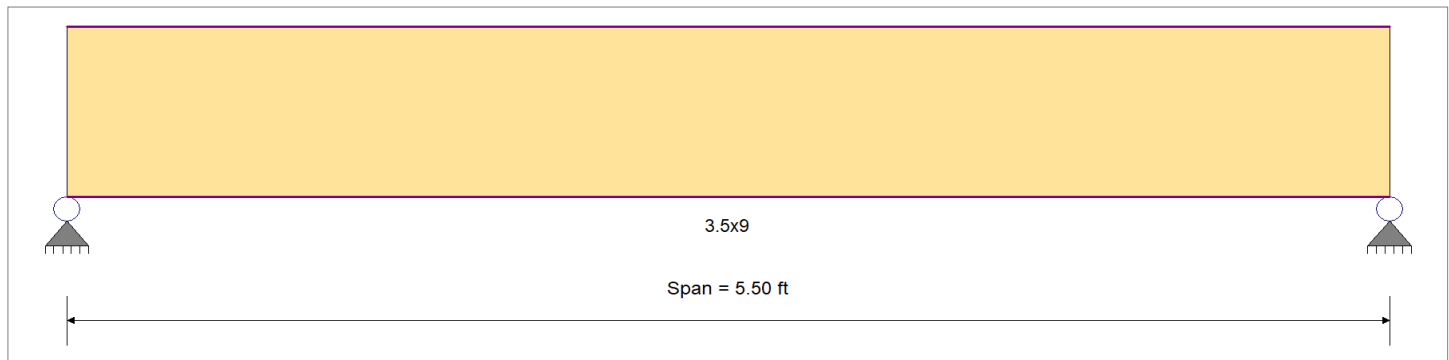
CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,400.0 psi	<i>E : Modulus of Elasticity</i>	
Load Combination : IBC 2018	Fb -	1,850.0 psi	Ebend- xx	1,800.0ksi
Wood Species : DF/DF	Fc - Prll	1,650.0 psi	Eminbend - xx	950.0ksi
Wood Grade : 24F-V4	Fc - Perp	650.0 psi	Ebend- yy	1,600.0ksi
	Fv	265.0 psi	Eminbend - yy	850.0ksi
	Ft	1,100.0 psi	Density	31.210pcf

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



Applied Loads

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

Beam self weight NOT internally calculated and added

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.000 : 1	Maximum Shear Stress Ratio	=	0.000 : 1
Section used for this span		3.5x9	Section used for this span		3.5x9
fb: Actual	=	0.00psi	fv: Actual	=	0.00 psi
F'b	=	0.00psi	F'v	=	0.00 psi
Load Combination			Load Combination		
Location of maximum on span	=	0.000ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0 in Ratio =	0 <360	n/a		
Max Upward Transient Deflection	0 in Ratio =	0 <360	n/a		
Max Downward Total Deflection	0 in Ratio =	0 <240	n/a		
Max Upward Total Deflection	0 in Ratio =	0 <240	n/a		

Maximum Forces & Stresses for Load Combinations

Load Combination	Max Stress Ratios	Moment Values										Shear Values								
		Segment Length	Span #	M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
Length = 5.50 ft	1			0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			2,160.0	0.0	0.0	0.00	0.0	238.5

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: R-16

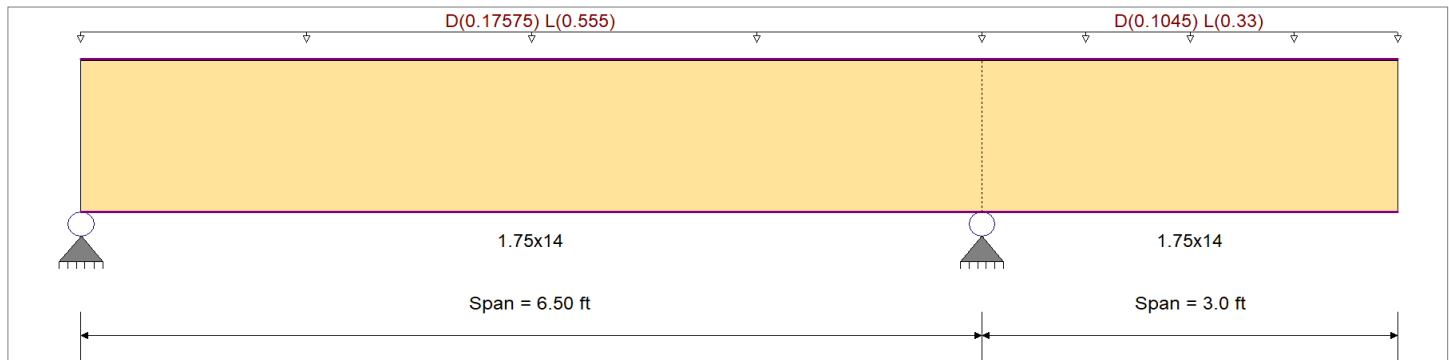
CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,600.0 psi	E : Modulus of Elasticity
Load Combination : IBC 2018	Fb -	2,600.0 psi	Ebend- xx
	Fc - Prll	2,510.0 psi	Eminbend - xx
Wood Species : iLevel Truss Joist	Fc - Perp	750.0 psi	
Wood Grade : MicroLam LVL 1.9 E	Fv	285.0 psi	Density
	Ft	1,555.0 psi	42.010pcf

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



Applied Loads

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

Beam self weight NOT internally calculated and added
 Load for Span Number 1
 Uniform Load : D = 0.0190, L = 0.060 ksf, Tributary Width = 9.250 ft, (RF)
 Load for Span Number 2
 Uniform Load : D = 0.0190, L = 0.060 ksf, Tributary Width = 5.50 ft, (RF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.241 : 1	Maximum Shear Stress Ratio	=	0.392 : 1
Section used for this span	=	1.75x14	Section used for this span	=	1.75x14
fb: Actual	=	617.89psi	fv: Actual	=	111.83 psi
F'b	=	2,563.39psi	F'v	=	285.00 psi
Load Combination	=	+D+L	Load Combination	=	+D+L
Location of maximum on span	=	2.832ft	Location of maximum on span	=	5.338 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.021 in	Ratio = 3770	>=240	Span: 1 : L Only	
Max Upward Transient Deflection	-0.014 in	Ratio = 5218	>=240	Span: 2 : L Only	
Max Downward Total Deflection	0.027 in	Ratio = 2863	>=180	Span: 1 : +D+L	
Max Upward Total Deflection	-0.018 in	Ratio = 3962	>=180	Span: 2 : +D+L	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v		
D Only																				
	Length = 6.50 ft	1	0.064	0.105	0.90	1.00	1.00	1.00	0.986	1.00	1.00	1.00	0.71	148.6	2,307.0	0.00	0.00	0.00	0.00	0.00
	Length = 3.0 ft	2	0.043	0.105	0.90	1.00	1.00	1.00	0.986	1.00	1.00	1.00	0.47	98.7	2,307.0	0.19	26.9	256.5	0.19	26.9
+D+L																				
	Length = 6.50 ft	1	0.241	0.392	1.00	1.00	1.00	1.00	0.986	1.00	1.00	1.00	2.94	617.9	2,563.4	1.83	111.8	285.0	1.83	111.8
	Length = 3.0 ft	2	0.160	0.392	1.00	1.00	1.00	1.00	0.986	1.00	1.00	1.00	1.96	410.4	2,563.4	0.80	111.8	285.0	0.80	111.8
+D+0.750L																				
	Length = 6.50 ft	1	0.156	0.254	1.25	1.00	1.00	1.00	0.986	1.00	1.00	1.00	2.38	500.6	3,204.2	1.48	90.6	356.3	1.48	90.6

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: R-16

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F _b	V	fv	F _v
Length = 3.0 ft +0.60D	2		0.104	0.254	1.25	1.00	1.00	1.00	0.986	1.00	1.00	1.00	1.58	332.5	3,204.2	0.65	90.6	356.3
															0.0	0.00	0.0	0.0
Length = 6.50 ft	1		0.022	0.035	1.60	1.00	1.00	1.00	0.986	1.00	1.00	1.00	0.42	89.2	4,101.4	0.26	16.1	456.0
Length = 3.0 ft	2		0.014	0.035	1.60	1.00	1.00	1.00	0.986	1.00	1.00	1.00	0.28	59.2	4,101.4	0.12	16.1	456.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0272	3.087		0.0000	0.000
	2	0.0000	3.087	+D+L	-0.0182	3.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	2.074	3.979	
Max Upward from Load Combinations	2.074	3.979	
Max Upward from Load Cases	1.575	3.022	
D Only	0.499	0.957	
+D+L	2.074	3.979	
+D+0.750L	1.680	3.224	
+0.60D	0.299	0.574	
L Only	1.575	3.022	

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: R-17 (UNUSED)

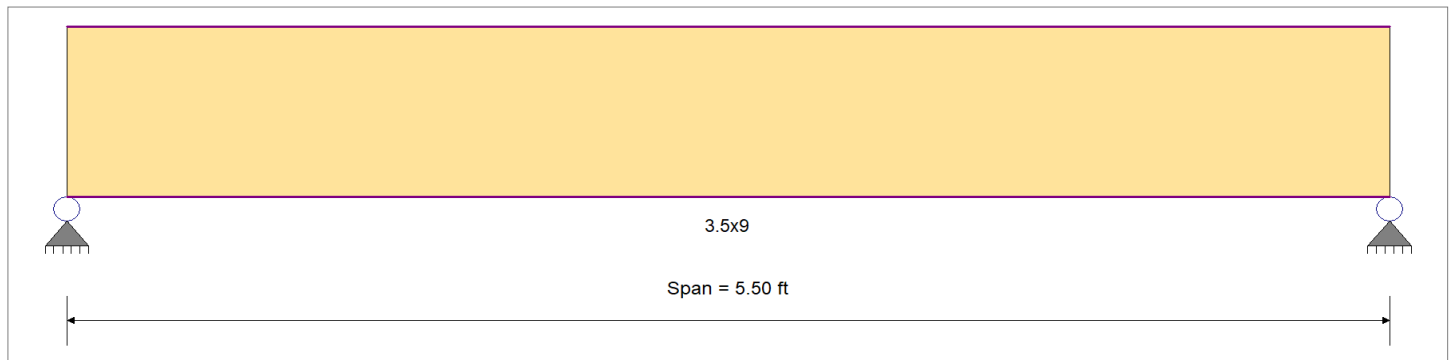
CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,400.0 psi	<i>E : Modulus of Elasticity</i>	
Load Combination : IBC 2018	Fb -	1,850.0 psi	Ebend- xx	1,800.0ksi
Wood Species : DF/DF	Fc - Prll	1,650.0 psi	Eminbend - xx	950.0ksi
Wood Grade : 24F-V4	Fc - Perp	650.0 psi	Ebend- yy	1,600.0ksi
	Fv	265.0 psi	Eminbend - yy	850.0ksi
	Ft	1,100.0 psi	Density	31.210pcf

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



Applied Loads

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

Beam self weight NOT internally calculated and added

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.000 : 1	Maximum Shear Stress Ratio	=	0.000 : 1
Section used for this span		3.5x9	Section used for this span		3.5x9
fb: Actual	=	0.00psi	fv: Actual	=	0.00 psi
F'b	=	0.00psi	F'v	=	0.00 psi
Load Combination			Load Combination		
Location of maximum on span	=	0.000ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0 in Ratio =	0 <360	n/a		
Max Upward Transient Deflection	0 in Ratio =	0 <360	n/a		
Max Downward Total Deflection	0 in Ratio =	0 <240	n/a		
Max Upward Total Deflection	0 in Ratio =	0 <240	n/a		

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v		
	Length = 5.50 ft	1			0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00			2,160.0	0.0	0.0	0.0	0.0	238.5

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: R-18

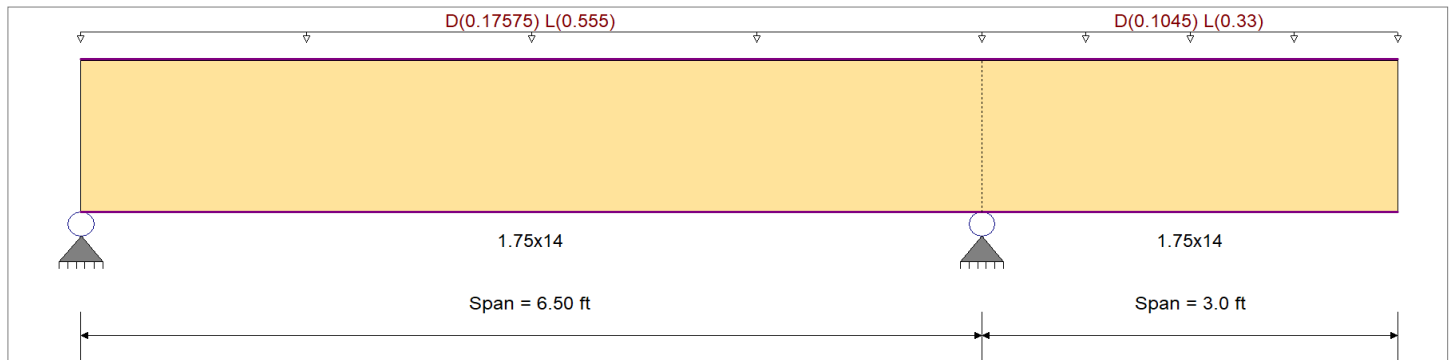
CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,600.0 psi	E : Modulus of Elasticity
Load Combination : IBC 2018	Fb -	2,600.0 psi	Ebend- xx
	Fc - Prll	2,510.0 psi	Eminbend - xx
Wood Species : iLevel Truss Joist	Fc - Perp	750.0 psi	
Wood Grade : MicroLam LVL 1.9 E	Fv	285.0 psi	Density
	Ft	1,555.0 psi	42.010pcf

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



Applied Loads

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

Beam self weight NOT internally calculated and added
 Load for Span Number 1
 Uniform Load : D = 0.0190, L = 0.060 ksf, Tributary Width = 9.250 ft, (RF)
 Load for Span Number 2
 Uniform Load : D = 0.0190, L = 0.060 ksf, Tributary Width = 5.50 ft, (RF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.241 : 1	Maximum Shear Stress Ratio	=	0.392 : 1
Section used for this span	=	1.75x14	Section used for this span	=	1.75x14
fb: Actual	=	617.89psi	fv: Actual	=	111.83 psi
F'b	=	2,563.39psi	F'v	=	285.00 psi
Load Combination	=	+D+L	Load Combination	=	+D+L
Location of maximum on span	=	2.832ft	Location of maximum on span	=	5.338 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.021 in	Ratio =	3770	>=240	Span: 1 : L Only
Max Upward Transient Deflection	-0.014 in	Ratio =	5218	>=240	Span: 2 : L Only
Max Downward Total Deflection	0.027 in	Ratio =	2863	>=180	Span: 1 : +D+L
Max Upward Total Deflection	-0.018 in	Ratio =	3962	>=180	Span: 2 : +D+L

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values			
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only																			
	Length = 6.50 ft	1	0.064	0.105	0.90	1.00	1.00	1.00	0.986	1.00	1.00	1.00	0.71	148.6	2,307.0	0.00	0.00	0.0	0.0
	Length = 3.0 ft	2	0.043	0.105	0.90	1.00	1.00	1.00	0.986	1.00	1.00	1.00	0.47	98.7	2,307.0	0.19	26.9	256.5	256.5
+D+L																			
	Length = 6.50 ft	1	0.241	0.392	1.00	1.00	1.00	1.00	0.986	1.00	1.00	1.00	2.94	617.9	2,563.4	1.83	111.8	285.0	285.0
	Length = 3.0 ft	2	0.160	0.392	1.00	1.00	1.00	1.00	0.986	1.00	1.00	1.00	1.96	410.4	2,563.4	0.80	111.8	285.0	285.0
+D+0.750L																			
	Length = 6.50 ft	1	0.156	0.254	1.25	1.00	1.00	1.00	0.986	1.00	1.00	1.00	2.38	500.6	3,204.2	1.48	90.6	356.3	356.3

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: R-18

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F _b	V	fv	F _v
Length = 3.0 ft +0.60D	2		0.104	0.254	1.25	1.00	1.00	1.00	0.986	1.00	1.00	1.00	1.58	332.5	3,204.2	0.65	90.6	356.3
															0.0	0.00	0.0	0.0
Length = 6.50 ft	1		0.022	0.035	1.60	1.00	1.00	1.00	0.986	1.00	1.00	1.00	0.42	89.2	4,101.4	0.26	16.1	456.0
Length = 3.0 ft	2		0.014	0.035	1.60	1.00	1.00	1.00	0.986	1.00	1.00	1.00	0.28	59.2	4,101.4	0.12	16.1	456.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0272	3.087		0.0000	0.000
	2	0.0000	3.087	+D+L	-0.0182	3.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	2.074	3.979	
Max Upward from Load Combinations	2.074	3.979	
Max Upward from Load Cases	1.575	3.022	
D Only	0.499	0.957	
+D+L	2.074	3.979	
+D+0.750L	1.680	3.224	
+0.60D	0.299	0.574	
L Only	1.575	3.022	

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: UF-01 (UNUSED)

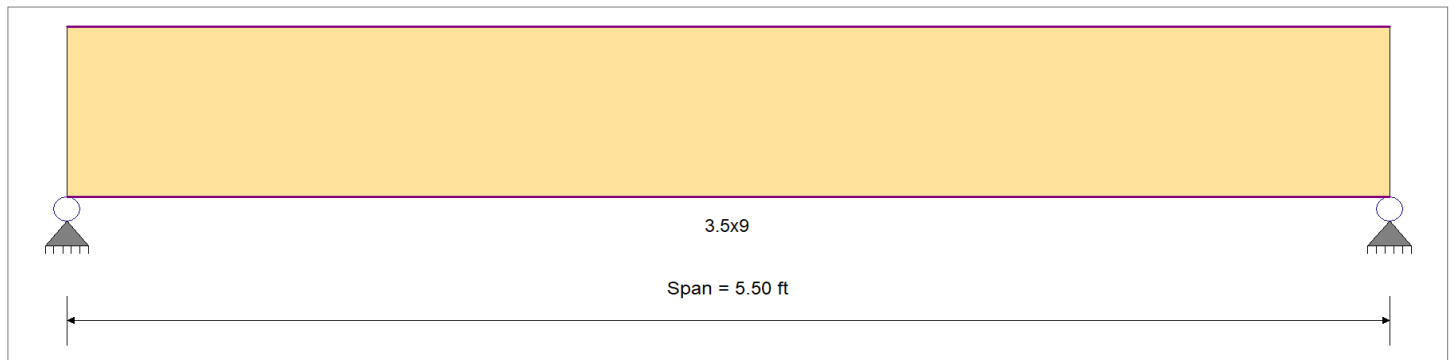
CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,400.0 psi	<i>E : Modulus of Elasticity</i>	
Load Combination : IBC 2018	Fb -	1,850.0 psi	Ebend- xx	1,800.0ksi
Wood Species : DF/DF	Fc - Prll	1,650.0 psi	Eminbend - xx	950.0ksi
Wood Grade : 24F-V4	Fc - Perp	650.0 psi	Ebend- yy	1,600.0ksi
	Fv	265.0 psi	Eminbend - yy	850.0ksi
	Ft	1,100.0 psi	Density	31.210pcf

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



Applied Loads

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

Beam self weight NOT internally calculated and added

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.000 : 1	Maximum Shear Stress Ratio	=	0.000 : 1
Section used for this span		3.5x9	Section used for this span		3.5x9
fb: Actual	=	0.00psi	fv: Actual	=	0.00 psi
F'b	=	0.00psi	F'v	=	0.00 psi
Load Combination			Load Combination		
Location of maximum on span	=	0.000ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0 in Ratio =	<360	n/a	
Max Upward Transient Deflection		0 in Ratio =	<360	n/a	
Max Downward Total Deflection		0 in Ratio =	<240	n/a	
Max Upward Total Deflection		0 in Ratio =	<240	n/a	

Maximum Forces & Stresses for Load Combinations

Load Combination	Max Stress Ratios	Moment Values										Shear Values								
		Segment Length	Span #	M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
Length = 5.50 ft	1			0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			2,160.0	0.0	0.0	0.00	0.0	238.5

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: UF-02 (UNUSED)

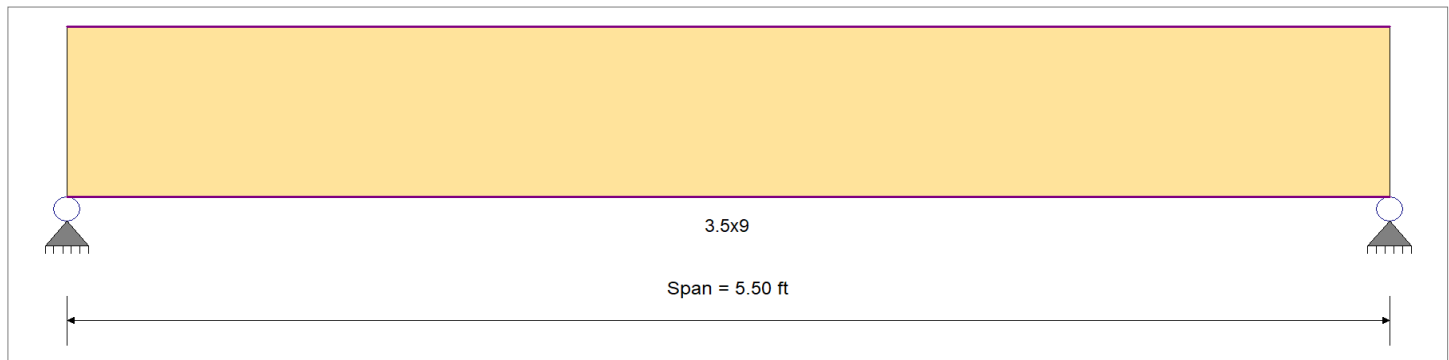
CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,400.0 psi	<i>E : Modulus of Elasticity</i>	
Load Combination : IBC 2018	Fb -	1,850.0 psi	Ebend- xx	1,800.0ksi
Wood Species : DF/DF	Fc - Prll	1,650.0 psi	Eminbend - xx	950.0ksi
Wood Grade : 24F-V4	Fc - Perp	650.0 psi	Ebend- yy	1,600.0ksi
	Fv	265.0 psi	Eminbend - yy	850.0ksi
	Ft	1,100.0 psi	Density	31.210pcf

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



Applied Loads

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

Beam self weight NOT internally calculated and added

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.000 : 1	Maximum Shear Stress Ratio	=	0.000 : 1
Section used for this span		3.5x9	Section used for this span		3.5x9
fb: Actual	=	0.00psi	fv: Actual	=	0.00 psi
F'b	=	0.00psi	F'v	=	0.00 psi
Load Combination			Load Combination		
Location of maximum on span	=	0.000ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0 in	Ratio =	0	<240	n/a
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v		
	Length = 5.50 ft	1			0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	2,160.0	0.0	0.0	0.0	238.5

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: UF-03 (UNUSED)

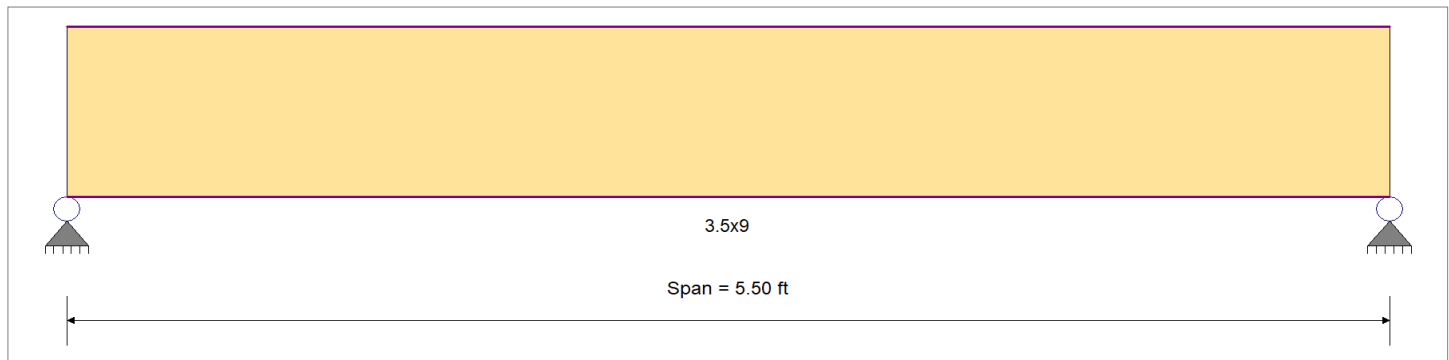
CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,400.0 psi	<i>E : Modulus of Elasticity</i>	
Load Combination : IBC 2018	Fb -	1,850.0 psi	Ebend- xx	1,800.0ksi
Wood Species : DF/DF	Fc - Prll	1,650.0 psi	Eminbend - xx	950.0ksi
Wood Grade : 24F-V4	Fc - Perp	650.0 psi	Ebend- yy	1,600.0ksi
	Fv	265.0 psi	Eminbend - yy	850.0ksi
	Ft	1,100.0 psi	Density	31.210pcf

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



Applied Loads

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

Beam self weight NOT internally calculated and added

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.000 : 1	Maximum Shear Stress Ratio	=	0.000 : 1
Section used for this span		3.5x9	Section used for this span		3.5x9
fb: Actual	=	0.00psi	fv: Actual	=	0.00 psi
F'b	=	0.00psi	F'v	=	0.00 psi
Load Combination			Load Combination		
Location of maximum on span	=	0.000ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0 in	Ratio =	0	<240	n/a
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v		
	Length = 5.50 ft	1			0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	2,160.0	0.00	0.0	0.0	238.5

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC#: KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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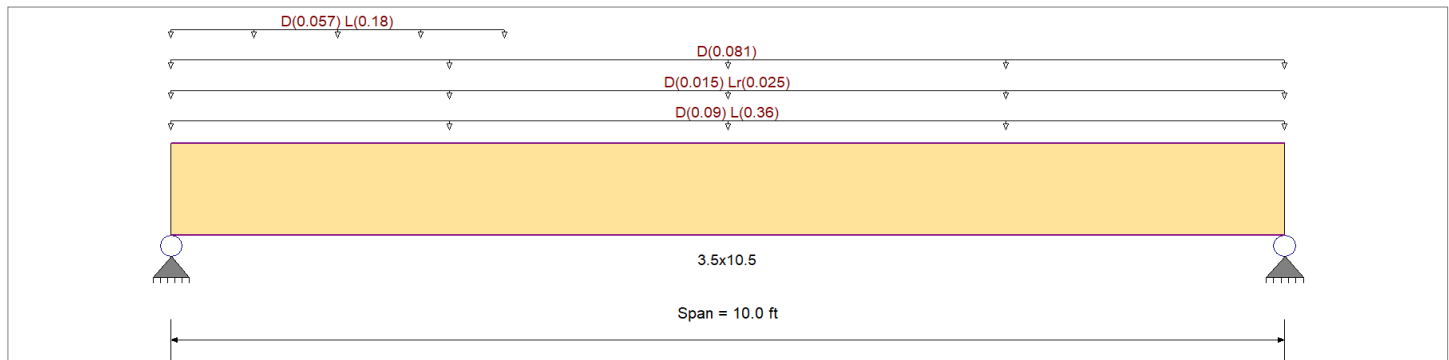
DESCRIPTION: UF-04

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2400 psi	<i>E : Modulus of Elasticity</i>	
Load Combination : IBC 2018	Fb -	1850 psi	Ebend- xx	1800ksi
Wood Species : DF/DF	Fc - Prll	1650 psi	Eminbend - xx	950ksi
Wood Grade : 24F-V4	Fc - Perp	650 psi	Ebend- yy	1600ksi
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling	Fv	265 psi	Eminbend - yy	850ksi
	Ft	1100 psi	Density	31.21 pcf



Applied Loads

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

Beam self weight NOT internally calculated and added

- Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 9.0 ft, (FLR)
- Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Tributary Width = 1.0 ft, (LO RF)
- Uniform Load : D = 0.010 ksf, Tributary Width = 8.10 ft, (WALL)
- Uniform Load : D = 0.0190, L = 0.060 ksf, Extent = 0.0 -->> 3.0 ft, Tributary Width = 3.0 ft, (RF DECK)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.573 : 1	Maximum Shear Stress Ratio	=	0.412 : 1
Section used for this span	=	3.5x10.5	Section used for this span	=	3.5x10.5
fb: Actual	=	1,374.90psi	fv: Actual	=	109.27 psi
F'b	=	2,400.00psi	F'v	=	265.00 psi
Load Combination	=	+D+L	Load Combination	=	+D+L
Location of maximum on span	=	4.818ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.148 in	Ratio =	812 >=360	Span: 1 : L Only	
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a	
Max Downward Total Deflection	0.221 in	Ratio =	542 >=40	Span: 1 : +D+L	
Max Upward Total Deflection	0 in	Ratio =	0 <40	n/a	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v		
D Only	Length = 10.0 ft	1	0.212	0.149	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.46	458.1	2,160.0	0.00	0.00	0.0	0.0	238.5
+D+L	Length = 10.0 ft	1	0.573	0.412	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	7.37	1,374.9	2,400.0	2.68	109.3	265.0	0.0	0.0
+D+Lr	Length = 10.0 ft	1	0.172	0.120	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.77	516.3	3,000.0	0.98	39.8	331.3	0.0	0.0
+D+0.750Lr+0.750L	Length = 10.0 ft	1	0.396	0.284	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	6.37	1,189.4	3,000.0	2.30	94.0	331.3	0.0	0.0

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: UF-04

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
+D+0.750L						1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1		0.415	0.298	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	6.14	1,145.7	2,760.0	2.23	90.8	304.8
+0.60D						1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1		0.072	0.050	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.47	274.8	3,840.0	0.52	21.3	424.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.2213	4.964		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	3.334	2.837
Max Upward from Load Combinations	3.334	2.837
Max Upward from Load Cases	2.259	1.881
D Only	1.075	0.956
+D+L	3.334	2.837
+D+Lr	1.200	1.081
+D+0.750Lr+0.750L	2.863	2.460
+D+0.750L	2.770	2.366
+0.60D	0.645	0.573
Lr Only	0.125	0.125
L Only	2.259	1.881

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: UF-05

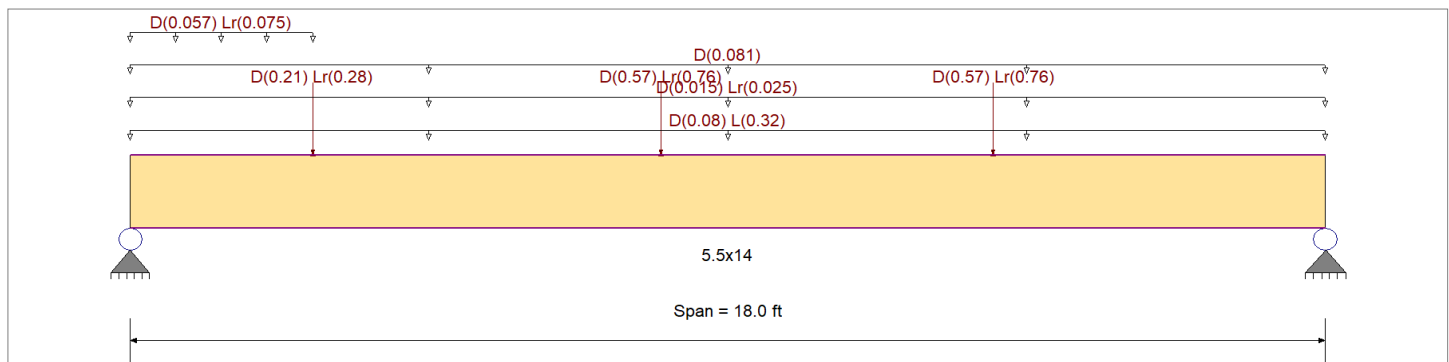
CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,400.0 psi	<i>E : Modulus of Elasticity</i>
Load Combination : IBC 2018	Fb -	1,850.0 psi	Ebend- xx 1,800.0ksi
Wood Species : DF/DF	Fc - Prll	1,650.0 psi	Eminbend - xx 950.0ksi
Wood Grade : 24F-V4	Fc - Perp	650.0 psi	Ebend- yy 1,600.0ksi
	Fv	265.0 psi	Eminbend - yy 850.0ksi
	Ft	1,100.0 psi	Density 31.210pcf

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



Applied Loads

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

Beam self weight NOT internally calculated and added

- Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 8.0 ft, (FLR)
- Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Tributary Width = 1.0 ft, (LO RF)
- Uniform Load : D = 0.010 ksf, Tributary Width = 8.0 ft, (WALL)
- Uniform Load : D = 0.0190, Lr = 0.0250 ksf, Extent = 0.0 -->> 2.750 ft, Tributary Width = 3.0 ft, (RF)
- Point Load : D = 0.210, Lr = 0.280 k @ 2.750 ft, (R-10)
- Point Load : D = 0.570, Lr = 0.760 k @ 8.0 ft, (R-10)
- Point Load : D = 0.570, Lr = 0.760 k @ 13.0 ft, (R-10)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.678 : 1	Maximum Shear Stress Ratio	=	0.341 : 1
Section used for this span		5.5x14	Section used for this span		5.5x14
fb: Actual	=	1,616.92psi	fv: Actual	=	90.47 psi
F'b	=	2,383.11 psi	F'v	=	265.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	8.737ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.336 in	Ratio =	643 >=360	Span: 1 : L Only	
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a	
Max Downward Total Deflection	0.664 in	Ratio =	325 >=40	Span: 1 : +D+0.750Lr+0.750L	
Max Upward Total Deflection	0 in	Ratio =	0 <40	n/a	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only	Length = 18.0 ft	1	0.351	0.173	0.90	1.00	1.00	1.00	0.993	1.00	1.00	1.00	11.28	753.7	2,144.8	0.0	0.00	0.0	0.0
+D+L	Length = 18.0 ft	1	0.678	0.341	1.00	1.00	1.00	1.00	0.993	1.00	1.00	1.00	24.21	1,616.9	2,383.1	4.64	90.5	265.0	0.0
+D+Lr						1.00	1.00	1.00	0.993	1.00	1.00	1.00			0.0	0.00	0.0	0.0	

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: UF-05

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv
Length = 18.0 ft	1	0.402	0.194	1.25	1.00	1.00	1.00	0.993	1.00	1.00	1.00	17.93	1,197.6	2,978.9	3.30	64.2	331.3
+D+0.750Lr+0.750L					1.00	1.00	1.00	0.993	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 18.0 ft	1	0.581	0.288	1.25	1.00	1.00	1.00	0.993	1.00	1.00	1.00	25.90	1,729.7	2,978.9	4.89	95.3	331.3
+D+0.750L					1.00	1.00	1.00	0.993	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 18.0 ft	1	0.511	0.257	1.15	1.00	1.00	1.00	0.993	1.00	1.00	1.00	20.97	1,400.8	2,740.6	4.01	78.2	304.8
+0.60D					1.00	1.00	1.00	0.993	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 18.0 ft	1	0.119	0.058	1.60	1.00	1.00	1.00	0.993	1.00	1.00	1.00	6.77	452.2	3,813.0	1.27	24.8	424.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750Lr+0.750L	1	0.6641	9.066		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	5.506	5.331
Max Upward from Load Combinations	5.506	5.331
Max Upward from Load Cases	2.880	2.880
D Only	2.382	2.293
+D+L	5.262	5.173
+D+Lr	3.668	3.463
+D+0.750Lr+0.750L	5.506	5.331
+D+0.750L	4.542	4.453
+0.60D	1.429	1.376
Lr Only	1.286	1.170
L Only	2.880	2.880

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

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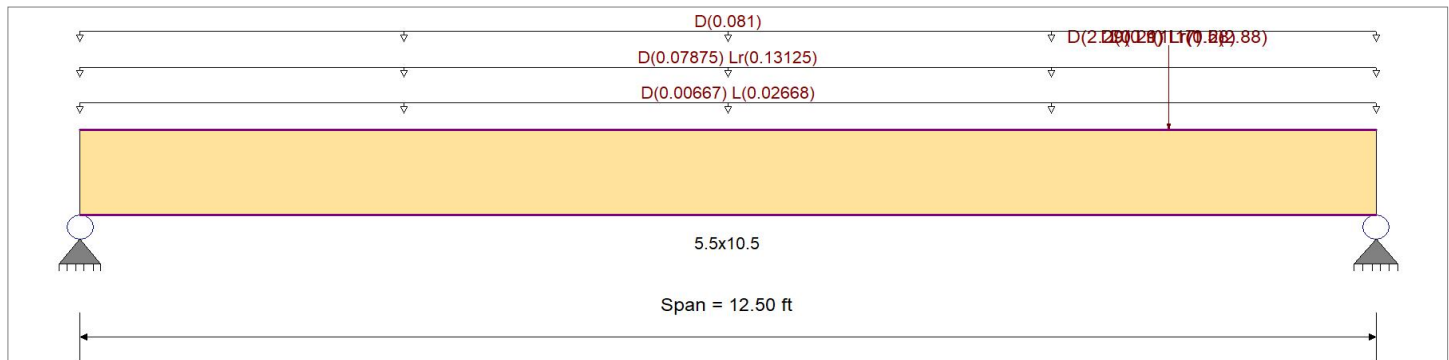
DESCRIPTION: UF-06

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,400.0 psi	E : Modulus of Elasticity	
Load Combination : IBC 2018	Fb -	1,850.0 psi	Ebend- xx	1,800.0ksi
Wood Species : DF/DF	Fc - Prll	1,650.0 psi	Eminbend - xx	950.0ksi
Wood Grade : 24F-V4	Fc - Perp	650.0 psi	Ebend- yy	1,600.0ksi
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling	Fv	265.0 psi	Eminbend - yy	850.0ksi
	Ft	1,100.0 psi	Density	31.210pcf



Applied Loads

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

- Beam self weight NOT internally calculated and added
- Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 0.6670 ft, (FLR)
- Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Tributary Width = 5.250 ft, (LO RF)
- Uniform Load : D = 0.010 ksf, Tributary Width = 8.10 ft, (WALL)
- Point Load : D = 0.90, Lr = 1.50 k @ 10.50 ft, (R-10a)
- Point Load : D = 0.210, Lr = 0.280 k @ 10.50 ft, (R-10)
- Point Load : D = 2.290, Lr = 1.170, L = 2.880 k @ 10.50 ft, (uf-05)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio = 0.635 1	Maximum Shear Stress Ratio = 0.632 1
Section used for this span = 5.5x10.5	Section used for this span = 5.5x10.5
fb: Actual = 1,905.59psi	fv: Actual = 209.41 psi
F'b = 3,000.00psi	F'v = 331.25 psi
Load Combination = +D+0.750Lr+0.750L	Load Combination = +D+0.750Lr+0.750L
Location of maximum on span = 10.493ft	Location of maximum on span = 11.633 ft
Span # where maximum occurs = Span # 1	Span # where maximum occurs = Span # 1
Maximum Deflection	
Max Downward Transient Deflection = 0.178 in Ratio = 841 >=360	Span: 1 : Lr Only
Max Upward Transient Deflection = 0 in Ratio = 0 <360	n/a
Max Downward Total Deflection = 0.435 in Ratio = 344 >=240	Span: 1 : +D+0.750Lr+0.750L
Max Upward Total Deflection = 0 in Ratio = 0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only	Length = 12.50 ft	1	0.414	0.409	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	7.54	895.2	2,160.0	0.0	0.00	0.0	0.0
+D+L	Length = 12.50 ft	1	0.622	0.619	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	12.58	1,493.3	2,400.0	0.0	0.00	0.0	0.0
+D+Lr	Length = 12.50 ft	1	0.550	0.544	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	13.90	1,650.2	3,000.0	0.0	0.00	0.0	0.0

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

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DESCRIPTION: UF-06

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values			
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F _b	V	fv	F _v	
+D+0.750Lr+0.750L	Length = 12.50 ft	1	0.635	0.632	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	16.05	1,905.6	3,000.0	0.0	0.00	0.0	0.0
+D+0.750L	Length = 12.50 ft	1	0.486	0.484	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	11.30	1,341.5	2,760.0	0.0	0.00	0.0	0.0
+0.60D	Length = 12.50 ft	1	0.140	0.138	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.52	537.1	3,840.0	0.0	0.00	0.0	0.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750Lr+0.750L	1	0.4349	6.797		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	3.024	8.309
Max Upward from Load Combinations	3.024	8.309
Max Upward from Load Cases	1.584	3.896
D Only	1.584	3.896
+D+L	2.212	6.482
+D+Lr	2.876	7.194
+D+0.750Lr+0.750L	3.024	8.309
+D+0.750L	2.055	5.836
+0.60D	0.950	2.338
Lr Only	1.292	3.298
L Only	0.628	2.586

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

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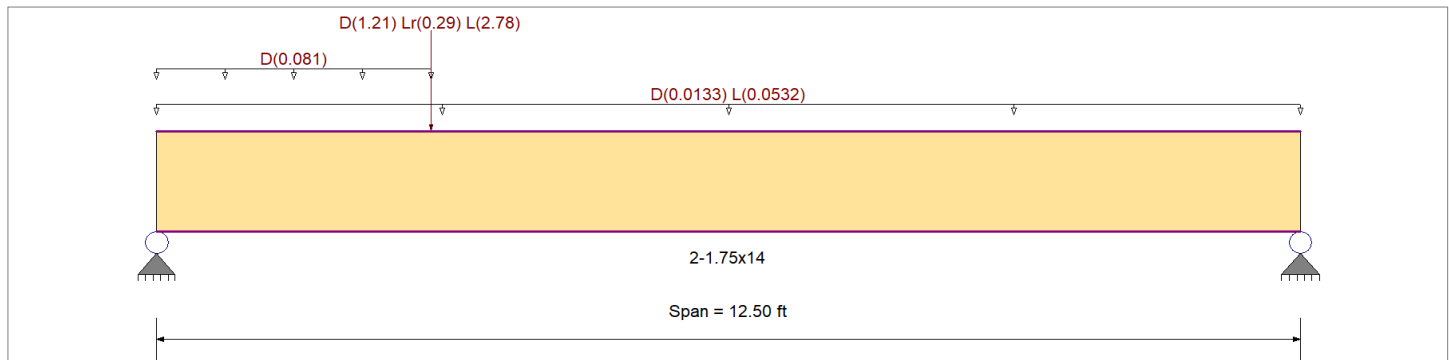
DESCRIPTION: UF-07

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2325 psi	E : Modulus of Elasticity	
Load Combination : IBC 2018	Fb -	2325 psi	Ebend- xx	1550 ksi
Wood Species : iLevel Truss Joist	Fc - Prll	2050 psi	Eminbend - xx	787.815 ksi
Wood Grade : TimberStrand LSL 1.55E	Fc - Perp	800 psi		
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling	Fv	310 psi	Density	45.01 pcf
	Ft	1070 psi		



Applied Loads

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

Beam self weight NOT internally calculated and added

Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 1.330 ft, (FLR)

Uniform Load : D = 0.010 ksf, Extent = 0.0 --> 3.0 ft, Tributary Width = 8.10 ft, (WALL)

Point Load : D = 1.210, Lr = 0.290, L = 2.780 k @ 3.0 ft, (R-3)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.475 : 1	Maximum Shear Stress Ratio	=	0.345 : 1
Section used for this span		2-1.75x14	Section used for this span		2-1.75x14
fb: Actual	=	1,082.46psi	fv: Actual	=	106.95 psi
F'b	=	2,276.76psi	F'v	=	310.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	3.011 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.131 in	Ratio = 1148	>=360	Span: 1 : L Only	
Max Upward Transient Deflection	0 in	Ratio = 0	<360	n/a	
Max Downward Total Deflection	0.188 in	Ratio = 797	>=240	Span: 1 : +D+L	
Max Upward Total Deflection	0 in	Ratio = 0	<240	n/a	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values			
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only	Length = 12.50 ft	1	0.165	0.122	0.90	1.00	1.00	1.00	0.979	1.00	1.00	1.00	3.22	338.2	2,049.1	0.0	0.00	0.0	0.0
+D+L	Length = 12.50 ft	1	0.475	0.345	1.00	1.00	1.00	1.00	0.979	1.00	1.00	1.00	10.31	1,082.5	2,276.8	0.0	0.00	0.0	0.0
+D+Lr	Length = 12.50 ft	1	0.143	0.105	1.25	1.00	1.00	1.00	0.979	1.00	1.00	1.00	3.88	407.5	2,846.0	0.0	0.00	0.0	0.0
+D+0.750Lr+0.750L	Length = 12.50 ft	1	0.333	0.242	1.25	1.00	1.00	1.00	0.979	1.00	1.00	1.00	9.04	948.4	2,846.0	0.0	0.00	0.0	0.0
+D+0.750L	Length = 12.50 ft	1				1.00	1.00	1.00	0.979	1.00	1.00	1.00			0.0	0.0	0.00	0.0	0.0

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

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DESCRIPTION: UF-07

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F _b	V	fv	F _v
Length = 12.50 ft	1	0.342	0.249	1.15	1.00	1.00	1.00	0.979	1.00	1.00	1.00	8.54	896.4	2,618.3	2.90	88.7	356.5	
+0.60D					1.00	1.00	1.00	0.979	1.00	1.00	1.00			0.0	0.00	0.0	0.0	
Length = 12.50 ft	1	0.056	0.041	1.60	1.00	1.00	1.00	0.979	1.00	1.00	1.00	1.93	202.9	3,642.8	0.67	20.4	496.0	

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.1880	5.657		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	3.662	1.402
Max Upward from Load Combinations	3.662	1.402
Max Upward from Load Cases	2.445	1.000
D Only	1.217	0.403
+D+L	3.662	1.402
+D+Lr	1.437	0.472
+D+0.750Lr+0.750L	3.216	1.205
+D+0.750L	3.051	1.152
+0.60D	0.730	0.242
Lr Only	0.220	0.070
L Only	2.445	1.000

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: UF-08

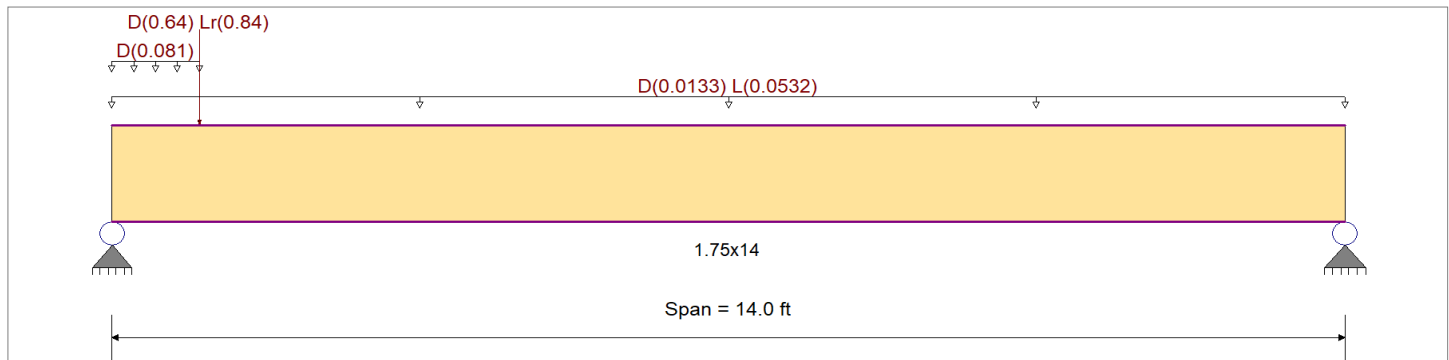
CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,325.0 psi	E : Modulus of Elasticity
Load Combination : IBC 2018	Fb -	2,325.0 psi	Ebend- xx
	Fc - Prll	2,050.0 psi	Eminbend - xx
Wood Species : iLevel Truss Joist	Fc - Perp	800.0 psi	
Wood Grade : TimberStrand LSL 1.55E	Fv	310.0 psi	
	Ft	1,070.0 psi	Density
			45.010pcf

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



Applied Loads

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

Beam self weight NOT internally calculated and added
 Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 1.330 ft, (FLR)
 Uniform Load : D = 0.010 ksf, Extent = 0.0 --> 1.0 ft, Tributary Width = 8.10 ft, (WALL)
 Point Load : D = 0.640, Lr = 0.840 k @ 1.0 ft, (R-04)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.182	1	Maximum Shear Stress Ratio	=	0.087	: 1
Section used for this span		1.75x14		Section used for this span		1.75x14	
fb: Actual	=	417.15psi		fv: Actual	=	26.90 psi	
F'b	=	2,292.26psi		F'v	=	310.00 psi	
Load Combination		+D+L		Load Combination		+D+L	
Location of maximum on span	=	6.285ft		Location of maximum on span	=	12.876 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.075 in	Ratio =	2252	>=360	Span: 1 : L Only	
Max Upward Transient Deflection		0 in	Ratio =	0	<360	n/a	
Max Downward Total Deflection		0.120 in	Ratio =	1402	>=240	Span: 1 : +D+0.750Lr+0.750L	
Max Upward Total Deflection		0 in	Ratio =	0	<240	n/a	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v		
D Only	Length = 14.0 ft	1	0.077	0.028	0.90	1.00	1.00	1.00	0.986	1.00	1.00	1.00	0.75	158.5	2,063.0	0.00	0.00	0.0	0.0	279.0
+D+L	Length = 14.0 ft	1	0.182	0.087	1.00	1.00	1.00	1.00	0.986	1.00	1.00	1.00	1.99	417.1	2,292.3	0.00	0.00	0.0	0.0	310.0
+D+Lr	Length = 14.0 ft	1	0.110	0.030	1.25	1.00	1.00	1.00	0.986	1.00	1.00	1.00	1.50	314.4	2,865.3	0.00	0.00	0.0	0.0	387.5
+D+0.750Lr+0.750L	Length = 14.0 ft	1	0.150	0.064	1.25	1.00	1.00	1.00	0.986	1.00	1.00	1.00	2.04	428.4	2,865.3	0.00	0.00	0.0	0.0	387.5
+D+0.750L						1.00	1.00	1.00	0.986	1.00	1.00	1.00			0.0	0.00	0.00	0.0	0.0	

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

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DESCRIPTION: UF-08

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
+0.60D	Length = 14.0 ft	1	0.133	0.062	1.15	1.00	1.00	1.00	0.986	1.00	1.00	1.00	1.67	349.7	2,636.1	0.36	22.1	356.5
															0.0	0.00	0.0	0.0
	Length = 14.0 ft	1	0.026	0.009	1.60	1.00	1.00	1.00	0.986	1.00	1.00	1.00	0.45	95.1	3,667.6	0.08	4.7	496.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750Lr+0.750L	1	0.1198	6.642		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.630	0.514
Max Upward from Load Combinations	1.630	0.514
Max Upward from Load Cases	0.780	0.372
D Only	0.765	0.142
+D+L	1.138	0.514
+D+Lr	1.545	0.202
+D+0.750Lr+0.750L	1.630	0.466
+D+0.750L	1.045	0.421
+0.60D	0.459	0.085
Lr Only	0.780	0.060
L Only	0.372	0.372

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

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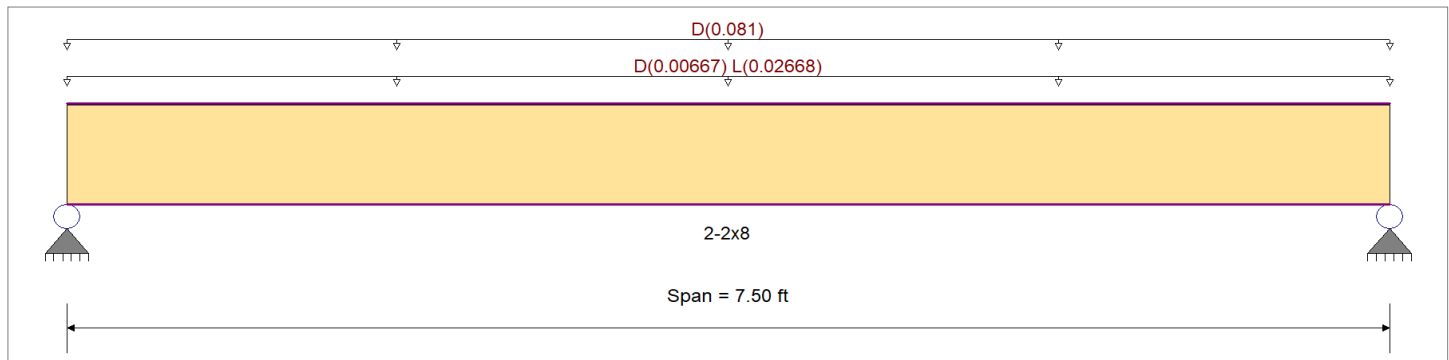
DESCRIPTION: UF-10

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	900 psi	<i>E : Modulus of Elasticity</i>	
Load Combination : IBC 2018	Fb -	900 psi	Ebend- xx	1600ksi
	Fc - Prll	1350 psi	Eminbend - xx	580ksi
Wood Species : Douglas Fir-Larch	Fc - Perp	625 psi		
Wood Grade : No.2	Fv	180 psi		
	Ft	575 psi	Density	31.21 pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

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

Beam self weight NOT internally calculated and added
 Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 0.6670 ft, (FLR)
 Uniform Load : D = 0.010 ksf, Tributary Width = 8.10 ft, (WALL)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.340 < 1	Maximum Shear Stress Ratio	=	0.138 < 1
Section used for this span		2-2x8	Section used for this span		2-2x8
fb: Actual	=	367.12psi	fv: Actual	=	24.82 psi
F'b	=	1,080.00psi	F'v	=	180.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	3.750ft	Location of maximum on span	=	6.898 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.013 in	Ratio = 7180	>=360	Span: 1 : L Only	
Max Upward Transient Deflection	0 in	Ratio = 0	<360	n/a	
Max Downward Total Deflection	0.054 in	Ratio = 1675	>=240	Span: 1 : +D+L	
Max Upward Total Deflection	0 in	Ratio = 0	<240	n/a	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v		
D Only	Length = 7.50 ft	1	0.290	0.117	0.90	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.62	281.5	972.0	0.00	0.00	0.0	0.0	162.0
+D+L	Length = 7.50 ft	1	0.340	0.138	1.00	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.80	367.1	1,080.0	0.00	0.00	0.0	0.0	180.0
+D+0.750L	Length = 7.50 ft	1	0.256	0.104	1.25	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.76	345.7	1,350.0	0.00	0.00	0.0	0.0	225.0
+0.60D	Length = 7.50 ft	1	0.098	0.040	1.60	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.37	168.9	1,728.0	0.00	0.00	0.0	0.0	288.0

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

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DESCRIPTION: UF-10

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0537	3.777		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.429	0.429
Max Upward from Load Combinations	0.429	0.429
Max Upward from Load Cases	0.329	0.329
D Only	0.329	0.329
+D+L	0.429	0.429
+D+0.750L	0.404	0.404
+0.60D	0.197	0.197
L Only	0.100	0.100

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

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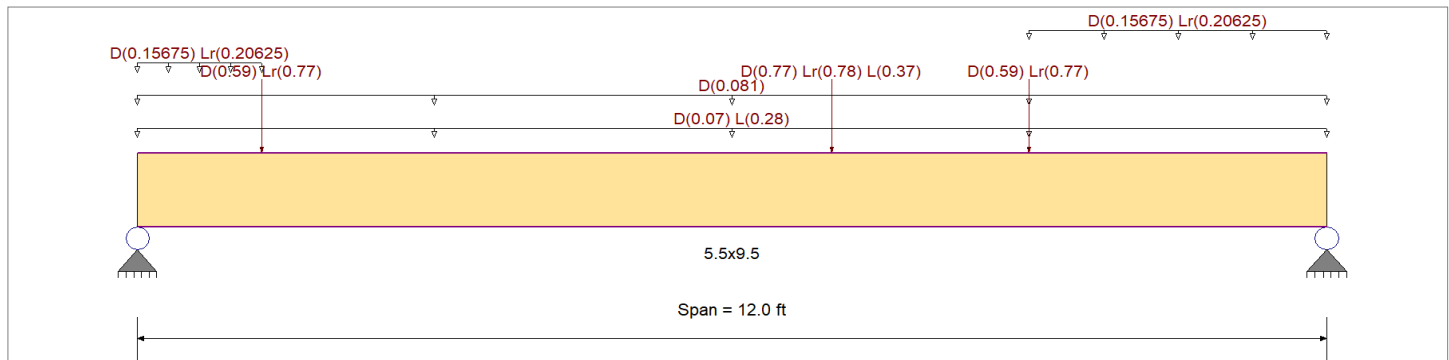
DESCRIPTION: UF-11

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,400.0 psi	E : Modulus of Elasticity	
Load Combination : IBC 2018	Fb -	1,850.0 psi	Ebend- xx	1,800.0ksi
Wood Species : DF/DF	Fc - Prll	1,650.0 psi	Eminbend - xx	950.0ksi
Wood Grade : 24F-V4	Fc - Perp	650.0 psi	Ebend- yy	1,600.0ksi
	Fv	265.0 psi	Eminbend - yy	850.0ksi
	Ft	1,100.0 psi	Density	31.210pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

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

Beam self weight NOT internally calculated and added

- Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 7.0 ft, (FLR)
- Uniform Load : D = 0.010 ksf, Tributary Width = 8.10 ft, (WALL)
- Uniform Load : D = 0.0190, Lr = 0.0250 ksf, Extent = 0.0 --> 1.250 ft, Tributary Width = 8.250 ft, (RF)
- Uniform Load : D = 0.0190, Lr = 0.0250 ksf, Extent = 9.0 --> 12.0 ft, Tributary Width = 8.250 ft, (RF)
- Point Load : D = 0.590, Lr = 0.770 k @ 1.250 ft, (R-13)
- Point Load : D = 0.590, Lr = 0.770 k @ 9.0 ft, (R-13)
- Point Load : D = 0.770, Lr = 0.780, L = 0.370 k @ 7.0 ft, (UF-08)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.765 : 1	Maximum Shear Stress Ratio	=	0.402 : 1
Section used for this span		5.5x9.5	Section used for this span		5.5x9.5
fb: Actual	=	1,836.79psi	fv: Actual	=	106.60 psi
F'b	=	2,400.00psi	F'v	=	265.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	6.964ft	Location of maximum on span	=	11.212 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.217 in Ratio = 662 >=360	Span: 1 : L Only		
Max Upward Transient Deflection		0 in Ratio = 0 <360	n/a		
Max Downward Total Deflection		0.517 in Ratio = 278 >=240	Span: 1 : +D+0.750Lr+0.750L		
Max Upward Total Deflection		0 in Ratio = 0 <240	n/a		

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values			
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only																0.0	0.00	0.0	0.0
Length = 12.0 ft	1		0.449	0.245	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	6.69	970.0	2,160.0	2.04	58.5	238.5	
+D+L																0.0	0.00	0.0	0.0
Length = 12.0 ft	1		0.765	0.402	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	12.66	1,836.8	2,400.0	3.71	106.6	265.0	
+D+Lr																0.0	0.00	0.0	0.0

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: UF-11

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
Length = 12.0 ft	1	0.547	0.307	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	11.32	1,641.6	3,000.0	3.54	101.7	331.3
+D+0.750Lr+0.750L							1.00	1.00	1.00	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.708	0.383	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	14.64	2,123.8	3,000.0	4.42	127.0	331.3
+D+0.750L							1.00	1.00	1.00	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.587	0.310	1.15	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	11.17	1,620.1	2,760.0	3.29	94.6	304.8
+0.60D							1.00	1.00	1.00	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.152	0.083	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	4.01	582.0	3,840.0	1.22	35.1	424.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750Lr+0.750L	1	0.5165	6.175		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	4.670	4.953
Max Upward from Load Combinations	4.670	4.953
Max Upward from Load Cases	2.147	2.281
D Only	2.147	2.281
+D+L	3.982	4.177
+D+Lr	3.676	3.948
+D+0.750Lr+0.750L	4.670	4.953
+D+0.750L	3.523	3.703
+0.60D	1.288	1.368
Lr Only	1.529	1.668
L Only	1.834	1.896

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC#: KW-06013781, Build:20.23.2.14

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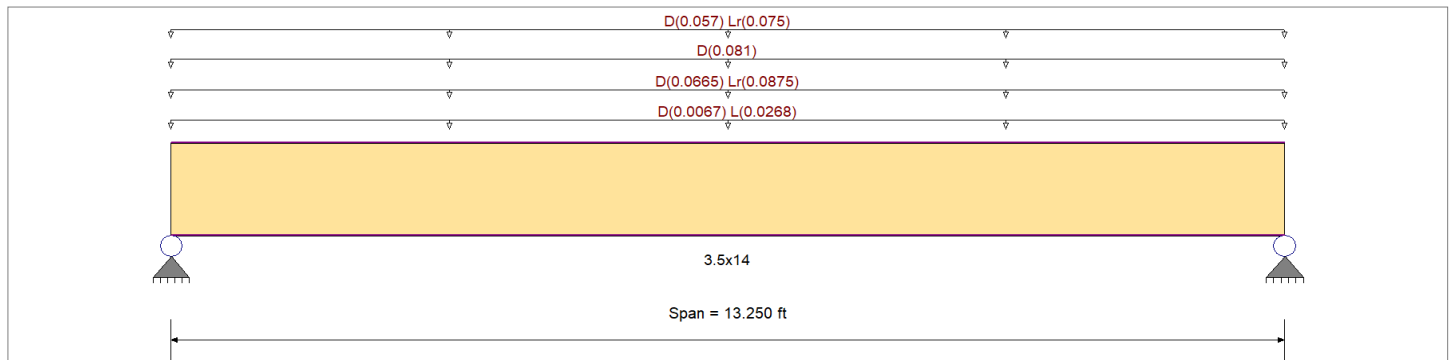
DESCRIPTION: UF-12

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2325 psi	<i>E : Modulus of Elasticity</i>	
Load Combination : IBC 2018	Fb -	2325 psi	Ebend- xx	1550 ksi
	Fc - Prll	2050 psi	Eminbend - xx	787.815 ksi
Wood Species : iLevel Truss Joist	Fc - Perp	800 psi		
Wood Grade : TimberStrand LSL 1.55E	Fv	310 psi		
	Ft	1070 psi	Density	45.01 pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

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

- Beam self weight NOT internally calculated and added
- Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 0.670 ft, (FLR)
- Uniform Load : D = 0.0190, Lr = 0.0250 ksf, Tributary Width = 3.50 ft, (LO RF)
- Uniform Load : D = 0.010 ksf, Tributary Width = 8.10 ft, (WALL)
- Uniform Load : D = 0.0190, Lr = 0.0250 ksf, Tributary Width = 3.0 ft, (RF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.300 : 1	Maximum Shear Stress Ratio	=	0.161 : 1
Section used for this span	=	3.5x14	Section used for this span	=	3.5x14
fb: Actual	=	860.74 psi	fv: Actual	=	62.51 psi
F'b	=	2,865.32 psi	F'v	=	387.50 psi
Load Combination	=	+D+Lr	Load Combination	=	+D+Lr
Location of maximum on span	=	6.625 ft	Location of maximum on span	=	12.089 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.091 in	Ratio = 1740	>=360	Span: 1 : Lr Only	
Max Upward Transient Deflection	0 in	Ratio = 0	<360	n/a	
Max Downward Total Deflection	0.210 in	Ratio = 756	>=240	Span: 1 : +D+Lr	
Max Upward Total Deflection	0 in	Ratio = 0	<240	n/a	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v		
D Only																				
Length = 13.250 ft	1	0.236	0.127	0.90	1.00	1.00	1.00	0.986	1.00	1.00	1.00	4.63	486.5	2,063.0	0.00	0.00	0.00	1.15	35.3	279.0
+D+L																				
Length = 13.250 ft	1	0.239	0.128	1.00	1.00	1.00	1.00	0.986	1.00	1.00	1.00	5.22	548.2	2,292.3	0.00	0.00	0.00	1.30	39.8	310.0
+D+Lr																				
Length = 13.250 ft	1	0.300	0.161	1.25	1.00	1.00	1.00	0.986	1.00	1.00	1.00	8.20	860.7	2,865.3	2.04	62.5	387.5	2.04	62.5	387.5
+D+0.750Lr+0.750L																				
Length = 13.250 ft	1	0.284	0.152	1.25	1.00	1.00	1.00	0.986	1.00	1.00	1.00	7.75	813.5	2,865.3	1.93	59.1	387.5	1.93	59.1	387.5

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: UF-12

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F _b	V	fv	F _v
+D+0.750L						1.00	1.00	1.00	0.986	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 13.250 ft	1		0.202	0.109	1.15	1.00	1.00	1.00	0.986	1.00	1.00	1.00	5.08	532.8	2,636.1	1.26	38.7	356.5
+0.60D						1.00	1.00	1.00	0.986	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 13.250 ft	1		0.080	0.043	1.60	1.00	1.00	1.00	0.986	1.00	1.00	1.00	2.78	291.9	3,667.6	0.69	21.2	496.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.2101	6.673		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	2.476	2.476
Max Upward from Load Combinations	2.476	2.476
Max Upward from Load Cases	1.399	1.399
D Only	1.399	1.399
+D+L	1.577	1.577
+D+Lr	2.476	2.476
+D+0.750Lr+0.750L	2.340	2.340
+D+0.750L	1.532	1.532
+0.60D	0.840	0.840
Lr Only	1.077	1.077
L Only	0.178	0.178

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

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DESCRIPTION: UF-13

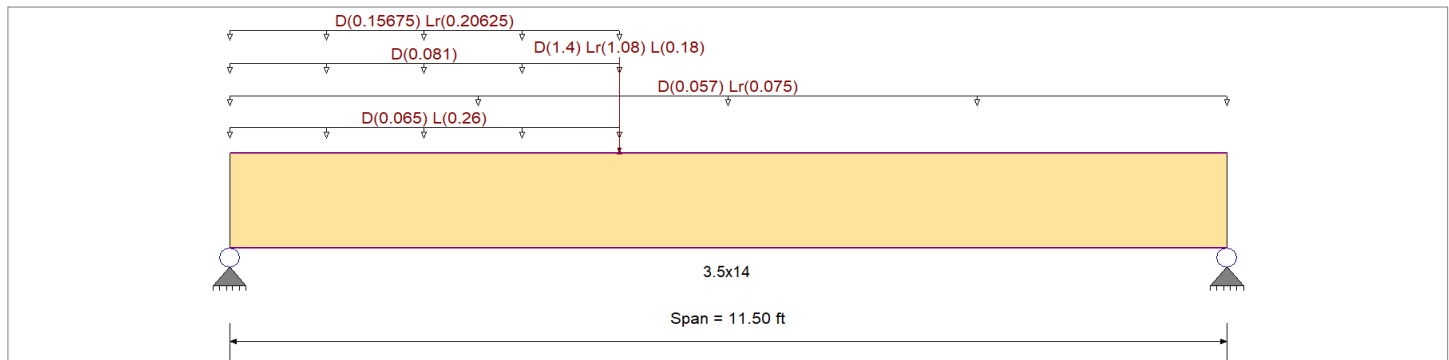
CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,325.0 psi	E : Modulus of Elasticity
Load Combination : IBC 2018	Fb -	2,325.0 psi	Ebend- xx
	Fc - Prll	2,050.0 psi	Eminbend - xx
Wood Species : iLevel Truss Joist	Fc - Perp	800.0 psi	
Wood Grade : TimberStrand LSL 1.55E	Fv	310.0 psi	
	Ft	1,070.0 psi	Density
			45.010pcf

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



Applied Loads

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

Beam self weight NOT internally calculated and added
 Load for Span Number 1

- Uniform Load : D = 0.010, L = 0.040 ksf, Extent = 0.0 -->> 4.50 ft, Tributary Width = 6.50 ft, (FLR)
- Uniform Load : D = 0.0190, Lr = 0.0250 ksf, Tributary Width = 3.0 ft, (LO RF)
- Uniform Load : D = 0.010 ksf, Extent = 0.0 -->> 4.50 ft, Tributary Width = 8.10 ft, (WALL)
- Uniform Load : D = 0.0190, Lr = 0.0250 ksf, Extent = 0.0 -->> 4.50 ft, Tributary Width = 8.250 ft, (RF)
- Point Load : D = 1.40, Lr = 1.080, L = 0.180 k @ 4.50 ft, (UF-12)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.448 < 1	Maximum Shear Stress Ratio	=	0.282 < 1
Section used for this span		3.5x14	Section used for this span		3.5x14
fb: Actual	=	1,282.44psi	fv: Actual	=	109.36 psi
F'b	=	2,865.32psi	F'v	=	387.50 psi
Load Combination		+D+0.750Lr+0.750L	Load Combination		+D+0.750Lr+0.750L
Location of maximum on span	=	4.491 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.091 in	Ratio =	1519	>=360
Max Upward Transient Deflection		0 in	Ratio =	0	<360
Max Downward Total Deflection		0.203 in	Ratio =	678	>=240
Max Upward Total Deflection		0 in	Ratio =	0	<240

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values				
			M	V	CD	CM	C _t	CL _x	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only	Length = 11.50 ft	1	0.335	0.205	0.90	1.00	1.00	1.00	0.986	1.00	1.00	1.00	6.59	691.9	2,063.0	0.0	0.00	0.0	0.0
+D+L	Length = 11.50 ft	1	0.398	0.259	1.00	1.00	1.00	1.00	0.986	1.00	1.00	1.00	8.69	912.0	2,292.3	0.0	0.00	0.0	0.0
+D+Lr	Length = 11.50 ft	1	0.439	0.267	1.25	1.00	1.00	1.00	0.986	1.00	1.00	1.00	12.00	1,259.2	2,865.3	0.0	0.00	0.0	0.0

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

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DESCRIPTION: UF-13

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F _b	V	fv	F _v
+D+0.750Lr+0.750L	Length = 11.50 ft	1	0.448	0.282	1.25	1.00	1.00	1.00	0.986	1.00	1.00	1.00	12.22	1,282.4	2,865.3	3.57	109.4	387.5
+D+0.750L	Length = 11.50 ft	1	0.325	0.209	1.15	1.00	1.00	1.00	0.986	1.00	1.00	1.00	8.16	856.9	2,636.1	2.44	74.5	356.5
+0.60D	Length = 11.50 ft	1	0.113	0.069	1.60	1.00	1.00	1.00	0.986	1.00	1.00	1.00	3.96	415.1	3,667.6	1.12	34.3	496.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750Lr+0.750L	1	0.2033	5.372		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	4.440	2.178
Max Upward from Load Combinations	4.440	2.178
Max Upward from Load Cases	2.276	1.142
D Only	2.276	1.142
+D+L	3.326	1.441
+D+Lr	4.111	2.178
+D+0.750Lr+0.750L	4.440	2.143
+D+0.750L	3.064	1.367
+0.60D	1.365	0.685
Lr Only	1.835	1.035
L Only	1.051	0.299

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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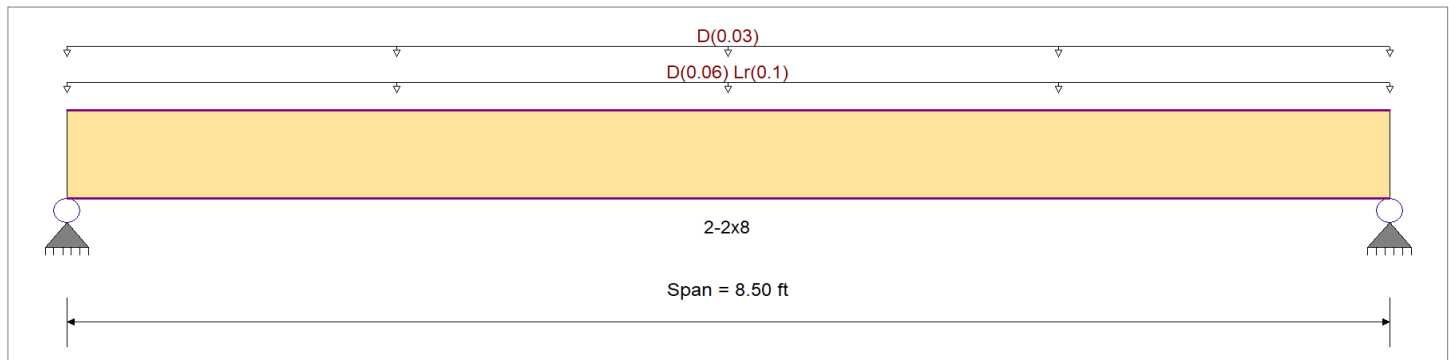
DESCRIPTION: UF-14

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	900.0 psi	E : Modulus of Elasticity	
Load Combination : IBC 2018	Fb -	900.0 psi	Ebend- xx	1,600.0ksi
	Fc - Prll	1,350.0 psi	Eminbend - xx	580.0ksi
Wood Species : Douglas Fir-Larch	Fc - Perp	625.0 psi		
Wood Grade : No.2	Fv	180.0 psi		
	Ft	575.0 psi	Density	31.210pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

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

Beam self weight NOT internally calculated and added

Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Tributary Width = 4.0 ft, (LO RF)

Uniform Load : D = 0.010 ksf, Tributary Width = 3.0 ft, (PARAPET)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.580 : 1	Maximum Shear Stress Ratio	=	0.213 : 1
Section used for this span		2-2x8	Section used for this span		2-2x8
fb: Actual	=	783.50psi	fv: Actual	=	47.97 psi
F'b	=	1,350.00psi	F'v	=	225.00 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	4.250ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.078 in	Ratio = 1316 >=360	Span: 1 : Lr Only		
Max Upward Transient Deflection	0 in	Ratio = 0 <360	n/a		
Max Downward Total Deflection	0.147 in	Ratio = 692 >=240	Span: 1 : +D+Lr		
Max Upward Total Deflection	0 in	Ratio = 0 <240	n/a		

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v		
D Only	Length = 8.50 ft	1	0.382	0.140	0.90	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.81	371.1	972.0	0.00	0.00	0.0	0.0	0.0
+D+Lr	Length = 8.50 ft	1	0.580	0.213	1.25	1.00	1.00	1.00	1.200	1.00	1.00	1.00	1.72	783.5	1,350.0	0.70	48.0	225.0	0.0	0.0
+D+0.750Lr	Length = 8.50 ft	1	0.504	0.185	1.25	1.00	1.00	1.00	1.200	1.00	1.00	1.00	1.49	680.4	1,350.0	0.60	41.7	225.0	0.0	0.0
+0.60D	Length = 8.50 ft	1	0.129	0.047	1.60	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.49	222.7	1,728.0	0.20	13.6	288.0	0.0	0.0

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

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DESCRIPTION: UF-14

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.1473	4.281		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.808	0.808
Max Upward from Load Combinations	0.808	0.808
Max Upward from Load Cases	0.425	0.425
D Only	0.383	0.383
+D+Lr	0.808	0.808
+D+0.750Lr	0.701	0.701
+0.60D	0.230	0.230
Lr Only	0.425	0.425

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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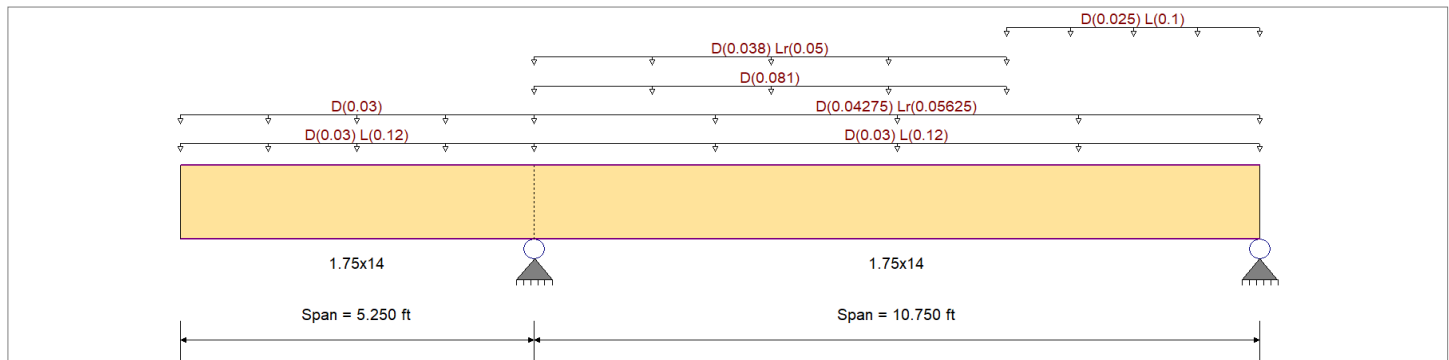
DESCRIPTION: UF-15

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,325.0 psi	E : Modulus of Elasticity
Load Combination : IBC 2018	Fb -	2,325.0 psi	Ebend- xx
	Fc - Prll	2,050.0 psi	Eminbend - xx
Wood Species : iLevel Truss Joist	Fc - Perp	800.0 psi	
Wood Grade : TimberStrand LSL 1.55E	Fv	310.0 psi	Density
	Ft	1,070.0 psi	45.010pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling			



Applied Loads

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

Beam self weight NOT internally calculated and added
 Load for Span Number 1

Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 3.0 ft, (FLR)
 Uniform Load : D = 0.010 ksf, Tributary Width = 3.0 ft, (RAIL)

Load for Span Number 2

Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 3.0 ft, (FLR)
 Uniform Load : D = 0.0190, Lr = 0.0250 ksf, Tributary Width = 2.250 ft, (LO RF)
 Uniform Load : D = 0.010 ksf, Extent = 0.0 -->> 7.0 ft, Tributary Width = 8.10 ft, (WALL)
 Uniform Load : D = 0.0190, Lr = 0.0250 ksf, Extent = 0.0 -->> 7.0 ft, Tributary Width = 2.0 ft, (RF)
 Uniform Load : D = 0.010, L = 0.040 ksf, Extent = 7.0 -->> 10.750 ft, Tributary Width = 2.50 ft, (FLR)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.309 : 1	Maximum Shear Stress Ratio	=	0.307 : 1
Section used for this span	=	1.75x14	Section used for this span	=	1.75x14
fb: Actual	=	707.92psi	fv: Actual	=	95.18 psi
F'b	=	2,292.26psi	F'v	=	310.00 psi
Load Combination	=	+D+L	Load Combination	=	+D+L
Location of maximum on span	=	6.126ft	Location of maximum on span	=	5.250 ft
Span # where maximum occurs	=	Span # 2	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.045 in	Ratio = 2841 >=360	Span: 2 : Lr Only		
Max Upward Transient Deflection	-0.072 in	Ratio = 1754 >=360	Span: 1 : Lr Only		
Max Downward Total Deflection	0.127 in	Ratio = 1013 >=240	Span: 2 : +D+0.750Lr+0.750L		
Max Upward Total Deflection	-0.141 in	Ratio = 890 >=240	Span: 1 : +D+Lr		

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values			
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only																0.0	0.00	0.0	0.0
	Length = 5.250 ft	1	0.084	0.182	0.90	1.00	1.00	1.00	0.986	1.00	1.00	1.00	0.83	173.6	2,063.0	0.83	50.7	279.0	
	Length = 10.750 ft	2	0.206	0.182	0.90	1.00	1.00	1.00	0.986	1.00	1.00	1.00	2.03	425.4	2,063.0	0.83	50.7	279.0	

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: UF-15

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values			
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
+D+L						1.00	1.00	1.00	0.986	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 5.250 ft	1		0.227	0.307	1.00	1.00	1.00	1.00	0.986	1.00	1.00	1.00	2.48	520.7	2,292.3	1.55	95.2	310.0
Length = 10.750 ft	2		0.309	0.307	1.00	1.00	1.00	1.00	0.986	1.00	1.00	1.00	3.37	707.9	2,292.3	1.55	95.2	310.0
+D+Lr						1.00	1.00	1.00	0.986	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 5.250 ft	1		0.061	0.197	1.25	1.00	1.00	1.00	0.986	1.00	1.00	1.00	0.83	173.6	2,865.3	1.24	76.2	387.5
Length = 10.750 ft	2		0.248	0.197	1.25	1.00	1.00	1.00	0.986	1.00	1.00	1.00	3.39	710.6	2,865.3	1.24	76.2	387.5
+D+0.750Lr+0.750L						1.00	1.00	1.00	0.986	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 5.250 ft	1		0.151	0.266	1.25	1.00	1.00	1.00	0.986	1.00	1.00	1.00	2.07	433.9	2,865.3	1.69	103.2	387.5
Length = 10.750 ft	2		0.295	0.266	1.25	1.00	1.00	1.00	0.986	1.00	1.00	1.00	4.02	844.3	2,865.3	1.69	103.2	387.5
+D+0.750L						1.00	1.00	1.00	0.986	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 5.250 ft	1		0.165	0.236	1.15	1.00	1.00	1.00	0.986	1.00	1.00	1.00	2.07	433.9	2,636.1	1.37	84.0	356.5
Length = 10.750 ft	2		0.241	0.236	1.15	1.00	1.00	1.00	0.986	1.00	1.00	1.00	3.03	635.4	2,636.1	1.37	84.0	356.5
+0.60D						1.00	1.00	1.00	0.986	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 5.250 ft	1		0.028	0.061	1.60	1.00	1.00	1.00	0.986	1.00	1.00	1.00	0.50	104.1	3,667.6	0.50	30.4	496.0
Length = 10.750 ft	2		0.070	0.061	1.60	1.00	1.00	1.00	0.986	1.00	1.00	1.00	1.22	255.2	3,667.6	0.50	30.4	496.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+Lr	-0.1414	0.000
+D+0.750Lr+0.750L	2	0.1273	5.585		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions		2.886	1.576
Max Upward from Load Combinations		2.886	1.576
Max Upward from Load Cases		1.494	0.801
D Only		1.361	0.663
+D+L		2.855	1.463
+D+Lr		1.899	1.079
+D+0.750Lr+0.750L		2.886	1.576
+D+0.750L		2.482	1.263
+0.60D		0.817	0.398
Lr Only		0.538	0.416
L Only		1.494	0.801

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: UF-16

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F _b	V	f _v	F _v
Length = 12.0 ft	1	0.438	0.256	1.15	1.00	1.00	1.00	0.986	1.00	1.00	1.00	5.50	1,155.1	2,636.1	1.49	91.4	356.5	
+0.60D														0.0	0.00	0.0	0.0	
Length = 12.0 ft	1	0.112	0.067	1.60	1.00	1.00	1.00	0.986	1.00	1.00	1.00	1.96	411.6	3,667.6	0.54	33.0	496.0	

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.2378	5.737		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.858	1.372
Max Upward from Load Combinations	1.858	1.372
Max Upward from Load Cases	1.006	0.786
D Only	1.006	0.786
+D+L	1.858	1.372
+D+Lr	1.286	0.926
+D+0.750Lr+0.750L	1.855	1.330
+D+0.750L	1.645	1.225
+0.60D	0.603	0.471
Lr Only	0.280	0.140
L Only	0.853	0.586

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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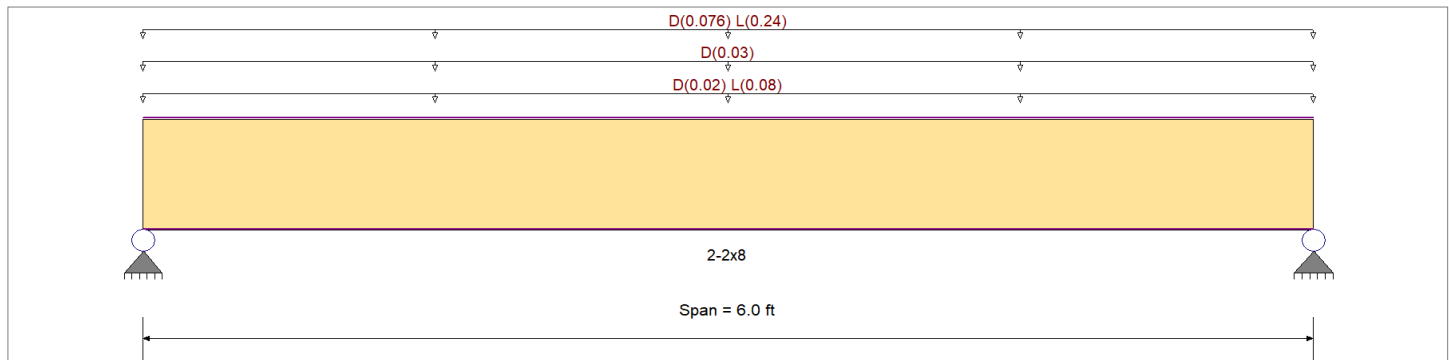
DESCRIPTION: UF-17

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	900 psi	<i>E : Modulus of Elasticity</i>	
Load Combination : IBC 2018	Fb -	900 psi	Ebend- xx	1600ksi
	Fc - Prll	1350 psi	Eminbend - xx	580ksi
Wood Species : Douglas Fir-Larch	Fc - Perp	625 psi		
Wood Grade : No.2	Fv	180 psi		
	Ft	575 psi	Density	31.21 pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

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

Beam self weight NOT internally calculated and added

Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 2.0 ft, (FLR)

Uniform Load : D = 0.010 ksf, Tributary Width = 3.0 ft, (RAIL)

Uniform Load : D = 0.0190, L = 0.060 ksf, Tributary Width = 4.0 ft, (RF DECK)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.849	1	Maximum Shear Stress Ratio	=	0.412	: 1
Section used for this span		2-2x8		Section used for this span		2-2x8	
fb: Actual	=	916.39psi		fv: Actual	=	74.09 psi	
F'b	=	1,080.00psi		F'v	=	180.00 psi	
Load Combination		+D+L		Load Combination		+D+L	
Location of maximum on span	=	3.000ft		Location of maximum on span	=	0.000 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.062 in	Ratio =	1169	>=360	Span: 1 : L Only	
Max Upward Transient Deflection		0 in	Ratio =	0	<360	n/a	
Max Downward Total Deflection		0.086 in	Ratio =	838	>=240	Span: 1 : +D+L	
Max Upward Total Deflection		0 in	Ratio =	0	<240	n/a	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v		
D Only	Length = 6.0 ft	1	0.266	0.129	0.90	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.57	258.9	972.0	0.00	0.00	0.0	0.0	0.0
+D+L	Length = 6.0 ft	1	0.849	0.412	1.00	1.00	1.00	1.00	1.200	1.00	1.00	1.00	2.01	916.4	1,080.0	1.07	74.1	180.0	0.0	0.0
+D+0.750L	Length = 6.0 ft	1	0.557	0.270	1.25	1.00	1.00	1.00	1.200	1.00	1.00	1.00	1.65	752.0	1,350.0	0.88	60.8	225.0	0.0	0.0
+0.60D	Length = 6.0 ft	1	0.090	0.044	1.60	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.34	155.3	1,728.0	0.18	12.6	288.0	0.0	0.0

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: UF-17

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0858	3.022		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.338	1.338
Max Upward from Load Combinations	1.338	1.338
Max Upward from Load Cases	0.960	0.960
D Only	0.378	0.378
+D+L	1.338	1.338
+D+0.750L	1.098	1.098
+0.60D	0.227	0.227
L Only	0.960	0.960

Steel Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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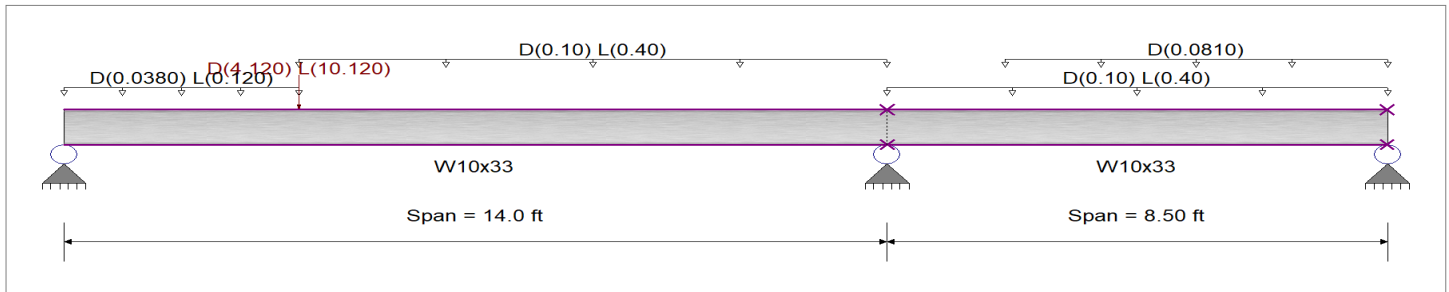
DESCRIPTION: UFS-01

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Strength Design
 Beam Bracing : Beam is Fully Braced against lateral-torsional buckling
 Bending Axis : Major Axis Bending
 Fy : Steel Yield : 36.0 ksi
 E: Modulus : 29,000.0 ksi



Applied Loads

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

Beam self weight NOT internally calculated and added

Load for Span Number 1

Uniform Load : D = 0.0190, L = 0.060 ksf, Extent = 0.0 -->> 4.0 ft, Tributary Width = 2.0 ft, (RF DECK)

Uniform Load : D = 0.010, L = 0.040 ksf, Extent = 4.0 -->> 14.0 ft, Tributary Width = 10.0 ft, (FLR)

Point Load : D = 4.120, L = 10.120 k @ 4.0 ft, (UFS-02)

Load for Span Number 2

Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 10.0 ft, (FLR)

Uniform Load : D = 0.010 ksf, Extent = 2.0 -->> 8.50 ft, Tributary Width = 8.10 ft, (WALL)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.595 : 1	Maximum Shear Stress Ratio =	0.264 : 1
Section used for this span	W10x33	Section used for this span	W10x33
Ma : Applied	41.451 k-ft	Va : Applied	10.712 k
Mn / Omega : Allowable	69.701 k-ft	Vn/Omega : Allowable	40.632 k
Load Combination	+D+L	Load Combination	+D+L
Span # where maximum occurs	Span # 1	Location of maximum on span	0.000 ft
		Span # where maximum occurs	Span # 1
Maximum Deflection			
Max Downward Transient Deflection	0.143 in	Ratio = 1,177	>=360
Max Upward Transient Deflection	-0.021 in	Ratio = 4,897	>=360
Max Downward Total Deflection	0.195 in	Ratio = 861	>=240
Max Upward Total Deflection	-0.028 in	Ratio = 3666	>=240
		Span: 2 : L Only	
		Span: 2 : L Only	
		Span: 2 : +D+L	
		Span: 2 : +D+L	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values						Summary of Shear Values			
			M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
D Only														
Dsgn. L =	14.00 ft	1	0.165	0.073	11.47	-6.65	11.47	116.40	69.70	1.00	1.00	2.95	60.95	40.63
Dsgn. L =	8.50 ft	2	0.095	0.035		-6.65	6.65	116.40	69.70	1.00	1.00	1.41	60.95	40.63
+D+L														
Dsgn. L =	14.00 ft	1	0.595	0.264	41.45	-25.01	41.45	116.40	69.70	1.00	1.00	10.71	60.95	40.63
Dsgn. L =	8.50 ft	2	0.359	0.130		-25.01	25.01	116.40	69.70	1.00	1.00	5.27	60.95	40.63
+D+0.750L														
Dsgn. L =	14.00 ft	1	0.487	0.216	33.96	-20.42	33.96	116.40	69.70	1.00	1.00	8.77	60.95	40.63
Dsgn. L =	8.50 ft	2	0.293	0.106		-20.42	20.42	116.40	69.70	1.00	1.00	4.30	60.95	40.63
+0.60D														

Steel Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: UFS-01

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values					Summary of Shear Values				
			M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega Cb	Rm	Va Max	Vnx/Vnx/Omega		
Dsgn. L =	14.00 ft	1	0.099	0.044	6.88	-3.99	6.88	116.40	69.70	1.00	1.00	1.77	60.95	40.63
Dsgn. L =	8.50 ft	2	0.057	0.021		-3.99	3.99	116.40	69.70	1.00	1.00	0.85	60.95	40.63

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.1951	5.824		0.0000	0.000
	2	0.0000	5.824	+D+L	-0.0278	3.264

Vertical Reactions

Load Combination	Support notation : Far left is #'			Values in KIPS
	Support 1	Support 2	Support 3	
Max Upward from all Load Conditions	10.712	14.429		
Max Upward from Load Combinations	10.712	14.429		
Max Upward from Load Cases	7.757	10.703		
Max Downward from all Load Conditions (Resis				-0.493
Max Downward from Load Combinations (Resi				-0.493
Max Downward from Load Cases (Resisting Up				-0.460
D Only	2.955	3.726		-0.033
+D+L	10.712	14.429		-0.493
+D+0.750L	8.773	11.753		-0.378
+0.60D	1.773	2.236		-0.020
L Only	7.757	10.703		-0.460

Steel Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

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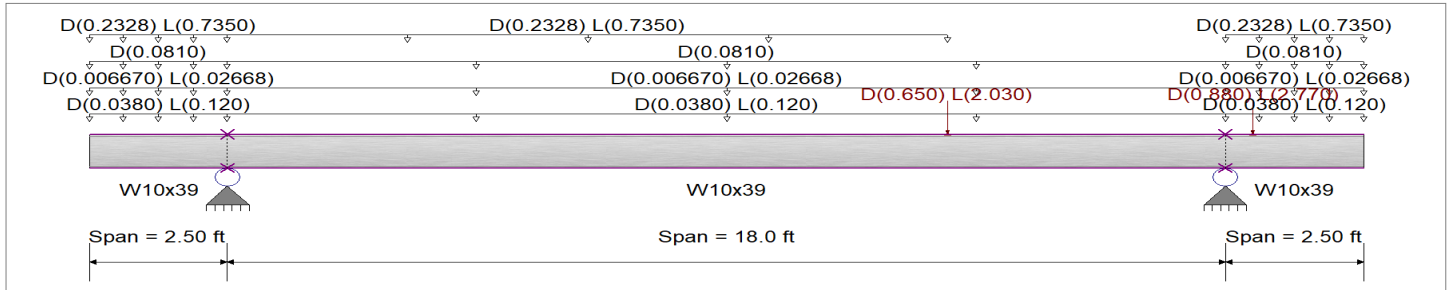
DESCRIPTION: UFS-02

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Strength Design
 Beam Bracing : Beam is Fully Braced against lateral-torsional buckling
 Bending Axis : Major Axis Bending
 Fy : Steel Yield : 36.0 ksi
 E: Modulus : 29,000.0 ksi



Applied Loads

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

Beam self weight NOT internally calculated and added

Load for Span Number 1

Uniform Load : D = 0.0190, L = 0.060 ksf, Tributary Width = 2.0 ft, (RF DECK)

Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 0.6670 ft, (FLR)

Uniform Load : D = 0.010 ksf, Tributary Width = 8.10 ft, (WALL)

Uniform Load : D = 0.0190, L = 0.060 ksf, Tributary Width = 12.250 ft, (RF DECK)

Load for Span Number 2

Uniform Load : D = 0.0190, L = 0.060 ksf, Tributary Width = 2.0 ft, (RF DECK)

Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 0.6670 ft, (FLR)

Uniform Load : D = 0.010 ksf, Tributary Width = 8.10 ft, (WALL)

Uniform Load : D = 0.0190, L = 0.060 ksf, Extent = 0.0 --> 13.0 ft, Tributary Width = 12.250 ft, (RF DECK)

Point Load : D = 0.650, L = 2.030 k @ 13.0 ft, (R-07)

Load for Span Number 3

Uniform Load : D = 0.0190, L = 0.060 ksf, Tributary Width = 2.0 ft, (RF DECK)

Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 0.6670 ft, (FLR)

Uniform Load : D = 0.010 ksf, Tributary Width = 8.10 ft, (WALL)

Uniform Load : D = 0.0190, L = 0.060 ksf, Tributary Width = 12.250 ft, (RF DECK)

Point Load : D = 0.880, L = 2.770 k @ 0.50 ft, (R-07)

Steel Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: UFS-02

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.548 : 1	Maximum Shear Stress Ratio =	0.247 : 1
Section used for this span	W10x39	Section used for this span	W10x39
Ma : Applied	46.088 k-ft	Va : Applied	11.132 k
Mn / Omega : Allowable	84.072 k-ft	Vn/Omega : Allowable	44.997 k
Load Combination	+D+L	Load Combination	+D+L
Span # where maximum occurs	Span # 2	Location of maximum on span	2.500 ft
		Span # where maximum occurs	Span # 1
Maximum Deflection			
Max Downward Transient Deflection	0.309 in	Ratio =	698 >=360
Max Upward Transient Deflection	-0.132 in	Ratio =	454 >=360
Max Downward Total Deflection	0.436 in	Ratio =	496 >=240
Max Upward Total Deflection	-0.186 in	Ratio =	323 >=240

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values						Summary of Shear Values			
			M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
D Only														
Dsgn. L =	2.50 ft	1	0.013	0.072		-1.12	1.12	140.40	84.07	1.00	1.00	3.22	67.50	45.00
Dsgn. L =	18.00 ft	2	0.159	0.072	13.35	-1.56	13.35	140.40	84.07	1.00	1.00	3.22	67.50	45.00
Dsgn. L =	2.50 ft	3	0.019	0.039		-1.56	1.56	140.40	84.07	1.00	1.00	1.78	67.50	45.00
+D+L														
Dsgn. L =	2.50 ft	1	0.046	0.247		-3.88	3.88	140.40	84.07	1.00	1.00	11.13	67.50	45.00
Dsgn. L =	18.00 ft	2	0.548	0.247	46.09	-5.70	46.09	140.40	84.07	1.00	1.00	11.13	67.50	45.00
Dsgn. L =	2.50 ft	3	0.068	0.150		-5.70	5.70	140.40	84.07	1.00	1.00	6.75	67.50	45.00
+D+0.750L														
Dsgn. L =	2.50 ft	1	0.038	0.203		-3.19	3.19	140.40	84.07	1.00	1.00	9.15	67.50	45.00
Dsgn. L =	18.00 ft	2	0.451	0.203	37.90	-4.67	37.90	140.40	84.07	1.00	1.00	9.15	67.50	45.00
Dsgn. L =	2.50 ft	3	0.055	0.122		-4.67	4.67	140.40	84.07	1.00	1.00	5.51	67.50	45.00
+0.60D														
Dsgn. L =	2.50 ft	1	0.008	0.043		-0.67	0.67	140.40	84.07	1.00	1.00	1.93	67.50	45.00
Dsgn. L =	18.00 ft	2	0.095	0.043	8.01	-0.94	8.01	140.40	84.07	1.00	1.00	1.93	67.50	45.00
Dsgn. L =	2.50 ft	3	0.011	0.024		-0.94	0.94	140.40	84.07	1.00	1.00	1.07	67.50	45.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+L	-0.1859	0.000
+D+L	2	0.4357	9.000		0.0000	0.000
	3	0.0000	9.000	+D+L	-0.1774	2.500

Vertical Reactions

Load Combination	Support notation : Far left is #'				Values in KIPS
	Support 1	Support 2	Support 3	Support 4	
Max Upward from all Load Conditions		14.232	15.781		
Max Upward from Load Combinations		14.232	15.781		
Max Upward from Load Cases		10.116	11.288		
D Only		4.116	4.494		
+D+L		14.232	15.781		
+D+0.750L		11.703	12.959		
+0.60D		2.470	2.696		
L Only		10.116	11.288		

Steel Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

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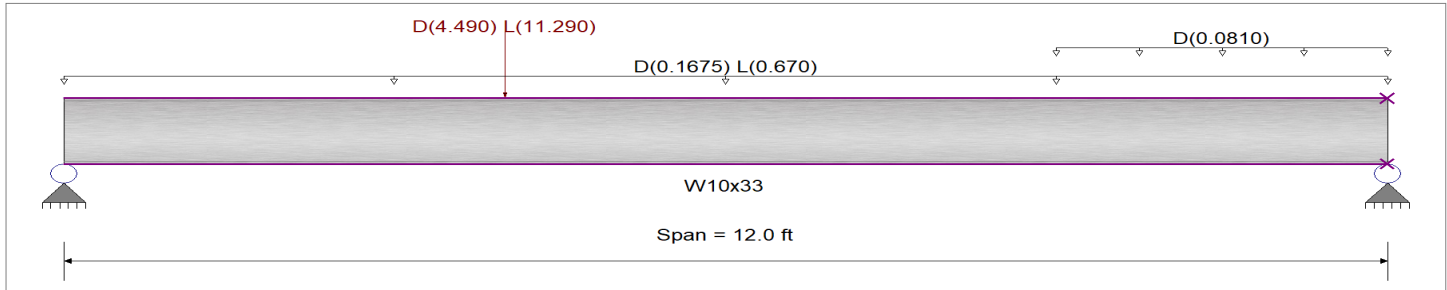
DESCRIPTION: UFS-03

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Strength Design
 Beam Bracing : Beam is Fully Braced against lateral-torsional buckling
 Bending Axis : Major Axis Bending
 Fy : Steel Yield : 36.0 ksi
 E: Modulus : 29,000.0 ksi



Applied Loads

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

Beam self weight NOT internally calculated and added
 Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 16.750 ft, (FLR)

Uniform Load : D = 0.010 ksf, Extent = 9.0 --> 12.0 ft, Tributary Width = 8.10 ft, (WALL)

Point Load : D = 4.490, L = 11.290 k @ 4.0 ft, (UFS-02)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.797 : 1	Maximum Shear Stress Ratio =	0.383 : 1
Section used for this span	W10x33	Section used for this span	W10x33
Ma : Applied	55.561 k-ft	Va : Applied	15.575 k
Mn / Omega : Allowable	69.701 k-ft	Vn/Omega : Allowable	40.632 k
Load Combination	+D+L	Load Combination	+D+L
Span # where maximum occurs	Span # 1	Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Maximum Deflection			
Max Downward Transient Deflection	0.185 in Ratio = 776 >=360		
Max Upward Transient Deflection	0.000 in Ratio = 0 <360	Span: 1 : L Only	
Max Downward Total Deflection	0.251 in Ratio = 574 >=240	Span: 1 : +D+L	
Max Upward Total Deflection	0.000 in Ratio = 0 <240.0		

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values					Summary of Shear Values				
			M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
D Only														
Dsgn. L = 12.00 ft		1	0.212	0.099	14.76		14.76	116.40	69.70	1.00	1.00	4.03	60.95	40.63
+D+L														
Dsgn. L = 12.00 ft		1	0.797	0.383	55.56		55.56	116.40	69.70	1.00	1.00	15.58	60.95	40.63
+D+0.750L														
Dsgn. L = 12.00 ft		1	0.651	0.312	45.36		45.36	116.40	69.70	1.00	1.00	12.69	60.95	40.63
+0.60D														
Dsgn. L = 12.00 ft		1	0.127	0.059	8.86		8.86	116.40	69.70	1.00	1.00	2.42	60.95	40.63

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.2508	5.657		0.0000	0.000

Vertical Reactions

Support notation : Far left is #'

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	15.575	10.498
Max Upward from Load Combinations	15.575	10.498

Steel Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

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DESCRIPTION: UFS-03

Vertical Reactions

Support notation : Far left is #'

Values in KIPS

Load Combination	Support 1	Support 2	
Max Upward from Load Cases	11.547	7.783	-0.460
Max Downward from all Load Conditions (Resi			-0.460
Max Downward from Load Combinations (Resi			-0.460
Max Downward from Load Cases (Resisting Up			-0.460
D Only	4.029	2.714	-0.460
+D+L	15.575	10.498	-0.460
+D+0.750L	12.689	8.552	-0.460
+0.60D	2.417	1.629	-0.460
L Only	11.547	7.783	-0.460

Steel Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

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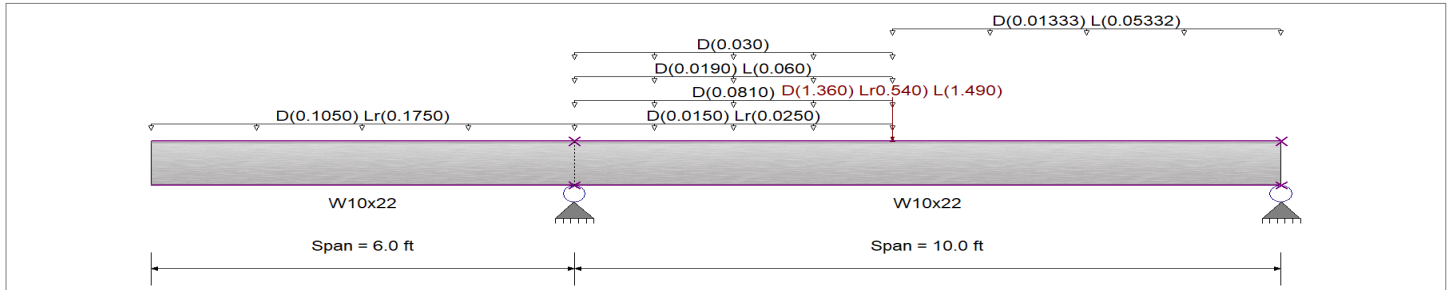
DESCRIPTION: UFS-04

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Strength Design
 Beam Bracing : Beam is Fully Braced against lateral-torsional buckling
 Bending Axis : Major Axis Bending
 Fy : Steel Yield : 36.0 ksi
 E: Modulus : 29,000.0 ksi



Applied Loads

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

Beam self weight NOT internally calculated and added

Load for Span Number 1

Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Tributary Width = 7.0 ft, (RF)

Load for Span Number 2

Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Extent = 0.0 --> 4.50 ft, Tributary Width = 1.0 ft, (LO RF)

Uniform Load : D = 0.010 ksf, Extent = 0.0 --> 4.50 ft, Tributary Width = 8.10 ft, (WALL)

Uniform Load : D = 0.0190, L = 0.060 ksf, Extent = 0.0 --> 4.50 ft, Tributary Width = 1.0 ft, (RF DECK)

Uniform Load : D = 0.010 ksf, Extent = 0.0 --> 4.50 ft, Tributary Width = 3.0 ft, (PARAPET)

Uniform Load : D = 0.010, L = 0.040 ksf, Extent = 4.50 --> 10.0 ft, Tributary Width = 1.333 ft, (FLR)

Point Load : D = 1.360, Lr = 0.540, L = 1.490 k @ 4.50 ft, (UF-15)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.162 : 1	Maximum Shear Stress Ratio =	0.080 : 1
Section used for this span	W10x22	Section used for this span	W10x22
Ma : Applied	7.585 k-ft	Va : Applied	2.819 k
Mn / Omega : Allowable	46.707 k-ft	Vn/Omega : Allowable	35.251 k
Load Combination	+D+L	Load Combination	+D+0.750Lr+0.750L
Span # where maximum occurs	Span # 2	Location of maximum on span	6.000 ft
		Span # where maximum occurs	Span # 1
Maximum Deflection			
Max Downward Transient Deflection	0.034 in Ratio = 4,214 >=360	Span: 2 : L Only	
Max Upward Transient Deflection	-0.036 in Ratio = 3,999 >=360	Span: 2 : Lr Only	
Max Downward Total Deflection	0.032 in Ratio = 3753 >=240.	Span: 2 : +D+L	
Max Upward Total Deflection	-0.044 in Ratio = 3242 >=240.	Span: 2 : +D+L	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values					Summary of Shear Values				
			M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx/Vnx/Omega	
D Only														
Dsgn. L =	6.00 ft	1	0.040	0.041		-1.89	1.89	78.00	46.71	1.00	1.00	1.46	52.88	35.25
Dsgn. L =	10.00 ft	2	0.069	0.041	3.21	-1.89	3.21	78.00	46.71	1.00	1.00	1.46	52.88	35.25
+D+L														
Dsgn. L =	6.00 ft	1	0.040	0.073		-1.89	1.89	78.00	46.71	1.00	1.00	2.57	52.88	35.25

Steel Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

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DESCRIPTION: UFS-04

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values						Summary of Shear Values			
			M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx/Vnx/Omega	
Dsgn. L = 10.00 ft		2	0.162	0.073	7.59	-1.89	7.59	78.00	46.71	1.00	1.00	2.57	52.88	35.25
+D+Lr														
Dsgn. L = 6.00 ft		1	0.108	0.061		-5.04	5.04	78.00	46.71	1.00	1.00	2.16	52.88	35.25
Dsgn. L = 10.00 ft		2	0.108	0.061	2.96	-5.04	5.04	78.00	46.71	1.00	1.00	2.16	52.88	35.25
+D+0.750Lr+0.750L														
Dsgn. L = 6.00 ft		1	0.091	0.080		-4.25	4.25	78.00	46.71	1.00	1.00	2.82	52.88	35.25
Dsgn. L = 10.00 ft		2	0.135	0.080	6.30	-4.25	6.30	78.00	46.71	1.00	1.00	2.82	52.88	35.25
+D+0.750L														
Dsgn. L = 6.00 ft		1	0.040	0.065		-1.89	1.89	78.00	46.71	1.00	1.00	2.29	52.88	35.25
Dsgn. L = 10.00 ft		2	0.139	0.065	6.49	-1.89	6.49	78.00	46.71	1.00	1.00	2.29	52.88	35.25
+0.60D														
Dsgn. L = 6.00 ft		1	0.024	0.025		-1.13	1.13	78.00	46.71	1.00	1.00	0.88	52.88	35.25
Dsgn. L = 10.00 ft		2	0.041	0.025	1.93	-1.13	1.93	78.00	46.71	1.00	1.00	0.88	52.88	35.25

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000		-0.0444	0.000
+D+L	2	0.0320	4.920	+D+L	0.0000	0.000

Vertical Reactions

Support notation : Far left is #'

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions		4.237	1.567
Max Upward from Load Combinations		4.237	1.567
Max Upward from Load Cases		2.093	0.944
Max Downward from all Load Conditions (Resis			-0.047
Max Downward from Load Cases (Resisting U _r			-0.047
D Only		2.093	0.623
+D+L		3.202	1.567
+D+Lr		3.842	0.576
+D+0.750Lr+0.750L		4.237	1.296
+D+0.750L		2.925	1.331
+0.60D		1.256	0.374
Lr Only		1.749	-0.047
L Only		1.109	0.944

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

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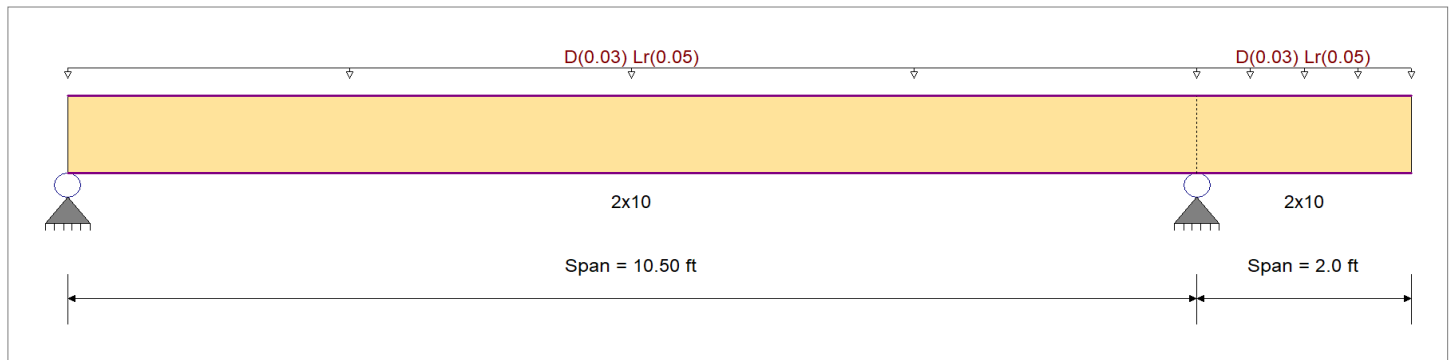
DESCRIPTION: LRR-01

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	900.0 psi	<i>E : Modulus of Elasticity</i>
Load Combination : IBC 2018	Fb -	900.0 psi	Ebend- xx 1,600.0ksi
Wood Species : DouglasFir-Larch	Fc - Prll	1,350.0 psi	Eminbend - xx 580.0ksi
Wood Grade : No.2	Fc - Perp	625.0 psi	Density 31.210pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling	Fv	180.0 psi	Repetitive Member Stress Increase
	Ft	575.0 psi	



Applied Loads

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

Beam self weight NOT internally calculated and added

Load for Span Number 1

Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Tributary Width = 2.0 ft, (RF)

Load for Span Number 2

Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Tributary Width = 2.0 ft, (RF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.404 : 1	Maximum Shear Stress Ratio	=	0.180 : 1
Section used for this span		2x10	Section used for this span		2x10
fb: Actual	=	574.42psi	fv: Actual	=	40.46 psi
F'b	=	1,423.13psi	F'v	=	225.00 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	5.045ft	Location of maximum on span	=	9.737 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.080 in	Ratio = 1582 >=240	Span: 1 : Lr Only		
Max Upward Transient Deflection	-0.044 in	Ratio = 1092 >=240	Span: 2 : Lr Only		
Max Downward Total Deflection	0.127 in	Ratio = 989 >=180	Span: 1 : +D+Lr		
Max Upward Total Deflection	-0.070 in	Ratio = 682 >=180	Span: 2 : +D+Lr		

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v		
D Only																				
	Length = 10.50 ft	1	0.210	0.094	0.90	1.00	1.00	1.00	1.100	1.00	1.00	1.15	0.38	215.4	1,024.7	0.00	0.00	0.0	0.0	162.0
	Length = 2.0 ft	2	0.033	0.094	0.90	1.00	1.00	1.00	1.100	1.00	1.00	1.15	0.06	33.7	1,024.7	0.04	15.2	162.0		
+D+Lr																				
	Length = 10.50 ft	1	0.404	0.180	1.25	1.00	1.00	1.00	1.100	1.00	1.00	1.15	1.02	574.4	1,423.1	0.37	40.5	225.0		
	Length = 2.0 ft	2	0.063	0.180	1.25	1.00	1.00	1.00	1.100	1.00	1.00	1.15	0.16	89.8	1,423.1	0.10	40.5	225.0		
+D+0.750Lr																				
	Length = 10.50 ft	1	0.341	0.152	1.25	1.00	1.00	1.00	1.100	1.00	1.00	1.15	0.86	484.7	1,423.1	0.32	34.1	225.0		

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

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DESCRIPTION: LRR-01

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
Length = 2.0 ft +0.60D	2		0.053	0.152	1.25	1.00	1.00	1.00	1.100	1.00	1.00	1.15	0.14	75.7	1,423.1	0.08	34.1	225.0
																0.0	0.00	0.0
Length = 10.50 ft	1		0.071	0.032	1.60	1.00	1.00	1.00	1.100	1.00	1.00	1.15	0.23	129.2	1,821.6	0.08	9.1	288.0
Length = 2.0 ft	2		0.011	0.032	1.60	1.00	1.00	1.00	1.100	1.00	1.00	1.15	0.04	20.2	1,821.6	0.02	9.1	288.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.1274	5.221		0.0000	0.000
	2	0.0000	5.221	+D+Lr	-0.0703	2.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	0.405	0.595	
Max Upward from Load Combinations	0.405	0.595	
Max Upward from Load Cases	0.253	0.372	
D Only	0.152	0.223	
+D+Lr	0.405	0.595	
+D+0.750Lr	0.342	0.502	
+0.60D	0.091	0.134	
Lr Only	0.253	0.372	

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

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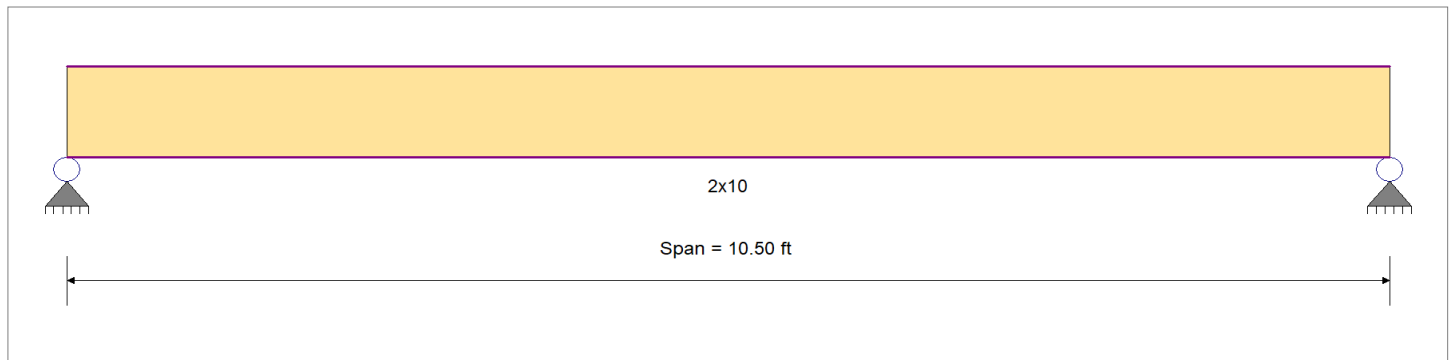
DESCRIPTION: LR-01 (UNUSED)

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	900.0 psi	<i>E : Modulus of Elasticity</i>
Load Combination : IBC 2018	Fb -	900.0 psi	Ebend- xx 1,600.0ksi
	Fc - Prll	1,350.0 psi	Eminbend - xx 580.0ksi
Wood Species : DouglasFir-Larch	Fc - Perp	625.0 psi	
Wood Grade : No.2	Fv	180.0 psi	
	Ft	575.0 psi	Density 31.210pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling			Repetitive Member Stress Increase



Applied Loads

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

Beam self weight NOT internally calculated and added

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.000 : 1	Maximum Shear Stress Ratio =	0.000 : 1
Section used for this span	2x10	Section used for this span	2x10
fb: Actual =	0.00psi	fv: Actual =	0.00 psi
F'b =	0.00psi	F'v =	0.00 psi
Load Combination		Load Combination	
Location of maximum on span =	0.000ft	Location of maximum on span =	0.000 ft
Span # where maximum occurs =	Span # 1	Span # where maximum occurs =	Span # 1
Maximum Deflection			
Max Downward Transient Deflection	0 in Ratio =	<240	n/a
Max Upward Transient Deflection	0 in Ratio =	<240	n/a
Max Downward Total Deflection	0 in Ratio =	<180	n/a
Max Upward Total Deflection	0 in Ratio =	<180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values					
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v			
	Length = 10.50 ft	1			0.90	1.00	1.00	1.00	1.100	1.00	1.00	1.15			0.0	1,024.7		0.00	0.0	0.0	162.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

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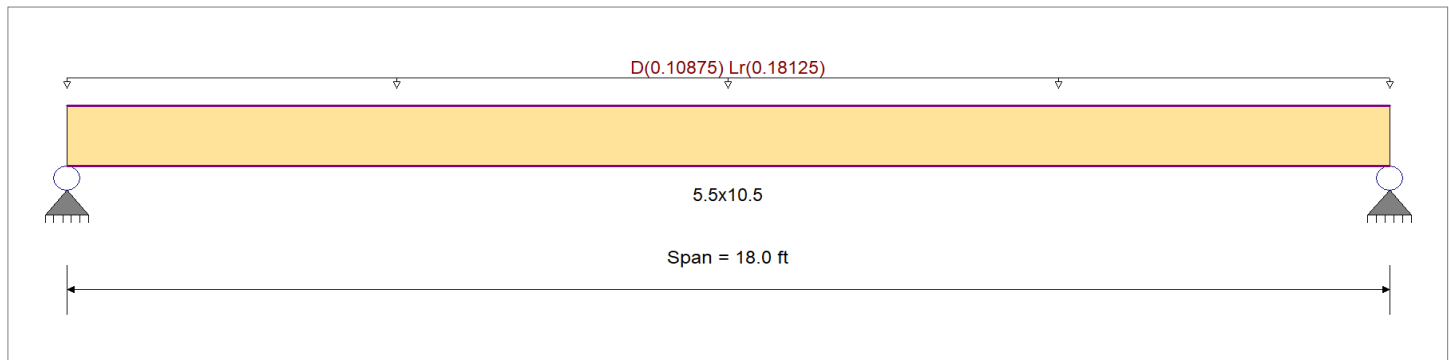
DESCRIPTION: LR-02

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,400.0 psi	<i>E : Modulus of Elasticity</i>	
Load Combination : IBC 2018	Fb -	1,850.0 psi	Ebend- xx	1,800.0ksi
Wood Species : DF/DF	Fc - Prll	1,650.0 psi	Eminbend - xx	950.0ksi
Wood Grade : 24F-V4	Fc - Perp	650.0 psi	Ebend- yy	1,600.0ksi
	Fv	265.0 psi	Eminbend - yy	850.0ksi
	Ft	1,100.0 psi	Density	31.210pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

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

Beam self weight NOT internally calculated and added

Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Tributary Width = 7.250 ft, (RF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.465 : 1	Maximum Shear Stress Ratio	=	0.185 : 1
Section used for this span		5.5x10.5	Section used for this span		5.5x10.5
fb: Actual	=	1,394.58psi	fv: Actual	=	61.36 psi
F'b	=	3,000.00psi	F'v	=	331.25 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	9.000ft	Location of maximum on span	=	17.146 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.451 in	Ratio =	479 >=240	Span: 1 : Lr Only	
Max Upward Transient Deflection	0 in	Ratio =	0 <240	n/a	
Max Downward Total Deflection	0.721 in	Ratio =	299 >=180	Span: 1 : +D+Lr	
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values					
			M	V	CD	CM	C _t	CL _x	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v			
D Only																					
Length = 18.0 ft	1		0.242	0.096	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.40	523.0	2,160.0	0.89	23.0	238.5	0.0	0.0	0.0
+D+Lr																					
Length = 18.0 ft	1		0.465	0.185	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	11.75	1,394.6	3,000.0	2.36	61.4	331.3	0.0	0.0	0.0
+D+0.750Lr																					
Length = 18.0 ft	1		0.392	0.156	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	9.91	1,176.7	3,000.0	1.99	51.8	331.3	0.0	0.0	0.0
+0.60D																					
Length = 18.0 ft	1		0.082	0.033	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.64	313.8	3,840.0	0.53	13.8	424.0	0.0	0.0	0.0

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

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DESCRIPTION: LR-02

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.7214	9.066		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	2.610	2.610
Max Upward from Load Combinations	2.610	2.610
Max Upward from Load Cases	1.631	1.631
D Only	0.979	0.979
+D+Lr	2.610	2.610
+D+0.750Lr	2.202	2.202
+0.60D	0.587	0.587
Lr Only	1.631	1.631

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

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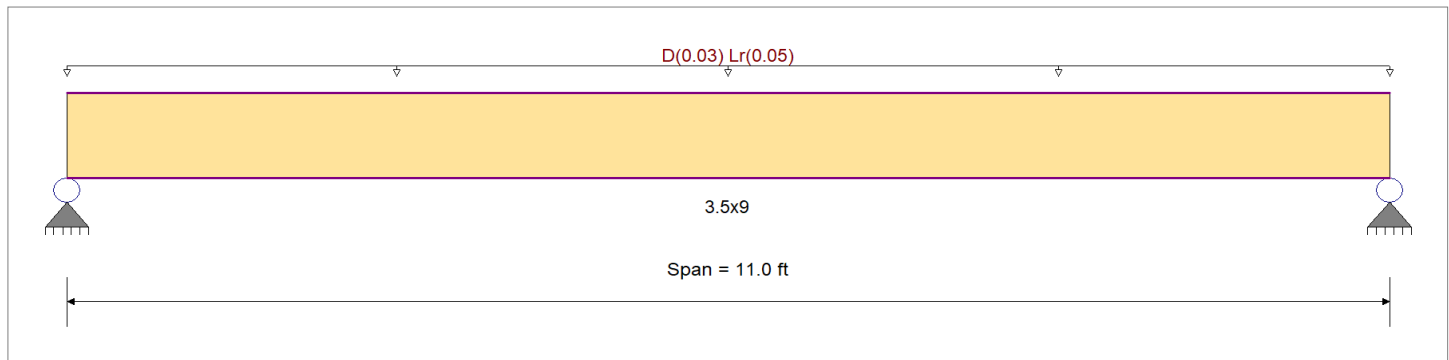
DESCRIPTION: LR-03

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,400.0 psi	<i>E : Modulus of Elasticity</i>	
Load Combination : IBC 2018	Fb -	1,850.0 psi	Ebend- xx	1,800.0ksi
Wood Species : DF/DF	Fc - Prll	1,650.0 psi	Eminbend - xx	950.0ksi
Wood Grade : 24F-V4	Fc - Perp	650.0 psi	Ebend- yy	1,600.0ksi
	Fv	265.0 psi	Eminbend - yy	850.0ksi
	Ft	1,100.0 psi	Density	31.210pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

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

Beam self weight NOT internally calculated and added
 Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Tributary Width = 2.0 ft, (RF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.102	1	Maximum Shear Stress Ratio	=	0.055	: 1
Section used for this span		3.5x9		Section used for this span		3.5x9	
fb: Actual	=	307.30psi		fv: Actual	=	18.20 psi	
F'b	=	3,000.00psi		F'v	=	331.25 psi	
Load Combination		+D+Lr		Load Combination		+D+Lr	
Location of maximum on span	=	5.500ft		Location of maximum on span	=	10.277 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.043 in	Ratio =	3049	>=240	Span: 1 : Lr Only	
Max Upward Transient Deflection		0 in	Ratio =	0	<240	n/a	
Max Downward Total Deflection		0.069 in	Ratio =	1905	>=180	Span: 1 : +D+Lr	
Max Upward Total Deflection		0 in	Ratio =	0	<180	n/a	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v		
D Only	Length = 11.0 ft	1	0.053	0.029	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.45	115.2	2,160.0	0.00	0.00	0.0	0.0	238.5
+D+Lr	Length = 11.0 ft	1	0.102	0.055	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.21	307.3	3,000.0	0.00	0.00	0.0	0.0	331.3
+D+0.750Lr	Length = 11.0 ft	1	0.086	0.046	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.02	259.3	3,000.0	0.00	0.00	0.0	0.0	331.3
+0.60D	Length = 11.0 ft	1	0.018	0.010	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.27	69.1	3,840.0	0.00	0.00	0.0	0.0	424.0

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

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DESCRIPTION: LR-03

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.0693	5.540		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.440	0.440
Max Upward from Load Combinations	0.440	0.440
Max Upward from Load Cases	0.275	0.275
D Only	0.165	0.165
+D+Lr	0.440	0.440
+D+0.750Lr	0.371	0.371
+0.60D	0.099	0.099
Lr Only	0.275	0.275

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

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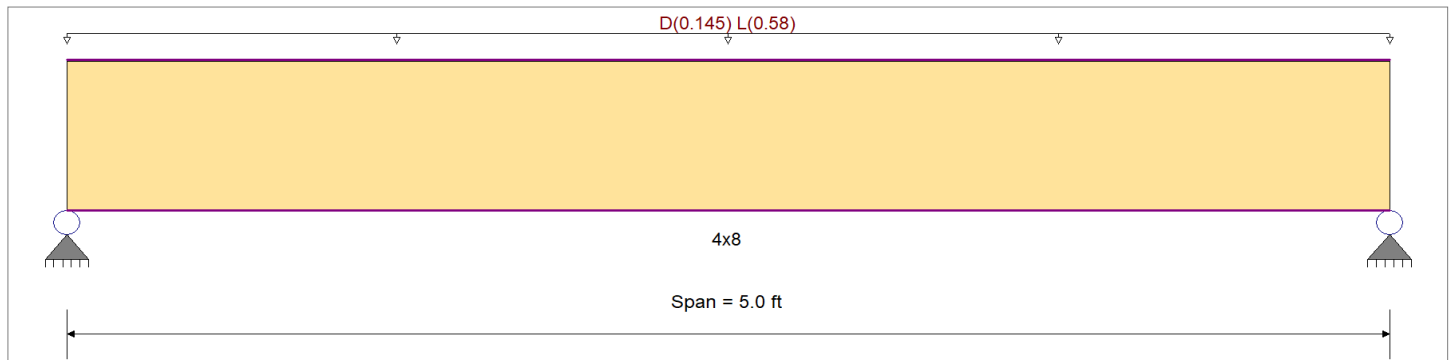
DESCRIPTION: MF-01

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	900.0 psi	<i>E : Modulus of Elasticity</i>
Load Combination : IBC 2018	Fb -	900.0 psi	Ebend- xx 1,600.0ksi
	Fc - Prll	1,350.0 psi	Eminbend - xx 580.0ksi
Wood Species : Douglas Fir-Larch	Fc - Perp	625.0 psi	
Wood Grade : No.2	Fv	180.0 psi	
	Ft	575.0 psi	Density 31.210pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling			



Applied Loads

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

Beam self weight NOT internally calculated and added
 Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 14.50 ft, (FLR)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.758 < 1	Maximum Shear Stress Ratio	=	0.452 < 1
Section used for this span		4x8	Section used for this span		4x8
fb: Actual	=	886.70psi	fv: Actual	=	81.33 psi
F'b	=	1,170.00psi	F'v	=	180.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	2.500ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.046 in	Ratio = 1300	>=360	Span: 1 : L Only	
Max Upward Transient Deflection	0 in	Ratio = 0	<360	n/a	
Max Downward Total Deflection	0.058 in	Ratio = 1040	>=240	Span: 1 : +D+L	
Max Upward Total Deflection	0 in	Ratio = 0	<240	n/a	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values			
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only	Length = 5.0 ft	1	0.168	0.100	0.90	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.45	177.3	1,053.0	0.0	0.00	0.0	0.0
+D+L	Length = 5.0 ft	1	0.758	0.452	1.00	1.00	1.00	1.00	1.300	1.00	1.00	1.00	2.27	886.7	1,170.0	1.38	81.3	180.0	0.0
+D+0.750L	Length = 5.0 ft	1	0.485	0.289	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.00	1.81	709.4	1,462.5	1.10	65.1	225.0	0.0
+0.60D	Length = 5.0 ft	1	0.057	0.034	1.60	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.27	106.4	1,872.0	0.17	9.8	288.0	0.0

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

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DESCRIPTION: MF-01

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0577	2.518		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.813	1.813
Max Upward from Load Combinations	1.813	1.813
Max Upward from Load Cases	1.450	1.450
D Only	0.363	0.363
+D+L	1.813	1.813
+D+0.750L	1.450	1.450
+0.60D	0.218	0.218
L Only	1.450	1.450

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

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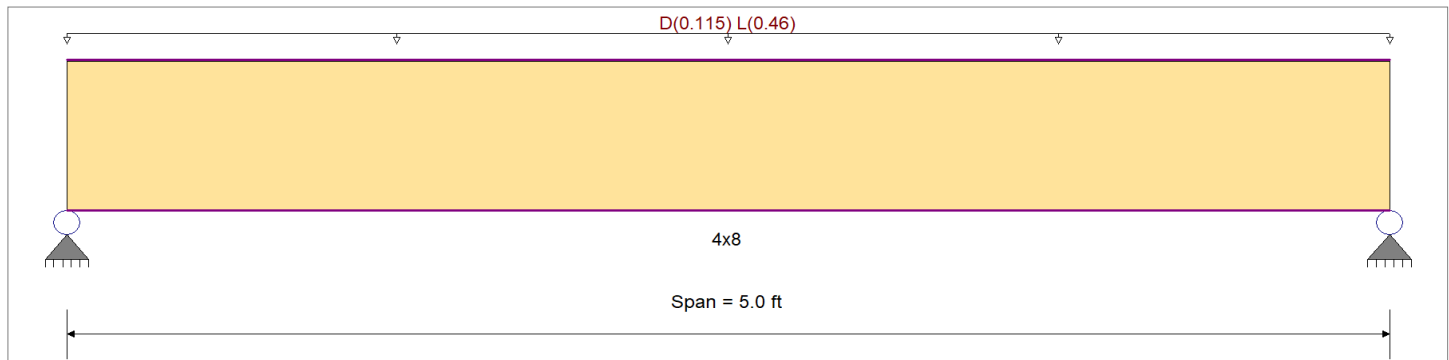
DESCRIPTION: MF-02

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	900.0 psi	<i>E : Modulus of Elasticity</i>
Load Combination : IBC 2018	Fb -	900.0 psi	Ebend- xx 1,600.0ksi
	Fc - Prll	1,350.0 psi	Eminbend - xx 580.0ksi
Wood Species : Douglas Fir-Larch	Fc - Perp	625.0 psi	
Wood Grade : No.2	Fv	180.0 psi	
	Ft	575.0 psi	Density 31.210pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling			



Applied Loads

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

Beam self weight NOT internally calculated and added
 Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 11.50 ft, (FLR)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.601 : 1	Maximum Shear Stress Ratio	=	0.358 : 1
Section used for this span		4x8	Section used for this span		4x8
fb: Actual	=	703.24psi	fv: Actual	=	64.51 psi
F'b	=	1,170.00psi	F'v	=	180.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	2.500ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.037 in	Ratio = 1639 >=360	Span: 1 : L Only		
Max Upward Transient Deflection	0 in	Ratio = 0 <360	n/a		
Max Downward Total Deflection	0.046 in	Ratio = 1311 >=240	Span: 1 : +D+L		
Max Upward Total Deflection	0 in	Ratio = 0 <240	n/a		

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values					
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v			
D Only	Length = 5.0 ft	1	0.134	0.080	0.90	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.36	140.6	1,053.0	0.00	0.00	0.0	0.0	162.0	
+D+L	Length = 5.0 ft	1	0.601	0.358	1.00	1.00	1.00	1.00	1.300	1.00	1.00	1.00	1.80	703.2	1,170.0	1.09	64.5	180.0	0.00	0.0	0.0
+D+0.750L	Length = 5.0 ft	1	0.385	0.229	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.00	1.44	562.6	1,462.5	0.87	51.6	225.0	0.00	0.0	0.0
+0.60D	Length = 5.0 ft	1	0.045	0.027	1.60	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.22	84.4	1,872.0	0.13	7.7	288.0	0.00	0.0	0.0

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

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DESCRIPTION: MF-02

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0457	2.518		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.438	1.438
Max Upward from Load Combinations	1.438	1.438
Max Upward from Load Cases	1.150	1.150
D Only	0.288	0.288
+D+L	1.438	1.438
+D+0.750L	1.150	1.150
+0.60D	0.173	0.173
L Only	1.150	1.150

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

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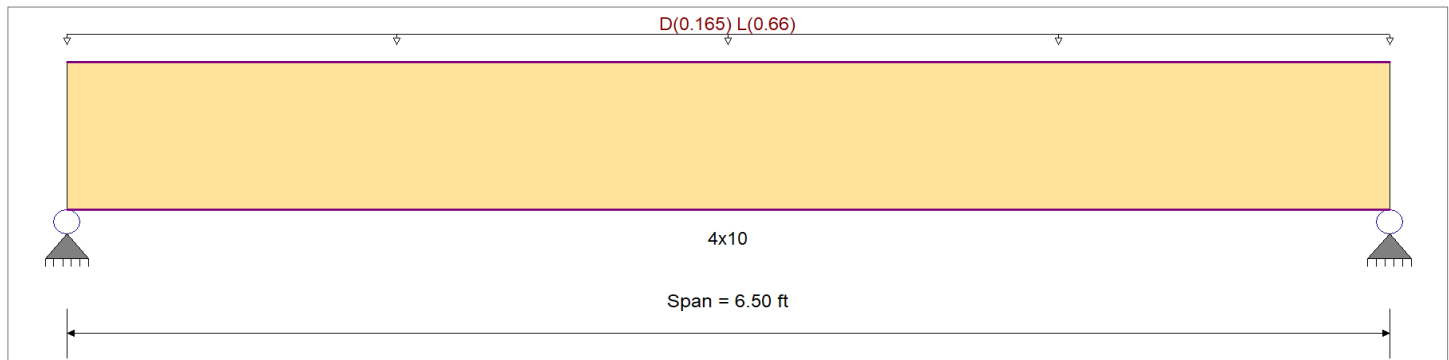
DESCRIPTION: MF-03

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	900.0 psi	<i>E : Modulus of Elasticity</i>
Load Combination : IBC 2018	Fb -	900.0 psi	Ebend- xx 1,600.0ksi
	Fc - Prll	1,350.0 psi	Eminbend - xx 580.0ksi
Wood Species : Douglas Fir-Larch	Fc - Perp	625.0 psi	
Wood Grade : No.2	Fv	180.0 psi	
	Ft	575.0 psi	Density 31.210pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling			



Applied Loads

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

Beam self weight NOT internally calculated and added
 Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 16.50 ft, (FLR)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.970 : 1	Maximum Shear Stress Ratio	=	0.529 : 1
Section used for this span		4x10	Section used for this span		4x10
fb: Actual	=	1,047.54psi	fv: Actual	=	95.21 psi
F'b	=	1,080.00psi	F'v	=	180.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	3.250ft	Location of maximum on span	=	5.741 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.072 in	Ratio = 1080 >=360	Span: 1 : L Only		
Max Upward Transient Deflection	0 in	Ratio = 0 <360	n/a		
Max Downward Total Deflection	0.090 in	Ratio = 864 >=240	Span: 1 : +D+L		
Max Upward Total Deflection	0 in	Ratio = 0 <240	n/a		

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v		
D Only																				
Length = 6.50 ft	1		0.216	0.118	0.90	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.87	209.5	972.0	0.0	0.00	0.0	0.0	0.0
+D+L																				
Length = 6.50 ft	1		0.970	0.529	1.00	1.00	1.00	1.00	1.200	1.00	1.00	1.00	4.36	1,047.5	1,080.0	0.0	2.05	95.2	180.0	0.0
+D+0.750L																				
Length = 6.50 ft	1		0.621	0.339	1.25	1.00	1.00	1.00	1.200	1.00	1.00	1.00	3.49	838.0	1,350.0	0.0	1.64	76.2	225.0	0.0
+0.60D																				
Length = 6.50 ft	1		0.073	0.040	1.60	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.52	125.7	1,728.0	0.0	0.25	11.4	288.0	0.0

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

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DESCRIPTION: MF-03

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0902	3.274		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	2.681	2.681
Max Upward from Load Combinations	2.681	2.681
Max Upward from Load Cases	2.145	2.145
D Only	0.536	0.536
+D+L	2.681	2.681
+D+0.750L	2.145	2.145
+0.60D	0.322	0.322
L Only	2.145	2.145

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

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DESCRIPTION: MF-04

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0907	3.022		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.650	1.650
Max Upward from Load Combinations	1.650	1.650
Max Upward from Load Cases	1.320	1.320
D Only	0.330	0.330
+D+L	1.650	1.650
+D+0.750L	1.320	1.320
+0.60D	0.198	0.198
L Only	1.320	1.320

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

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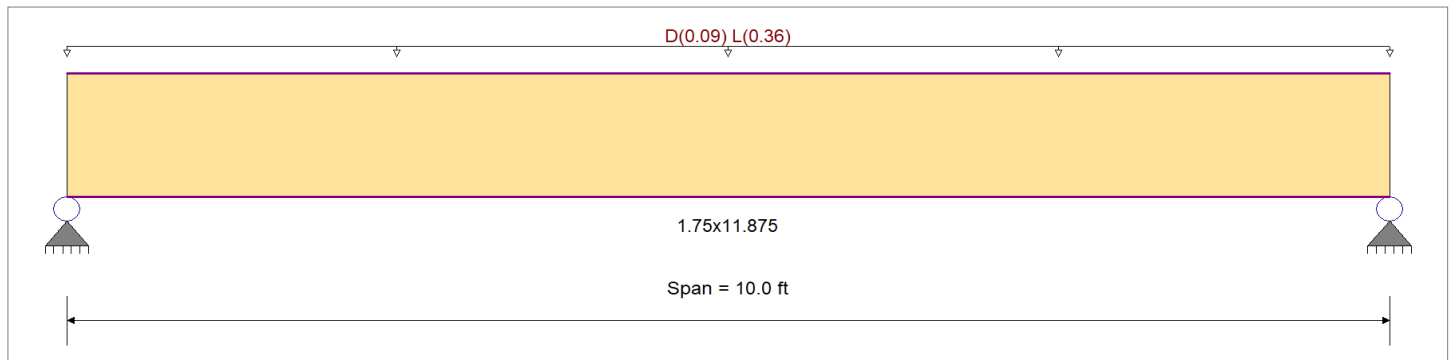
DESCRIPTION: MF-05

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2325 psi	<i>E : Modulus of Elasticity</i>
Load Combination : IBC 2018	Fb -	2325 psi	Ebend- xx 1550 ksi
	Fc - Prll	2050 psi	Eminbend - xx 787.815 ksi
Wood Species : iLevel Truss Joist	Fc - Perp	800 psi	
Wood Grade : TimberStrand LSL 1.55E	Fv	310 psi	
	Ft	1070 psi	Density 45.01 pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling			



Applied Loads

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

Beam self weight NOT internally calculated and added
 Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 9.0 ft, (FLR)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio = 0.705 : 1	Maximum Shear Stress Ratio = 0.421 : 1
Section used for this span = 1.75x11.875	Section used for this span = 1.75x11.875
fb: Actual = 1,641.16psi	fv: Actual = 130.40 psi
F'b = 2,327.24psi	F'v = 310.00 psi
Load Combination = +D+L	Load Combination = +D+L
Location of maximum on span = 5.000ft	Location of maximum on span = 0.000 ft
Span # where maximum occurs = Span # 1	Span # where maximum occurs = Span # 1
Maximum Deflection	
Max Downward Transient Deflection = 0.215 in Ratio = 557 >=360	Span: 1 : L Only
Max Upward Transient Deflection = 0 in Ratio = 0 <360	n/a
Max Downward Total Deflection = 0.269 in Ratio = 446 >=240	Span: 1 : +D+L
Max Upward Total Deflection = 0 in Ratio = 0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values			
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only	Length = 10.0 ft	1	0.157	0.093	0.90	1.00	1.00	1.00	1.001	1.00	1.00	1.00	1.13	328.2	2,094.5	0.0	0.00	0.0	0.0
+D+L	Length = 10.0 ft	1	0.705	0.421	1.00	1.00	1.00	1.00	1.001	1.00	1.00	1.00	5.63	1,641.2	2,327.2	1.81	130.4	310.0	0.0
+D+0.750L	Length = 10.0 ft	1	0.451	0.269	1.25	1.00	1.00	1.00	1.001	1.00	1.00	1.00	4.50	1,312.9	2,909.1	1.45	104.3	387.5	0.0
+0.60D	Length = 10.0 ft	1	0.053	0.032	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.00	0.68	196.9	3,723.6	0.22	15.6	496.0	0.0

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

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DESCRIPTION: MF-05

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.2691	5.036		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	2.250	2.250
Max Upward from Load Combinations	2.250	2.250
Max Upward from Load Cases	1.800	1.800
D Only	0.450	0.450
+D+L	2.250	2.250
+D+0.750L	1.800	1.800
+0.60D	0.270	0.270
L Only	1.800	1.800

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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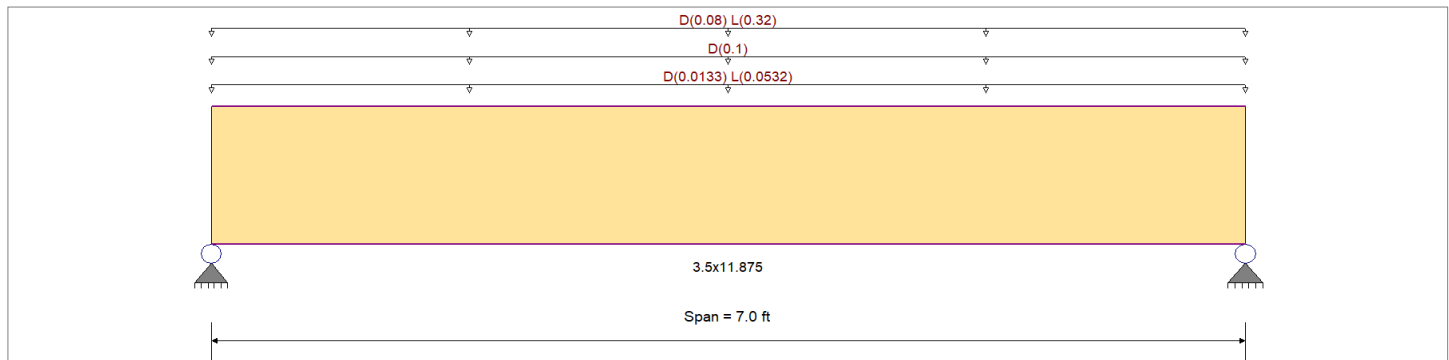
DESCRIPTION: MF-06

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,325.0 psi	<i>E : Modulus of Elasticity</i>
Load Combination : IBC 2018	Fb -	2,325.0 psi	Ebend- xx 1,550.0ksi
	Fc - Prll	2,050.0 psi	Eminbend - xx 787.82ksi
Wood Species : iLevel Truss Joist	Fc - Perp	800.0 psi	
Wood Grade : TimberStrand LSL 1.55E	Fv	310.0 psi	
	Ft	1,070.0 psi	Density 45.010pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling			



Applied Loads

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

Beam self weight NOT internally calculated and added
 Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 1.330 ft, (FLR)
 Uniform Load : D = 0.010 ksf, Tributary Width = 10.0 ft, (WALL)
 Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 8.0 ft, (FLR)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio = 0.218 < 1	Maximum Shear Stress Ratio = 0.167 < 1
Section used for this span 3.5x11.875	Section used for this span 3.5x11.875
fb: Actual = 506.18psi	fv: Actual = 51.71 psi
F'b = 2,327.24psi	F'v = 310.00 psi
Load Combination +D+L	Load Combination +D+L
Location of maximum on span = 3.500ft	Location of maximum on span = 6.029 ft
Span # where maximum occurs = Span # 1	Span # where maximum occurs = Span # 1
Maximum Deflection	
Max Downward Transient Deflection 0.027 in Ratio = 3135 >=360	Span: 1 : L Only
Max Upward Transient Deflection 0 in Ratio = 0 <360	n/a
Max Downward Total Deflection 0.041 in Ratio = 2065 >=240	Span: 1 : +D+L
Max Upward Total Deflection 0 in Ratio = 0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v		
D Only																				
Length = 7.0 ft	1	0.082	0.063	0.90	1.00	1.00	1.00	1.001	1.00	1.00	1.00	1.18	172.7	2,094.5	0.49	17.6	279.0			
+D+L																				
Length = 7.0 ft	1	0.218	0.167	1.00	1.00	1.00	1.00	1.001	1.00	1.00	1.00	3.47	506.2	2,327.2	1.43	51.7	310.0			
+D+0.750L																				
Length = 7.0 ft	1	0.145	0.111	1.25	1.00	1.00	1.00	1.001	1.00	1.00	1.00	2.90	422.8	2,909.1	1.20	43.2	387.5			
+0.60D																				
Length = 7.0 ft	1	0.028	0.021	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.00	0.71	103.6	3,723.6	0.29	10.6	496.0			

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

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DESCRIPTION: MF-06

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0407	3.526		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.983	1.983
Max Upward from Load Combinations	1.983	1.983
Max Upward from Load Cases	1.306	1.306
D Only	0.677	0.677
+D+L	1.983	1.983
+D+0.750L	1.656	1.656
+0.60D	0.406	0.406
L Only	1.306	1.306

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

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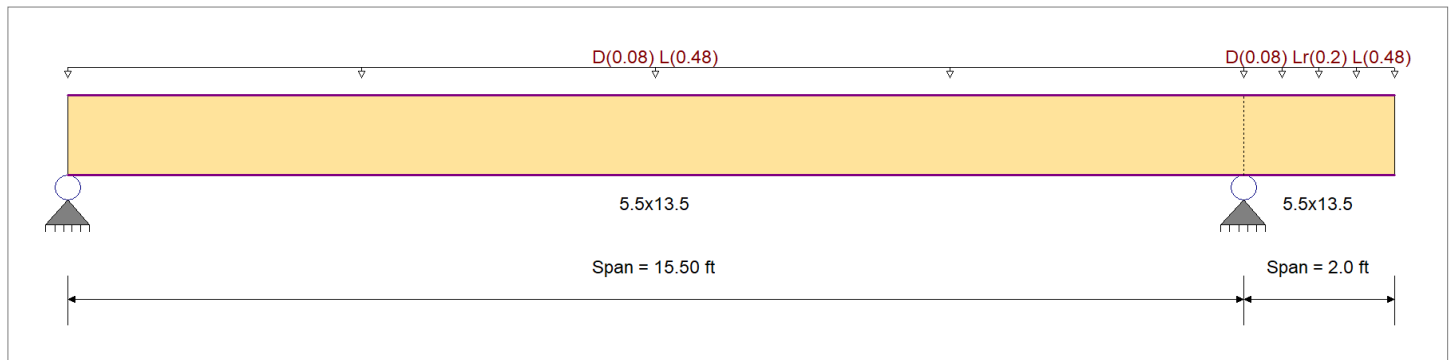
DESCRIPTION: MF-07

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,400.0 psi	<i>E : Modulus of Elasticity</i>
Load Combination : IBC 2018	Fb -	1,850.0 psi	Ebend- xx 1,800.0ksi
Wood Species : DF/DF	Fc - Prll	1,650.0 psi	Eminbend - xx 950.0ksi
Wood Grade : 24F-V4	Fc - Perp	650.0 psi	Ebend- yy 1,600.0ksi
	Fv	265.0 psi	Eminbend - yy 850.0ksi
	Ft	1,100.0 psi	Density 31.210pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling			



Applied Loads

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

Beam self weight NOT internally calculated and added

Load for Span Number 1

Uniform Load : D = 0.010, L = 0.060 ksf, Tributary Width = 8.0 ft, (DECK)

Load for Span Number 2

Uniform Load : D = 0.010, Lr = 0.0250, L = 0.060 ksf, Tributary Width = 8.0 ft, (DECK)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.487 : 1	Maximum Shear Stress Ratio	=	0.292 : 1
Section used for this span	=	5.5x13.5	Section used for this span	=	5.5x13.5
fb: Actual	=	1,168.10psi	fv: Actual	=	77.38 psi
F'b	=	2,400.00psi	F'v	=	265.00 psi
Load Combination	=	+D+L	Load Combination	=	+D+L
Location of maximum on span	=	7.620ft	Location of maximum on span	=	14.461 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.298 in	Ratio = 625 >=360	Span: 2 : Lr Only		
Max Upward Transient Deflection	-0.118 in	Ratio = 408 >=360	Span: 2 : L Only		
Max Downward Total Deflection	0.347 in	Ratio = 535 >=240	Span: 1 : +D+L		
Max Upward Total Deflection	-0.137 in	Ratio = 350 >=240	Span: 2 : +D+L		

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v		
D Only																				
	Length = 15.50 ft	1	0.077	0.046	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.32	166.9	2,160.0	0.00	0.00	0.0	0.0	238.5
	Length = 2.0 ft	2	0.007	0.046	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.16	11.5	1,665.0	0.07	11.1	238.5		
+D+L																				
	Length = 15.50 ft	1	0.487	0.292	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	16.26	1,168.1	2,400.0	3.83	77.4	265.0		
	Length = 2.0 ft	2	0.043	0.292	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.12	80.4	1,850.0	0.49	77.4	265.0		
+D+Lr																				
	Length = 15.50 ft	1	0.051	0.035	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.13	153.0	3,000.0	0.57	11.6	331.3		

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: MF-07

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values			
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
Length = 2.0 ft +D+0.750Lr+0.750L	2		0.017	0.035	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.56	40.2	2,312.5	0.25	11.6	331.3
																	0.00	0.0
Length = 15.50 ft +D+0.750L	1		0.302	0.185	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	12.63	907.2	3,000.0	3.03	61.2	331.3
																	0.00	0.0
Length = 2.0 ft +D+0.750L	2		0.037	0.185	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.18	84.8	2,312.5	0.52	61.2	331.3
																	0.00	0.0
Length = 15.50 ft +0.60D	1		0.333	0.200	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	12.78	917.8	2,760.0	3.01	60.8	304.8
																	0.00	0.0
Length = 2.0 ft +0.60D	2		0.030	0.200	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.88	63.2	2,127.5	0.39	60.8	304.8
																	0.00	0.0
Length = 15.50 ft	1		0.026	0.016	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.39	100.1	3,840.0	0.33	6.6	424.0
																	0.04	6.6
Length = 2.0 ft	2		0.002	0.016	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.10	6.9	2,960.0	0.04	6.6	424.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.3471	7.707	+D+L	0.0000	0.000
	2	0.0000	7.707		-0.1371	2.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	4.268	5.532	
Max Upward from Load Combinations	4.268	5.532	
Max Upward from Load Cases	3.658	4.742	
Max Downward from all Load Conditions	-0.026		
Max Downward from Load Cases (Resis)	-0.026		
D Only	0.610	0.790	
+D+L	4.268	5.532	
+D+Lr	0.584	1.216	
+D+0.750Lr+0.750L	3.334	4.666	
+D+0.750L	3.353	4.347	
+0.60D	0.366	0.474	
Lr Only	-0.026	0.426	
L Only	3.658	4.742	

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

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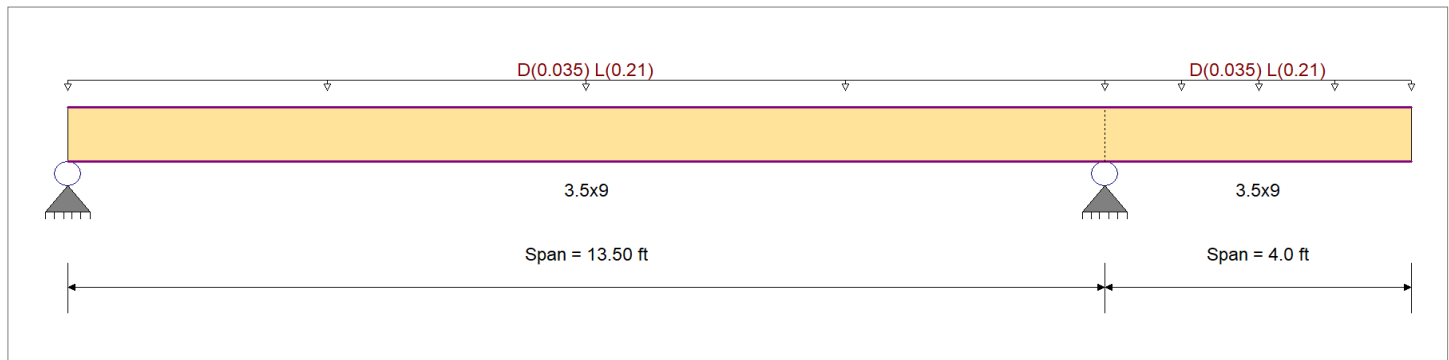
DESCRIPTION: MF-08

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2400 psi	<i>E : Modulus of Elasticity</i>	
Load Combination : IBC 2018	Fb -	2400 psi	Ebend- xx	1800ksi
Wood Species : DF/DF	Fc - Prll	1650 psi	Eminbend - xx	950ksi
Wood Grade : 24F-V8	Fc - Perp	650 psi	Ebend- yy	1600ksi
	Fv	265 psi	Eminbend - yy	850ksi
	Ft	1100 psi	Density	31.21 pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

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

Beam self weight NOT internally calculated and added
 Load for Span Number 1
 Uniform Load : D = 0.010, L = 0.060 ksf, Tributary Width = 3.50 ft, (DECK)
 Load for Span Number 2
 Uniform Load : D = 0.010, L = 0.060 ksf, Tributary Width = 3.50 ft, (DECK)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.491 : 1	Maximum Shear Stress Ratio	=	0.293 : 1
Section used for this span	=	3.5x9	Section used for this span	=	3.5x9
fb: Actual	=	1,179.51 psi	fv: Actual	=	77.74 psi
F'b	=	2,400.00psi	F'v	=	265.00 psi
Load Combination	=	+D+L	Load Combination	=	+D+L
Location of maximum on span	=	6.184ft	Location of maximum on span	=	12.821 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.327 in	Ratio =	495	>=360	Span: 1 : L Only
Max Upward Transient Deflection	-0.222 in	Ratio =	432	>=360	Span: 2 : L Only
Max Downward Total Deflection	0.382 in	Ratio =	424	>=240	Span: 1 : +D+L
Max Upward Total Deflection	-0.259 in	Ratio =	370	>=240	Span: 2 : +D+L

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v		
D Only																				
	Length = 13.50 ft	1	0.078	0.047	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.66	168.5	2,160.0	0.23	11.1	238.5		
	Length = 4.0 ft	2	0.033	0.047	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.28	71.1	2,160.0	0.11	11.1	238.5		
+D+L																				
	Length = 13.50 ft	1	0.491	0.293	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.64	1,179.5	2,400.0	1.63	77.7	265.0		
	Length = 4.0 ft	2	0.207	0.293	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.96	497.8	2,400.0	0.80	77.7	265.0		
+D+0.750L																				
	Length = 13.50 ft	1	0.309	0.184	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.65	926.8	3,000.0	1.28	61.1	331.3		

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

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DESCRIPTION: MF-08

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F _b	V	f _v	F _v
Length = 4.0 ft	2		0.130	0.184	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.54	391.1	3,000.0	0.63	61.1	331.3
+0.60D															0.0	0.00	0.0	0.0
Length = 13.50 ft	1		0.026	0.016	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.40	101.1	3,840.0	0.14	6.7	424.0
Length = 4.0 ft			2		0.011	0.016	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.17	42.7	3,840.0	0.07

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.3817	6.561	+D+L	0.0000	0.000
	2	0.0000	6.561		-0.2590	4.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	1.509	2.779	
Max Upward from Load Combinations	1.509	2.779	
Max Upward from Load Cases	1.293	2.382	
D Only	0.216	0.397	
+D+L	1.509	2.779	
+D+0.750L	1.185	2.183	
+0.60D	0.129	0.238	
L Only	1.293	2.382	

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

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DESCRIPTION: MF-09

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values			
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F _b	V	f _v	F _v
Length = 17.0 ft	1	0.343	0.180	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	14.34	1,030.0	3,000.0	2.95	59.5	331.3
Length = 4.0 ft	2	0.010	0.180	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.40	28.7	3,000.0	0.14	59.5	331.3
+D+0.750Lr+0.750L															0.0	0.00	0.0	0.0
Length = 17.0 ft	1	0.581	0.320	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	24.25	1,742.0	3,000.0	5.25	106.1	331.3
Length = 4.0 ft	2	0.053	0.320	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.20	158.0	3,000.0	0.79	106.1	331.3
+D+0.750L															0.0	0.00	0.0	0.0
Length = 17.0 ft	1	0.526	0.295	1.15	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	20.21	1,451.9	2,760.0	4.44	89.8	304.8
Length = 4.0 ft	2	0.057	0.295	1.15	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.20	158.0	2,760.0	0.79	89.8	304.8
+0.60D															0.0	0.00	0.0	0.0
Length = 17.0 ft	1	0.100	0.053	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5.37	385.9	3,840.0	1.12	22.6	424.0
Length = 4.0 ft	2	0.004	0.053	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.24	17.2	3,840.0	0.09	22.6	424.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.5644	7.978	+D+L	0.0000	0.000
	2	0.0000	7.978		-0.3589	4.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	5.669	5.731	
Max Upward from Load Combinations	5.669	5.731	
Max Upward from Load Cases	3.750	4.450	
D Only	1.919	1.281	
+D+L	5.669	5.731	
+D+Lr	2.999	1.731	
+D+0.750Lr+0.750L	5.542	4.956	
+D+0.750L	4.732	4.618	
+0.60D	1.151	0.769	
Lr Only	1.080	0.450	
L Only	3.750	4.450	

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: MF-10

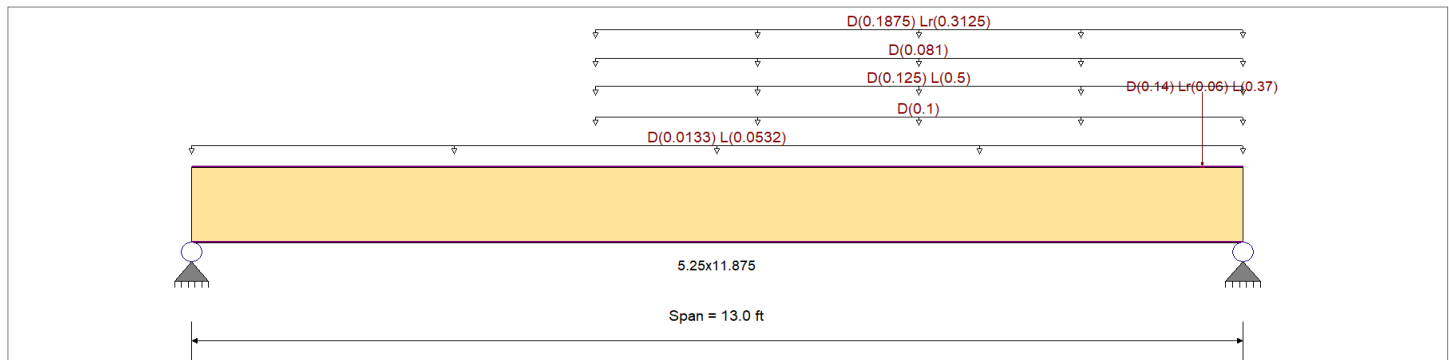
CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,325.0 psi	E : Modulus of Elasticity
Load Combination : IBC 2018	Fb -	2,325.0 psi	Ebend- xx
	Fc - Prll	2,050.0 psi	Eminbend - xx
Wood Species : iLevel Truss Joist	Fc - Perp	800.0 psi	
Wood Grade : TimberStrand LSL 1.55E	Fv	310.0 psi	
	Ft	1,070.0 psi	Density
			45.010pcf

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



Applied Loads

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

Beam self weight NOT internally calculated and added

- Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 1.330 ft, (FLR)
- Uniform Load : D = 0.010 ksf, Extent = 5.0 -->> 13.0 ft, Tributary Width = 10.0 ft, (WALL)
- Uniform Load : D = 0.010, L = 0.040 ksf, Extent = 5.0 -->> 13.0 ft, Tributary Width = 12.50 ft, (FLR)
- Uniform Load : D = 0.010 ksf, Extent = 5.0 -->> 13.0 ft, Tributary Width = 8.10 ft, (WALL)
- Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Extent = 5.0 -->> 13.0 ft, Tributary Width = 12.50 ft, (RF)
- Point Load : D = 0.140, Lr = 0.060, L = 0.370 k @ 12.50 ft, (UF-08)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.700 < 1	Maximum Shear Stress Ratio	=	0.381 < 1
Section used for this span		5.25x11.875	Section used for this span		5.25x11.875
fb: Actual	=	1,629.85psi	fv: Actual	=	118.12 psi
F'b	=	2,327.70psi	F'v	=	310.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	7.401ft	Location of maximum on span	=	12.051 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.227 in	Ratio =	686 >=360	Span: 1 : L Only
Max Upward Transient Deflection		0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection		0.462 in	Ratio =	337 >=240	Span: 1 : +D+0.750Lr+0.750L
Max Upward Total Deflection		0 in	Ratio =	0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values				
			M	V	CD	CM	C _t	CL _x	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only	Length = 13.0 ft	1	0.366	0.201	0.90	1.00	1.00	1.00	1.001	1.00	1.00	1.00	7.88	766.7	2,094.9	0.0	0.00	0.0	0.0
+D+L	Length = 13.0 ft	1	0.700	0.381	1.00	1.00	1.00	1.00	1.001	1.00	1.00	1.00	16.76	1,629.9	2,327.7	4.91	118.1	310.0	0.0
+D+Lr	Length = 13.0 ft	1	0.424	0.234	1.25	1.00	1.00	1.00	1.001	1.00	1.00	1.00	12.69	1,234.5	2,909.6	3.77	90.6	387.5	0.0

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: MF-10

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F _b	V	f _v	F _v
+D+0.750Lr+0.750L	Length = 13.0 ft	1	0.607	0.332	1.25	1.00	1.00	1.00	1.001	1.00	1.00	1.00	18.15	1,764.9	2,909.6	5.34	128.5	387.5
+D+0.750L	Length = 13.0 ft	1	0.528	0.288	1.15	1.00	1.00	1.00	1.001	1.00	1.00	1.00	14.54	1,414.1	2,676.9	4.27	102.6	356.5
+0.60D	Length = 13.0 ft	1	0.124	0.068	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.00	4.73	460.0	3,724.3	1.40	33.7	496.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750Lr+0.750L	1	0.4619	6.832		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	3.078	6.899
Max Upward from Load Combinations	3.078	6.899
Max Upward from Load Cases	1.591	3.471
D Only	1.307	2.954
+D+L	2.897	6.425
+D+Lr	2.078	4.743
+D+0.750Lr+0.750L	3.078	6.899
+D+0.750L	2.500	5.557
+0.60D	0.784	1.773
Lr Only	0.772	1.788
L Only	1.591	3.471

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: MF-11

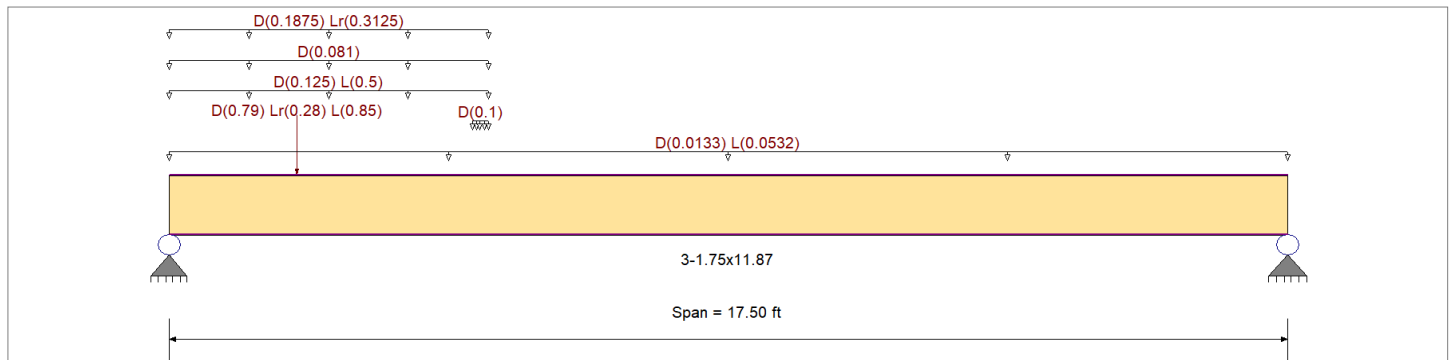
CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,325.0 psi	E : Modulus of Elasticity
Load Combination : IBC 2018	Fb -	2,325.0 psi	Ebend- xx
	Fc - Prll	2,050.0 psi	Eminbend - xx
Wood Species : iLevel Truss Joist	Fc - Perp	800.0 psi	
Wood Grade : TimberStrand LSL 1.55E	Fv	310.0 psi	
	Ft	1,070.0 psi	Density
			45.010pcf

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



Applied Loads

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

Beam self weight NOT internally calculated and added

- Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 1.330 ft, (FLR)
- Uniform Load : D = 0.010 ksf, Extent = 4.750 -->> 5.0 ft, Tributary Width = 10.0 ft, (WALL)
- Uniform Load : D = 0.010, L = 0.040 ksf, Extent = 0.0 -->> 5.0 ft, Tributary Width = 12.50 ft, (FLR)
- Uniform Load : D = 0.010 ksf, Extent = 0.0 -->> 5.0 ft, Tributary Width = 8.10 ft, (WALL)
- Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Extent = 0.0 -->> 5.0 ft, Tributary Width = 12.50 ft, (RF)
- Point Load : D = 0.790, Lr = 0.280, L = 0.850 k @ 2.0 ft, (UF-16)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.528	1	Maximum Shear Stress Ratio	=	0.385	1
Section used for this span		3-1.75x11.87		Section used for this span		3-1.75x11.87	
fb: Actual	=	1,230.36psi		fv: Actual	=	119.39 psi	
F'b	=	2,328.31psi		F'v	=	310.00 psi	
Load Combination		+D+L		Load Combination		+D+L	
Location of maximum on span	=	4.407ft		Location of maximum on span	=	0.000 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.325 in	Ratio =	646	>=360	Span: 1 : L Only	
Max Upward Transient Deflection		0 in	Ratio =	0	<360	n/a	
Max Downward Total Deflection		0.552 in	Ratio =	380	>=240	Span: 1 : +D+0.750Lr+0.750L	
Max Upward Total Deflection		0 in	Ratio =	0	<240	n/a	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only	Length = 17.50 ft	1	0.244	0.184	0.90	1.00	1.00	1.00	1.001	1.00	1.00	1.00	5.26	511.6	2,095.5	0.0	0.00	0.0	0.0
+D+L	Length = 17.50 ft	1	0.528	0.385	1.00	1.00	1.00	1.00	1.001	1.00	1.00	1.00	12.65	1,230.4	2,328.3	0.0	0.00	0.0	0.0
+D+Lr	Length = 17.50 ft	1	0.286	0.212	1.25	1.00	1.00	1.00	1.001	1.00	1.00	1.00	8.55	832.0	2,910.4	0.0	0.00	0.0	0.0

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: MF-11

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F _b	V	f _v	F _v
+D+0.750Lr+0.750L	Length = 17.50 ft	1	0.443	0.324	1.25	1.00	1.00	1.00	1.001	1.00	1.00	1.00	13.27	1,290.5	2,910.4	5.22	125.6	387.5
+D+0.750L	Length = 17.50 ft	1	0.392	0.287	1.15	1.00	1.00	1.00	1.001	1.00	1.00	1.00	10.80	1,050.6	2,677.6	4.25	102.4	356.5
+0.60D	Length = 17.50 ft	1	0.082	0.062	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.00	3.16	307.0	3,725.3	1.28	30.8	496.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750Lr+0.750L	1	0.5524	7.856		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	6.232	1.414
Max Upward from Load Combinations	6.232	1.414
Max Upward from Load Cases	3.361	0.920
D Only	2.521	0.495
+D+L	5.882	1.414
+D+Lr	4.108	0.750
+D+0.750Lr+0.750L	6.232	1.376
+D+0.750L	5.041	1.185
+0.60D	1.512	0.297
Lr Only	1.587	0.255
L Only	3.361	0.920

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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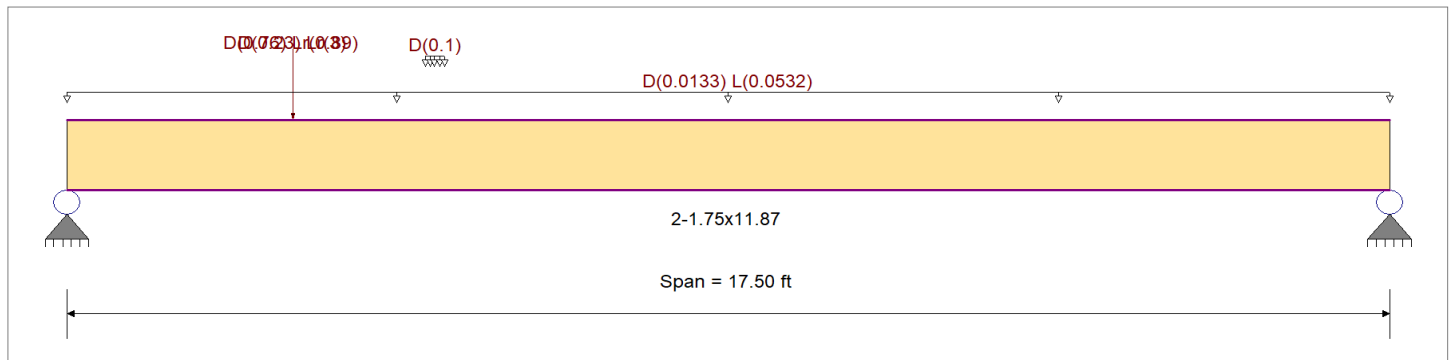
DESCRIPTION: MF-12

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,325.0 psi	E : Modulus of Elasticity
Load Combination : IBC 2018	Fb -	2,325.0 psi	Ebend- xx
	Fc - Prll	2,050.0 psi	Eminbend - xx
Wood Species : iLevel Truss Joist	Fc - Perp	800.0 psi	
Wood Grade : TimberStrand LSL 1.55E	Fv	310.0 psi	
	Ft	1,070.0 psi	Density
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling			45.010pcf



Applied Loads

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

Beam self weight NOT internally calculated and added
 Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 1.330 ft, (FLR)
 Uniform Load : D = 0.010 ksf, Extent = 4.750 -->> 5.0 ft, Tributary Width = 10.0 ft, (WALL)
 Point Load : D = 0.230, Lr = 3.0 k @ 3.0 ft, (R-04a)
 Point Load : D = 0.760, Lr = 0.890 k @ 3.0 ft, (GT-01)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.625 : 1	Maximum Shear Stress Ratio =	0.388 : 1
Section used for this span	2-1.75x11.87	Section used for this span	2-1.75x11.87
fb: Actual =	1,819.47 psi	fv: Actual =	150.32 psi
F'b =	2,910.39 psi	F'v =	387.50 psi
Load Combination	+D+Lr	Load Combination	+D+Lr
Location of maximum on span =	3.002ft	Location of maximum on span =	0.000 ft
Span # where maximum occurs =	Span # 1	Span # where maximum occurs =	Span # 1
Maximum Deflection			
Max Downward Transient Deflection	0.504 in Ratio =	416 >=360	Span: 1 : Lr Only
Max Upward Transient Deflection	0 in Ratio =	0 <360	n/a
Max Downward Total Deflection	0.674 in Ratio =	311 >=240	Span: 1 : +D+Lr
Max Upward Total Deflection	0 in Ratio =	0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination	Max Stress Ratios											Moment Values			Shear Values			
	Segment Length	Span #	M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
D Only															0.0	0.00	0.0	0.0
Length = 17.50 ft	1	0.195	0.122	0.90	1.00	1.00	1.00	1.001	1.00	1.00	1.00	2.80	409.1	2,095.5	0.94	34.0	279.0	
+D+L															0.0	0.00	0.0	0.0
Length = 17.50 ft	1	0.271	0.158	1.00	1.00	1.00	1.00	1.001	1.00	1.00	1.00	4.33	631.1	2,328.3	1.36	49.0	310.0	
+D+Lr															0.0	0.00	0.0	0.0
Length = 17.50 ft	1	0.625	0.388	1.25	1.00	1.00	1.00	1.001	1.00	1.00	1.00	12.47	1,819.5	2,910.4	4.17	150.3	387.5	
+D+0.750Lr+0.750L															0.0	0.00	0.0	0.0
Length = 17.50 ft	1	0.548	0.342	1.25	1.00	1.00	1.00	1.001	1.00	1.00	1.00	10.92	1,593.5	2,910.4	3.67	132.5	387.5	

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: MF-12

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
+D+0.750L						1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 17.50 ft	1		0.211	0.127	1.15	1.00	1.00	1.00	1.001	1.00	1.00	1.00	3.88	565.4	2,677.6	1.25	45.2	356.5
+0.60D						1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 17.50 ft	1		0.066	0.041	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.00	1.68	245.4	3,725.3	0.57	20.4	496.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.6739	7.664		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	4.178	1.142
Max Upward from Load Combinations	4.178	1.142
Max Upward from Load Cases	3.223	0.667
D Only	0.955	0.293
+D+L	1.420	0.759
+D+Lr	4.178	0.960
+D+0.750Lr+0.750L	3.721	1.142
+D+0.750L	1.304	0.642
+0.60D	0.573	0.176
Lr Only	3.223	0.667
L Only	0.466	0.466

Restrained Retaining Wall

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: 9.5' TOP RESTRAINED

Code Reference:

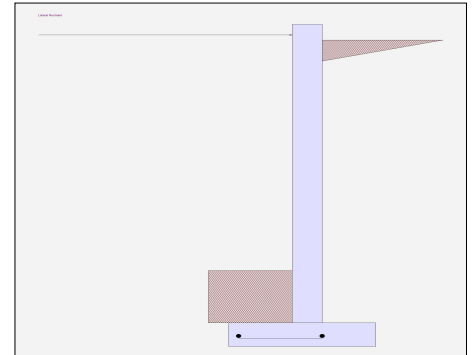
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

Retained Height	=	9.0 ft
Wall height above soil	=	0.50 ft
Total Wall Height	=	9.50 ft
Top Support Height	=	9.0 ft
Slope Behind Wall	=	0
Height of Soil over Toe	=	20.0 in

Soil Data

Allow Soil Bearing	=	1,500.0 psf
Equivalent Fluid Pressure Method		
At-Rest Heel Pressure	=	35.0 psf/ft
	=	0.0 psf/ft
Passive Pressure	=	300.0 psf/ft
Soil Density	=	110.0 pcf
Footing Soil Frictior	=	0.4 psf
Soil height to ignore for passive pressure	=	12 in



Surcharge Loads

Surcharge Over Heel	=	psf
>>>Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0 psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	345.0 lbs
Axial Live Load	=	545.0 lbs
Axial Load Eccentricity	=	in

Earth Pressure Seismic Load

Uniform Lateral Load Applied to Stem

Lateral Load	=	66.50 #/ft
...Height to Top	=	8.50 ft
...Height to Bottom	=	ft
Load Type	=	Seismic (E) (Service Level)
Wind on Exposed Stem	=	0.00 psf (Strength Level)
Wind acts left-to-right toward retention side.		
K_h Soil Density Multiplier	=	0.2 g

Adjacent Footing Load

Adjacent Footing Load	=	lbs
Footing Width	=	ft
Eccentricity	=	in
Wall to Ftg CL Dist	=	ft
Footing Type		Line Load
Base Above/Below Soil at Back of Wall	=	ft
Poisson's Ratio	=	0.3
Added seismic per unit area	=	0.0 psf

Design Summary

Total Bearing Load	=	3,878.15 lbs
...resultant ecc.	=	-1.603 in
Soil Pressure @ Toe	=	826.44 psf OK
Soil Pressure @ Heel	=	1,288.73 psf OK
Allowable	=	psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	1,038.18 psf
ACI Factored @ Heel	=	1,618.91 psf
Footing Shear @ Toe	=	14.264 psi OK
Footing Shear @ Heel	=	3.254 psi OK
Allowable	=	82.158 psi
Reaction at Top	=	738.40 lbs
Reaction at Bottom	=	1,489.42 lbs

Sliding Calcs

Lateral Sliding Force	=	1,489.42 lbs
-----------------------	---	--------------

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

Concrete Stem Construction

Thickness	=	8.00 in
Wall Weight	=	100.0 psf
Stem is FREE to rotate at top of footing		

	@ Top Support	Mmax Between Top & Base	@ Base of Wall
Design Height Above Ftg	Stem OK = 9.0 ft	Stem OK = 3.976 ft	Stem OK = 0.00 ft
Rebar Size	# 4	# 4	# 4
Rebar Spacing	8.00 in	8.00 in	8.00 in
Rebar Placed at	Edge	Edge	Edge
Rebar Depth 'd'	5.50 in	6.0 in	5.50 in
Design Data			
fb/FB + fa/Fa	=	0.652	
Moment.....Actual	=	0.0 ft-#	0.0 ft-#
Moment.....Allowable	=	4,773.0 ft-#	4,773.0 ft-#
Shear Force @ this height	=	1,076.31 lbs	1,869.99 lbs
Shear.....Actual	=	16.308 psi	28.333 psi
Shear.....Allowable	=	82.158 psi	82.158 psi

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

Restrained Retaining Wall

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: 9.5' TOP RESTRAINED

Footing Strengths & Dimensions

Toe Width	=	1.667 ft
Heel Width	=	2.0
Total Footing Width	=	3.667
Footing Thickness	=	9.0 in
Key Width	=	in
Key Depth	=	in
Key Distance from Toe	=	ft
f'c =	3000 psi	Fy = 40000 psi
Footing Concrete Density	=	150 pcf
Min. As %	=	0.0018
Cover @ Top	= 2 in	@ Btm.= 3 in

Footing Design Results

	Toe	Heel
Factored Pressure	= 1,038.18	1,618.91 psf
Mu' : Upward	= 1,564.77	ft-#
Mu' : Downward	= 493.253	ft-#
Mu: Design	= 1,072	-232 ft-#
Actual 1-Way Shear	= 14.264	psi
Allow 1-Way Shear	= 82.158	82.158 psi

Other Acceptable Sizes & Spacings:

Toe: # 4 @ 18.00 in	-or-	phiMn = phi * 5 * lambda * sqrt(fc) * Sm
Heel: None Spec'd	-or-	phiMn = phi * 5 * lambda * sqrt(fc) * Sm
Key: # 0 @ 0.00 in	-or-	No key defined
Min footing T&S reinf Area		0.71 in2
Min footing T&S reinf Area per foot		0.19 in2 /ft
If one layer of horizontal bars:		If two layers of horizontal bars:
#4@ 12.35 in		#4@ 24.69 in
#5@ 19.14 in		#5@ 38.27 in
#6@ 27.16 in		#6@ 54.32 in

Summary of Forces on Footing : Slab is NOT resisting sliding, stem is PINNED at footing

Forces acting on footing for overturning, sliding, & soil pressure

Overturning Moments...	Lateral lbs	Distance ft	Moment ft-#
Stem Shear @ Top of Footing	= 1,243.33	0.750	-932.49
Heel Active Pressure	= 246.094	0.370	-91.055
Sliding Force	= 1,489.42		
Overturning Moment			= -1,023.55
Footing Overturning Stability Ratio			8.453
Net Moment Used For Soil Pressure Calculations			-518.03 ft-#

Resisting Moments...	Vertical lbs	Lateral lbs	Distance ft	Moment ft-#
Surcharge Over Heel	=	0.0	0.0	0.0
Adjacent Footing Load	=	0.0	0.0	0.0
Axial Dead Load on Stem	=	890.0	2.0	1,780.30
Soil Over Toe	=	305.617	0.8335	254.731
Stem Weight	=	950.0	0.0	0.0
Surcharge Over Toe	=	0.0	2.0	1,900.32
Soil Over Heel	=	1,320.0	3.0	3,960.44
Footing Weight	=	412.538	1.834	756.39
Total Vertical Force	=	3,878.15 lbs		
Resisting Moment			=	8,652.17

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

UPSTATE

 engineering, inc.

22002 64TH AVE W - SUITE 2C, MOUNTLAKE TERRACE, WA 98043
SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

Project Title: DHALIWAL-KLAR
Engineer: amg
Project ID: 1651
Project Descr: NEW SFR

Restrained Retaining Wall

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: 9.5' TOP RESTRAINED

Rebar Lap & Embedment Lengths Information

Restrained Retaining Wall

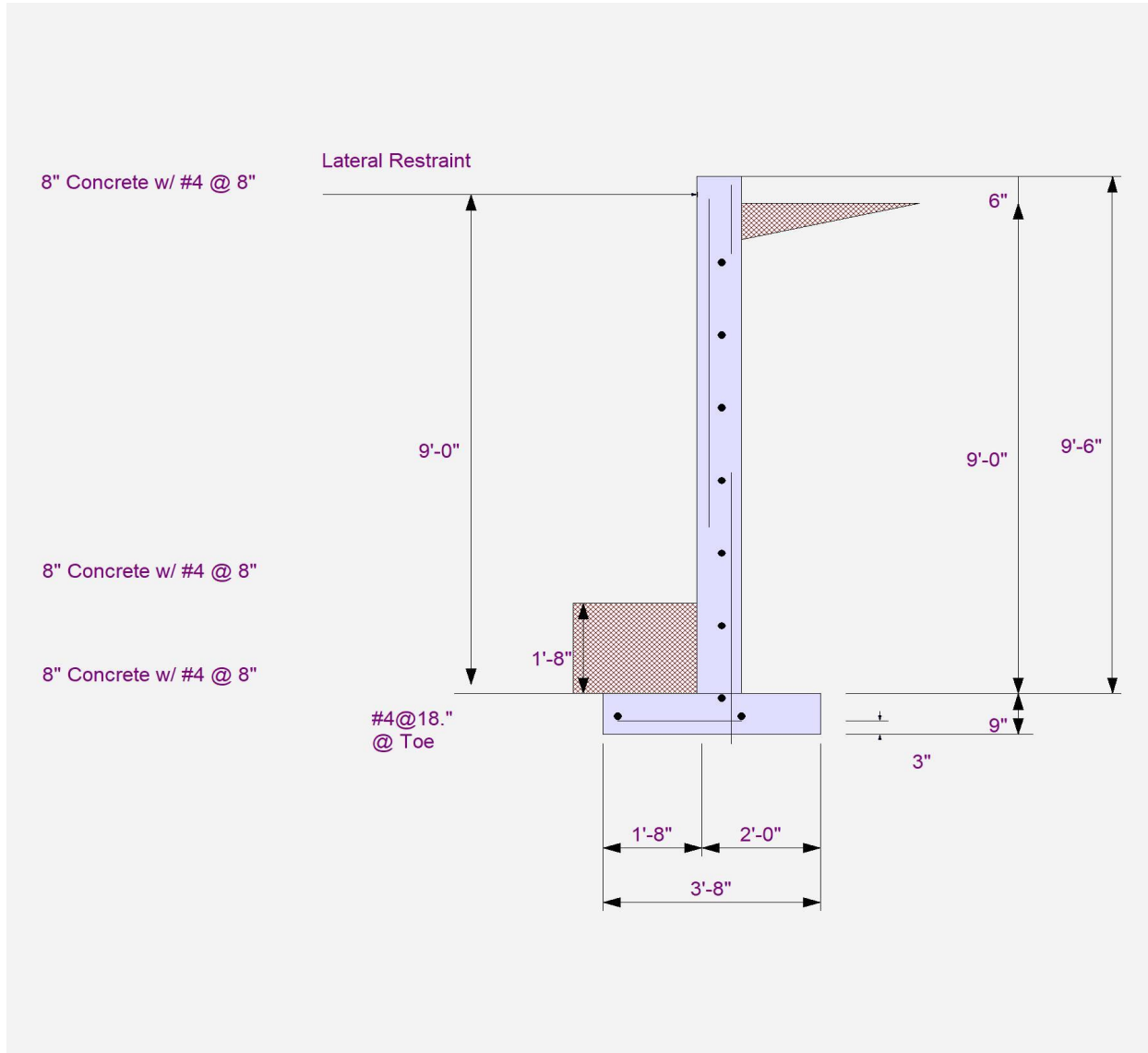
Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

(c) ENERCALC INC 1983-2022

DESCRIPTION: 9.5' TOP RESTRAINED



Restrained Retaining Wall

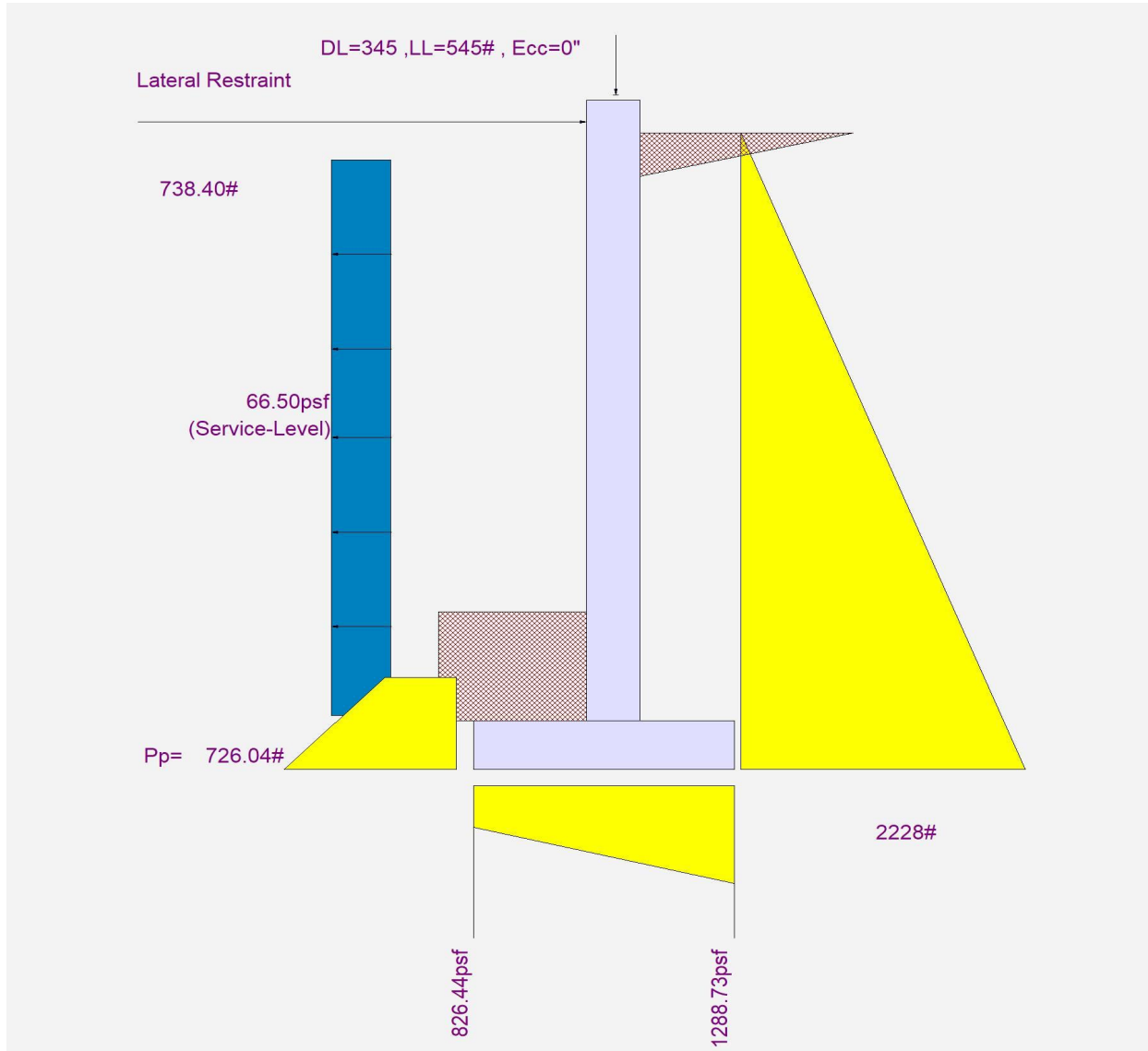
Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

(c) ENERCALC INC 1983-2022

DESCRIPTION: 9.5' TOP RESTRAINED



Cantilevered Retaining Wall

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: 8' MAX CANT'D

Code Reference:

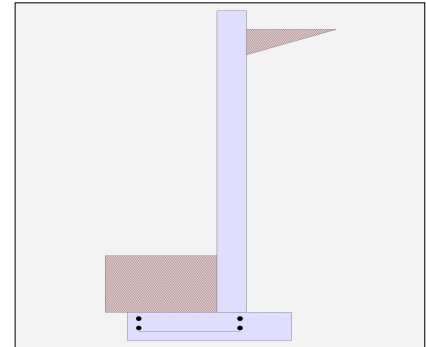
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

Retained Height	=	7.50 ft
Wall height above soil	=	0.50 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	18.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	1,500.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	345.0 lbs
Axial Live Load	=	515.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Strength Level)
Wind on Exposed Stem	=	0.0 psf (Strength Level)

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type	=	Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Cantilevered Retaining Wall

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

(c) ENERCALC INC 1983-2022

DESCRIPTION: 8' MAX CANT'D

Design Summary

Wall Stability Ratios

Overturning	=	2.53	OK
Sliding	=	1.51	OK
Global Stability	=	1.74	
Total Bearing Load	=	3,754 lbs	
...resultant ecc.	=	1.14 in	
Eccentricity within middle third			
Soil Pressure @ Toe	=	743 psf	OK
Soil Pressure @ Heel	=	1,017 psf	OK
Allowable	=	1,500 psf	
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	1,040 psf	
ACI Factored @ Heel	=	1,424 psf	
Footing Shear @ Toe	=	16.9 psi	OK
Footing Shear @ Heel	=	7.1 psi	OK
Allowable	=	82.2 psi	

Sliding Calcs

Lateral Sliding Force	=	1,191.1 lbs	
less 100% Passive Force	=	507.8 lbs	
less 100% Friction Force	=	1,295.4 lbs	
Added Force Req'd	=	0.0 lbs	OK
...for 1.5 Stability	=	0.0 lbs	OK

Vertical component of active lateral soil pressure IS considered in the calculation of soil bearing pressures.

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

Design Height Above Ftg	ft =	Stem OK		
		0.00		
Wall Material Above "Ht"	=	Concrete		
Design Method	=	SD	SD	SD
Thickness	=	8.00		
Rebar Size	=	# 4		
Rebar Spacing	=	8.00		
Rebar Placed at	=	Edge		

Design Data

fb/FB + fa/Fa	=	0.722
---------------	---	-------

Total Force @ Section

Service Level	lbs =	
Strength Level	lbs =	1,575.0

Moment....Actual

Service Level	ft-# =	
Strength Level	ft-# =	3,937.5

Moment.....Allowable	=	5,448.0
----------------------	---	---------

Shear.....Actual

Service Level	psi =	
Strength Level	psi =	21.0

Shear.....Allowable	psi =	82.2
---------------------	-------	------

Anet (Masonry)	in2 =	
----------------	-------	--

Wall Weight	psf =	100.0
-------------	-------	-------

Rebar Depth 'd'	in =	6.25
-----------------	------	------

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	3,000.0
Fy	psi =	40,000.0

Cantilevered Retaining Wall

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: 8' MAX CANT'D

Concrete Stem Rebar Area Details

Bottom Stem	<u>Vertical Reinforcing</u>	<u>Horizontal Reinforcing</u>	
As (based on applied moment) :	0.2213 in2/ft		
(4/3) * As :	0.295 in2/ft	Min Stem T&S Reinf Area 1.536 in2	
200bd/fy : 200(12)(6.25)/40000 :	0.375 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :	
	=====	<u>One layer of :</u> <u>Two layers of :</u>	
Required Area :	0.295 in2/ft	#4@ 12.50 in	#4@ 25.00 in
Provided Area :	0.3 in2/ft	#5@ 19.38 in	#5@ 38.75 in
Maximum Area :	1.524 in2/ft	#6@ 27.50 in	#6@ 55.00 in

Footing Data

Toe Width	=	2.00 ft
Heel Width	=	1.67
Total Footing Width	=	3.67
Footing Thickness	=	9.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft
f'c =	3,000 psi	Fy = 40,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm.= 3.00 in

Footing Design Results

	<u>Toe</u>	<u>Heel</u>	
Factored Pressure	= 1,040	1,424 psf	
Mu' : Upward	= 2,220	730 ft-#	
Mu' : Downward	= 666	1,404 ft-#	
Mu: Design	= 1,554 OK	674 ft-#	OK
phiMn	= 3,372	1,342 ft-#	
Actual 1-Way Shear	= 16.86	7.07 psi	
Allow 1-Way Shear	= 82.16	43.82 psi	
Toe Reinforcing	= # 4 @ 12.00 in		
Heel Reinforcing	= None Spec'd		
Key Reinforcing	= None Spec'd		
Footing Torsion, Tu	=	0.00 ft-lbs	
Footing Allow. Torsion, phi Tu	=	0.00 ft-lbs	

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 12.34 in, #5@ 19.13 in, #6@ 27.16 in, #7@ 37.03 in, #8@ 48.76 in, #9@ 61.72 in, #10@ 78.39 in

Heel: phiMn = ph*5*lambda*sqrt(fc)*Sm

Key: No key defined

Min footing T&S reinf Area 0.71 in2
Min footing T&S reinf Area per foot 0.19 in2 /ft

If one layer of horizontal bars:

#4@ 12.35 in
#5@ 19.14 in
#6@ 27.16 in

If two layers of horizontal bars:

#4@ 24.69 in
#5@ 38.27 in
#6@ 54.32 in

Cantilevered Retaining Wall

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: 8' MAX CANT'D

Summary of Overturning & Resisting Forces & Moments

ItemOVERTURNING.....		RESISTING.....			
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#	
HL Act Pres (ab water tbl)	1,191.1	2.75	3,275.5	Soil Over HL (ab. water tbl)	825.3	3.17	2,613.5
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		3.17	2,613.5
Hydrostatic Force				Water Table			
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =				Surcharge Over Heel =			
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =	345.0	2.33	805.0
Added Lateral Load =				* Axial Live Load on Stem =	515.0	2.33	1,201.7
Load @ Stem Above Soil =				Soil Over Toe =	330.0	1.00	330.0
				Surcharge Over Toe =			
				Stem Weight(s) =	800.0	2.33	1,866.7
				Earth @ Stem Transitions =			
Total	= 1,191.1	O.T.M. =	3,275.5	Footing Weight =	412.5	1.83	756.4
				Key Weight =			
Resisting/Overturning Ratio		= 2.53		Vert. Component =	525.8	3.67	1,928.0
Vertical Loads used for Soil Pressure =		3,753.6 lbs		Total =	3,238.6 lbs	R.M.=	8,299.6

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Vertical component of active lateral soil pressure IS considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci
Horizontal Defl @ Top of Wall (approximate only) 0.000 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

Cantilevered Retaining Wall

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: 8' MAX CANT'D

Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #4 bar specified in this stem design segment (25.4.2.3a) =	15.60 in
Development length for #4 bar specified in this stem design segment =	12.00 in
Hooked embedment length into footing for #4 bar specified in this stem design segment =	6.00 in
As Provided =	0.3000 in/ft
As Required =	0.2950 in/ft

Cantilevered Retaining Wall

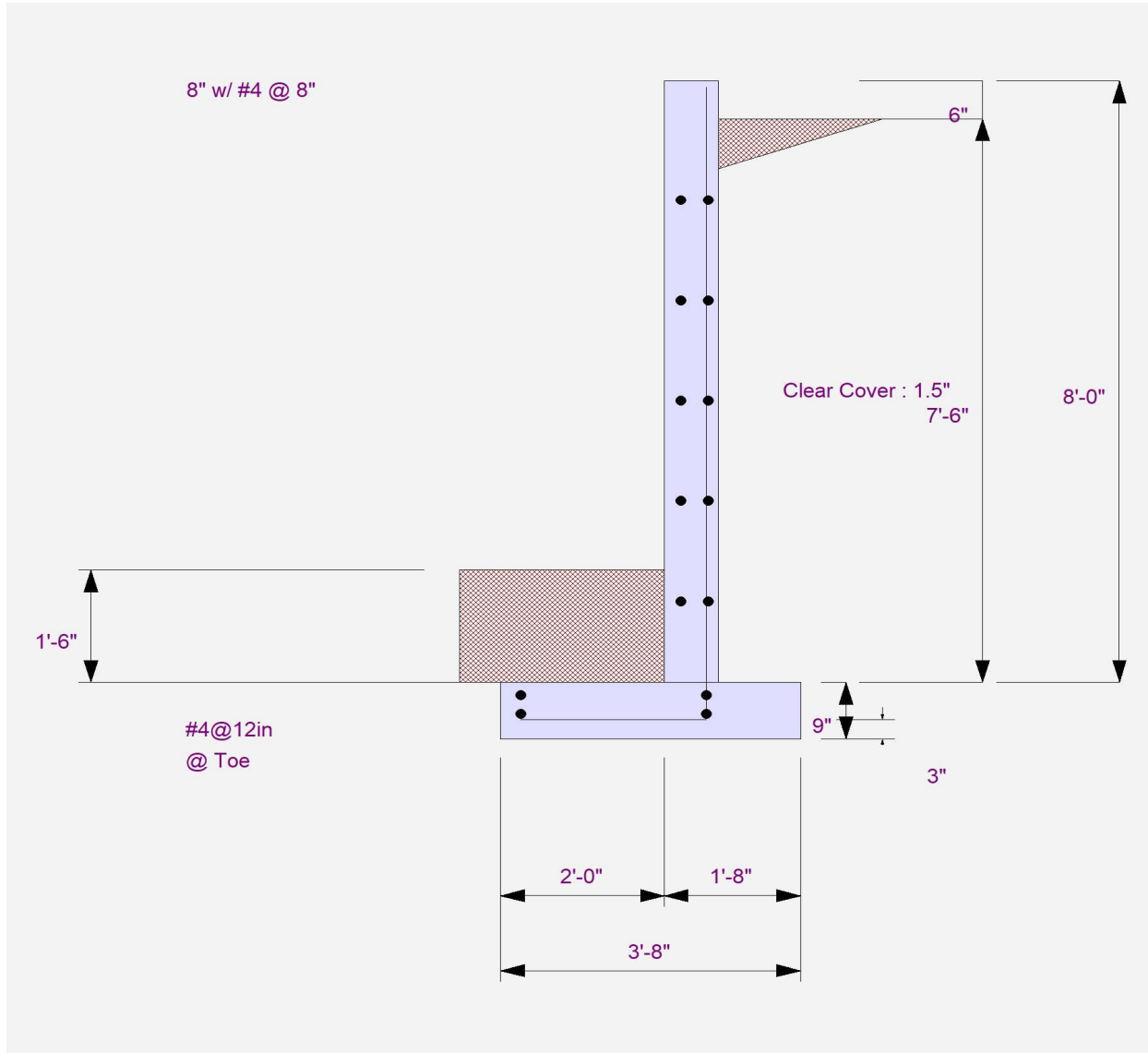
Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: 8' MAX CANT'D



Cantilevered Retaining Wall

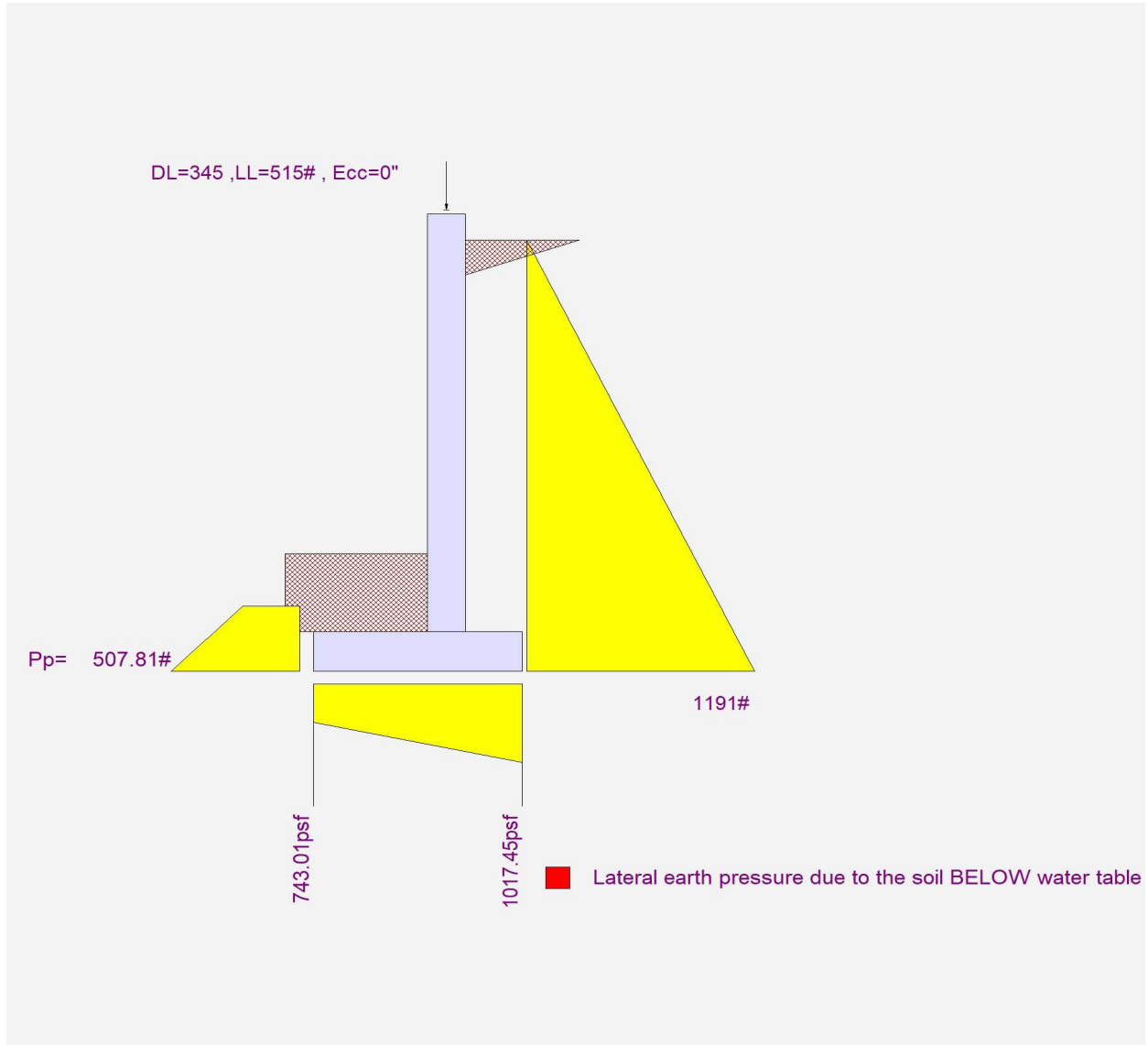
Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

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DESCRIPTION: 8' MAX CANT'D



Cantilevered Retaining Wall

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: 6' MAX CANT'D

Code Reference:

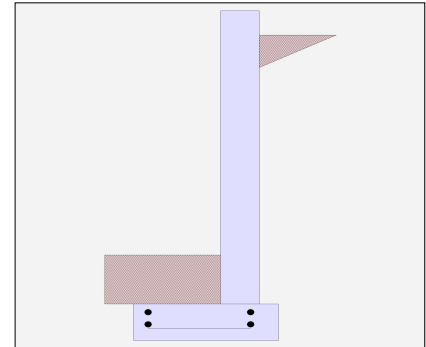
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

Retained Height	=	5.50 ft
Wall height above soil	=	0.50 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	12.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	1,500.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	385.0 lbs
Axial Live Load	=	545.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Strength Level)
Wind on Exposed Stem	=	0.0 psf (Strength Level)

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type	=	Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Cantilevered Retaining Wall

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: 6' MAX CANT'D

Design Summary

Wall Stability Ratios

Overturning	=	1.93	OK
Sliding	=	1.51	OK
Global Stability	=	1.71	

Total Bearing Load	=	2,178	lbs
...resultant ecc.	=	2.18	in

Eccentricity within middle third

Soil Pressure @ Toe	=	1,251	psf	OK
Soil Pressure @ Heel	=	491	psf	OK
Allowable	=	1,500	psf	

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	1,751	psf	
ACI Factored @ Heel	=	688	psf	
Footing Shear @ Toe	=	19.2	psi	OK
Footing Shear @ Heel	=	0.4	psi	OK
Allowable	=	82.2	psi	

Sliding Calcs

Lateral Sliding Force	=	683.6	lbs	
less 100% Passive Force	=	257.8	lbs	
less 100% Friction Force	=	773.9	lbs	
Added Force Req'd	=	0.0	lbs	OK
...for 1.5 Stability	=	0.0	lbs	OK

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

Design Height Above Ftg	ft =	Stem OK	0.00
Wall Material Above "Ht"	=	Concrete	
Design Method	=	SD	SD SD
Thickness	=	8.00	
Rebar Size	=	# 4	
Rebar Spacing	=	12.00	
Rebar Placed at	=	Edge	

Design Data

fb/FB + fa/Fa	=	0.422
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Total Force @ Section

Service Level	lbs =	
Strength Level	lbs =	847.0

Moment....Actual

Service Level	ft-# =	
Strength Level	ft-# =	1,552.8

Moment.....Allowable	=	3,671.3
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Shear.....Actual

Service Level	psi =	
Strength Level	psi =	11.3

Shear.....Allowable	psi =	82.2
---------------------	-------	------

Anet (Masonry)	in2 =	
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Wall Weight	psf =	100.0
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Rebar Depth 'd'	in =	6.25
-----------------	------	------

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	3,000.0
Fy	psi =	40,000.0

Cantilevered Retaining Wall

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

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DESCRIPTION: 6' MAX CANT'D

Concrete Stem Rebar Area Details

	<u>Vertical Reinforcing</u>	<u>Horizontal Reinforcing</u>	
Bottom Stem			
As (based on applied moment) :	0.0873 in2/ft		
(4/3) * As :	0.1164 in2/ft	Min Stem T&S Reinf Area 1.152 in2	
200bd/fy : 200(12)(6.25)/40000 :	0.375 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :	
	=====	<u>One layer of :</u> <u>Two layers of :</u>	
Required Area :	0.1728 in2/ft	#4@ 12.50 in	#4@ 25.00 in
Provided Area :	0.2 in2/ft	#5@ 19.38 in	#5@ 38.75 in
Maximum Area :	1.524 in2/ft	#6@ 27.50 in	#6@ 55.00 in

Footing Data

Toe Width	=	1.50 ft
Heel Width	=	1.00
Total Footing Width	=	2.50
Footing Thickness	=	9.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft
f'c =	3,000 psi	Fy = 40,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm = 3.00 in

Footing Design Results

	<u>Toe</u>	<u>Heel</u>	
Factored Pressure	= 1,751	688 psf	
Mu' : Upward	= 1,731	41 ft-#	
Mu' : Downward	= 300	48 ft-#	
Mu: Design	= 1,431 OK	7 ft-#	OK
phiMn	= 3,372	1,342 ft-#	
Actual 1-Way Shear	= 19.24	0.41 psi	
Allow 1-Way Shear	= 82.16	43.82 psi	
Toe Reinforcing	= # 4 @ 12.00 in		
Heel Reinforcing	= None Spec'd		
Key Reinforcing	= None Spec'd		
Footing Torsion, Tu	=	0.00 ft-lbs	
Footing Allow. Torsion, phi Tu	=	0.00 ft-lbs	

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 12.34 in, #5@ 19.13 in, #6@ 27.16 in, #7@ 37.03 in, #8@ 48.76 in, #9@ 61.72 in, #10@ 78.39 in

Heel: phiMn = ph*5*lambda*sqrt(fc)*Sm

Key: No key defined

Min footing T&S reinf Area 0.49 in2
Min footing T&S reinf Area per foot 0.19 in2 /ft

If one layer of horizontal bars:

#4@ 12.35 in
#5@ 19.14 in
#6@ 27.16 in

If two layers of horizontal bars:

#4@ 24.69 in
#5@ 38.27 in
#6@ 54.32 in

Cantilevered Retaining Wall

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

(c) ENERCALC INC 1983-2022

DESCRIPTION: 6' MAX CANT'D

Summary of Overturning & Resisting Forces & Moments

ItemOVERTURNING.....			RESISTING.....		
	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	683.6	2.08	1,424.2	Soil Over HL (ab. water tbl)	201.7	2.33	470.6
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		2.33	470.6
Hydrostatic Force				Water Table			
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =				Surcharge Over Heel =			
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =	385.0	1.83	705.8
Added Lateral Load =				* Axial Live Load on Stem =	545.0	1.83	999.2
Load @ Stem Above Soil =				Soil Over Toe =	165.0	0.75	123.8
				Surcharge Over Toe =			
				Stem Weight(s) =	600.0	1.83	1,100.0
				Earth @ Stem Transitions =			
Total	= 683.6	O.T.M.	= 1,424.2	Footing Weight =	281.3	1.25	351.6
				Key Weight =			
				Vert. Component =			
Resisting/Overturning Ratio		=	1.93	Total =	1,632.9 lbs	R.M.=	2,751.7
Vertical Loads used for Soil Pressure =		2,177.9 lbs		* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.			

Vertical component of active lateral soil pressure IS considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci
Horizontal Defl @ Top of Wall (approximate only) 0.083 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

Cantilevered Retaining Wall

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

(c) ENERCALC INC 1983-2022

DESCRIPTION: 6' MAX CANT'D

Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #4 bar specified in this stem design segment (25.4.2.3a) =	15.60 in
Development length for #4 bar specified in this stem design segment =	12.00 in
Hooked embedment length into footing for #4 bar specified in this stem design segment =	6.00 in
As Provided =	0.2000 in/ft
As Required =	0.1728 in/ft

Cantilevered Retaining Wall

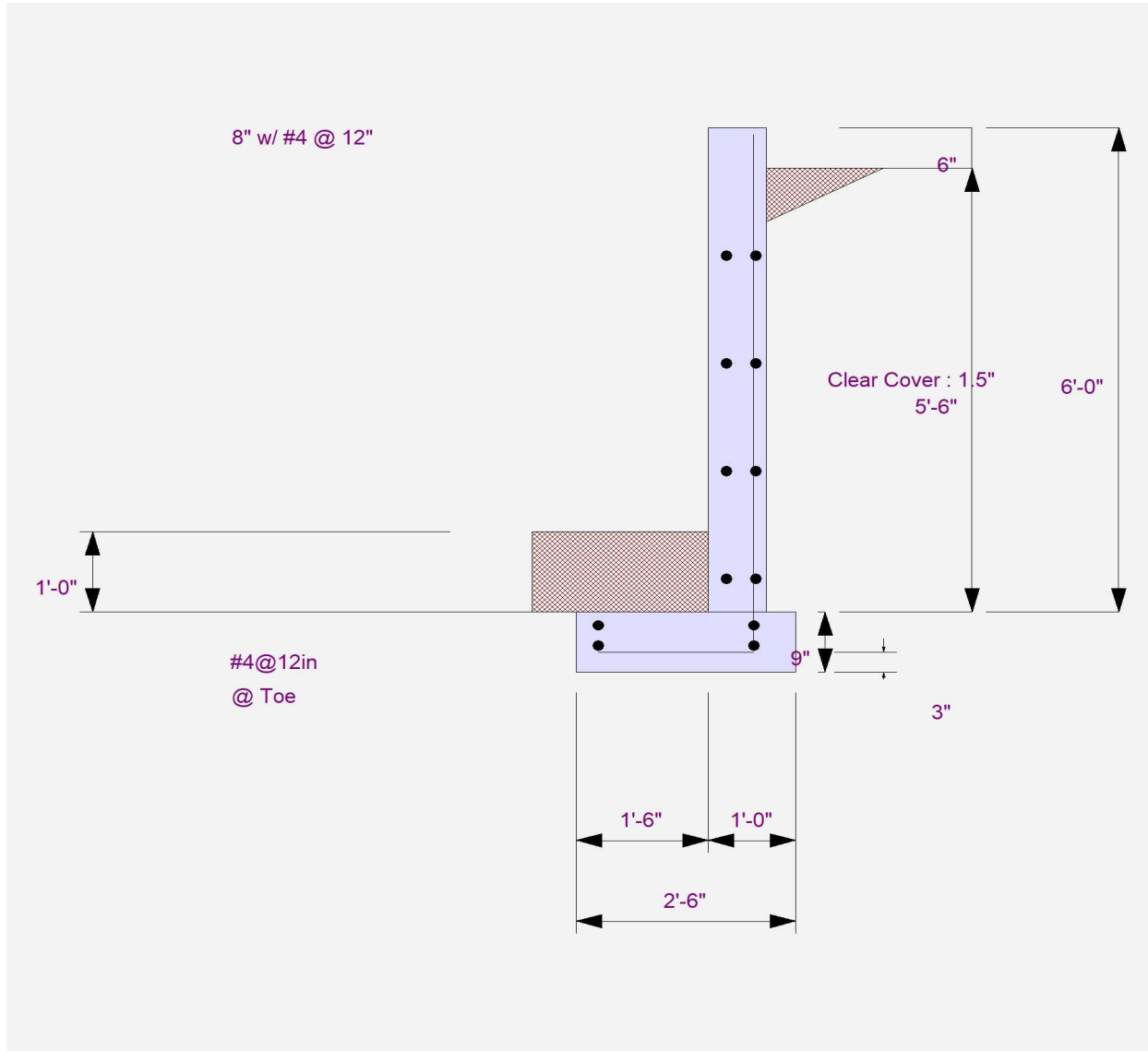
Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14

Upstate Engineering, Inc.

(c) ENERCALC INC 1983-2022

DESCRIPTION: 6' MAX CANT'D



Cantilevered Retaining Wall

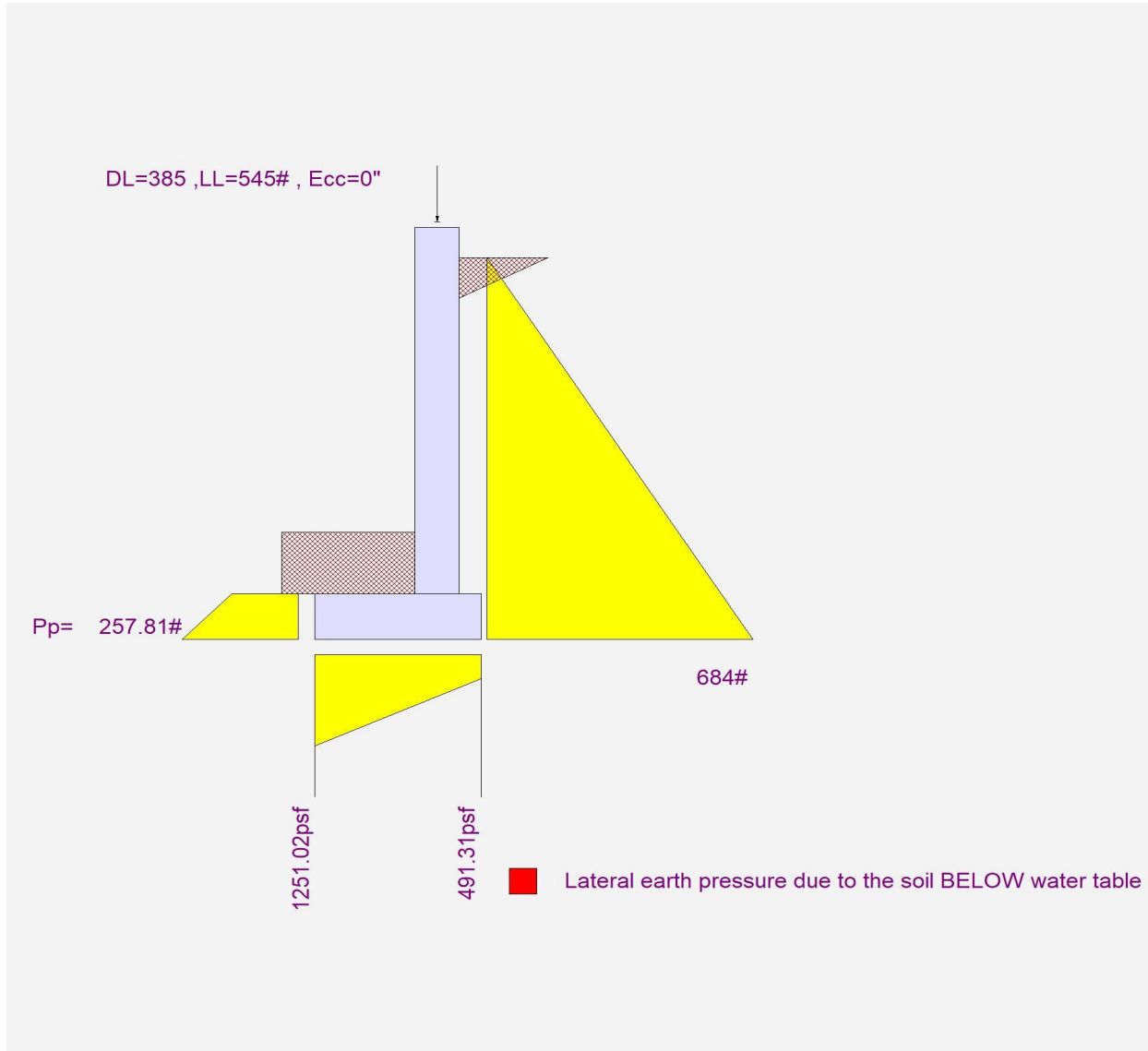
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SHEARWALL & HOLDOWN NOTES (U.N.O.) :

- (1) Simpson or equal. Locate at end of shearwall u.n.o. Install per manufacturer recommendations for foundation minimum end distance and embedment, deepen foundation as required.
- (2) Construct cripple wall same as shearwall (SW) above, and gable-end same as shearwall (SW) below.
- (3) Requires 3x or (2) 2x foundation sill plate
- (4) Threaded rod and coupler as required.
- (5) Common nails, UNO: 8d=0.131"x2½", 10d=0.148"x3", 12d=0.148"x3¼", 16d=0.162"x3½", 16d sinker=0.148"x3¼".
- (6) Install H1's on all trusses/rafters, A35's at 24"o/c on gables & rim joist (or solid blk) to top plate (sill plate at fdn) u.n.o.; When specified spacing is less than 24"o/c, install A35's at roof solid blk'ing to SW top plate, and install H1 or H2.5 on all trusses/rafters. LTP4, LTP5 or LS50 can be substituted for A35. Conn. per Simpson Strong-Tie or equal.
- (7) Minimum 3x or dbl-2x stud lam'd w/ (2)-16d @ 6" o/c at abutting panel edges.
- (8) Anchor bolts shall be embedded at least 7" into concrete; there shall be a minimum of two bolts per piece with one bolt located not more than 12" or less than seven bolt diameters from each end of the piece. 2x min PT, u.n.o.
- (9) All sheathing must be APA rated.

HOLDOWN SCHEDULE

Date: 3/2/2023
Job #: 1651

MARK	HOLDOWN / STRAP *(1)	FASTENERS TO (2)-STUDS MIN U.N.O.	FOUNDATION ANCHOR *(1)(4)	COMMENTS
T-1	MSTC48B3	10d NAILS - (12) FACE, (4) BTM, (38) FRAMING	N/A	TO BEAM/HDR/DBL JST BELOW PER PLAN
T-2	MSTC52	(24) - 16d sinkers to each connected element	N/A	
T-3	HDU4-SDS2.5	(10) - SDS 0.25x2.5 WOOD SCREWS	SSTB24	
T-4	HDU8-SDS2.5	(20) - SDS 0.25x2.5 WOOD SCREWS	SSTB28	MIN. DF#2 4X POST
T-5	HDU14-SDS2.5	(36) - SDS 0.25x2.5 WOOD SCREWS	PAB8 W/ 11" MIN EMBEDMENT	MIN 6x6 POST

SHEARWALL SCHEDULE

Date: 3/2/2023
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MARK *(2)	SHEATHING - APPLY TO 2x HF STUDS @ 16"o/c U.N.O. BELOW *(9)	SHEATHING EDGE NAILS *(5) ALL EDGES BLOCKED (do not penetrate past flush)	BASE PLATE NAILS *(5)	ROOF TO TOP PLATE, FLOOR TO TOP PLATE & SILL PLATE *(6)	SILL PLATE ANCHORS w/ 3" x 3" x 1/4" WASHERS *(8)
P1-6	7/16" OSB	8d @ 6" o/c (12" o/c field)	16d @ 12 " o/c	H1 @ 24 " o/c or A35 @ 24 " o/c	5/8"Øx10" AB's @ 60 " o/c
P1-4	7/16" OSB	8d @ 4" o/c (12" o/c field)	16d @ 6 " o/c	A35 @ 16 " o/c	5/8"Øx10" AB's @ 42 " o/c
P1-3	7/16" OSB *(7)	8d @ 3" o/c (12" o/c field)	16d @ 4 " o/c	A35 @ 12 " o/c	5/8"Øx10" AB's @ 36 " o/c
P1-2	7/16" OSB *(7)	8d @ 2" o/c staggered (12" o/c field)	16d @ 3 " o/c	A35 @ 8 " o/c	5/8"Øx10" AB's @ 24 " o/c *(3)
P2-2	7/16" OSB Both Sides *(7)	8d @ 2" o/c staggered (12" o/c field)	(2)-16d @ 4"o/c to dbl 2x rim / blk'g	A35 / LTP4 each side @ 10 " o/c	5/8"Øx10" AB's @ 16 " o/c *(3)
RSW	7/16" OSB	8d @ 4" o/c (12" o/c field)	16d @ 6 " o/c	A35 @ 16 " o/c	5/8"Øx10" AB's @ 42 " o/c