UPSTATE engineering, inc.
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.

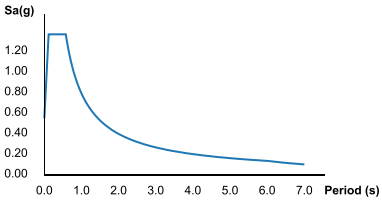
The ATC Hazards by Location website will not be updated to support ASCE 7-22. Find out why.

Hazards by Location

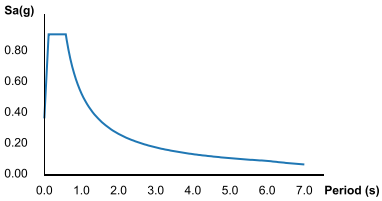
Search Information

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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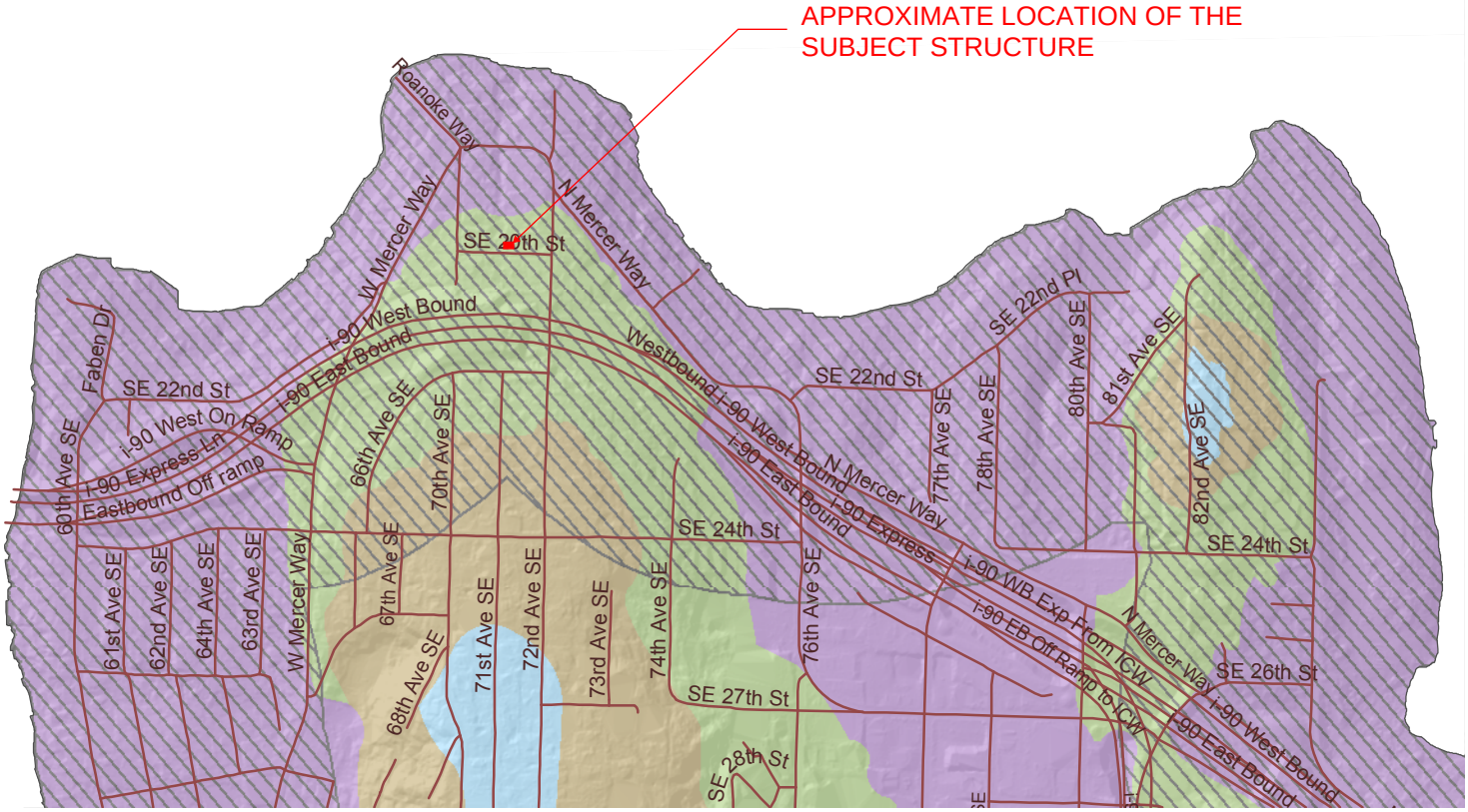
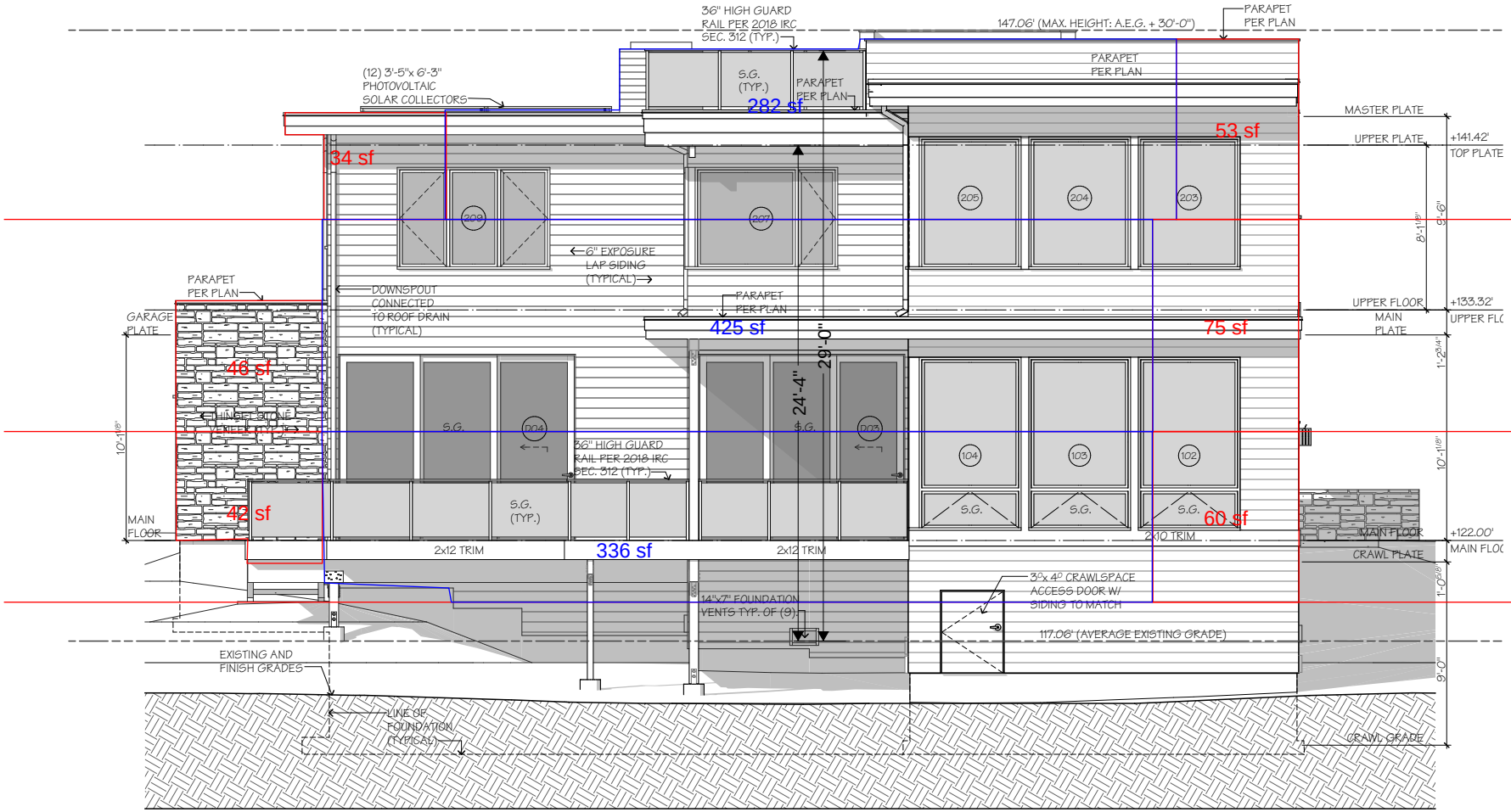


WIND EXPOSURE CATEGORIES:

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

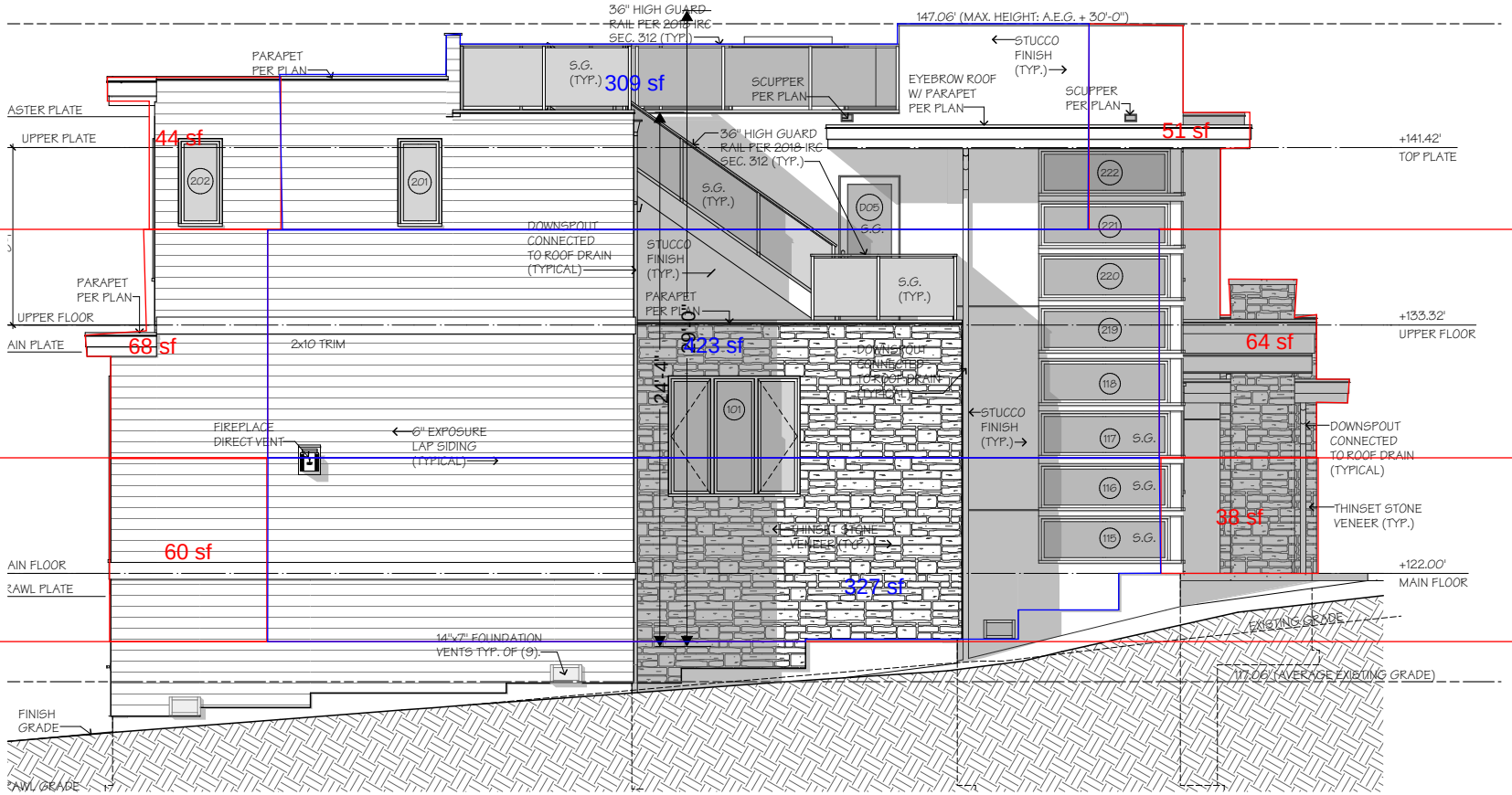
WIND SPEED-UP (TOPOGRAPHIC EFFECT) - K_zt Factor :

K_zt Factor	
	$K_zt = 1.0$
	$K_zt = 1.3$
	$K_zt = 1.6$
	$K_zt = 1.9$



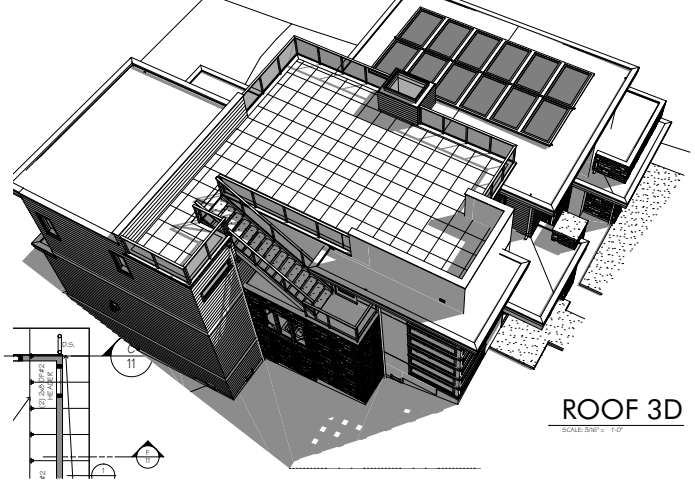
NORTH ELEVATION

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



WEST ELEVATION

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



ROOF 3D

323.1974 sf

709.6613 sf

609.3254 sf

81.9272 sf

LINE OF WALL BELOW

2x6 OUTLOOKERS @ 24" O.C. (TYP.)

LINE OF ROOF BELOW

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

R-10a 3½"x7¼" GLB 24F-V4 HEADER

14" MANUF. WOOD MONO TRUSSES @ 24" O.C. (TYP.)

CANTILEVER R-12 HEADER

R-11 (2) 2x8 DF#2 HEADER

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

R-06 3½"x14" LSL 1.55E (FLUSH)

R-05 1¾"x14" LSL 1.55E (FLUSH)

IUS1.81/9.5 HANGER

R-07 3½"x9" GLB 24F-V4 HEADER

SCUPPER TO D.S.

SIM.

VALLEY

HIP

RIDGE

R-12 4x8 DF#2 HEADER

R-13 (2) 2x8 DF#2 HEADER

R-03 1¾"x14" LSL 1.55E (FLUSH)

14" MANUF. WOOD TRUSSES @ 24" O.C. (TYP.)

SCUPPER TO ROOF BELOW

SKYLIGHT W/ TEMPERED S.G.

14" MANUF. WOOD TRUSSES W/ (3) POINT BEARING @ 24" O.C. (TYP.)

R-04a 4x6 DF#2 DROPPED

R-04 (2) 2x8 DF#2 HEADER

R-02 (4) 1¾"x14" LVL 2.0E (FLUSH)

GT-02 GIRDER TRUSS (LOADING ONLY)

GT-01 GIRDER TRUSS (LOADING ONLY)

HU1.81/5 HANGER

14" STUB MANUF. WOOD TRUSS (2) 2x8 DF#2 HEADER

2x8 DF#2 ROOF JOISTS @ 24" O.C. (RIPPED TO SLOPE ¼" PER FT. TO DRAIN)

R-15 1¾"x14" LVL 2.0E (FLUSH)

1¾"x7¼" LVL 2.0E (FLUSH)

INVERTED HU1.81/5 HANGER

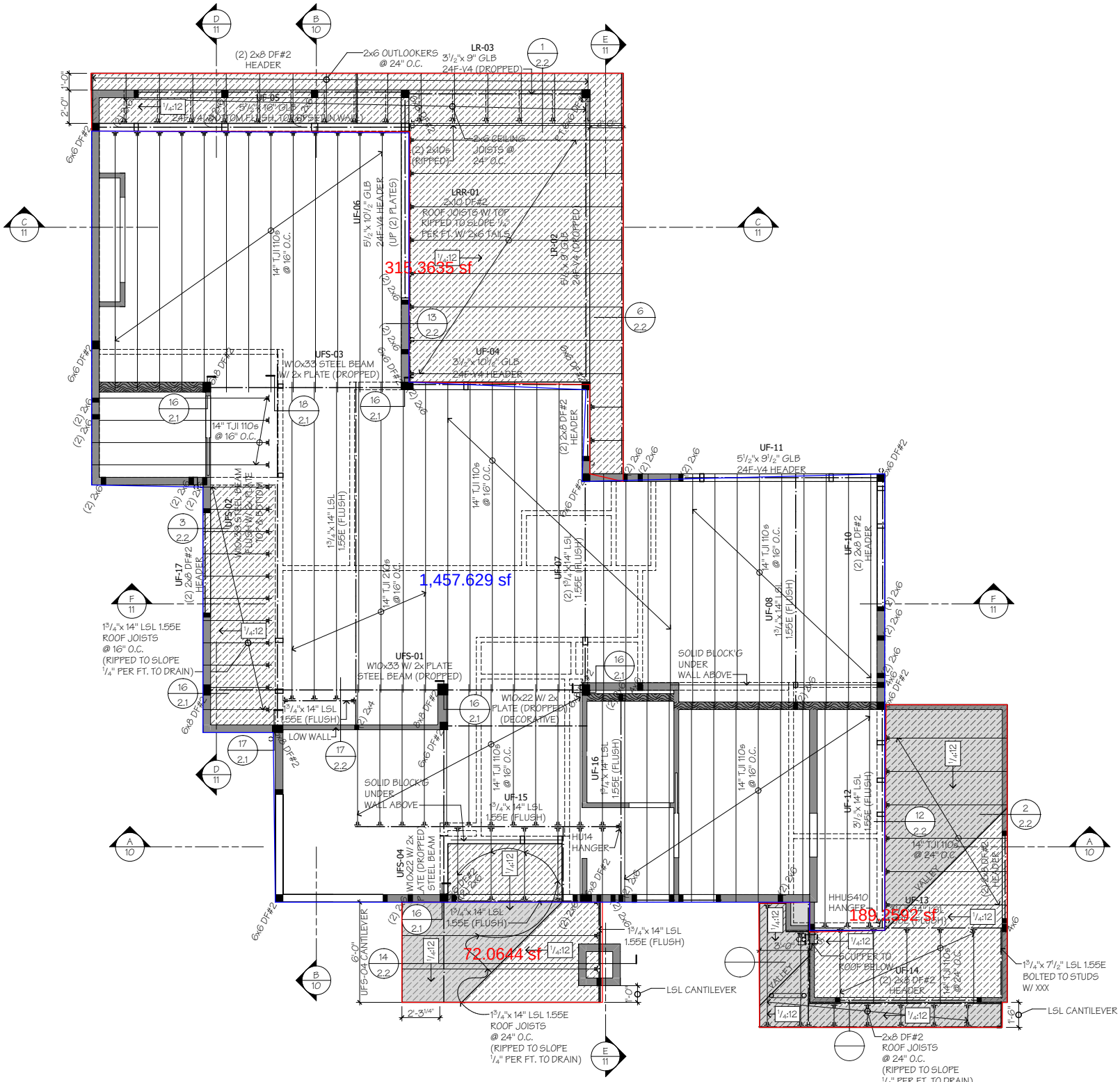
2x6 OUTLOOKERS @ 24" O.C. (TYP.)

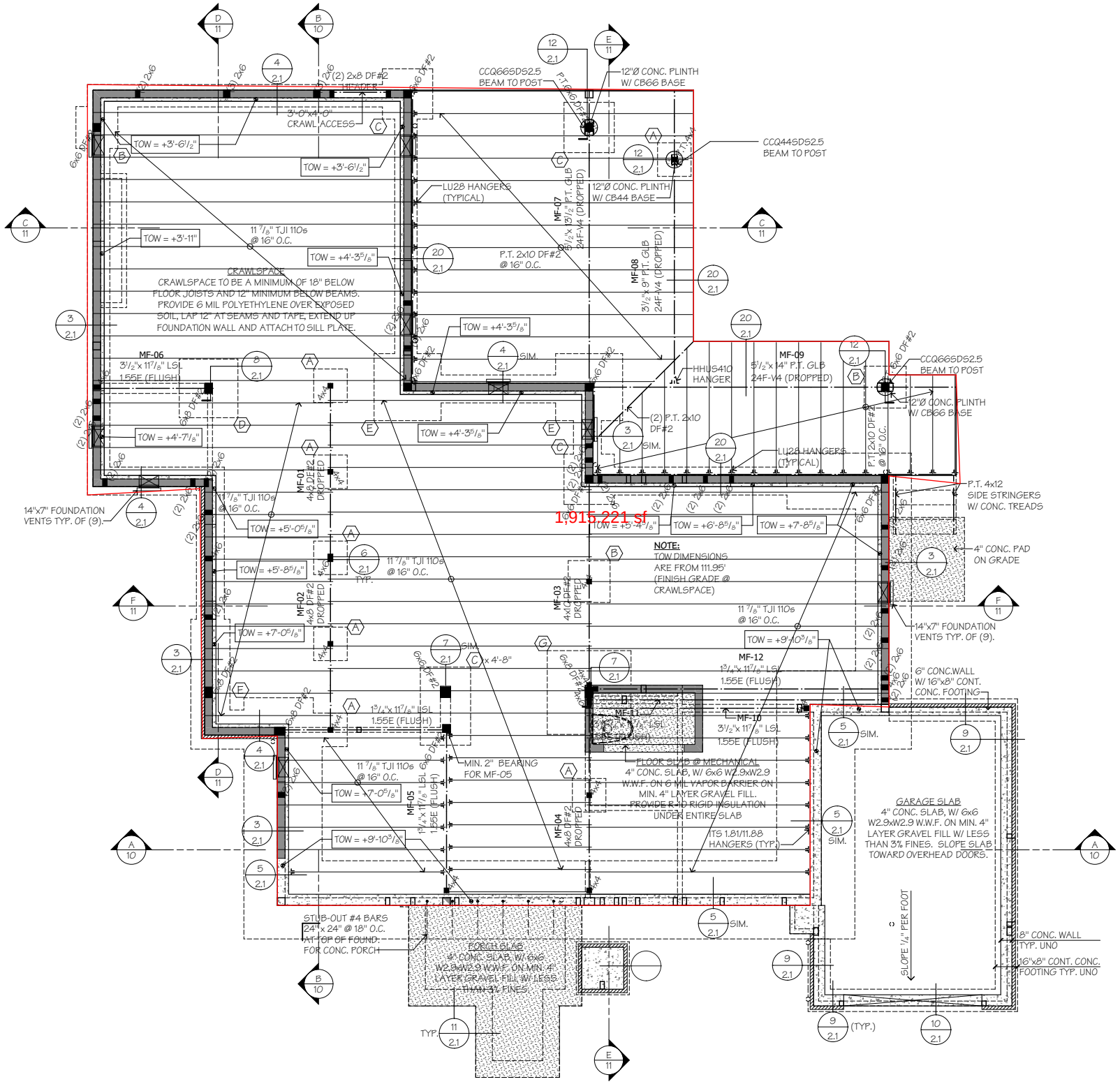
R-01 4x10 DF#2 HEADER

14" TJI 110s @ 16" O.C. W/ 2x6 RIPPED TO ¼" PER FT. ON TOP

FLUSH LVL RIPPED TO 7¼" @ O.H.

D.S.


315.3635 sf
1,457.629 sf
189.2502 sf
72.0644 sf
(2) 2x8 DF#2 HEADER
2x6 OUTLOOKERS @ 24" O.C.
LR-03 3½"x 9" GLB 24F-V4 (DROPPED)
UF-05 5½"x 10½" GLB 24F-V4 HEADER (BOTTOM FLUSH TO OFFSET IN WALL)
2x6 CEILING JOISTS @ 24" O.C.
(2) 2x10s (RIPPED)
LRR-01 2x10 DF#2 ROOF JOISTS W/ TOP RIPPED TO SLOPE ¼" PER FT. W/ 2x6 TAILS
UF-06 5½"x 10½" GLB 24F-V4 HEADER (UP (2) PLATES)
LR-02 5½"x 9" GLB 24F-V4 (DROPPED)
14" TJI 110s @ 16" O.C.
UF-04 5½"x 10½" GLB 24F-V4 HEADER
UFS-03 W10x33 STEEL BEAM W/ 2x PLATE (DROPPED)
UF-11 5½"x 9½" GLB 24F-V4 HEADER
UF-10 (2) 2x8 DF#2 HEADER
UF-08 1¾"x 14" LSL 1.55E (FLUSH)
UF-07 (2) 1¾"x 14" LSL 1.55E (FLUSH)
UFS-02 W10x33 STEEL BEAM FLUSH W/ 2x PLATE TO BOTTOM
UF-17 (2) 2x8 DF#2 HEADER
1¾"x 14" LSL 1.55E (FLUSH)
14" TJI 210s @16" O.C.
1¾"x 14" LSL 1.55E ROOF JOISTS @ 16" O.C. (RIPPED TO SLOPE ¼" PER FT. TO DRAIN)
UFS-01 W10x33 W/ 2x PLATE STEEL BEAM (DROPPED)
SOLID BLOCKING UNDER WALL ABOVE
W10x22 W/ 2x PLATE (DROPPED) (DECORATIVE)
LOW WALL
UF-16 1¾"x 14" LSL 1.55E (FLUSH)
UF-15 1¾"x 14" LSL 1.55E (FLUSH)
UF-12 5½"x 14" LSL 1.55E (FLUSH)
14" TJI 110s @ 24" O.C.
UFS-04 W10x22 W/ 2x PLATE (DROPPED) STEEL BEAM
HU14 HANGER
HHUS410 HANGER
UF-13 1¾"x 14" LSL 1.55E (FLUSH)
SCUPPER TO ROOF BELOW
UF-14 (2) 2x8 DF#2 HEADER
VALLEY
UFS-04 CANTILEVER
1¾"x 14" LSL 1.55E (FLUSH)
LSL CANTILEVER
1¾"x 14" LSL 1.55E ROOF JOISTS @ 24" O.C. (RIPPED TO SLOPE ¼" PER FT. TO DRAIN)
1¾"x 7½" LSL 1.55E BOLTED TO STUDS W/ XXX
2x8 DF#2 ROOF JOISTS @ 24" O.C. (RIPPED TO SLOPE ¼" PER FT. TO DRAIN)


1,915.221 sf
CRAWLSPACE
CRAWLSPACE TO BE A MINIMUM OF 18" BELOW FLOOR JOISTS AND 12" MINIMUM BELOW BEAMS. PROVIDE 6 MIL POLYETHYLENE OVER EXPOSED SOIL, LAP 12" AT SEAMS AND TAPE, EXTEND UP FOUNDATION WALL AND ATTACH TO SILL PLATE.
3'-0"x4'-0" CRAWL ACCESS
(2) 2x8 DF#2 HEADER
CCQ665DS2.5 BEAM TO POST
12"Ø CONC. PLINTH W/ CB66 BASE
CCQ445DS2.5 BEAM TO POST
12"Ø CONC. PLINTH W/ CB44 BASE
LU28 HANGERS (TYPICAL)
HHUS410 HANGER
(2) P.T. 2x10 DF#2
P.T. 2x10 DF#2 @ 16" O.C.
P.T. 4x12 SIDE STRINGERS W/ CONC. TREADS
4" CONC. PAD ON GRADE
14"x7" FOUNDATION VENTS TYP. OF (9).
6" CONC.WALL W/ 16"x8" CONT. CONC. FOOTING
NOTE:
TOW DIMENSIONS ARE FROM 111.95' (FINISH GRADE @ CRAWLSPACE)
MF-01 4x8 DF#2 DROPPED
MF-02 4x8 DF#2 DROPPED
MF-03 4x10 DF#2 DROPPED
MF-04 4x8 DF#2 DROPPED
MF-05 1¾"x11⅞" LSL 1.55E (FLUSH)
MF-06 3½"x11⅞" LSL 1.55E (FLUSH)
MF-07 3½"x 35½" P.T. GLB 24F-V4 (DROPPED)
MF-08 3½"x 9" P.T. GLB 24F-V4 (DROPPED)
MF-09 5½"x 14" P.T. GLB 24F-V4 (DROPPED)
MF-10 3½"x11⅞" LSL 1.55E (FLUSH)
MF-11 1¾"x11⅞" LSL 1.55E (FLUSH)
MF-12 1¾"x11⅞" LSL 1.55E (FLUSH)
11 ⅞" TJI 110s @ 16" O.C.
TOW = +3'-6½"
TOW = +3'-11"
TOW = +4'-3⅝"
TOW = +4'-7⅛"
TOW = +5'-0⅝"
TOW = +5'-4⅛"
TOW = +5'-8⅝"
TOW = +6'-8⅝"
TOW = +7'-0⅝"
TOW = +7'-8⅝"
TOW = +9'-10⅝"
FLOOR SLAB @ MECHANICAL 4" CONC. SLAB, W/ 6x6 W2.9xW2.9 W.W.F. ON 6 MIL VAPOR BARRIER ON MIN. 4" LAYER GRAVEL FILL. PROVIDE R-10 RIGID INSULATION UNDER ENTIRE SLAB
GARAGE SLAB 4" CONC. SLAB, W/ 6x6 W2.9xW2.9 W.W.F. ON MIN. 4" LAYER GRAVEL FILL W/ LESS THAN 3% FINES. SLOPE SLAB TOWARD OVERHEAD DOORS.
PORCH SLAB 4" CONC. SLAB, W/ 6x6 W2.9xW2.9 W.W.F. ON MIN. 4" LAYER GRAVEL FILL W/ LESS THAN 3% FINES.
STUB-OUT #4 BARS 24" x 24" @ 18" O.C. AT TOP OF FOUND. FOR CONC. PORCH
MIN. 2" BEARING FOR MF-05
ITS 1.81/11.88 HANGERS (TYP.)
SLOPE ¼" PER FOOT
8" CONC. WALL TYP. UNO
16"x8" CONT. CONC. FOOTING TYP. UNO

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

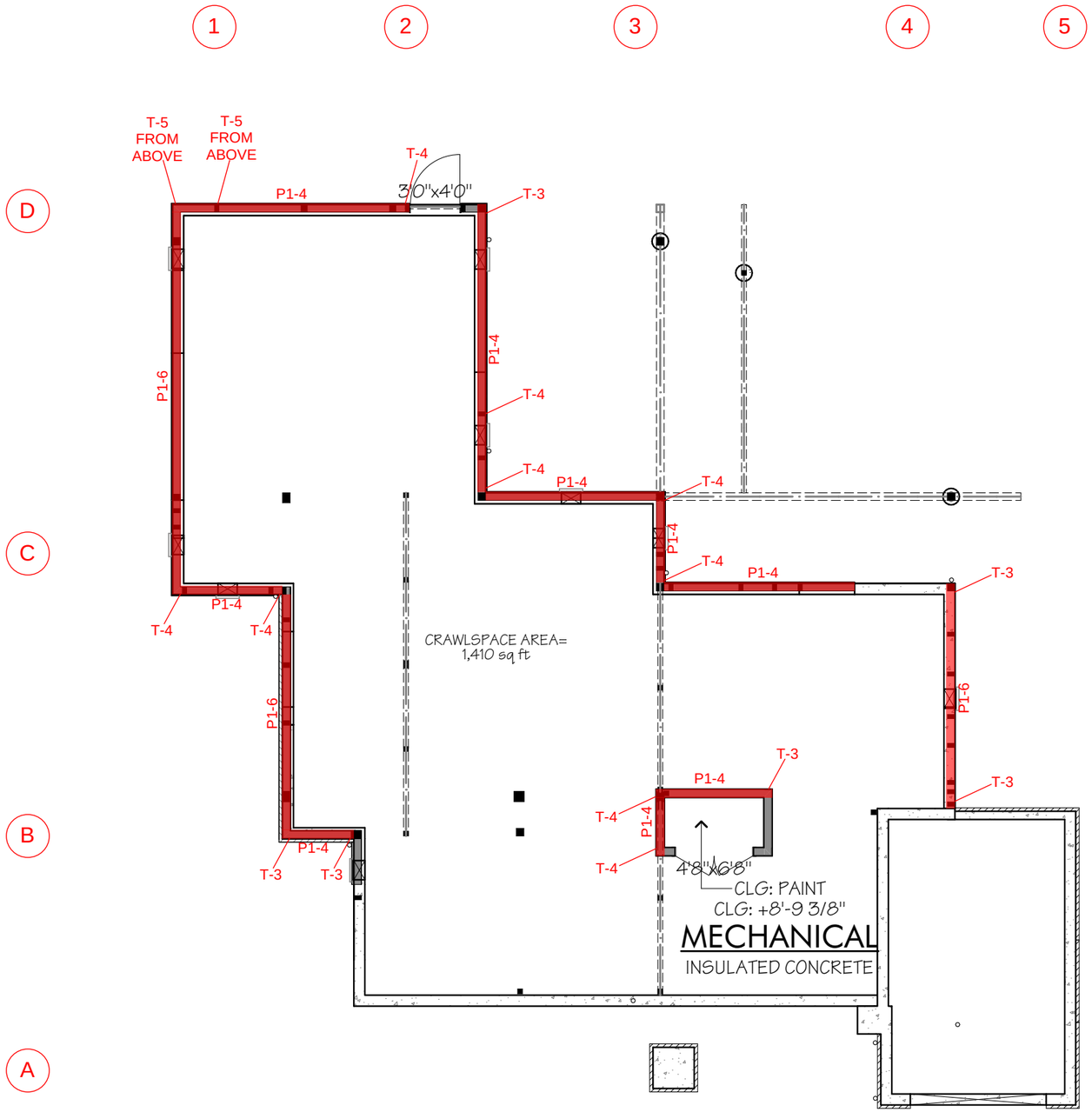
1603.1.4 Wind Design Criteria

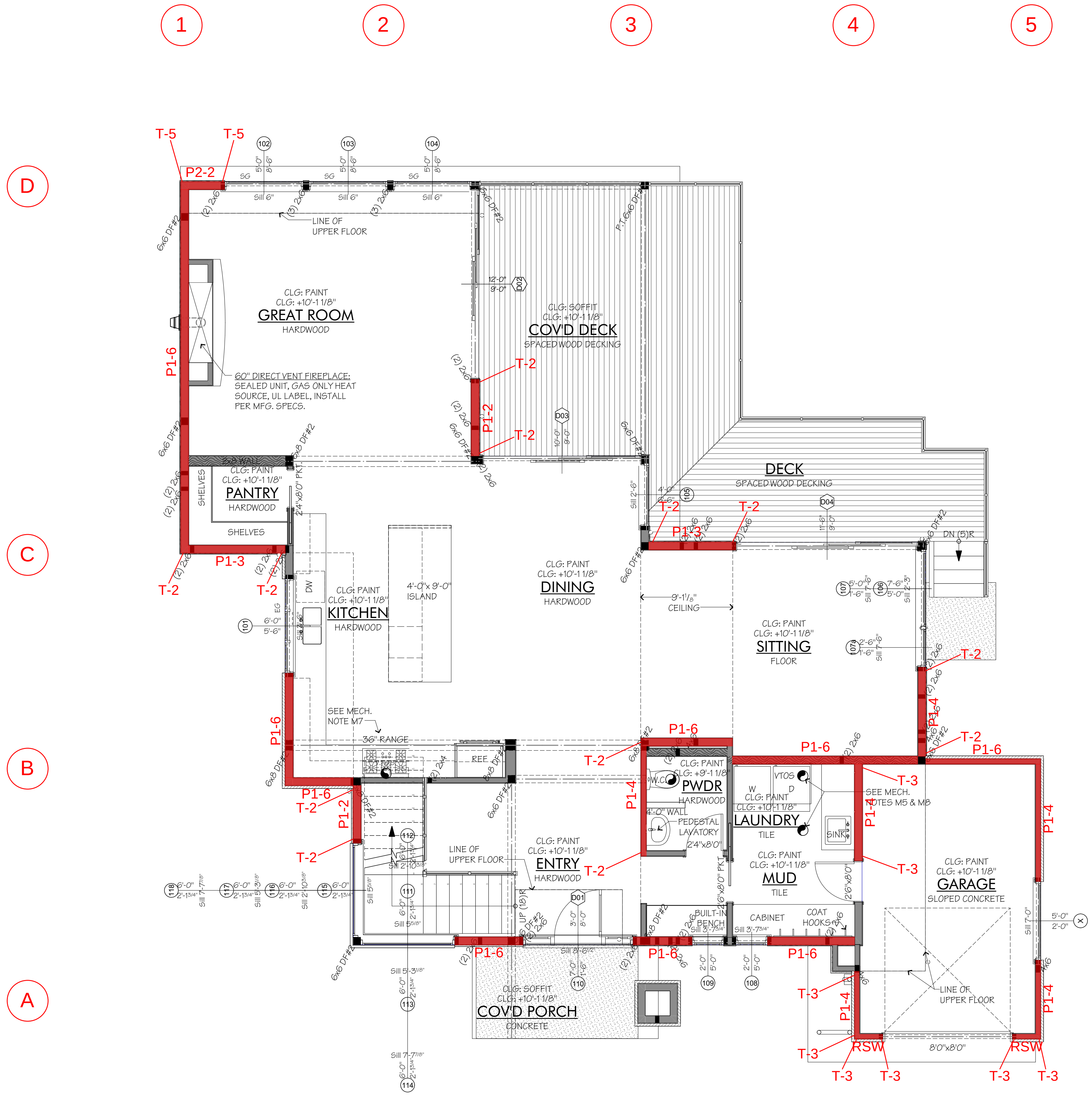
1. Basic /ASD Wind Speed	V/V_{asd}	110/85	mph	*F 1609.3(1)*
2. Risk Category	II	1.00		*ASCE 7 T 1.5-1*
3. Wind Exposure Category		"C"		*1609.4*
4. Internal Pressure Coefficient		+/-0. 55		*ASCE 7 F 26.13-1*
5. Components and Cladding design pressure		+/- 16	psf	*ASCE 7 30.2.2*

1603.1.5 Earthquake Design Data

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

Table of Contents

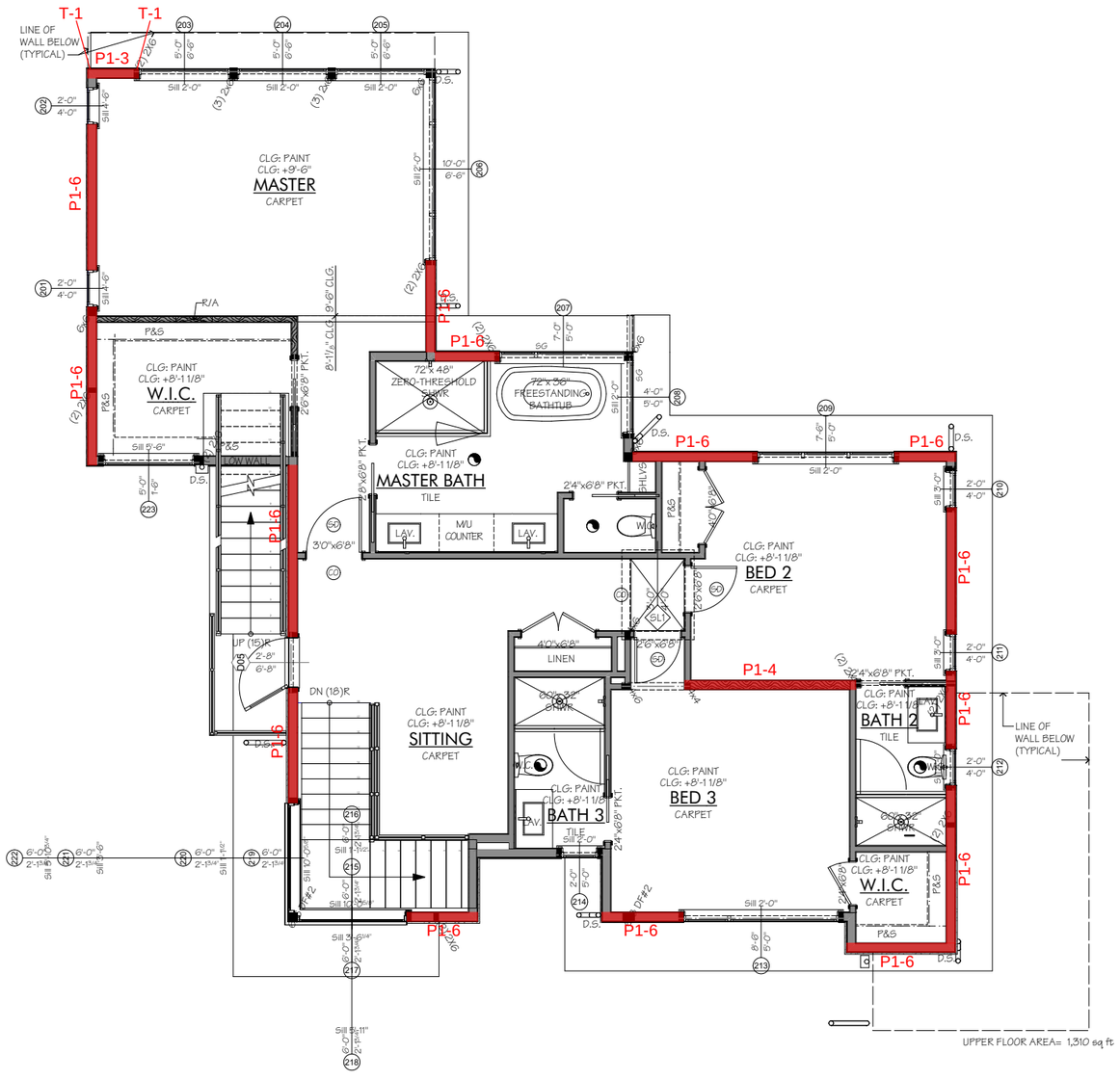

1
2
3
4
5
D
C
B
A
T-5 FROM ABOVE
T-5 FROM ABOVE
T-4
3'0"x4'0"
T-3
P1-4
P1-6
T-4
T-4
P1-4
P1-4
T-4
P1-4
T-4
T-3
P1-6
T-4
T-4
P1-4
P1-6
CRAWLSPACE AREA=
1,410 sq ft
T-3
T-3
P1-4
T-4
T-4
P1-4
4'8"x6'8"
CLG: PAINT
CLG: +8'-9 3/8"
MECHANICAL
INSULATED CONCRETE



1
2
3
4
5
D
C
B
A
T-5
T-5
P2-2
P1-6
P1-3
T-2
102
103
104
SG
Sill 6"
5'-0"
8'-6"
LINE OF UPPER FLOOR
CLG: PAINT
CLG: +10'-1 1/8"
GREAT ROOM
HARDWOOD
60" DIRECT VENT FIREPLACE:
SEALED UNIT, GAS ONLY HEAT SOURCE, UL LABEL, INSTALL PER MFG. SPECS.
6x6 DF#2
(2) 2x6
(3) 2x6
2x8 WALL
CLG: PAINT
CLG: +10'-1 1/8"
PANTRY
HARDWOOD
SHELVES
2'4"x8'0" PKT.
CLG: SOFFIT
CLG: +10'-1 1/8"
COV'D DECK
SPACED WOOD DECKING
12'-0"
9'-0"
D02
D03
10'-0"
9'-0"
P1-2
P.T. 6x6 DF#2
DECK
SPACED WOOD DECKING
D04
105
4'-0"
6'-6"
Sill 2'-6"
11'-6"
9'-0"
P1-3
DN (5)R
CLG: PAINT
CLG: +10'-1 1/8"
DINING
HARDWOOD
9'-1 1/8"
CEILING
CLG: PAINT
CLG: +10'-1 1/8"
SITTING
FLOOR
107
5'-0"
1'-6"
Sill 7'-6"
106
7'-6"
5'-0"
Sill 2'-3"
107a
2'-6"
1'-6"
Sill 7'-6"
DW
CLG: PAINT
CLG: +10'-1 1/8"
KITCHEN
HARDWOOD
4'-0"x 9'-0"
ISLAND
101
6'-0"
5'-6"
EG
SEE MECH. NOTE M7
36" RANGE
REF
6x8 DF#2
(2) 2x4
P1-4
CLG: PAINT
CLG: +9'-1 1/8"
PWDR
HARDWOOD
W.C.
4'-0" WALL
PEDESTAL LAVATORY
2'4"x8'0"
VTOS
W
D
CLG: PAINT
CLG: +10'-1 1/8"
LAUNDRY
TILE
SINK
SEE MECH. NOTES M5 & M8
T-3
CLG: PAINT
CLG: +10'-1 1/8"
MUD
TILE
2'6"x8'0"
2'6"x8'0" PKT.
BUILT-IN BENCH
CABINET
COAT HOOKS
Sill 3'-7 3/4"
CLG: PAINT
CLG: +10'-1 1/8"
GARAGE
SLOPED CONCRETE
LINE OF UPPER FLOOR
8'0"x8'0"
RSW
Sill 7'-0"
5'-0"
2'-0"
4x6
112
111
Sill 2'-10 3/8"
Sill 5 5/8"
LINE OF UPPER FLOOR
CLG: PAINT
CLG: +10'-1 1/8"
ENTRY
HARDWOOD
UP (18)R
D01
3'-0"
8'-0"
Sill 8'-6 1/2"
110
7'-0"
1'-6"
109
108
2'-0"
5'-0"
CLG: SOFFIT
CLG: +10'-1 1/8"
COV'D PORCH
CONCRETE
Sill 5'-3 1/8"
113
6'-0"
2'-1 3/4"
Sill 7'-7 7/8"
114
118
117
116
115
Sill 7'-7 7/8"
Sill 5'-3 1/8"
Sill 2'-10 3/8"

1 2 3 4

D C B A


T-1
T-1
LINE OF WALL BELOW (TYPICAL)
P1-3
(2) 2x6
203
204
205
5'-0" 6'-6"
Sill 2'-0"
(3) 2x6
D.S.
202
2'-0" 4'-0"
Sill 4'-6"
P1-6
CLG: PAINT
CLG: +9'-6"
MASTER
CARPET
10'-0" 6'-6"
206
201
R/A
9'-6" CLG
8'-1½" CLG
P&S
207
7'-0" 5'-0"
72" x 48" ZERO-THRESHOLD SHWR
72" x 36" FREESTANDING BATHTUB
4'-0" 5'-0"
208
209
CLG: PAINT
CLG: +8'-1 1/8"
W.I.C.
CARPET
Sill 5'-6"
LOW WALL
5'-0" 1'-6"
223
CLG: PAINT
CLG: +8'-1 1/8"
MASTER BATH
TILE
2'4"x6'8" PKT.
LAV.
M/U COUNTER
LAV.
WC
3'0"x6'8"
CLG: PAINT
CLG: +8'-1 1/8"
BED 2
CARPET
SLT
4'0"x6'8"
LINEN
2'-0" 4'-0"
210
211
UP (15)R
2'-8" 6'-8"
DN (18)R
CLG: PAINT
CLG: +8'-1 1/8"
SITTING
CARPET
CLG: PAINT
CLG: +8'-1 1/8"
BATH 3
TILE
Sill 2'-0"
CLG: PAINT
CLG: +8'-1 1/8"
BED 3
CARPET
2'4"x6'8" PKT.
CLG: PAINT
CLG: +8'-1 1/8"
BATH 2
TILE
LINE OF WALL BELOW (TYPICAL)
212
216
215
214
213
217
218
DF#2
2'-0" 5'-0"
8'-6" 5'-0"
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	I =	1.37		*ASCE 7 F 28.5-1*
Topographic Factor	Kzt =	1.30		*ASCE 7 F 26.8-1*

Wind Pressures *ASCE 7 28.5.3*

$p_s = I K_{zt} p_{S30}$ *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)(p_{S30}) *ASCE 7 F 28.5-1*

110	Horizontal Pressures				Vertical Pressures				Overhangs	
0	A	B	C	D	E	F	G	H	EOH	GOH
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, Fx *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
2a (ft) = 6

Areas	Front to Rear A	B	C	D	Side to Side A	B	C	D
	87	0	282	0	95	0	309	0
Forces	F_x = -707		F_{xmin} = 3690		F_x = -784		F_{xmin} = 4040	

Diaphragm (x = 2)

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

Areas	Front to Rear A	B	C	D	Side to Side A	B	C	D
	121	0	425	0	132	0	423	0
Forces	F_x = -1370		Fxmin = 5460		F_x = -1015		F_{xmin} = 5550	

Diaphragm (x = 1)

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

Areas	Front to Rear A	B	C	D	Side to Side A	B	C	D
	102	0	336	0	98	0	327	0
Forces	F_x = -892		Fxmin = 4380		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 Coeffiecient, F_a	1.0	*T1613.2.3(1)*
Site Coeffiecient, F_v	1.5	*T1613.2.3(2)*

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

$$S_{DS} = \frac{2}{3} \cdot F_a \cdot S_s$$ S_{DS} = 0.91 *EQ 16-38*

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

Seismic base shear ASCE 7 *12.14.8.1*

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

Vertical Distribution, Forces at each level ASCE 7 *12.14.8.2*

$F_x = (w_x/W)\ V$ $F_x =$ 0.168 x w_x *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	164	
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	138	
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	110	
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, 16-19and 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,

$0.9\,D + E/1.4$, substitute ASCE 7 EQ 12.14-6 for E

ASCE 7 12.14.3.2 (2), EQ 12.14-6

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

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

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 Fx

	For Kzt =	1.30
	Front to Rear	Side to Side
Diaphragm	Force (lbs)	Force (lbs)
x = 3	3742	4097
x = 2	5536	5628
x = 1	4441	4310

Seismic Design Loads, (ρ/1.4) F_x

ρ = 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,

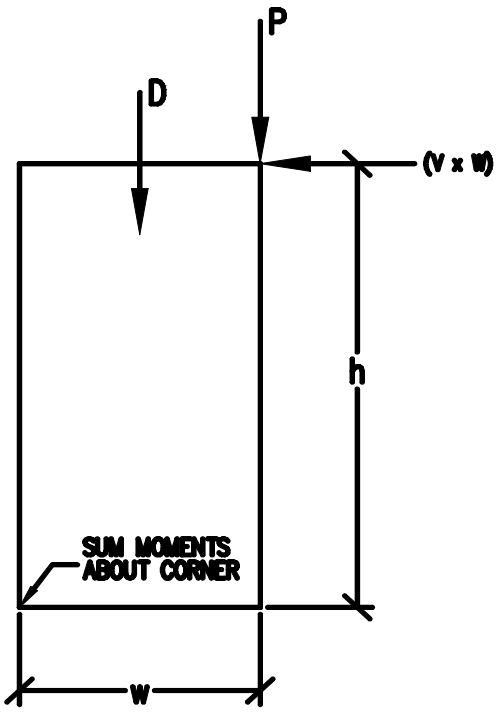
$$(v \cdot w) \cdot h - \frac{2}{3}\left(D \cdot \frac{w}{2} + P \cdot w\right) \quad \text{for wind}$$

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

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		
			Width	Height	wr	wra	wf	wfa	T(x)	T(x+1)	T(x)	T(x+1)	Seis max
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	174											
$T_{MAX(x)}$ [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	153											
$T_{MAX(x)}$ [lbs]													

Wall Line	Level (x)	Direction	Segment		Tributary loads				Wind		Seismic		
			Width	Height	wr	wra	wf	wfa	T(x)	T(x+1)	T(x)	T(x+1)	Seis max
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		
			Width	Height	wr	wra	wf	wfa	T(x)	T(x+1)	T(x)	T(x+1)	Seis max
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		
			Width	Height	wr	wra	wf	wfa	T(x)	T(x+1)	T(x)	T(x+1)	Seis max
5	**2**	**F-R**											
	Wind	**Seis**											
VD(x+1) [lbs]													
%	9%	9%											
VD(x) [lbs]	498.28	599.059	7.75	10.1					-209		-229		
VT(x) [lbs]	498.28	599.059	5.00	10.1					-116		-120		47
L	12.75	12.75											
n	39	47											
2015 SDPWS	SEISMIC MAX	47											
TMAX(x) [lbs]													
	2	**F-R**											
	Wind	**Seis**											
VD(x+1) [lbs]													
%													
VD(x) [lbs]													
VT(x) [lbs]													
L													
n													
2015 SDPWS	SEISMIC MAX												
TMAX(x) [lbs]													
	2	**F-R**											
	Wind	**Seis**											
VD(x+1) [lbs]													
%	0%	0%											
VD(x) [lbs]													
VT(x) [lbs]													
L													
n													
2015 SDPWS	SEISMIC MAX												
TMAX(x) [lbs]													
	2	**F-R**											
	Wind	**Seis**											
VD(x+1) [lbs]													
%													
VD(x) [lbs]													
VT(x) [lbs]													
L													
n													
2015 SDPWS	SEISMIC MAX												
TMAX(x) [lbs]													

Wall Line	Level (x)	Direction	Segment		Tributary loads				Wind		Seismic		
			Width	Height	wr	wra	wf	wfa	T(x)	T(x+1)	T(x)	T(x+1)	Seis max
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	356											
$T_{MAX(x)}$ [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		
			Width	Height	wr	wra	wf	wfa	T(x)	T(x+1)	T(x)	T(x+1)	Seis max
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		
			Width	Height	wr	wra	wf	wfa	T(x)	T(x+1)	T(x)	T(x+1)	Seis max
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
n	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											
n	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
n	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											
n	328	456											
2015 SDPWS	SEISMIC MAX	672											
$T_{MAX(x)}$ [lbs]	2224	3194											

Wall Line	Level (x)	Direction	Segment		Tributary loads				Wind		Seismic		
			Width	Height	wr	wra	wf	wfa	T(x)	T(x+1)	T(x)	T(x+1)	Seis max
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		
n	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	
n	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											
n	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											
n	778	989											
2015 SDPWS	SEISMIC MAX	1356											
$T_{MAX(x)}$ [lbs]	7130	9140											

Wall Line	Level (x)	Direction	Segment		Tributary loads				Wind		Seismic		
			Width	Height	wr	wra	wf	wfa	T(x)	T(x+1)	T(x)	T(x+1)	Seis max
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											

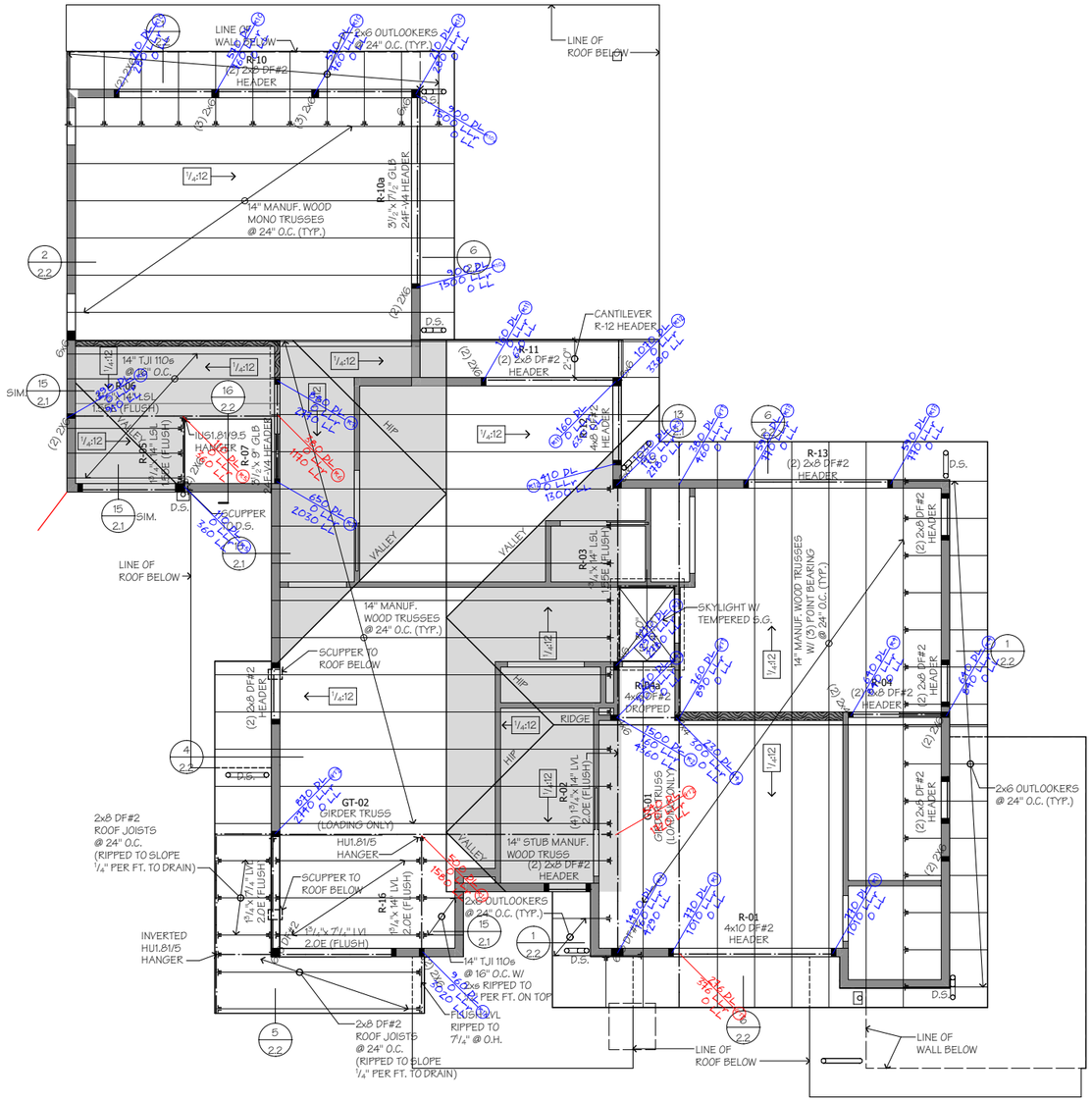
Shear wall Summary

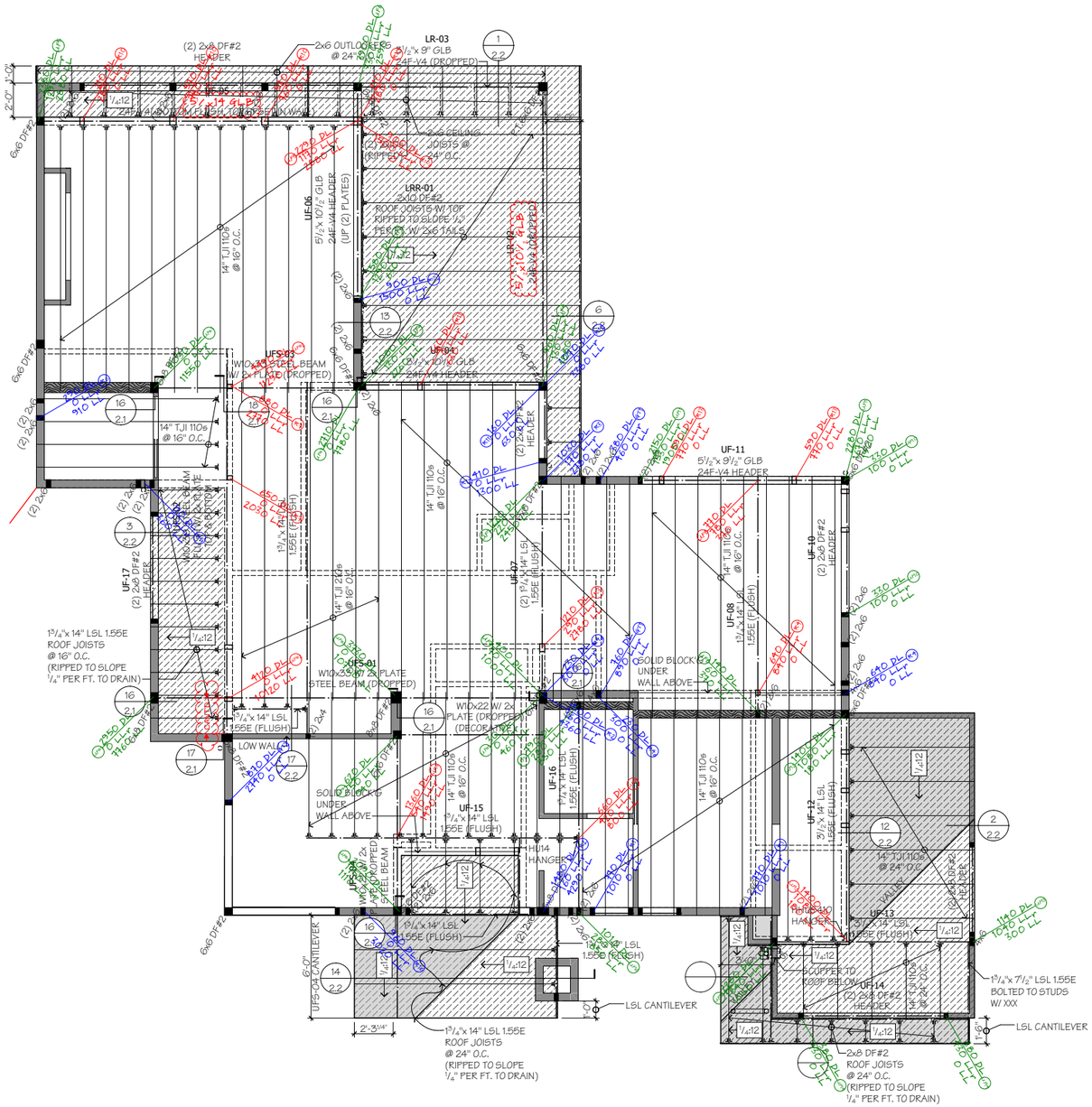
	Sheeting Reqm'ts				Shear Transfer		Overturning Values	
	Wind	Seis Max			Wind	Seismic	Wind	Seismic
1 - 3rd	26	55	1	1	36	55		
2 - 3rd	65	174	1	1	91	139		
3 - 3rd								
4 - 3rd	46	153	1	1	64	98		
A - 3rd	29	93	1	1	40	56		
B - 3rd	91	177	1	2	127	177		
C - 3rd	70	257	2	1	98	137		
D - 3rd	234	672	5	7	328	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

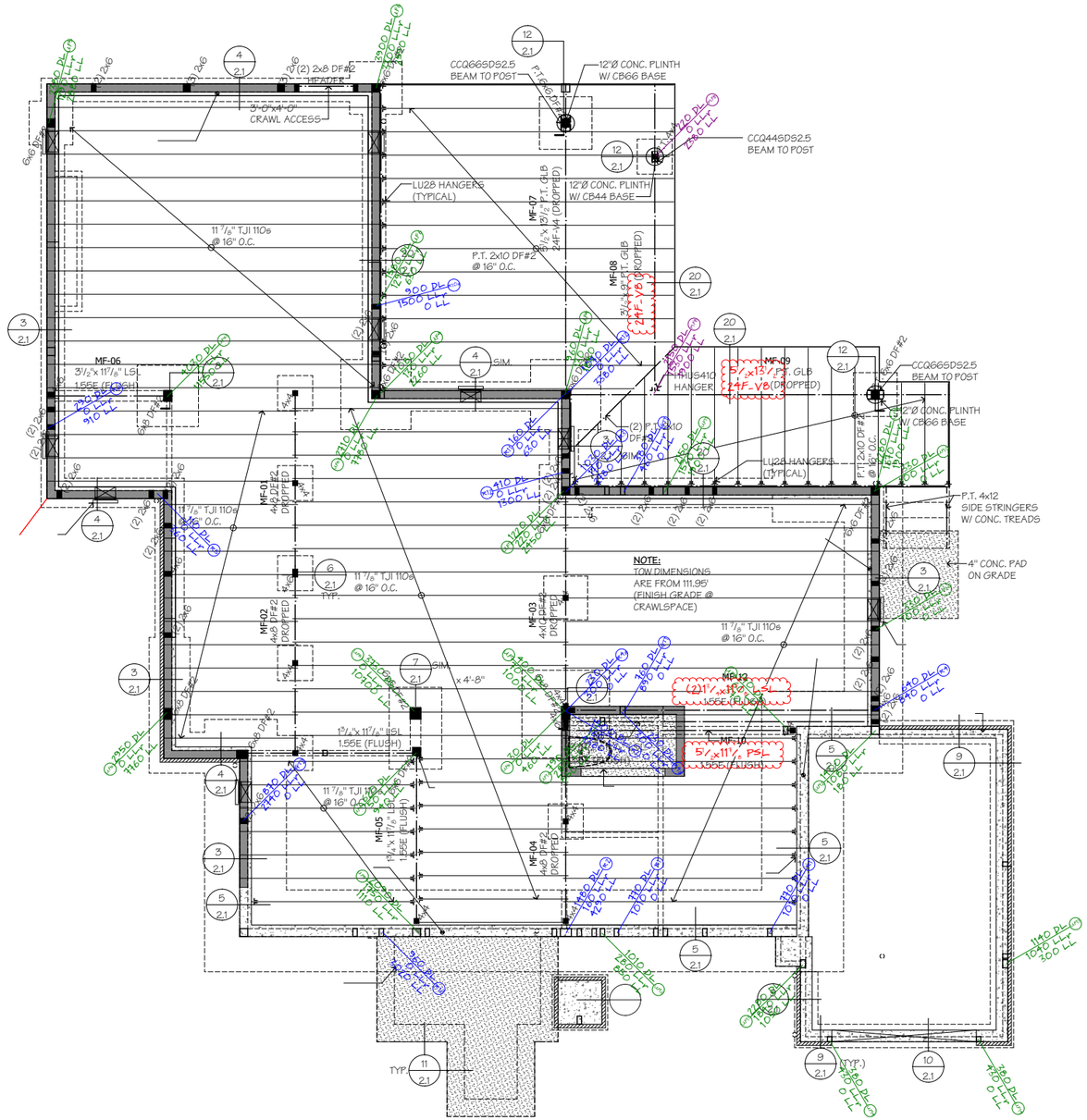
	P1-6	P1-4	P1-3	P1-2	P2-2	RSW	
Sheathing	260	350	511	679	1356	350	(plf)
Shear Flow	150	320	456	675	989	320	(plf)

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	


LINE OF WALL BELOW
LINE OF ROOF BELOW
2x6 OUTLOOKERS @ 24" O.C. (TYP.)
R-10
(2) 2x8 DF#2 HEADER
14" MANUF. WOOD MONO TRUSSES @ 24" O.C. (TYP.)
R-10a
3½"x 7¼" GLB 24F-V4 HEADER
CANTILEVER R-12 HEADER
R-11
(2) 2x8 DF#2 HEADER
14" TJI 110s @ 16" O.C.
R-06
1¾"x 14" LSL 1.3E (FLUSH)
R-05
1¾"x 14" LSL 1.3E (FLUSH)
R-07
5¼"x 9" GLB 24F-V4 HEADER
HU1.81/9.5 HANGER
SCUPPER TO ROOF BELOW
VALLEY
HIP
R-12
5¼"x 14" GLB 24F-V4 HEADER
R-13
(2) 2x8 DF#2 HEADER
R-03
1¾"x 14" LSL 1.3E (FLUSH)
14" MANUF. WOOD TRUSSES @ 24" O.C. (TYP.)
SKYLIGHT W/ TEMPERED S.G.
14" MANUF. WOOD TRUSSES W/ (3) POINT BEARING @ 24" O.C. (TYP.)
R-03a
4x8 DF#2 DROPPED
RIDGE
R-04
(2) 2x8 DF#2 HEADER
R-02
(4) 1¾"x 14" LVL 2.0E (FLUSH)
GT-01
GIRDER TRUSS (LOADING ONLY)
14" STUB MANUF. WOOD TRUSS
(2) 2x8 DF#2 HEADER
2x8 DF#2 ROOF JOISTS @ 24" O.C. (RIPPED TO SLOPE ¼" PER FT. TO DRAIN)
GT-02
GIRDER TRUSS (LOADING ONLY)
HU1.81/5 HANGER
R-15
1¾"x 14" LVL 2.0E (FLUSH)
1¾"x 7¼" LVL 2.0E (FLUSH)
2x6 OUTLOOKERS @ 24" O.C. (TYP.)
INVERTED HU1.81/5 HANGER
14" TJI 110s @ 16" O.C. W/ 2x6 RIPPED TO 7¼" PER FT. ON TOP
FLUSH LVL RIPPED TO 7¼" @ O.H.
R-01
4x10 DF#2 HEADER
D.S.
SCUPPER
SIM.
LINE OF ROOF BELOW
LINE OF WALL BELOW


LR-03
5½"x 9" GLB
24F-V4 (DROPPED)
(2) 2x8 DF#2 HEADER
2x6 OUTLOOKERS @ 24" O.C.
UF-05
5½"x 10½" GLB
24F-V4 HEADER
LRR-01
5:00 DF#2
ROOF JOISTS W/ TOP KIPPED TO SLOPE 1/4" PER FT W/ 2x6 TAILS
2x6 CEILING JOISTS @ 24" O.C. (RIPPED TO SLOPE 1/4" PER FT. TO DRAIN)
14" TJI 110s @ 16" O.C.
UF-06
5½"x 10½" GLB
24F-V4 HEADER
(2) 2x6 (UP (2) PLATES)
UF-03
W10x33 STEEL BEAM W/ 2x PLATE (DROPPED)
UF-04
5½"x 10½" GLB
24F-V4 HEADER
UF-11
5½"x 9½" GLB
24F-V4 HEADER
UF-17
(2) 2x8 DF#2 HEADER
UF-07
(2) 1¾"x 14" LSL 1.55E (FLUSH)
UF-08
1¾"x 14" LSL 1.55E (FLUSH)
UF-10
(2) 2x8 DF#2 HEADER
1¾"x 14" LSL 1.55E ROOF JOISTS @ 16" O.C. (RIPPED TO SLOPE 1/4" PER FT. TO DRAIN)
UF-01
W10x22 W/ 2x PLATE (DROPPED)
6x6 POST
6'-8" LOW WALL
UF-16
1¾"x 14" LSL 1.55E (FLUSH)
SOLID BLOCKING UNDER WALL ABOVE
UF-15
1¾"x 14" LSL 1.55E (FLUSH)
W10x22 W/ 2x PLATE DROPPED STEEL BEAM
HU14 HANGER
6x6 DF#2
6'-0" CANTILEVER
UF5-04 CANTILEVER
LSL CANTILEVER
2'-3¼"
1¾"x 14" LSL 1.55E ROOF JOISTS @ 24" O.C. (RIPPED TO SLOPE 1/4" PER FT. TO DRAIN)
SOLID BLOCK UNDER WALL ABOVE
UF-12
1¾"x 14" LSL 1.55E (FLUSH)
14" TJI 110s @ 24" O.C.
UF-13
1¾"x 14" LSL 1.55E (FLUSH)
HU410 HANGER
GUTTER TO ROOF BELOW
UF-14
(2) 2x8 DF#2 HEADER
1¾"x 7½" LSL 1.55E BOLTED TO STUDS W/ XXX
LSL CANTILEVER
2x8 DF#2 ROOF JOISTS @ 24" O.C. (RIPPED TO SLOPE 1/4" PER FT. TO DRAIN)


CCQ665DS2.5
BEAM TO POST
12"Ø CONC. PLINTH
W/ CB66 BASE
CCQ445DS2.5
BEAM TO POST
12"Ø CONC. PLINTH
W/ CB44 BASE
3'-0"x4'-0"
CRAWL ACCESS
HEADER
(2) 2x8 DF#2
LU28 HANGERS
(TYPICAL)
11 7/8" TJI 110s
@ 16" O.C.
P.T. 2x10 DF#2
@ 16" O.C.
MF-06
3 1/2"x 11 7/8" LSL
1.55E (FLUSH)
MF-01
4x6 DF#2
DROPPED
MF-02
4x6 DF#2
DROPPED
MF-03
4x6 DF#2
DROPPED
MF-04
4x6 DF#2
DROPPED
MF-05
1 3/4"x 11 7/8" LSL
1.55E (FLUSH)
MF-07
5 1/2"x 13 1/2" P.T. GLB
24F-V4 (DROPPED)
MF-08
5 1/2"x 13 1/2" P.T. GLB
24F-V8 (DROPPED)
MF-09
5 1/2"x 13 1/2" P.T. GLB
24F-V8 (DROPPED)
HHUS410
HANGER
(2) P.T. 2x10
DF#2
SIM.
MPU2
(2) 1 3/4"x 11 7/8" LSL
1.55E (FLUSH)
MPU3
(2) 1 3/4"x 11 7/8" LSL
1.55E (FLUSH)
MF-10
5"x11 7/8" PSL
1.55E (FLUSH)
P.T. 4x12
SIDE STRINGERS
W/ CONC. TREADS
4" CONC. PAD
ON GRADE
NOTE:
TOW DIMENSIONS
ARE FROM 111.95'
(FINISH GRADE @
CRAWLSPACE)
TYP.
(TYP.)

16"x8" FOOTING W/ (2)
#4 CONTINUOUS

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.22.12.28 Upstate Engineering, Inc.

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
Load Combination : IBC 2018

Wood Species : iLevel Truss Joist
Wood Grade : MicroLam LVL 1.9 E

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

Fb +	2,600.0 psi
Fb -	2,600.0 psi
Fc - Prll	2,510.0 psi
Fc - Perp	750.0 psi
Fv	285.0 psi
Ft	1,555.0 psi

E : Modulus of Elasticity

Ebend- xx	1,900.0 ksi
Eminbend - xx	965.71 ksi
Density	42.010 pcf

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	=	218.55 psi	fv: Actual	=	26.59 psi
F'b	=	3,182.57 psi	F'v	=	356.25 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	12.500 ft	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 M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
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

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LIC# : KW-06013781, Build:20.22.12.28 Upstate Engineering, Inc.

DESCRIPTION: GT-01 (FOR REACTIONS ONLY)

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values 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					1.00	1.00	1.00	0.979	1.00	1.00	1.00			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					1.00	1.00	1.00	0.979	1.00	1.00	1.00			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					1.00	1.00	1.00	0.979	1.00	1.00	1.00			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	

UPSTATE engineering, inc.
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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

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
Load Combination : IBC 2018

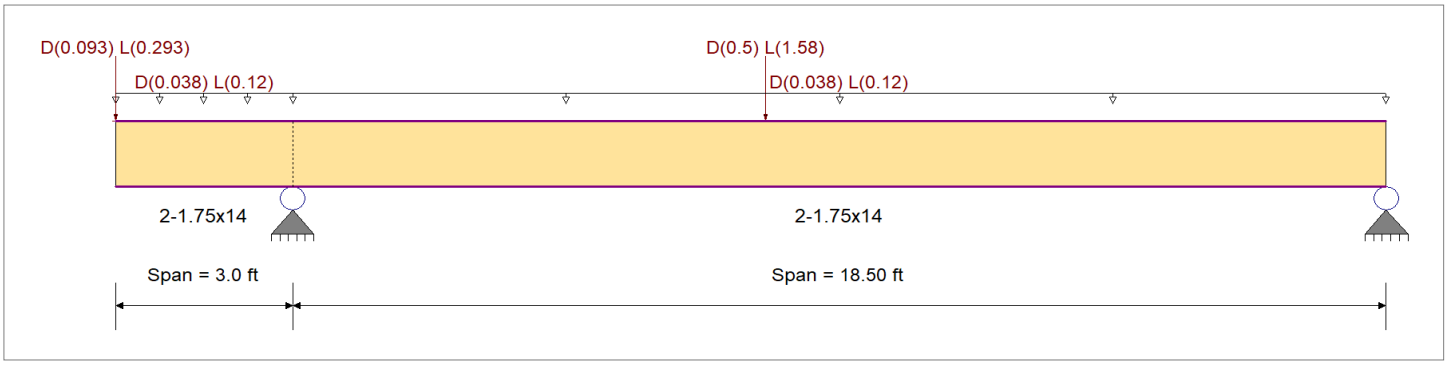
Wood Species : iLevel Truss Joist
Wood Grade : MicroLam LVL 1.9 E

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

Fb +	2,600.0 psi
Fb -	2,600.0 psi
Fc - Prll	2,510.0 psi
Fc - Perp	750.0 psi
Fv	285.0 psi
Ft	1,555.0 psi

E : Modulus of Elasticity

Ebend- xx	1,900.0 ksi
Eminbend - xx	965.71 ksi
Density	42.010 pcf



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	=	1,572.49 psi	fv: Actual	=	78.47 psi
F'b	=	2,546.06 psi	F'v	=	285.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	8.061 ft	Location of maximum on span	=	3.000 ft
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 M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
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
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
+D+L					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	0.077	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
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

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

DESCRIPTION: GT-02 (FOR REACTIONS ONLY)

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values 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

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

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
Load Combination : IBC 2018

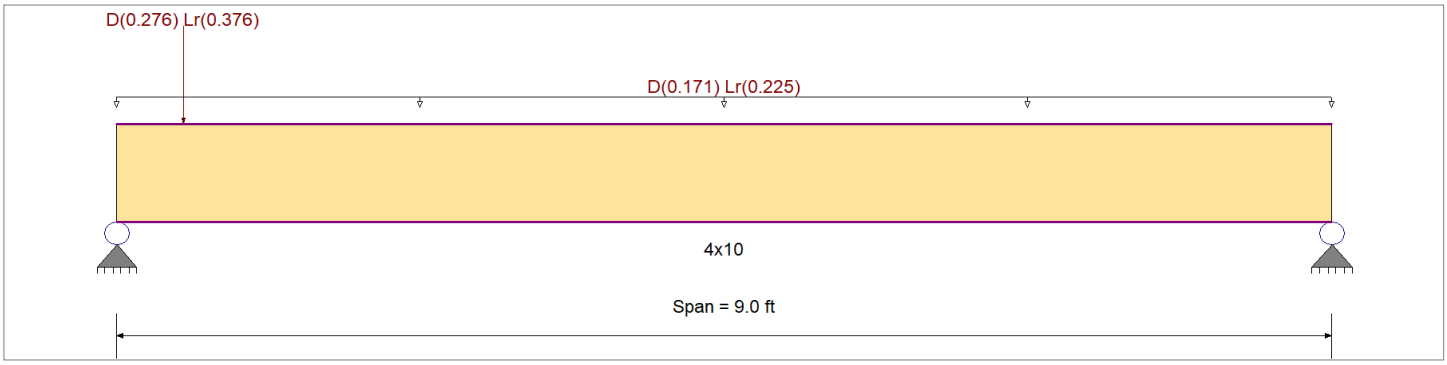
Wood Species : DouglasFir-Larch
Wood Grade : No.2

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

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

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.0190, 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	=	1,003.57 psi	fv: Actual	=	70.38 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	=	4.401 ft	Location of maximum on span	=	8.245 ft
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 M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
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	0.66	30.4	162.0
+D+Lr					1.00	1.00	1.00	1.200	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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
+D+0.750Lr					1.00	1.00	1.00	1.200	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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
+0.60D					1.00	1.00	1.00	1.200	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

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

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14 Upstate Engineering, Inc.

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
Load Combination : IBC 2018

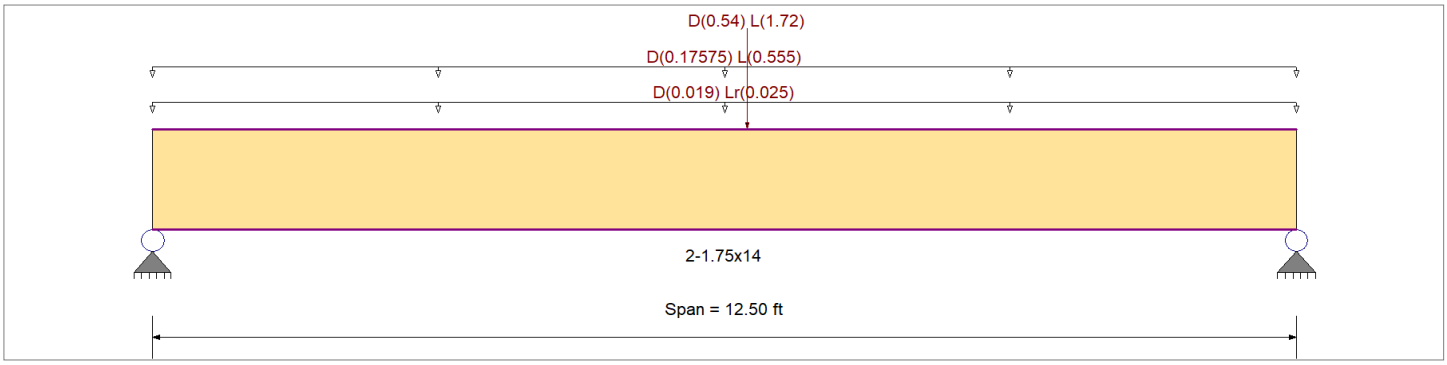
Wood Species : iLevel Truss Joist
Wood Grade : MicroLam LVL 1.9 E

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

Fb +	2,600.0 psi
Fb -	2,600.0 psi
Fc - Prll	2,510.0 psi
Fc - Perp	750.0 psi
Fv	285.0 psi
Ft	1,555.0 psi

E : Modulus of Elasticity

Ebend- xx	1,900.0 ksi
Eminbend - xx	965.71 ksi
Density	42.010 pcf



Applied Loads

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

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.0190, 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	=	2,272.46 psi	fv: Actual	=	153.25 psi
F'b	=	2,546.06 psi	F'v	=	285.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	6.478 ft	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 M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
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	1.28	39.1	256.5
+D+L					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	0.893	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
+D+Lr					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	0.197	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
+D+0.750Lr+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 = 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
+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

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

DESCRIPTION: R-02

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	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	0.00	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

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14 Upstate Engineering, Inc.

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
Load Combination : IBC 2018

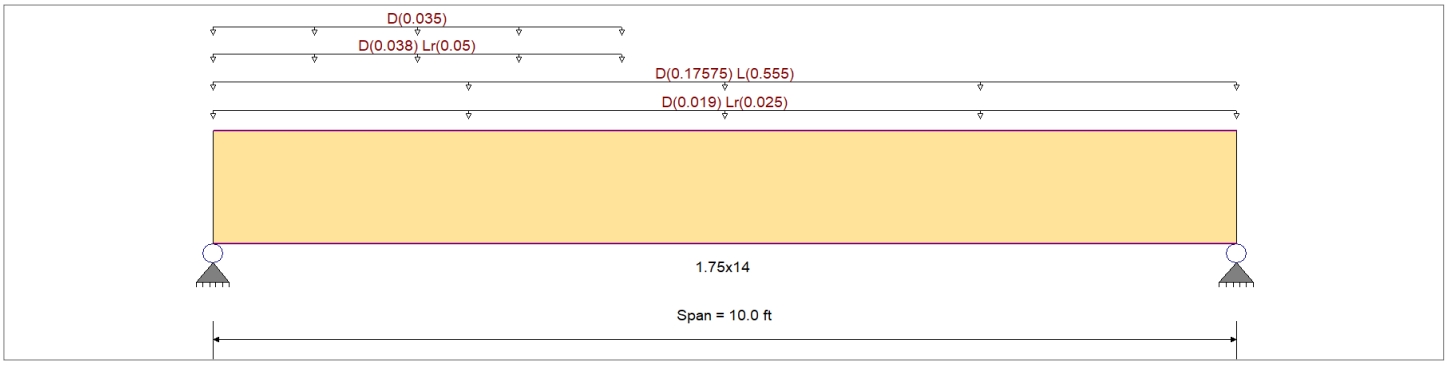
Wood Species : iLevel Truss Joist
Wood Grade : TimberStrand LSL 1.55E

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

Fb +	2,325.0 psi
Fb -	2,325.0 psi
Fc - Prll	2,050.0 psi
Fc - Perp	800.0 psi
Fv	310.0 psi
Ft	1,070.0 psi

E : Modulus of Elasticity

Ebend- xx	1,550.0 ksi
Eminbend - xx	787.82 ksi
Density	45.010 pcf



Applied Loads

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

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.0190, 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	=	2,029.04 psi	fv: Actual	=	186.83 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	=	4.927 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	0.203 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 M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
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	0.90	55.4	279.0
+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 = 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
+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 = 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
+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 = 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

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

DESCRIPTION: R-03

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values 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

UPSTATE engineering, inc.
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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

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
Load Combination : IBC 2018

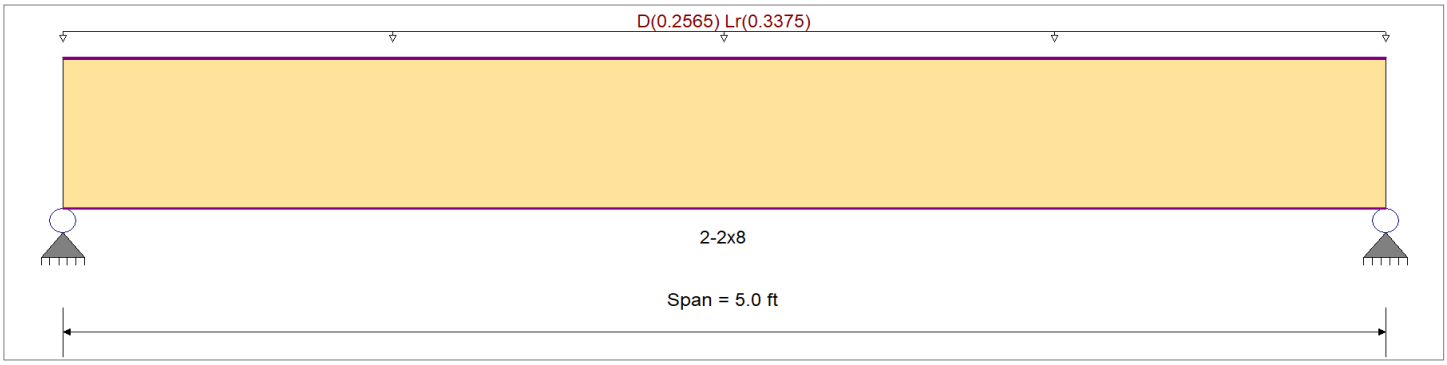
Wood Species : Douglas Fir-Larch
Wood Grade : No.2

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

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

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.0190, 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	=	847.56 psi	fv: Actual	=	77.74 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	=	2.500 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.031 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 M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
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	0.49	33.6	162.0
+D+Lr					1.00	1.00	1.00	1.200	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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	1.13	77.7	225.0
+D+0.750Lr					1.00	1.00	1.00	1.200	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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	0.97	66.7	225.0
+0.60D					1.00	1.00	1.00	1.200	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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	0.29	20.1	288.0

UPSTATE engineering, inc.
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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

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

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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

DESCRIPTION: R-04a

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
Load Combination : IBC 2018

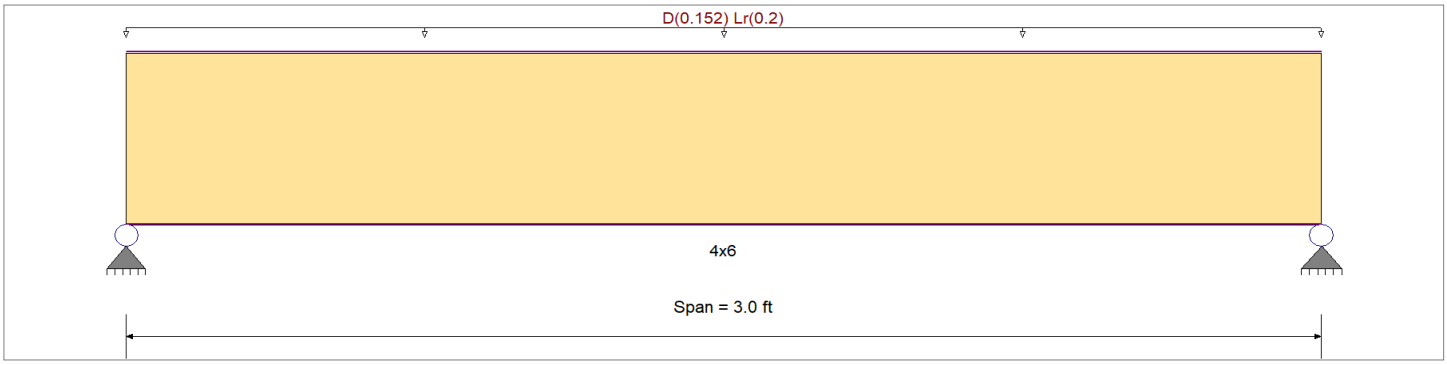
Wood Species : Douglas Fir-Larch
Wood Grade : No.2

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

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

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.0190, Lr = 0.0250 ksf, Tributary Width = 8.0 ft, (RF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.184 : 1	Maximum Shear Stress Ratio	=	0.128 : 1
Section used for this span		4x6	Section used for this span		4x6
fb: Actual	=	269.30 psi	fv: Actual	=	28.83 psi
F'b	=	1,462.50 psi	F'v	=	225.00 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	1.500 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.005 in	Ratio =	7623 >=240	Span: 1 : Lr Only
Max Upward Transient Deflection	0 in	Ratio =	0 <240	n/a
Max Downward Total Deflection	0.008 in	Ratio =	4331 >=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 M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 3.0 ft	1	0.110	0.077	0.90	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.17	116.3	1,053.0	0.16	12.4	162.0
+D+Lr					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 3.0 ft	1	0.184	0.128	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.40	269.3	1,462.5	0.37	28.8	225.0
+D+0.750Lr					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 3.0 ft	1	0.158	0.110	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.34	231.0	1,462.5	0.32	24.7	225.0
+0.60D					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 3.0 ft	1	0.037	0.026	1.60	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.10	69.8	1,872.0	0.10	7.5	288.0

UPSTATE engineering, inc.
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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

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

UPSTATE engineering, inc.
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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

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
Load Combination : IBC 2018

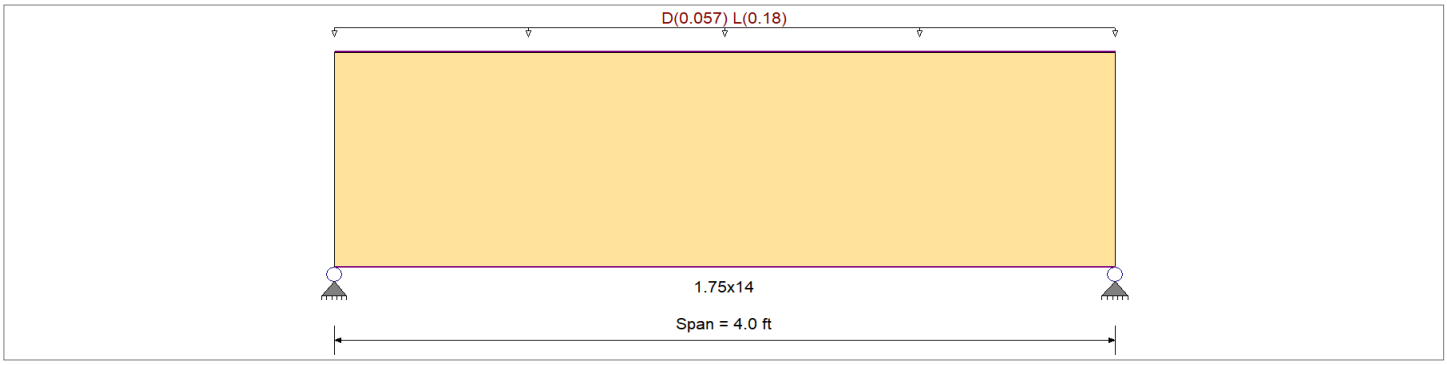
Wood Species : iLevel Truss Joist
Wood Grade : TimberStrand LSL 1.55E

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

Fb +	2,325.0 psi
Fb -	2,325.0 psi
Fc - Prll	2,050.0 psi
Fc - Perp	800.0 psi
Fv	310.0 psi
Ft	1,070.0 psi

E : Modulus of Elasticity

Ebend- xx	1,550.0 ksi
Eminbend - xx	787.82 ksi
Density	45.010 pcf



Applied Loads

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

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.0190, 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	=	99.50 psi	fv: Actual	=	12.29 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	=	2.000 ft	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 M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
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	0.05	3.0	279.0
+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 = 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
+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 = 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
+0.60D					1.00	1.00	1.00	0.986	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

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

UPSTATE engineering, inc.
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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14 Upstate Engineering, Inc.

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
Load Combination : IBC 2018

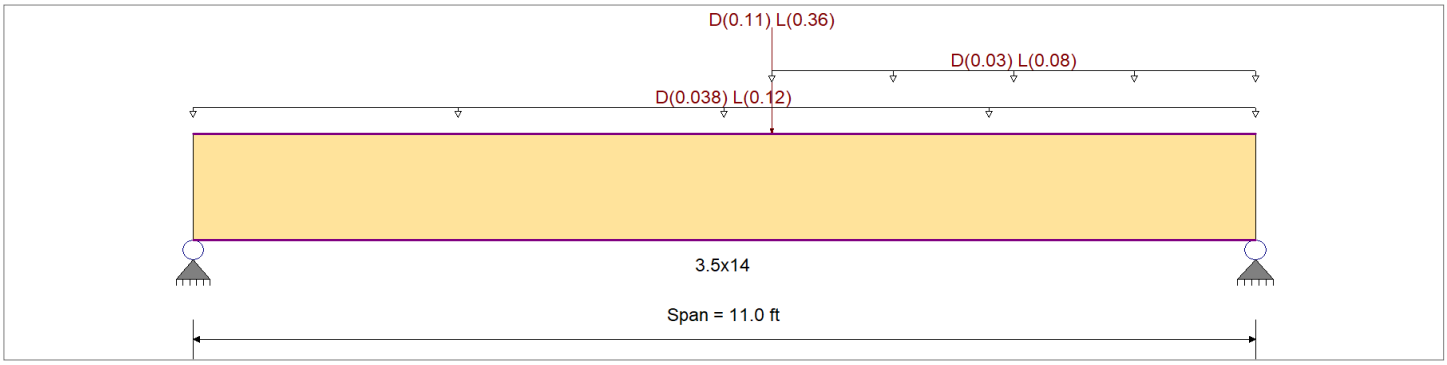
Wood Species : iLevel Truss Joist
Wood Grade : TimberStrand LSL 1.55E

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

Fb +	2,325.0 psi
Fb -	2,325.0 psi
Fc - Prll	2,050.0 psi
Fc - Perp	800.0 psi
Fv	310.0 psi
Ft	1,070.0 psi

E : Modulus of Elasticity

Ebend- xx	1,550.0 ksi
Eminbend - xx	787.82 ksi
Density	45.010 pcf



Applied Loads

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

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.0190, 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	=	6.022 ft	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 M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
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	0.31	9.4	279.0
+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 = 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
+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 = 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
+0.60D					1.00	1.00	1.00	0.986	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

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

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

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
Load Combination : IBC 2018

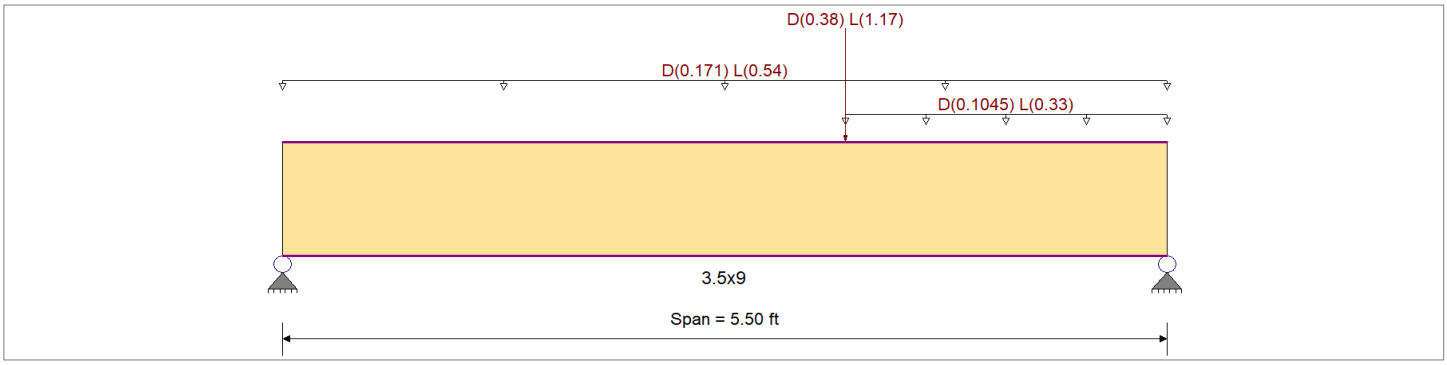
Wood Species : DF/DF
Wood Grade : 24F-V4

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

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

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.210 pcf



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	=	1,273.10 psi	fv: Actual	=	133.42 psi
F'b	=	2,400.00 psi	F'v	=	265.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	3.493 ft	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		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
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	0.68	32.3	238.5
+D+L					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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
+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 = 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
+0.60D					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

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

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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

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
Load Combination : IBC 2018

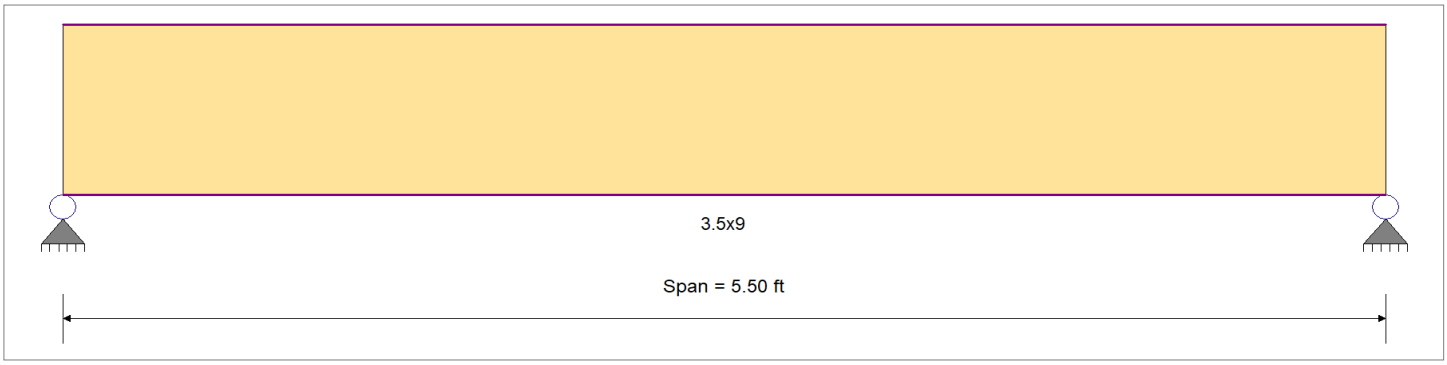
Wood Species : DF/DF
Wood Grade : 24F-V4

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

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

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.210 pcf



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	=	0.00 psi	fv: Actual	=	0.00 psi
F'b	=	0.00 psi	F'v	=	0.00 psi
Load Combination			Load Combination		
Location of maximum on span	=	0.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0 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	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
														0.0	0.00	0.0	0.0
Length = 5.50 ft	1			0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00			2,160.0	0.00	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

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

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
Load Combination : IBC 2018

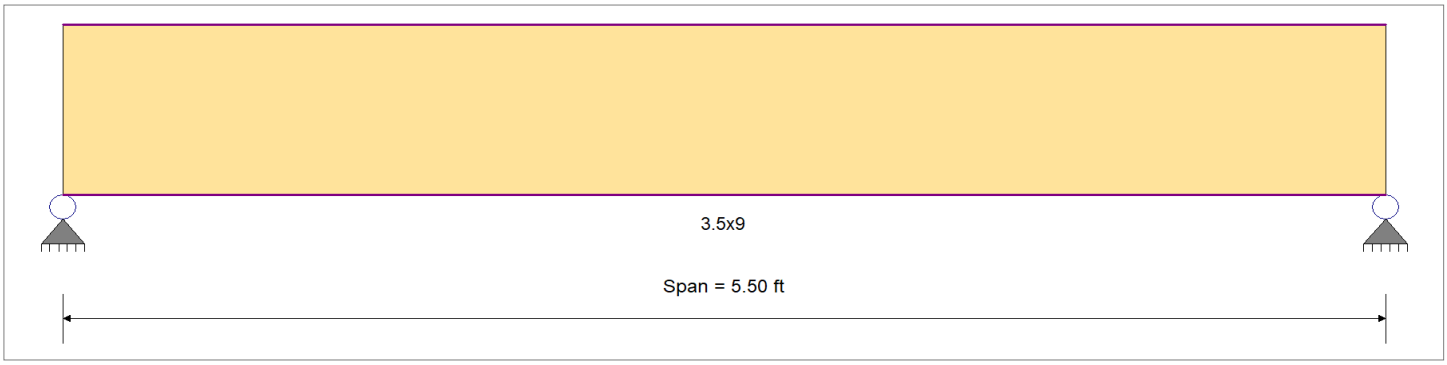
Wood Species : DF/DF
Wood Grade : 24F-V4

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

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

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.210 pcf



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	=	0.00 psi	fv: Actual	=	0.00 psi
F'b	=	0.00 psi	F'v	=	0.00 psi
Load Combination			Load Combination		
Location of maximum on span	=	0.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0 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	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
														0.0	0.00	0.0	0.0
Length = 5.50 ft	1			0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00			2,160.0	0.00	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

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

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
Load Combination : IBC 2018

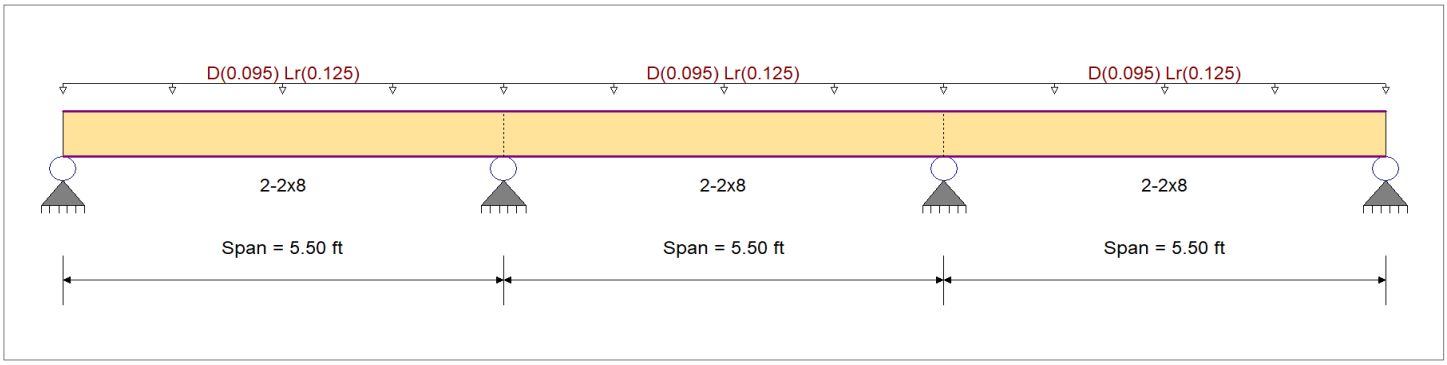
Wood Species : Douglas Fir-Larch
Wood Grade : No.2

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

Fb +	900 psi
Fb -	900 psi
Fc - Prll	1350 psi
Fc - Perp	625 psi
Fv	180 psi
Ft	575 psi

E : Modulus of Elasticity

Ebend- xx	1600 ksi
Eminbend - xx	580 ksi
Density	31.21 pcf



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	=	5.500 ft	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		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
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	0.26	17.7	162.0
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
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
+D+Lr					1.00	1.00	1.00	1.200	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

DESCRIPTION: R-10

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	Cfu	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	1.200	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	1.200	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

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

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
Load Combination : IBC 2018

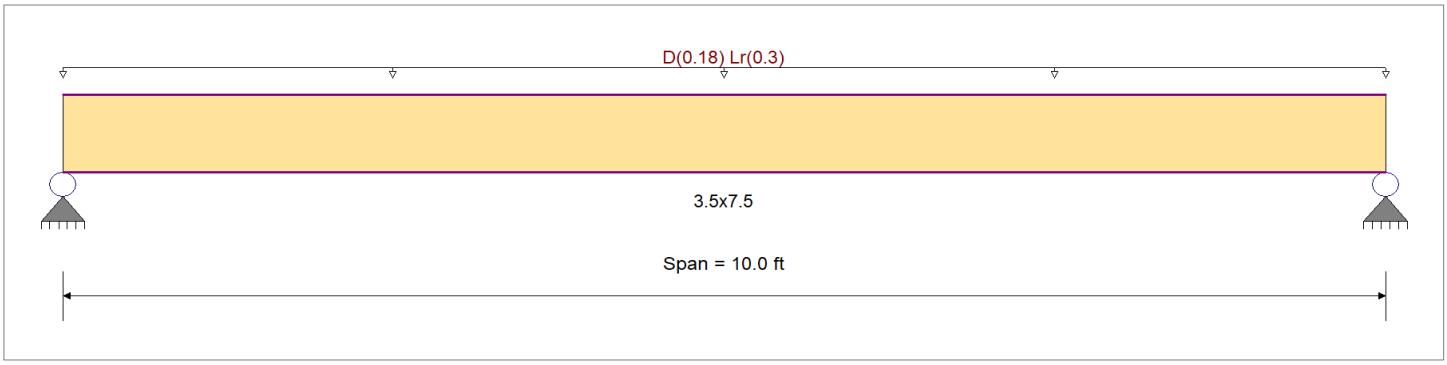
Wood Species : DF/DF
Wood Grade : 24F-V4

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

Fb +	2400 psi
Fb -	1850 psi
Fc - Prll	1650 psi
Fc - Perp	650 psi
Fv	265 psi
Ft	1100 psi

E : Modulus of Elasticity

Ebend- xx	1800 ksi
Eminbend - xx	950 ksi
Ebend- yy	1600 ksi
Eminbend - yy	850 ksi
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 = 0.0150, 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	=	2,194.29 psi	fv: Actual	=	120.13 psi
F'b	=	3,000.00 psi	F'v	=	331.25 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	5.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.307 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 M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
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	0.79	45.0	238.5
+D+Lr					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	0.731	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
+D+0.750Lr					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	0.617	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
+0.60D					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	0.129	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

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

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

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14 Upstate Engineering, Inc.

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
Load Combination : IBC 2018

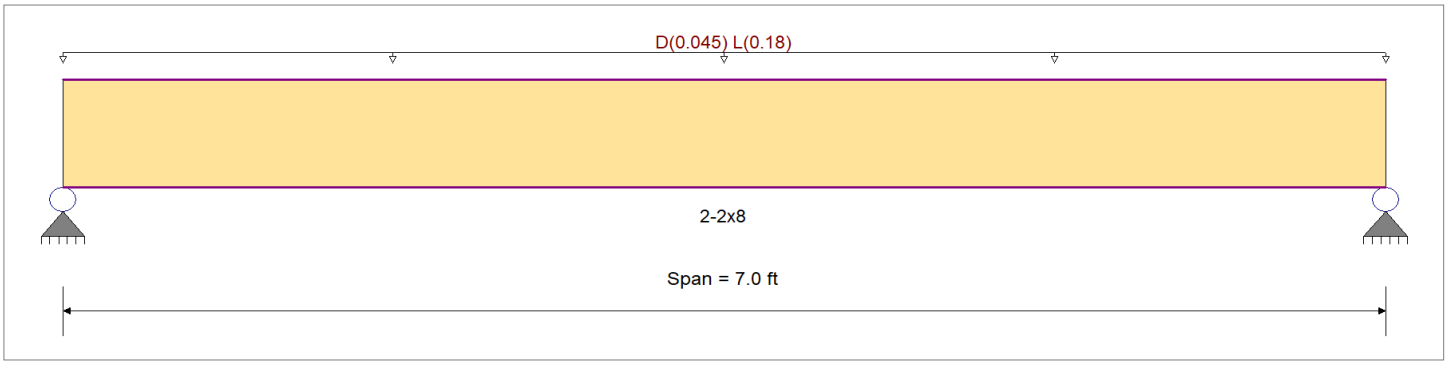
Wood Species : Douglas Fir-Larch
Wood Grade : No.2

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

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

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.0150, 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	=	629.25 psi	fv: Actual	=	45.19 psi
F'b	=	1,080.00 psi	F'v	=	180.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	3.500 ft	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 M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
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	0.13	9.0	162.0
+D+L					1.00	1.00	1.00	1.200	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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	0.66	45.2	180.0
+D+0.750L					1.00	1.00	1.00	1.200	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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	0.52	36.2	225.0
+0.60D					1.00	1.00	1.00	1.200	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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	0.08	5.4	288.0

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

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

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

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
Load Combination : IBC 2018

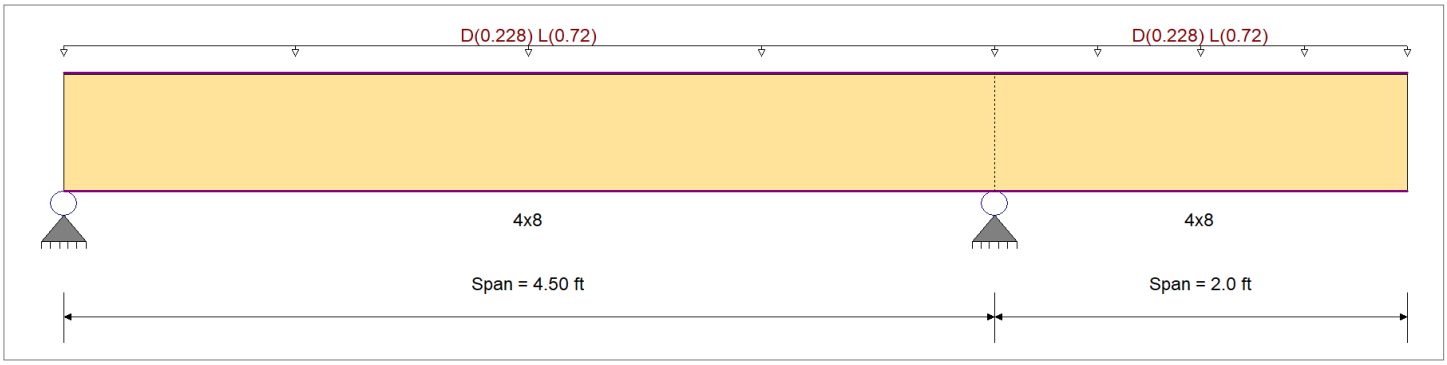
Wood Species : Douglas Fir-Larch
Wood Grade : No.2

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

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

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.210 pcf



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	=	742.04 psi	fv: Actual	=	117.18 psi
F'b	=	1,170.00 psi	F'v	=	180.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	4.500 ft	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 M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
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	0.48	28.2	162.0
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
+D+L					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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
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
+D+0.750L					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

DESCRIPTION: R-12

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 2.0 ft	**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
+0.60D					1.00	1.00	1.00	1.300	1.00	1.00	1.00			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	

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

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
Load Combination : IBC 2018

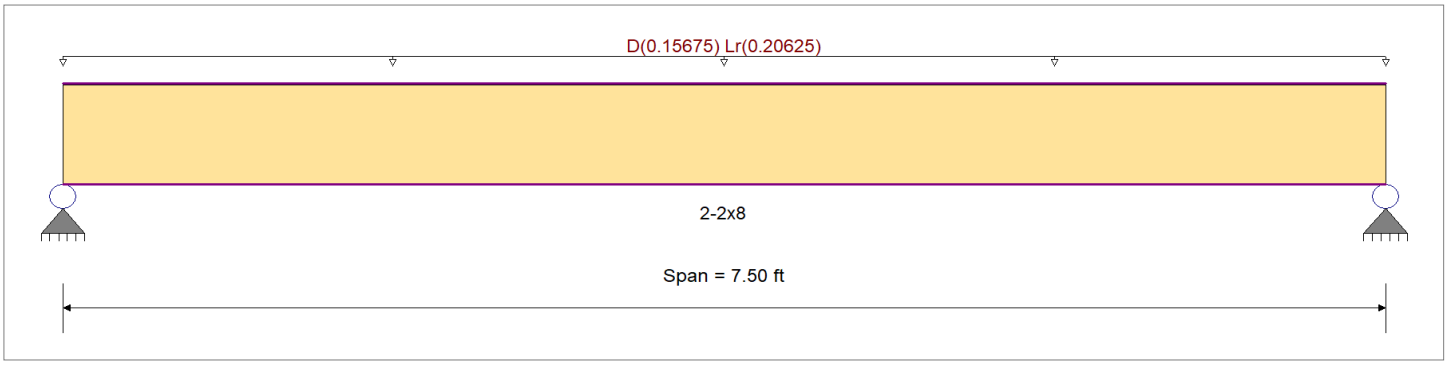
Wood Species : Douglas Fir-Larch
Wood Grade : No.2

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

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

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.0190, 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	=	1,165.40 psi	fv: Actual	=	78.80 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	=	3.750 ft	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 M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
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	0.49	34.0	162.0
+D+Lr					1.00	1.00	1.00	1.200	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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
+D+0.750Lr					1.00	1.00	1.00	1.200	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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
+0.60D					1.00	1.00	1.00	1.200	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

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

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14 Upstate Engineering, Inc.

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
Load Combination : IBC 2018

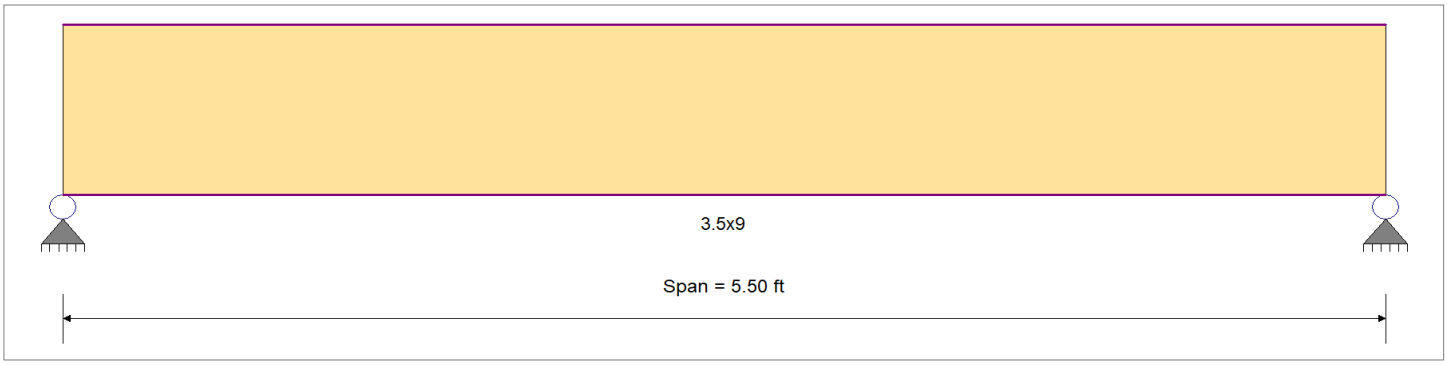
Wood Species : DF/DF
Wood Grade : 24F-V4

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

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

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.210 pcf



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	=	0.00 psi	fv: Actual	=	0.00 psi
F'b	=	0.00 psi	F'v	=	0.00 psi
Load Combination			Load Combination		
Location of maximum on span	=	0.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0 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	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
														0.0	0.00	0.0	0.0
Length = 5.50 ft	1			0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00			2,160.0	0.00	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

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

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
Load Combination : IBC 2018

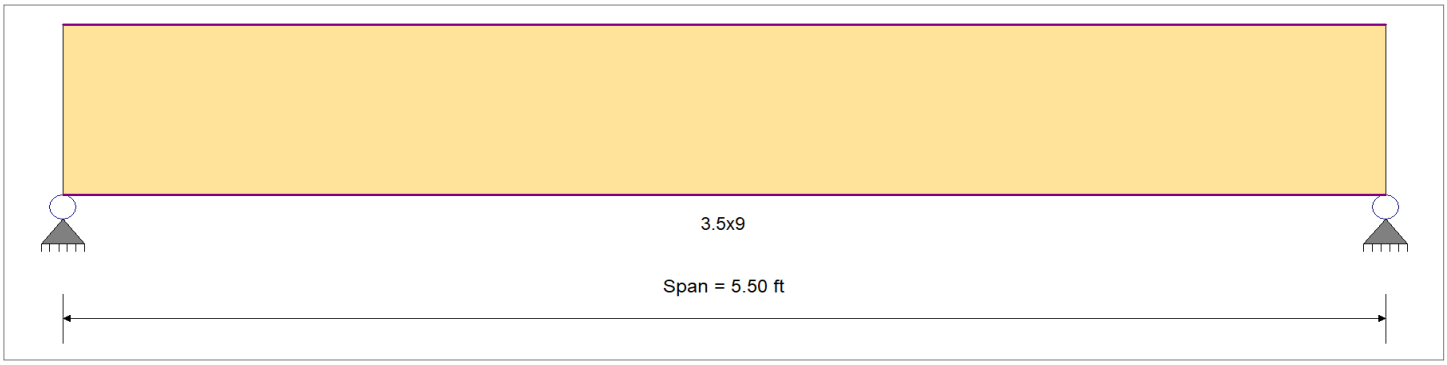
Wood Species : DF/DF
Wood Grade : 24F-V4

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

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

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.210 pcf



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	=	0.00 psi	fv: Actual	=	0.00 psi
F'b	=	0.00 psi	F'v	=	0.00 psi
Load Combination			Load Combination		
Location of maximum on span	=	0.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0 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	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
														0.0	0.00	0.0	0.0
Length = 5.50 ft	1			0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00			2,160.0	0.00	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

UPSTATE engineering, inc.
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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14 Upstate Engineering, Inc.

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
Load Combination : IBC 2018

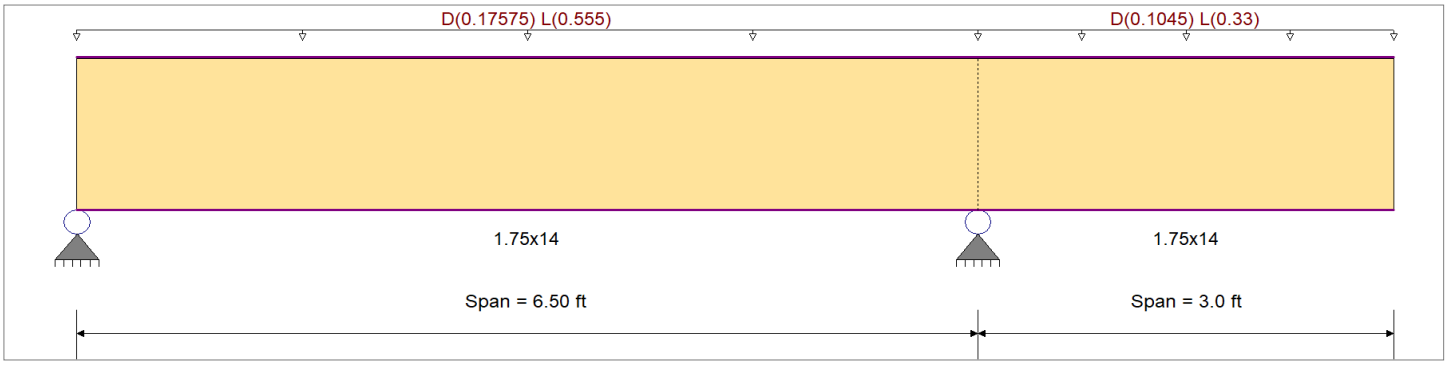
Wood Species : iLevel Truss Joist
Wood Grade : MicroLam LVL 1.9 E

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

Fb +	2,600.0 psi
Fb -	2,600.0 psi
Fc - Prll	2,510.0 psi
Fc - Perp	750.0 psi
Fv	285.0 psi
Ft	1,555.0 psi

E : Modulus of Elasticity

Ebend- xx	1,900.0 ksi
Eminbend - xx	965.71 ksi
Density	42.010 pcf



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	=	617.89 psi	fv: Actual	=	111.83 psi
F'b	=	2,563.39 psi	F'v	=	285.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	2.832 ft	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 M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
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	0.44	26.9	256.5
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
+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 = 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
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
+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 = 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

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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14 Upstate Engineering, Inc.

DESCRIPTION: R-16

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 3.0 ft	**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
+0.60D					1.00	1.00	1.00	0.986	1.00	1.00	1.00			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	

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

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
Load Combination : IBC 2018

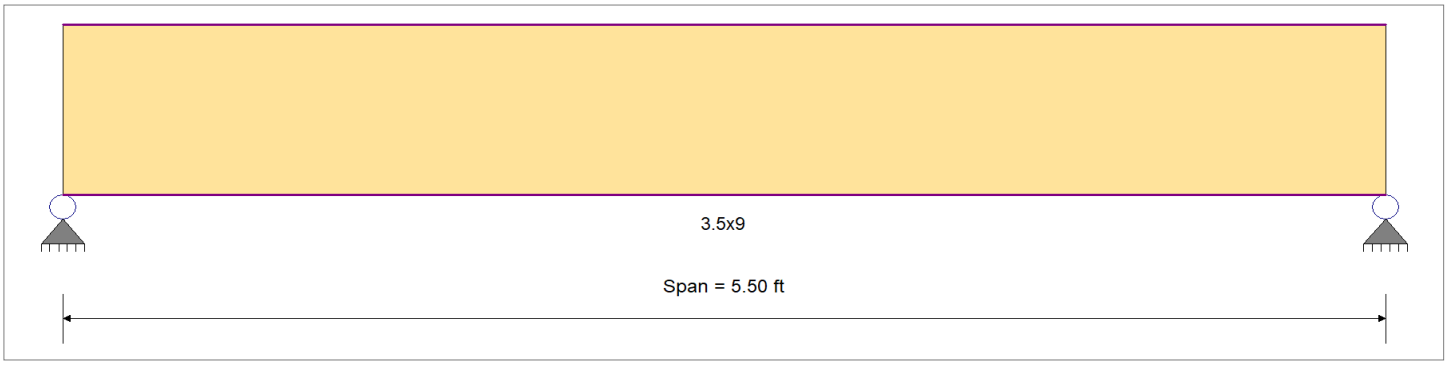
Wood Species : DF/DF
Wood Grade : 24F-V4

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

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

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.210 pcf



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	=	0.00 psi	fv: Actual	=	0.00 psi
F'b	=	0.00 psi	F'v	=	0.00 psi
Load Combination			Load Combination		
Location of maximum on span	=	0.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0 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	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
														0.0	0.00	0.0	0.0
Length = 5.50 ft	1			0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00			2,160.0	0.00	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

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14 Upstate Engineering, Inc.

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
Load Combination : IBC 2018

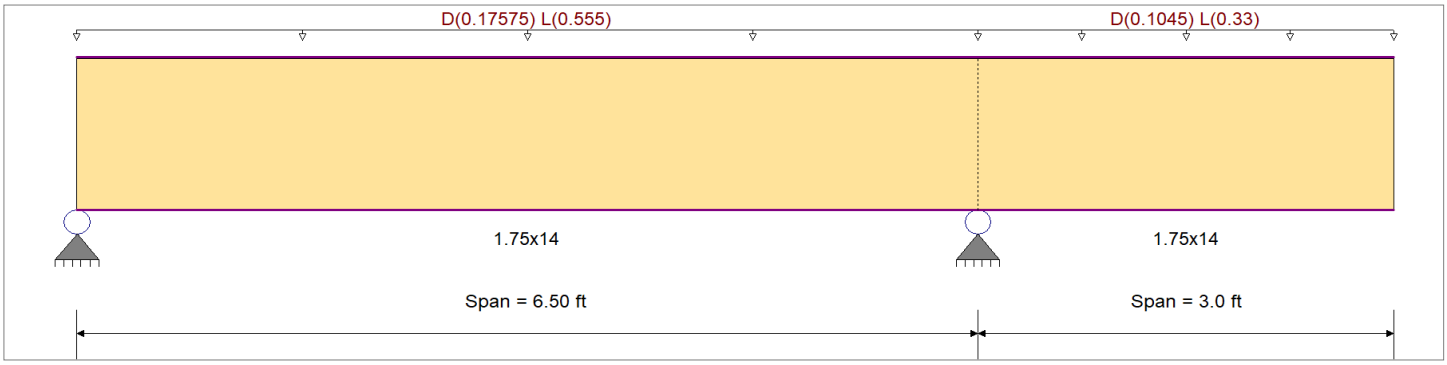
Wood Species : iLevel Truss Joist
Wood Grade : MicroLam LVL 1.9 E

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

Fb +	2,600.0 psi
Fb -	2,600.0 psi
Fc - Prll	2,510.0 psi
Fc - Perp	750.0 psi
Fv	285.0 psi
Ft	1,555.0 psi

E : Modulus of Elasticity

Ebend- xx	1,900.0 ksi
Eminbend - xx	965.71 ksi
Density	42.010 pcf



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	=	617.89 psi	fv: Actual	=	111.83 psi
F'b	=	2,563.39 psi	F'v	=	285.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	2.832 ft	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 M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
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	0.44	26.9	256.5
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
+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 = 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
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
+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 = 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

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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14 Upstate Engineering, Inc.

DESCRIPTION: R-18

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 3.0 ft	**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
+0.60D					1.00	1.00	1.00	0.986	1.00	1.00	1.00			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	

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

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14 Upstate Engineering, Inc.

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
Load Combination : IBC 2018

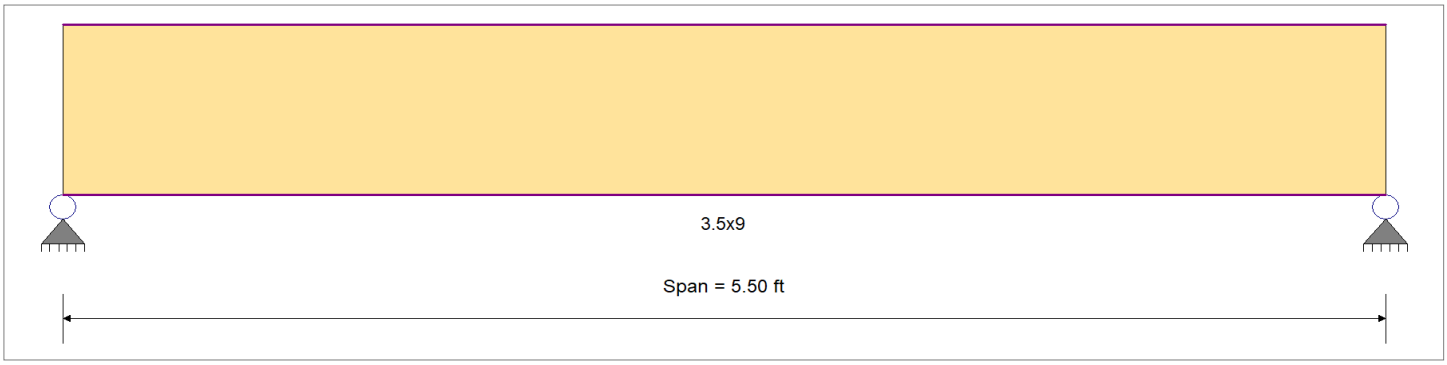
Wood Species : DF/DF
Wood Grade : 24F-V4

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

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

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.210 pcf



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	=	0.00 psi	fv: Actual	=	0.00 psi
F'b	=	0.00 psi	F'v	=	0.00 psi
Load Combination			Load Combination		
Location of maximum on span	=	0.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0 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	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
														0.0	0.00	0.0	0.0
Length = 5.50 ft	1			0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00			2,160.0	0.00	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

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

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14 Upstate Engineering, Inc.

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
Load Combination : IBC 2018

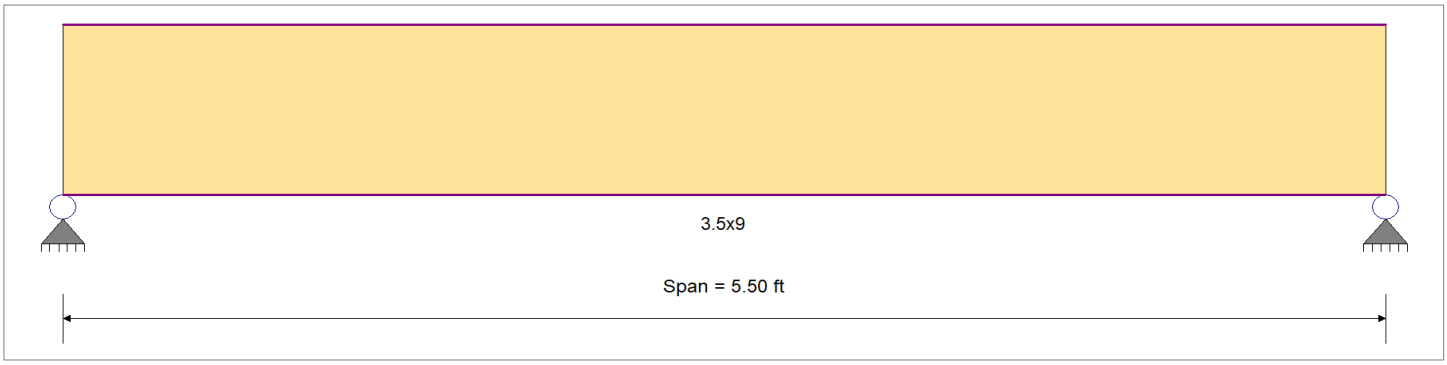
Wood Species : DF/DF
Wood Grade : 24F-V4

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

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

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.210 pcf



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	=	0.00 psi	fv: Actual	=	0.00 psi
F'b	=	0.00 psi	F'v	=	0.00 psi
Load Combination			Load Combination		
Location of maximum on span	=	0.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0 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	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
														0.0	0.00	0.0	0.0
Length = 5.50 ft	1			0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00			2,160.0	0.00	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

UPSTATE engineering, inc.
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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14 Upstate Engineering, Inc.

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
Load Combination : IBC 2018

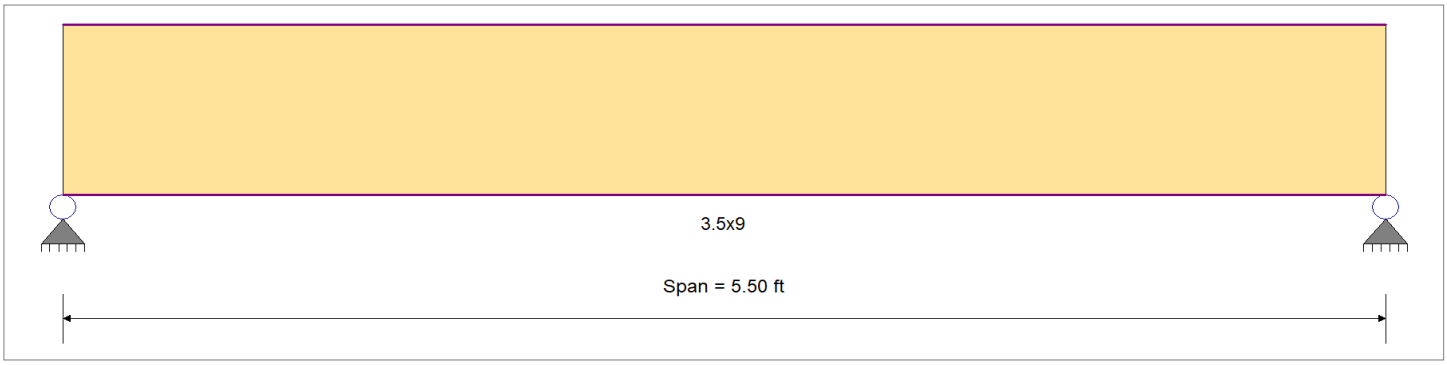
Wood Species : DF/DF
Wood Grade : 24F-V4

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

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

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.210 pcf



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	=	0.00 psi	fv: Actual	=	0.00 psi
F'b	=	0.00 psi	F'v	=	0.00 psi
Load Combination			Load Combination		
Location of maximum on span	=	0.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0 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	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
														0.0	0.00	0.0	0.0
Length = 5.50 ft	1			0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00			2,160.0	0.00	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

UPSTATE engineering, inc.
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Project Title: DHALIWAL-KLAR
Engineer: amg
Project ID: 1651
Project Descr: NEW SFR

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

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
Load Combination : IBC 2018

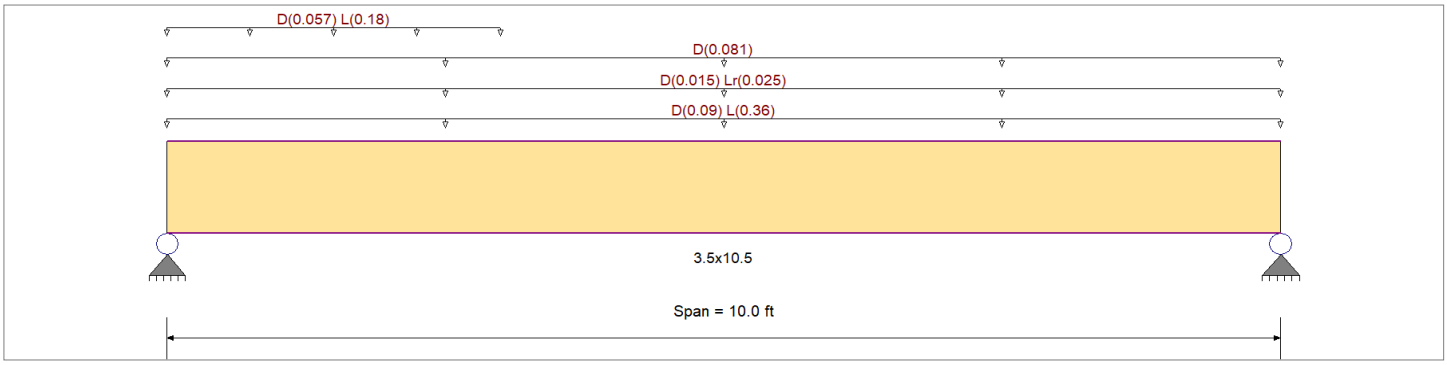
Wood Species : DF/DF
Wood Grade : 24F-V4

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

Fb +	2400 psi
Fb -	1850 psi
Fc - Prll	1650 psi
Fc - Perp	650 psi
Fv	265 psi
Ft	1100 psi

E : Modulus of Elasticity

Ebend- xx	1800 ksi
Eminbend - xx	950 ksi
Ebend- yy	1600 ksi
Eminbend - yy	850 ksi
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	=	1,374.90 psi	fv: Actual	=	109.27 psi
F'b	=	2,400.00 psi	F'v	=	265.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	4.818 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	0.148 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		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
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	0.87	35.6	238.5
+D+L					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	0.573	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
+D+Lr					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	0.172	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
+D+0.750Lr+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	0.396	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

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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

DESCRIPTION: UF-04

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values 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

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

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
Load Combination : IBC 2018

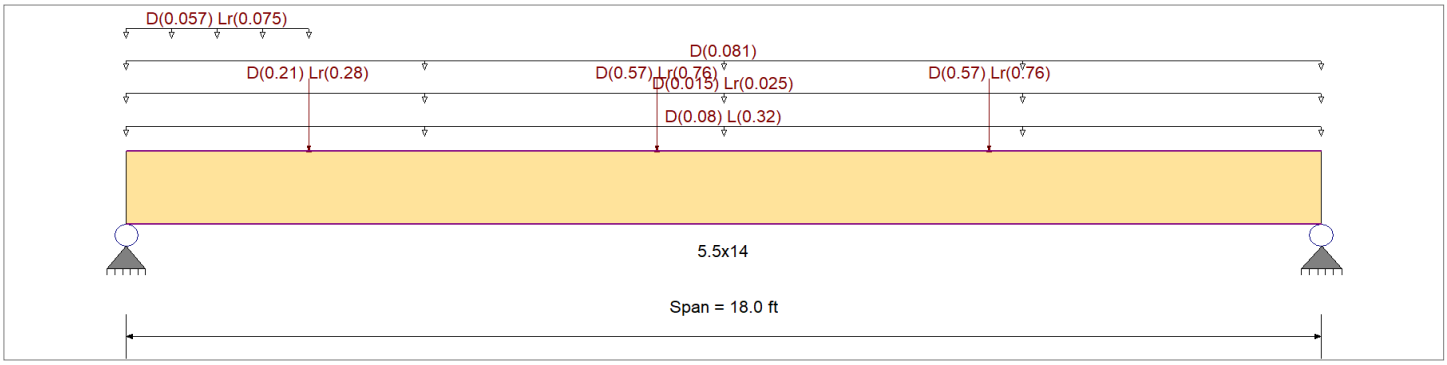
Wood Species : DF/DF
Wood Grade : 24F-V4

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

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

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.210 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 = 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 = 8.10 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	=	1,616.92 psi	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	=	8.737 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	0.336 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 M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
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	2.12	41.3	238.5
+D+L					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	0.678	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
+D+Lr					1.00	1.00	1.00	0.993	1.00	1.00	1.00			0.0	0.00	0.0	0.0

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

DESCRIPTION: UF-05

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	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
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

UPSTATE engineering, inc.
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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

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
Load Combination : IBC 2018

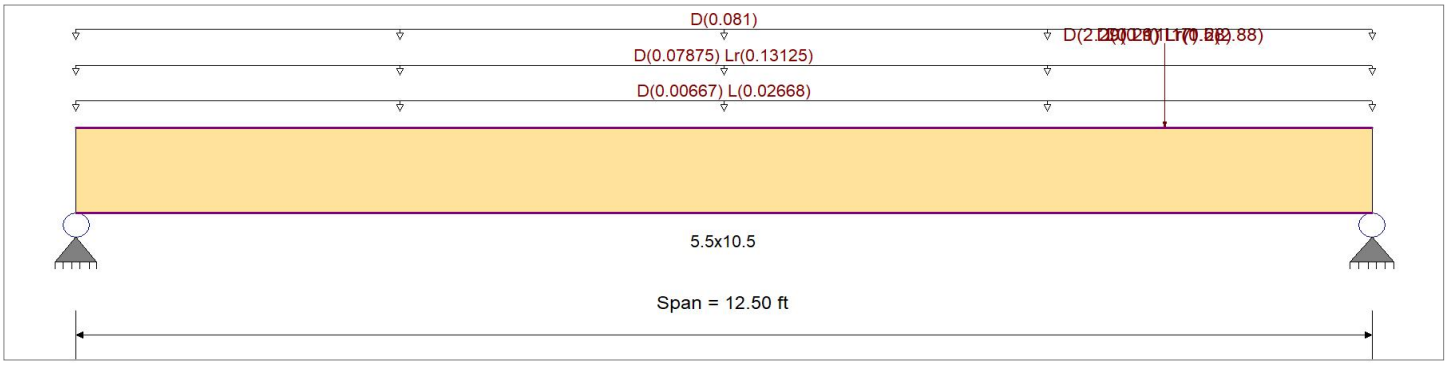
Wood Species : DF/DF
Wood Grade : 24F-V4

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

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

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.210 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 = 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	=	1,905.59 psi	fv: Actual	=	209.41 psi
F'b	=	3,000.00 psi	F'v	=	331.25 psi
Load Combination		+D+0.750Lr+0.750L	Load Combination		+D+0.750Lr+0.750L
Location of maximum on span	=	10.493 ft	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 M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
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	3.75	97.5	238.5
+D+L					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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	6.31	164.0	265.0
+D+Lr					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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	6.94	180.2	331.3

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

DESCRIPTION: UF-06

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+0.750Lr+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 = 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	8.06	209.4	331.3
+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 = 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	5.67	147.4	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 = 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	2.25	58.5	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	0.4349	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

UPSTATE engineering, inc.
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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14 Upstate Engineering, Inc.

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
Load Combination : IBC 2018

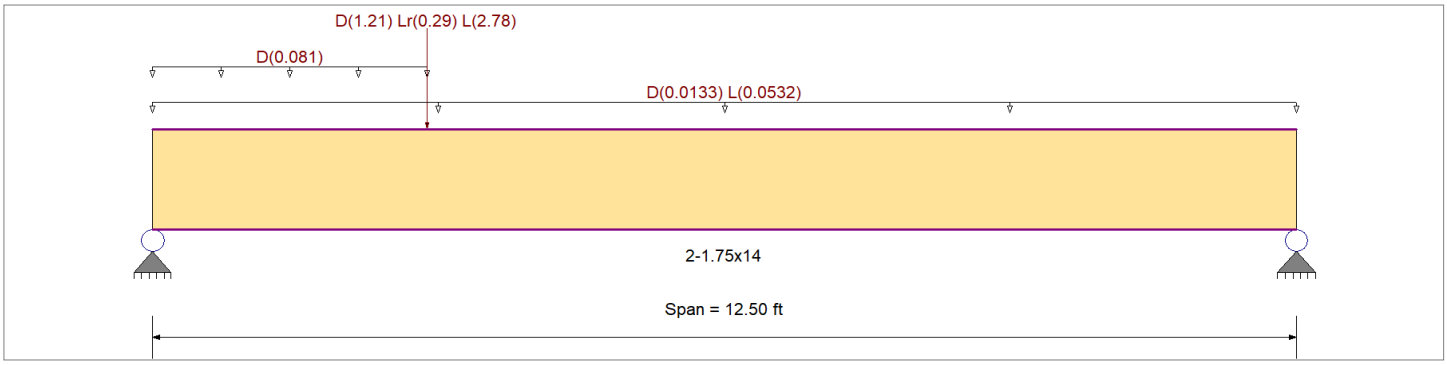
Wood Species : iLevel Truss Joist
Wood Grade : TimberStrand LSL 1.55E

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

Fb +	2325 psi
Fb -	2325 psi
Fc - Prll	2050 psi
Fc - Perp	800 psi
Fv	310 psi
Ft	1070 psi

E : Modulus of Elasticity

Ebend- xx	1550 ksi
Eminbend - xx	787.815 ksi
Density	45.01 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 = 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	=	1,082.46 psi	fv: Actual	=	106.95 psi
F'b	=	2,276.76 psi	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 M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
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	1.11	33.9	279.0
+D+L					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	0.475	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	3.49	106.9	310.0
+D+Lr					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	0.143	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	1.33	40.7	387.5
+D+0.750Lr+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 = 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	3.06	93.8	387.5
+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

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

DESCRIPTION: UF-07

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	Cfu	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

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

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
Load Combination : IBC 2018

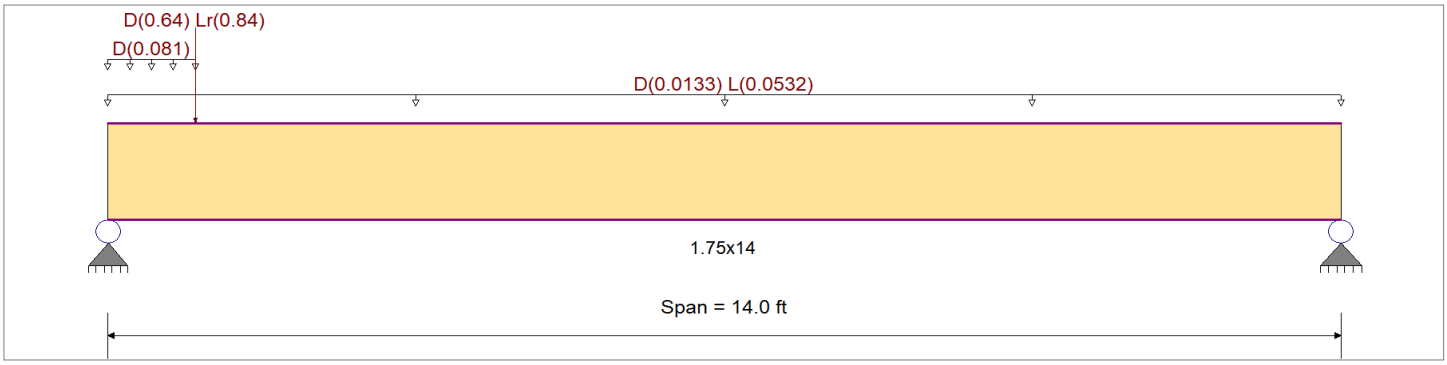
Wood Species : iLevel Truss Joist
Wood Grade : TimberStrand LSL 1.55E

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

Fb +	2,325.0 psi
Fb -	2,325.0 psi
Fc - Prll	2,050.0 psi
Fc - Perp	800.0 psi
Fv	310.0 psi
Ft	1,070.0 psi

E : Modulus of Elasticity

Ebend- xx	1,550.0 ksi
Eminbend - xx	787.82 ksi
Density	45.010 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 = 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	=	417.15 psi	fv: Actual	=	26.90 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	=	6.285 ft	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 M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
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	0.13	7.8	279.0
+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 = 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	0.44	26.9	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 = 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	0.19	11.4	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 = 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	0.41	24.9	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

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

DESCRIPTION: UF-08

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
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
+0.60D					1.00	1.00	1.00	0.986	1.00	1.00	1.00			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

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

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
Load Combination : IBC 2018

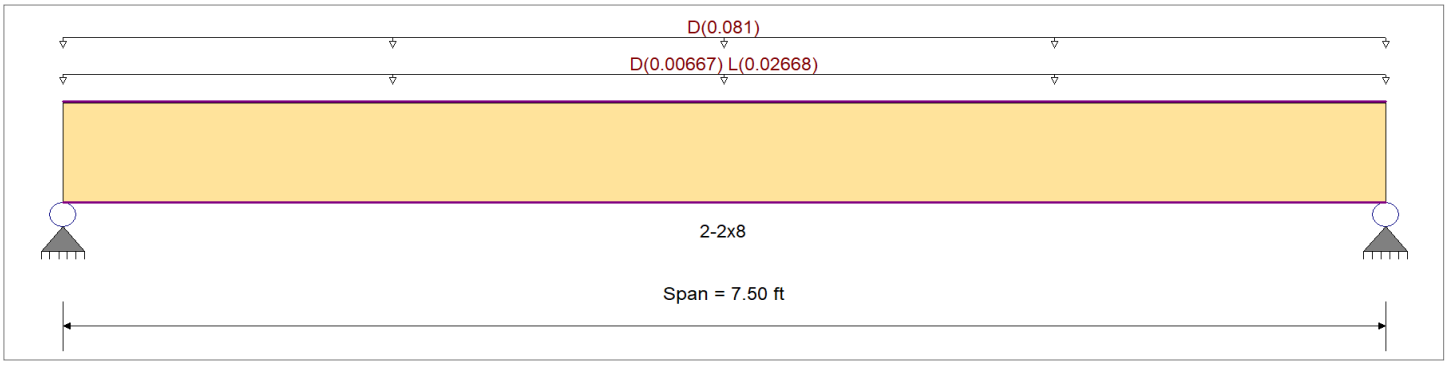
Wood Species : Douglas Fir-Larch
Wood Grade : No.2

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

Fb +	900 psi
Fb -	900 psi
Fc - Prll	1350 psi
Fc - Perp	625 psi
Fv	180 psi
Ft	575 psi

E : Modulus of Elasticity

Ebend- xx	1600 ksi
Eminbend - xx	580 ksi
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 = 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	=	367.12 psi	fv: Actual	=	24.82 psi
F'b	=	1,080.00 psi	F'v	=	180.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	3.750 ft	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 M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
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	0.28	19.0	162.0
+D+L					1.00	1.00	1.00	1.200	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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	0.36	24.8	180.0
+D+0.750L					1.00	1.00	1.00	1.200	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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	0.34	23.4	225.0
+0.60D					1.00	1.00	1.00	1.200	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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	0.17	11.4	288.0

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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

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

UPSTATE engineering, inc.
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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

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
Load Combination : IBC 2018

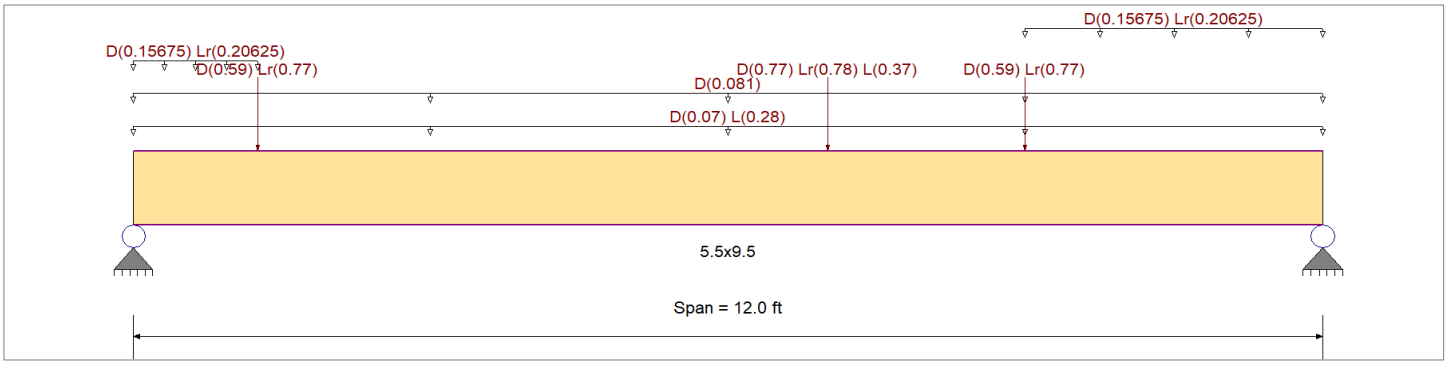
Wood Species : DF/DF
Wood Grade : 24F-V4

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

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

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.210 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 = 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	=	1,836.79 psi	fv: Actual	=	106.60 psi
F'b	=	2,400.00 psi	F'v	=	265.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	6.964 ft	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 M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values 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					1.00	1.00	1.00	1.000	1.00	1.00	1.00			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					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

DESCRIPTION: UF-11

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	Cfu	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	1.000	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	1.000	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	1.000	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	1.000	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	1.000	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	1.000	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	1.000	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

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

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
Load Combination : IBC 2018

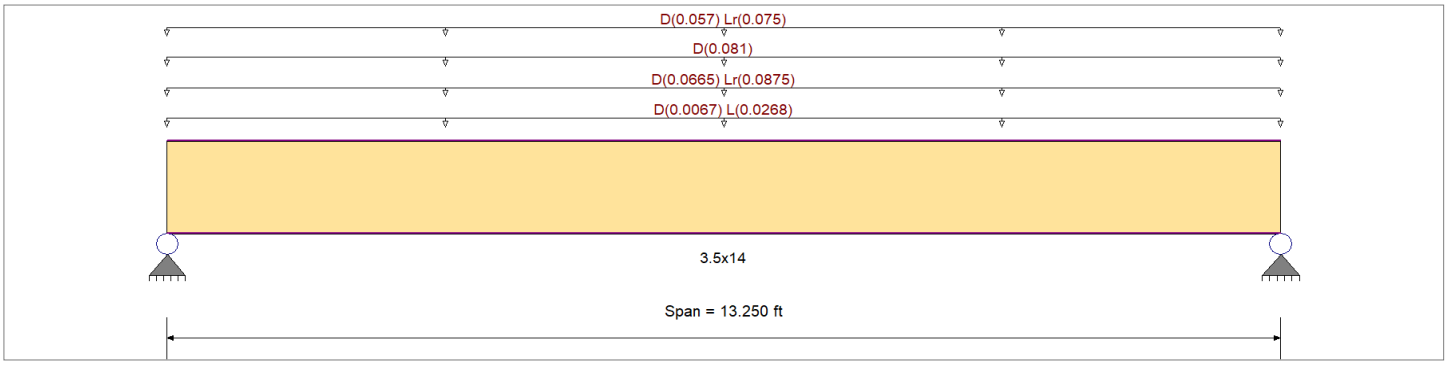
Wood Species : iLevel Truss Joist
Wood Grade : TimberStrand LSL 1.55E

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

Fb +	2325 psi
Fb -	2325 psi
Fc - Prll	2050 psi
Fc - Perp	800 psi
Fv	310 psi
Ft	1070 psi

E : Modulus of Elasticity

Ebend- xx	1550 ksi
Eminbend - xx	787.815 ksi
Density	45.01 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 = 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 M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
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	1.15	35.3	279.0
+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 = 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	1.30	39.8	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 = 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
+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 = 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

UPSTATE engineering, inc.
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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

DESCRIPTION: UF-12

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values 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

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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

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
Load Combination : IBC 2018

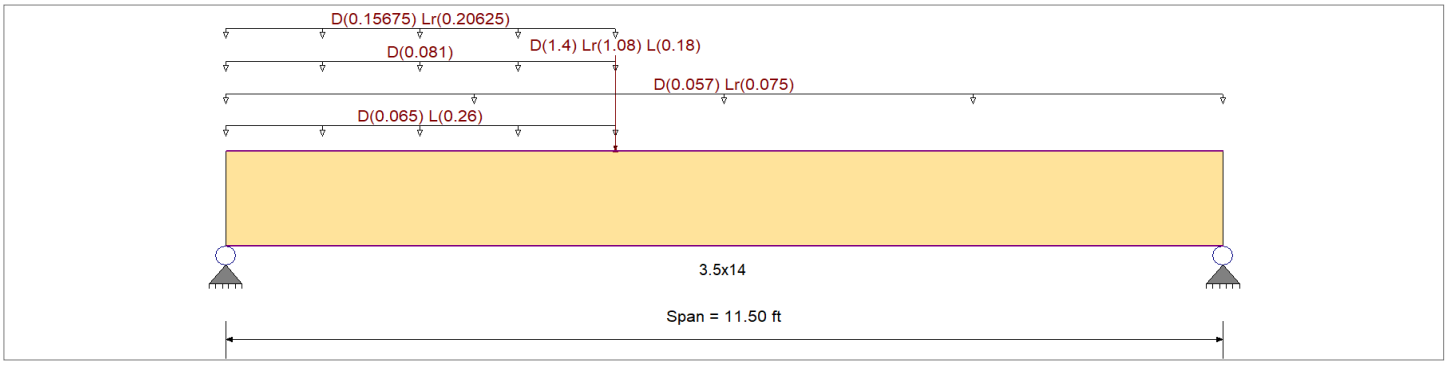
Wood Species : iLevel Truss Joist
Wood Grade : TimberStrand LSL 1.55E

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

Fb +	2,325.0 psi
Fb -	2,325.0 psi
Fc - Prll	2,050.0 psi
Fc - Perp	800.0 psi
Fv	310.0 psi
Ft	1,070.0 psi

E : Modulus of Elasticity

Ebend- xx	1,550.0 ksi
Eminbend - xx	787.82 ksi
Density	45.010 pcf



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	=	1,282.44 psi	fv: Actual	=	109.36 psi
F'b	=	2,865.32 psi	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	Span: 1 : Lr Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.203 in	Ratio =	678 >=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 M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
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	1.87	57.2	279.0
+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 = 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	2.62	80.3	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 = 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	3.38	103.6	387.5

UPSTATE engineering, inc.
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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

DESCRIPTION: UF-13

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+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 = 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					1.00	1.00	1.00	0.986	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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					1.00	1.00	1.00	0.986	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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

UPSTATE engineering, inc.
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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14 Upstate Engineering, Inc.

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
Load Combination : IBC 2018

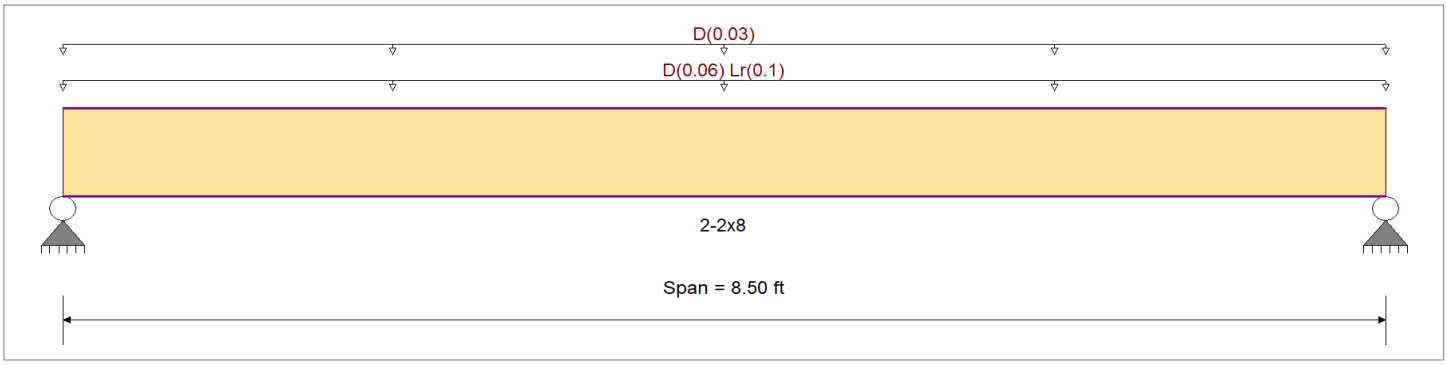
Wood Species : Douglas Fir-Larch
Wood Grade : No.2

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

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

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.0150, 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	=	783.50 psi	fv: Actual	=	47.97 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	=	4.250 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	0.078 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 M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
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	0.33	22.7	162.0
+D+Lr					1.00	1.00	1.00	1.200	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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
+D+0.750Lr					1.00	1.00	1.00	1.200	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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
+0.60D					1.00	1.00	1.00	1.200	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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

UPSTATE engineering, inc.
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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

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

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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

LIC# : KW-06013781, Build:20.23.2.14 Upstate Engineering, Inc.

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
Load Combination : IBC 2018

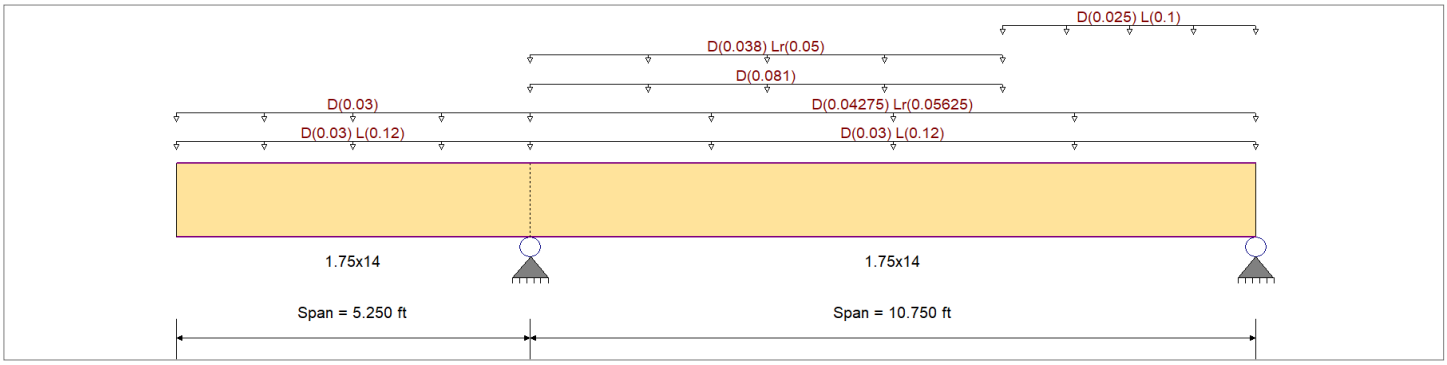
Wood Species : iLevel Truss Joist
Wood Grade : TimberStrand LSL 1.55E

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

Fb +	2,325.0 psi
Fb -	2,325.0 psi
Fc - Prll	2,050.0 psi
Fc - Perp	800.0 psi
Fv	310.0 psi
Ft	1,070.0 psi

E : Modulus of Elasticity

Ebend- xx	1,550.0 ksi
Eminbend - xx	787.82 ksi
Density	45.010 pcf



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	=	707.92 psi	fv: Actual	=	95.18 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	=	6.126 ft	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 M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values 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

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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 GRAVITY - 4D ARCHITECTS.ec6

DESCRIPTION: UF-15

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values 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

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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14 Upstate Engineering, Inc.

DESCRIPTION: UF-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
Load Combination : IBC 2018

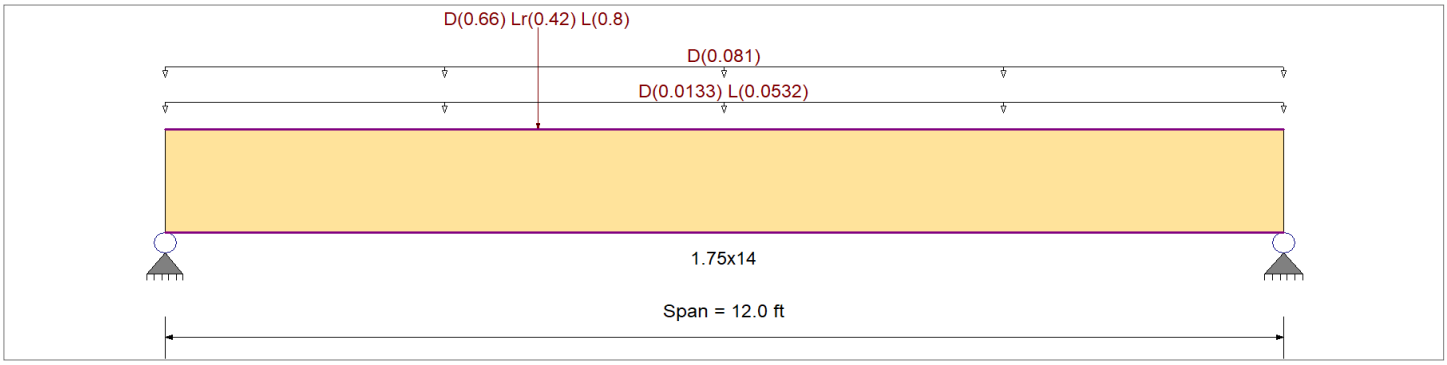
Wood Species : iLevel Truss Joist
Wood Grade : TimberStrand LSL 1.55E

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

Fb +	2,325.0 psi
Fb -	2,325.0 psi
Fc - Prll	2,050.0 psi
Fc - Perp	800.0 psi
Fv	310.0 psi
Ft	1,070.0 psi

E : Modulus of Elasticity

Ebend- xx	1,550.0 ksi
Eminbend - xx	787.82 ksi
Density	45.010 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 = 1.330 ft, (FLR)
Uniform Load : D = 0.010 ksf, Tributary Width = 8.10 ft, (WALL)
Point Load : D = 0.660, Lr = 0.420, L = 0.80 k @ 4.0 ft, (UF-15)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.572 : 1	Maximum Shear Stress Ratio	=	0.334 : 1
Section used for this span		1.75x14	Section used for this span		1.75x14
fb: Actual	=	1,311.47 psi	fv: Actual	=	103.49 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	=	4.029 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	0.109 in	Ratio =	1315 >=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.238 in	Ratio =	605 >=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 M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.333	0.197	0.90	1.00	1.00	1.00	0.986	1.00	1.00	1.00	3.27	686.0	2,063.0	0.90	55.0	279.0
+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 = 12.0 ft	1	0.572	0.334	1.00	1.00	1.00	1.00	0.986	1.00	1.00	1.00	6.25	1,311.5	2,292.3	1.69	103.5	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 = 12.0 ft	1	0.321	0.186	1.25	1.00	1.00	1.00	0.986	1.00	1.00	1.00	4.38	920.2	2,865.3	1.18	72.1	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 = 12.0 ft	1	0.464	0.269	1.25	1.00	1.00	1.00	0.986	1.00	1.00	1.00	6.34	1,330.8	2,865.3	1.70	104.2	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

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

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

DESCRIPTION: UF-16

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	Cfu	C_i	C_r	M	fb	F'b	V	fv	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					1.00	1.00	1.00	0.986	1.00	1.00	1.00			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

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

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14 Upstate Engineering, Inc.

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
Load Combination : IBC 2018

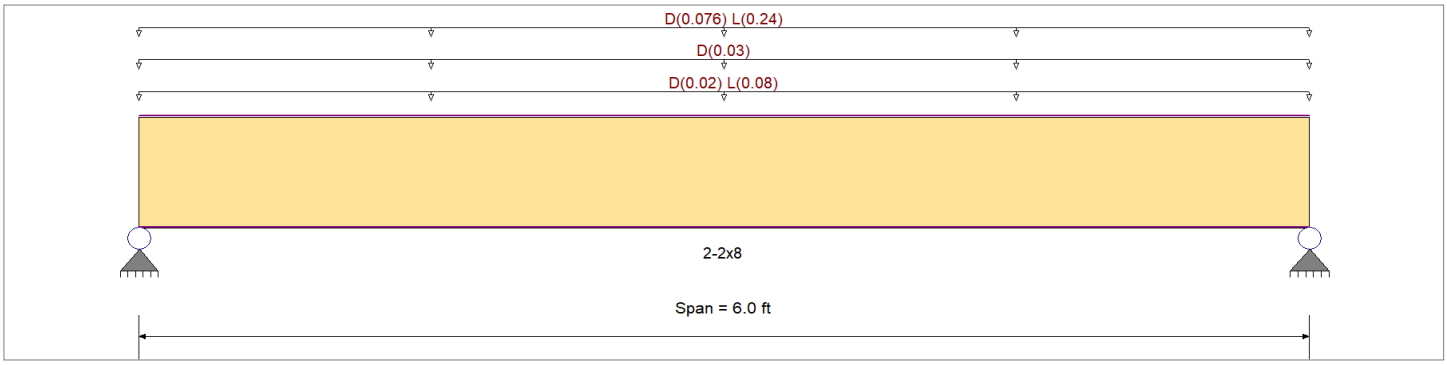
Wood Species : Douglas Fir-Larch
Wood Grade : No.2

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

Fb +	900 psi
Fb -	900 psi
Fc - Prll	1350 psi
Fc - Perp	625 psi
Fv	180 psi
Ft	575 psi

E : Modulus of Elasticity

Ebend- xx	1600 ksi
Eminbend - xx	580 ksi
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 = 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	=	916.39 psi	fv: Actual	=	74.09 psi
F'b	=	1,080.00 psi	F'v	=	180.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	3.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.062 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 M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
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	0.30	20.9	162.0
+D+L					1.00	1.00	1.00	1.200	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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
+D+0.750L					1.00	1.00	1.00	1.200	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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
+0.60D					1.00	1.00	1.00	1.200	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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

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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

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

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

Steel Beam

Project File: 1651 gravity - 4d architects.ec6

DESCRIPTION: UFS-01

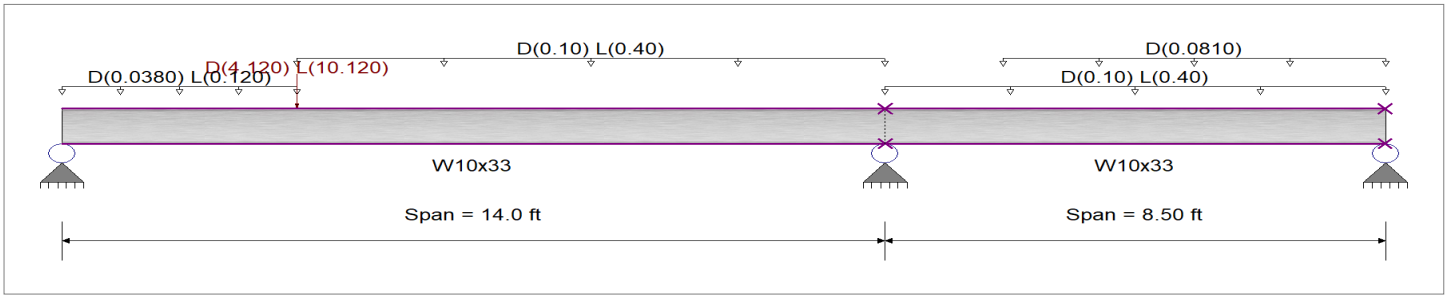
CODE REFERENCES

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
		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	0.143 in	Ratio =	1,177	>=360	Span: 2 : L Only
Max Upward Transient Deflection	-0.021 in	Ratio =	4,897	>=360	Span: 2 : L Only
Max Downward Total Deflection	0.195 in	Ratio =	861	>=240.	Span: 2 : +D+L
Max Upward Total Deflection	-0.028 in	Ratio =	3666	>=240.	Span: 2 : +D+L

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	VnxVnx/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												

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

Steel Beam

Project File: 1651 gravity - 4d architects.ec6

DESCRIPTION: UFS-01

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	VnxVnx/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

Support notation : Far left is #1 Values in KIPS

Load Combination	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

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

Steel Beam

Project File: 1651 gravity - 4d architects.ec6

DESCRIPTION: UFS-02

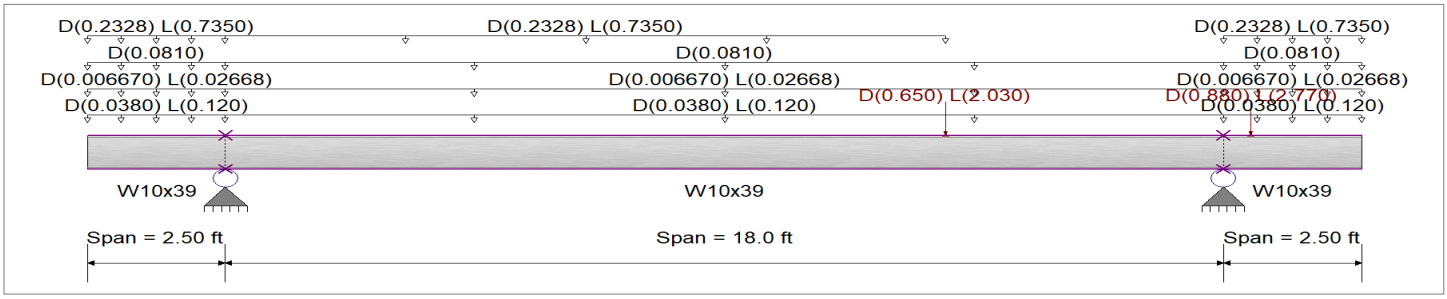
CODE REFERENCES

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)

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

Steel Beam

Project File: 1651 gravity - 4d architects.ec6

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
		Location of maximum on span	2.500 ft
Span # where maximum occurs	Span # 2	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.309 in	Ratio =	698	>=360	Span: 3 : L Only
Max Upward Transient Deflection	-0.132 in	Ratio =	454	>=360	Span: 3 : L Only
Max Downward Total Deflection	0.436 in	Ratio =	496	>=240.	Span: 3 : +D+L
Max Upward Total Deflection	-0.186 in	Ratio =	323	>=240.	Span: 3 : +D+L

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	VnxVnx/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

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		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	

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

Steel Beam

Project File: 1651 gravity - 4d architects.ec6

DESCRIPTION: UFS-03

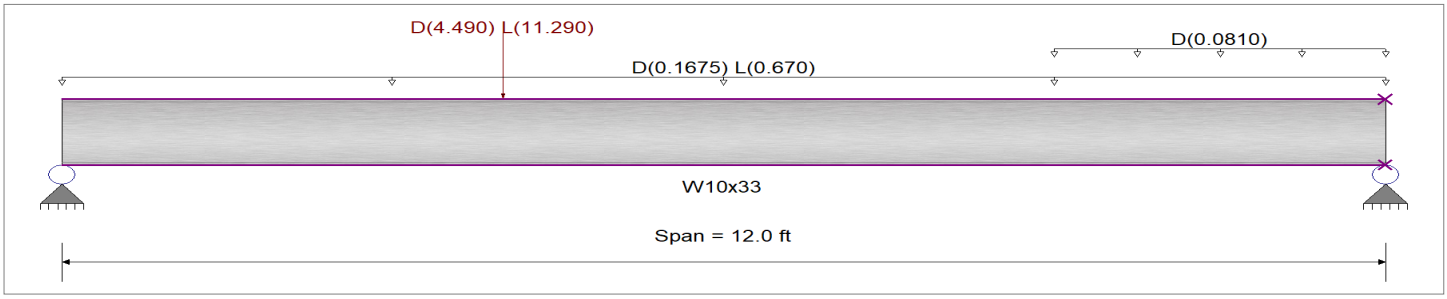
CODE REFERENCES

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
		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 M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values 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 #1 Values in KIPS

Load Combination	Support 1	Support 2	
Max Upward from all Load Conditions	15.575	10.498	-0.460
Max Upward from Load Combinations	15.575	10.498	-0.460

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

Steel Beam

DESCRIPTION: UFS-03

Vertical Reactions

Support notation : Far left is #1 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 (Resis			-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

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

Steel Beam

Project File: 1651 gravity - 4d architects.ec6

DESCRIPTION: UFS-04

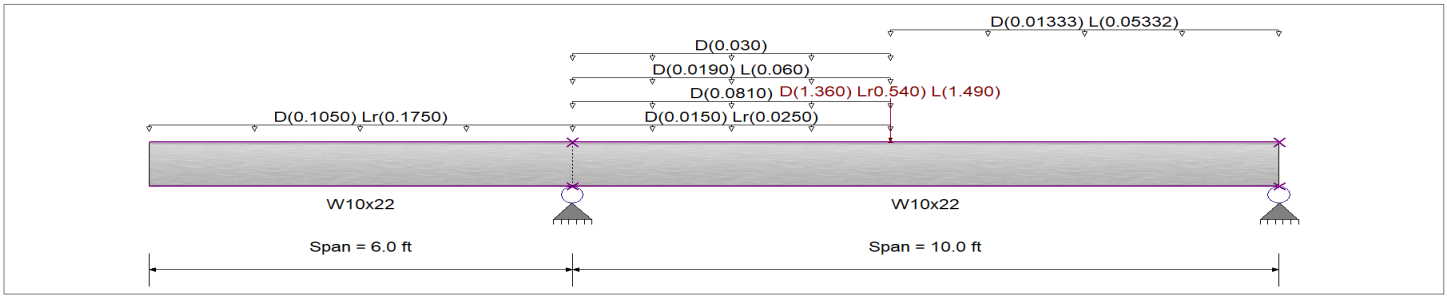
CODE REFERENCES

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
		Location of maximum on span	6.000 ft
Span # where maximum occurs	Span # 2	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 M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	VnxVnx/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

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

Steel Beam

Project File: 1651 gravity - 4d architects.ec6

DESCRIPTION: UFS-04

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	VnxVnx/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	+D+L	-0.0444	0.000
+D+L	2	0.0320	4.920		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		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 Up			-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

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

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14 Upstate Engineering, Inc.

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
Load Combination : IBC 2018

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

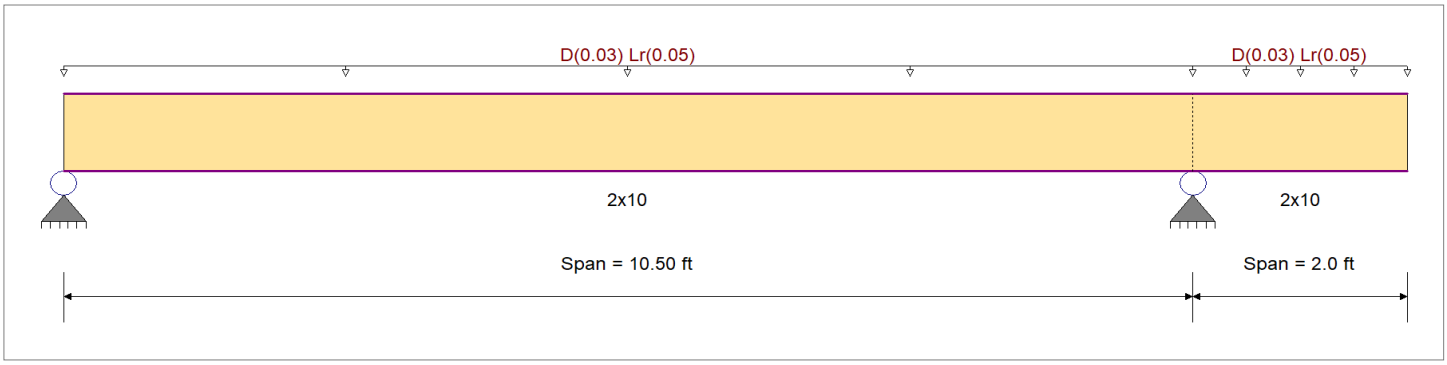
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

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

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.210 pcf

Repetitive Member Stress Increase



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	=	574.42 psi	fv: Actual	=	40.46 psi
F'b	=	1,423.13 psi	F'v	=	225.00 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	5.045 ft	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		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
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	0.14	15.2	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					1.00	1.00	1.00	1.100	1.00	1.00	1.15			0.0	0.00	0.0	0.0
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					1.00	1.00	1.00	1.100	1.00	1.00	1.15			0.0	0.00	0.0	0.0
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

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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

DESCRIPTION: LRR-01

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	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
Length = 2.0 ft	**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
+0.60D					1.00	1.00	1.00	1.100	1.00	1.00	1.15			0.0	0.00	0.0	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	

UPSTATE engineering, inc.
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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14 Upstate Engineering, Inc.

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
Load Combination : IBC 2018

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

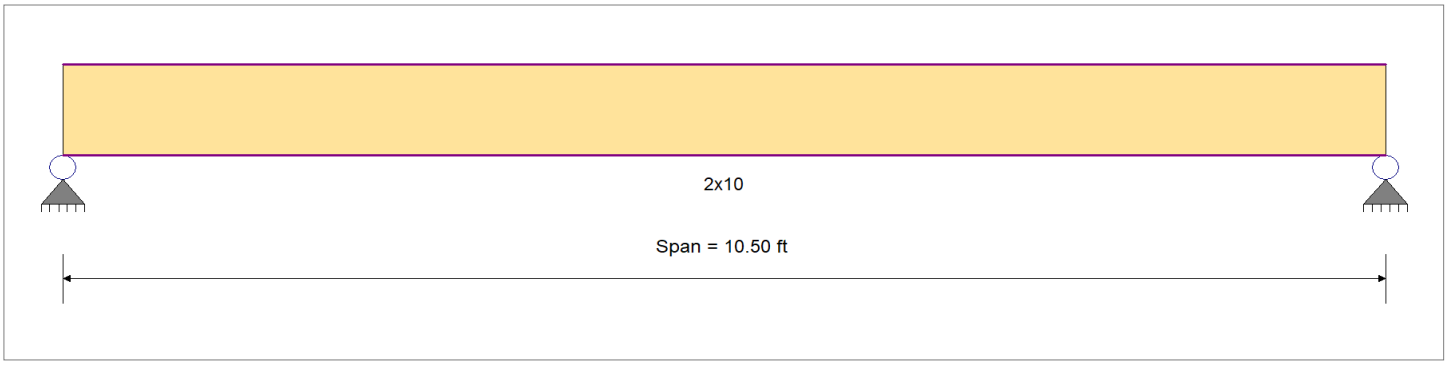
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

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

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.210 pcf

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	=	0.00 psi	fv: Actual	=	0.00 psi
F'b	=	0.00 psi	F'v	=	0.00 psi
Load Combination			Load Combination		
Location of maximum on span	=	0.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0 in	Ratio =	0 <240	n/a
Max Upward Transient Deflection	0 in	Ratio =	0 <240	n/a
Max Downward Total Deflection	0 in	Ratio =	0 <180	n/a
Max Upward Total Deflection	0 in	Ratio =	0 <180	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	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
														0.0	0.00	0.0	0.0
Length = 10.50 ft	1			0.90	1.00	1.00	1.00	1.100	1.00	1.00	1.15			1,024.7	0.00	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

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

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

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
Load Combination : IBC 2018

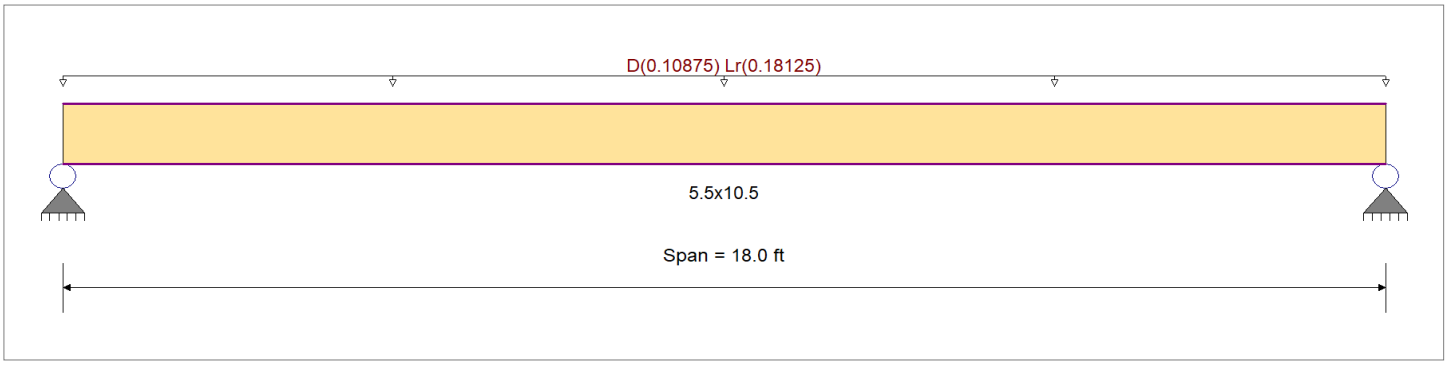
Wood Species : DF/DF
Wood Grade : 24F-V4

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

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

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.0150, 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	=	1,394.58 psi	fv: Actual	=	61.36 psi
F'b	=	3,000.00 psi	F'v	=	331.25 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	9.000 ft	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 M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
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
+D+Lr					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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
+D+0.750Lr					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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
+0.60D					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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

UPSTATE engineering, inc.
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Project Title: DHALIWAL-KLAR
Engineer: amg
Project ID: 1651
Project Descr: NEW SFR

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

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

UPSTATE engineering, inc.
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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

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
Load Combination : IBC 2018

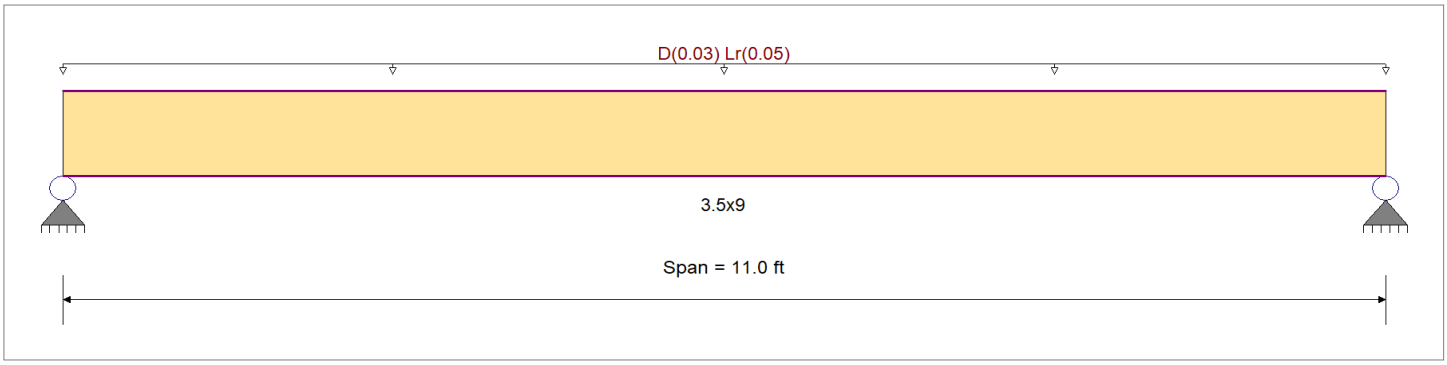
Wood Species : DF/DF
Wood Grade : 24F-V4

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

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

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.0150, 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	=	307.30 psi	fv: Actual	=	18.20 psi
F'b	=	3,000.00 psi	F'v	=	331.25 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	5.500 ft	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 M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
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	0.14	6.8	238.5
+D+Lr					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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	0.38	18.2	331.3
+D+0.750Lr					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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	0.32	15.4	331.3
+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 = 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	0.09	4.1	424.0

UPSTATE engineering, inc.
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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

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

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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14 Upstate Engineering, Inc.

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
Load Combination : IBC 2018

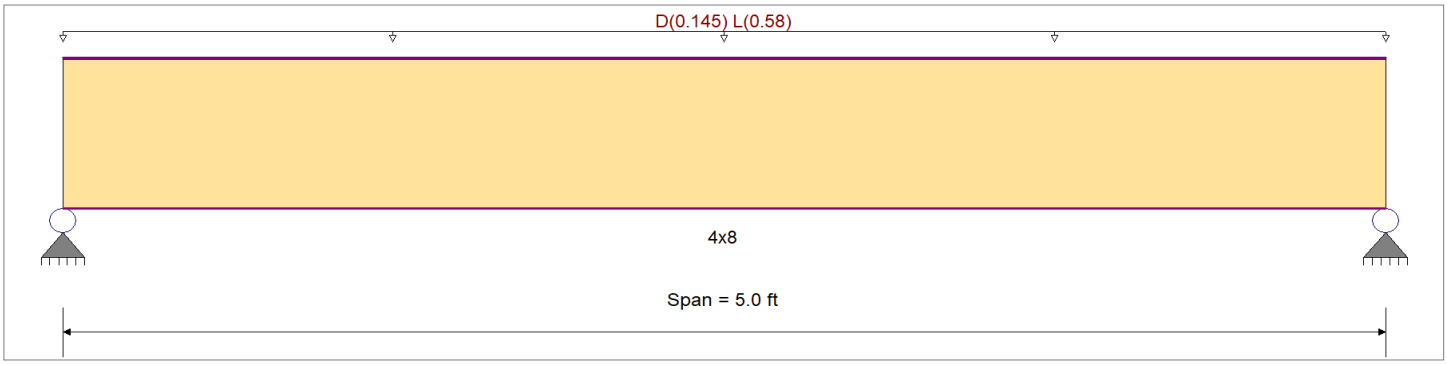
Wood Species : Douglas Fir-Larch
Wood Grade : No.2

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

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

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.210 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 = 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	=	886.70 psi	fv: Actual	=	81.33 psi
F'b	=	1,170.00 psi	F'v	=	180.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	2.500 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.046 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 M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
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	0.28	16.3	162.0
+D+L					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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
+D+0.750L					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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
+0.60D					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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

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

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

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

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

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

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
Load Combination : IBC 2018

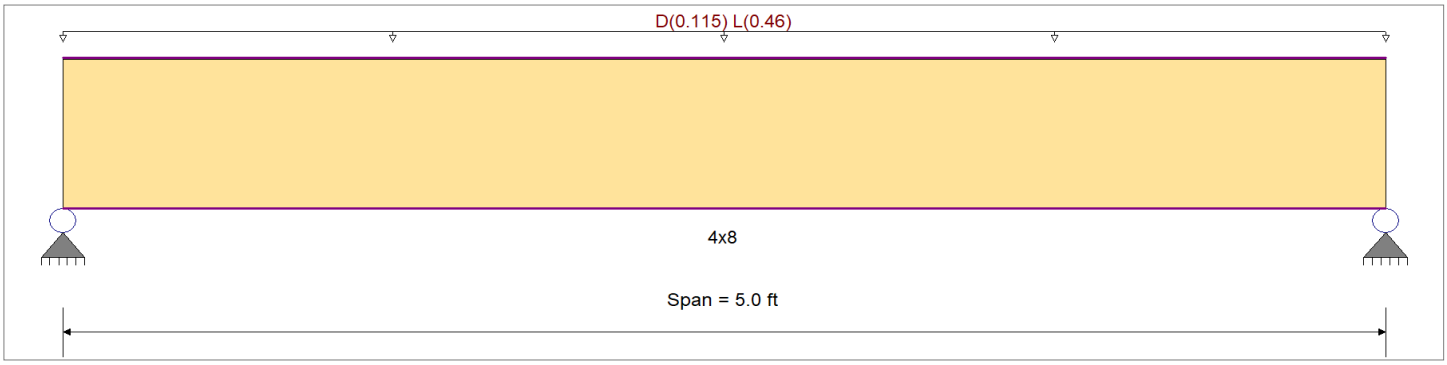
Wood Species : Douglas Fir-Larch
Wood Grade : No.2

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

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

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.210 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 = 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	=	703.24 psi	fv: Actual	=	64.51 psi
F'b	=	1,170.00 psi	F'v	=	180.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	2.500 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.037 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 M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
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	0.22	12.9	162.0
+D+L					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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
+D+0.750L					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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
+0.60D					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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

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

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

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

UPSTATE engineering, inc.
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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

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
Load Combination : IBC 2018

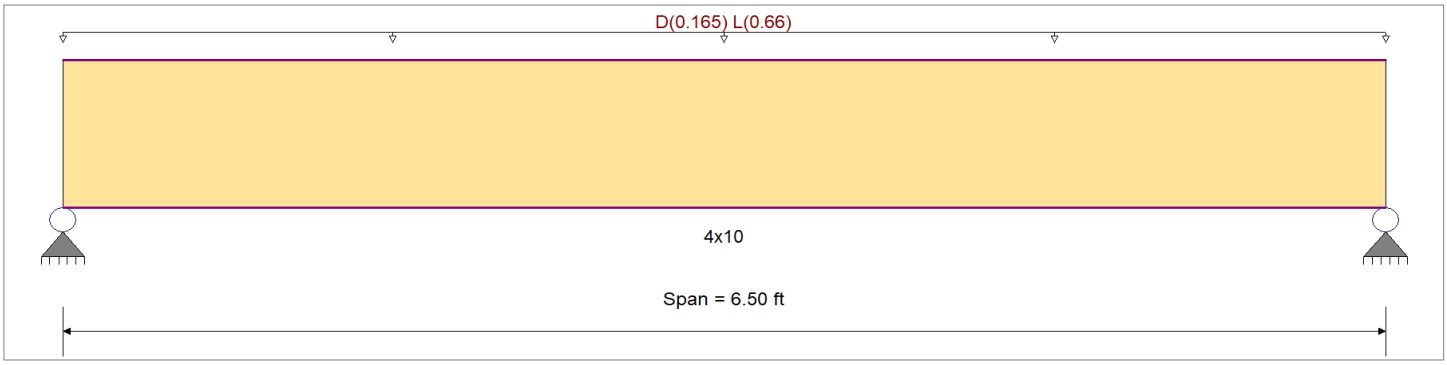
Wood Species : Douglas Fir-Larch
Wood Grade : No.2

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

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

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.210 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 = 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	=	1,047.54 psi	fv: Actual	=	95.21 psi
F'b	=	1,080.00 psi	F'v	=	180.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	3.250 ft	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 M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
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	0.41	19.0	162.0
+D+L					1.00	1.00	1.00	1.200	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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	2.05	95.2	180.0
+D+0.750L					1.00	1.00	1.00	1.200	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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	1.64	76.2	225.0
+0.60D					1.00	1.00	1.00	1.200	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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	0.25	11.4	288.0

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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

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

UPSTATE engineering, inc.
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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

DESCRIPTION: MF-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
Load Combination : IBC 2018

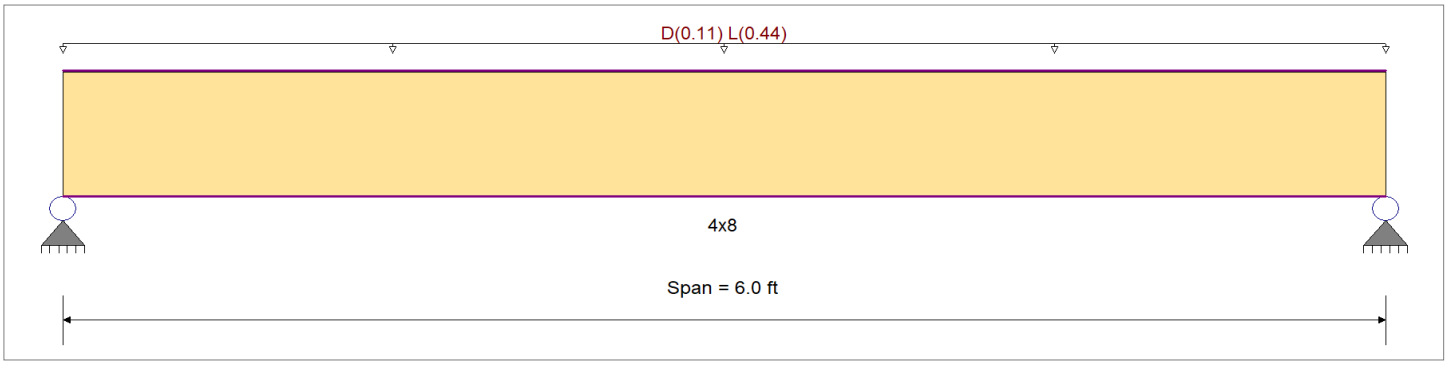
Wood Species : Douglas Fir-Larch
Wood Grade : No.2

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

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

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.210 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 = 11.0 ft, (FLR)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.828 : 1	Maximum Shear Stress Ratio	=	0.435 : 1
Section used for this span		4x8	Section used for this span		4x8
fb: Actual	=	968.64 psi	fv: Actual	=	78.31 psi
F'b	=	1,170.00 psi	F'v	=	180.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	3.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.073 in	Ratio =	992 >=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.091 in	Ratio =	793 >=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 M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 6.0 ft	1	0.184	0.097	0.90	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.50	193.7	1,053.0	0.26	15.7	162.0
+D+L					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 6.0 ft	1	0.828	0.435	1.00	1.00	1.00	1.00	1.300	1.00	1.00	1.00	2.48	968.6	1,170.0	1.32	78.3	180.0
+D+0.750L					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 6.0 ft	1	0.530	0.278	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.00	1.98	774.9	1,462.5	1.06	62.7	225.0
+0.60D					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 6.0 ft	1	0.062	0.033	1.60	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.30	116.2	1,872.0	0.16	9.4	288.0

UPSTATE engineering, inc.
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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

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

UPSTATE engineering, inc.
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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14 Upstate Engineering, Inc.

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
Load Combination : IBC 2018

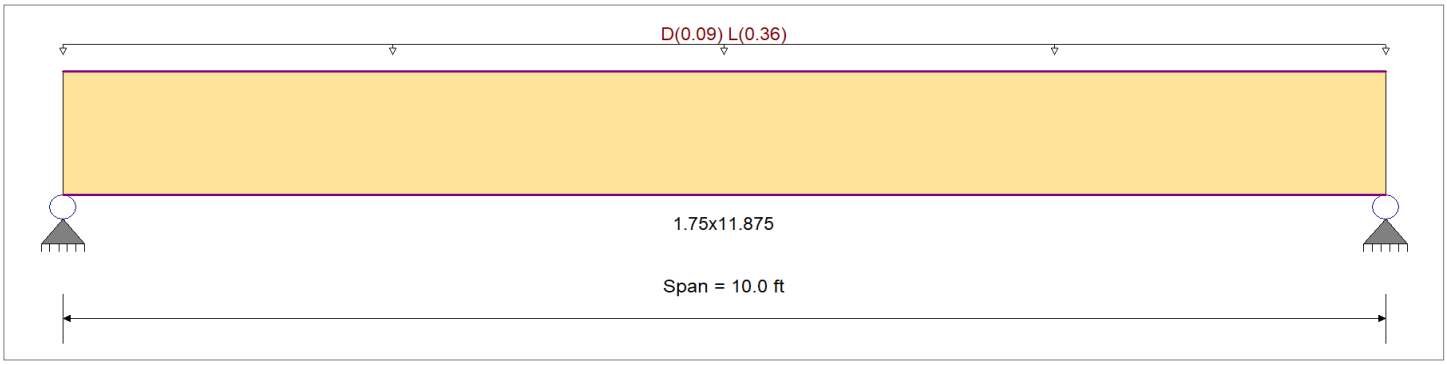
Wood Species : iLevel Truss Joist
Wood Grade : TimberStrand LSL 1.55E

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

Fb +	2325 psi
Fb -	2325 psi
Fc - Prll	2050 psi
Fc - Perp	800 psi
Fv	310 psi
Ft	1070 psi

E : Modulus of Elasticity

Ebend- xx	1550 ksi
Eminbend - xx	787.815 ksi
Density	45.01 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)

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	=	1,641.16 psi	fv: Actual	=	130.40 psi
F'b	=	2,327.24 psi	F'v	=	310.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	5.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.215 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 M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
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	0.36	26.1	279.0
+D+L					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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
+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 = 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
+0.60D					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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

UPSTATE engineering, inc.
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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

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

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

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14 Upstate Engineering, Inc.

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
Load Combination : IBC 2018

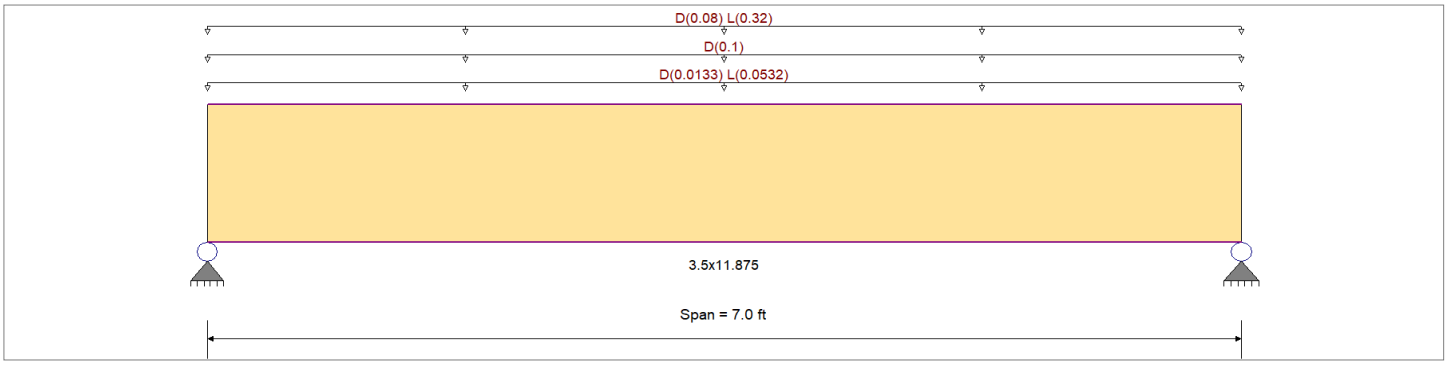
Wood Species : iLevel Truss Joist
Wood Grade : TimberStrand LSL 1.55E

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

Fb +	2,325.0 psi
Fb -	2,325.0 psi
Fc - Prll	2,050.0 psi
Fc - Perp	800.0 psi
Fv	310.0 psi
Ft	1,070.0 psi

E : Modulus of Elasticity

Ebend- xx	1,550.0 ksi
Eminbend - xx	787.82 ksi
Density	45.010 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 = 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	=	506.18 psi	fv: Actual	=	51.71 psi
F'b	=	2,327.24 psi	F'v	=	310.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	3.500 ft	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 M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
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					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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

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

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

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

UPSTATE engineering, inc.
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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

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
Load Combination : IBC 2018

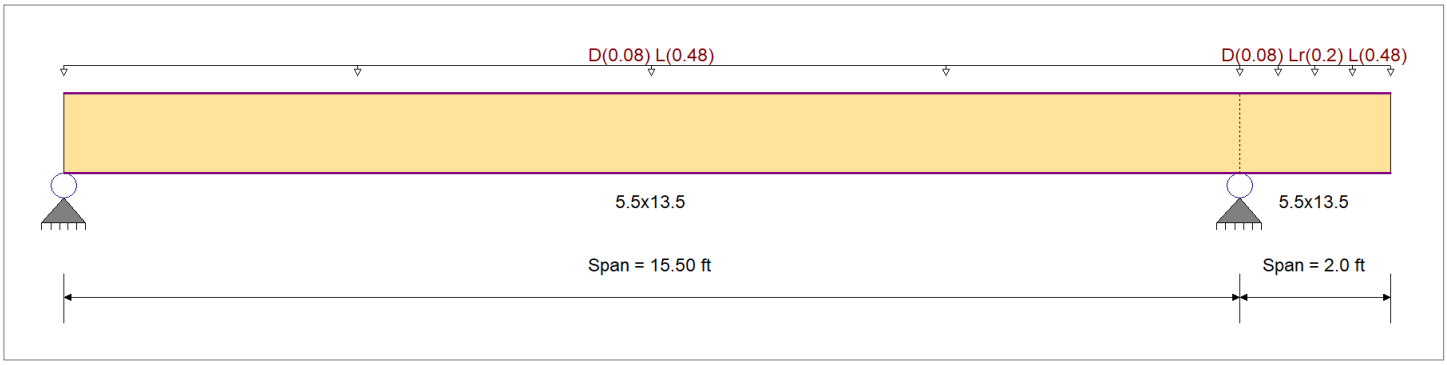
Wood Species : DF/DF
Wood Grade : 24F-V4

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

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

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.210 pcf



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	=	1,168.10 psi	fv: Actual	=	77.38 psi
F'b	=	2,400.00 psi	F'v	=	265.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	7.620 ft	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 M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
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	0.55	11.1	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					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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

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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

DESCRIPTION: MF-07

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	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
Length = 2.0 ft	**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
+D+0.750Lr+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 = 15.50 ft	**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
Length = 2.0 ft	**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
+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 = 15.50 ft	**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
Length = 2.0 ft	**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
+0.60D					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	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
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		0.0000	0.000
	2	0.0000	7.707	+D+L	-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 Conditio	-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	

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

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

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
Load Combination : IBC 2018

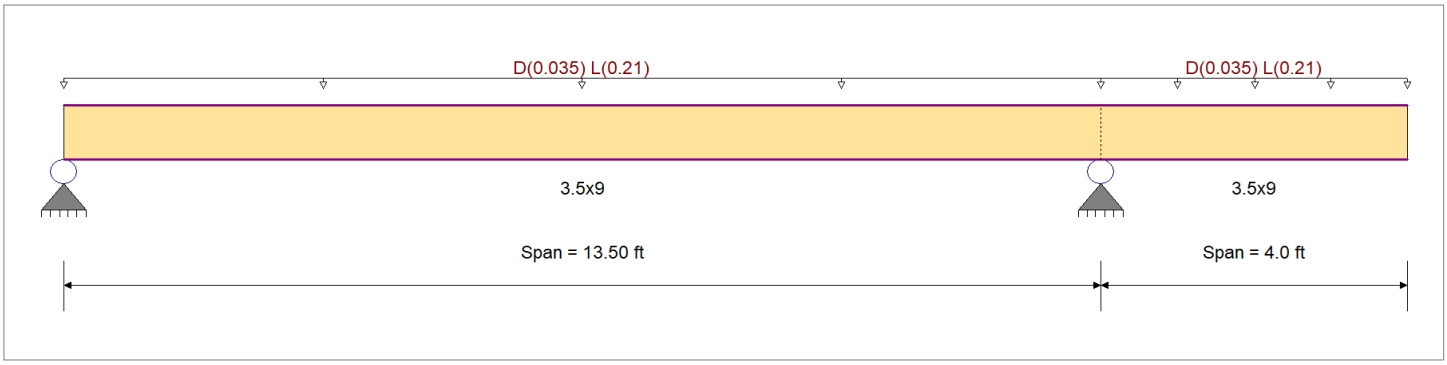
Wood Species : DF/DF
Wood Grade : 24F-V8

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

Fb +	2400 psi
Fb -	2400 psi
Fc - Prll	1650 psi
Fc - Perp	650 psi
Fv	265 psi
Ft	1100 psi

E : Modulus of Elasticity

Ebend- xx	1800 ksi
Eminbend - xx	950 ksi
Ebend- yy	1600 ksi
Eminbend - yy	850 ksi
Density	31.21 pcf



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	=	2,400.00 psi	F'v	=	265.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	6.184 ft	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		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
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					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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

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

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

DESCRIPTION: MF-08

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	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					1.00	1.00	1.00	1.000	1.00	1.00	1.00			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	6.7	424.0

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		0.0000	0.000
	2	0.0000	6.561	+D+L	-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	

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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14 Upstate Engineering, Inc.

DESCRIPTION: MF-09

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
Load Combination : IBC 2018

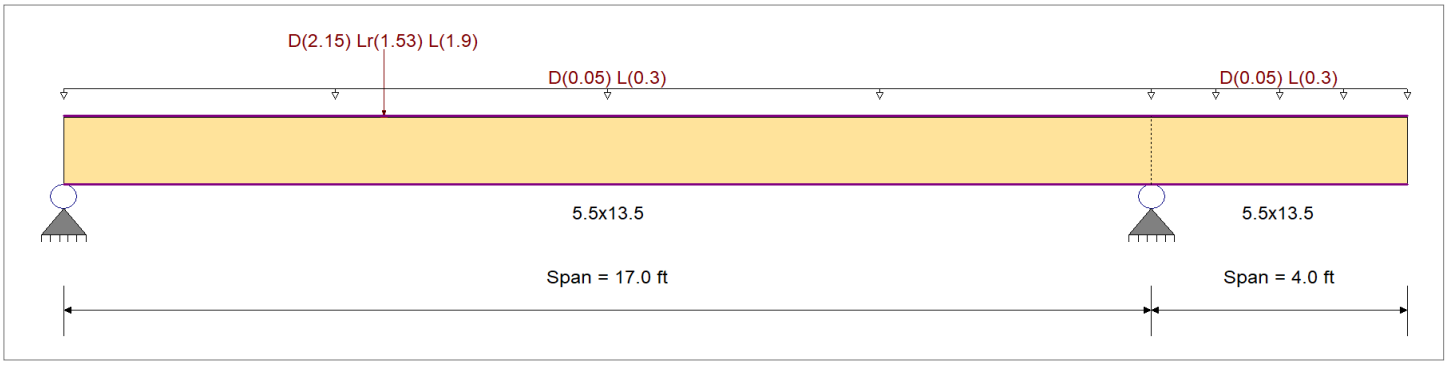
Wood Species : DF/DF
Wood Grade : 24F-V8

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

Fb +	2,400.0 psi
Fb -	2,400.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.210 pcf



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 = 5.0 ft, (DECK)
Point Load : D = 2.150, Lr = 1.530, L = 1.90 k @ 5.0 ft, (MF-08)
Load for Span Number 2
Uniform Load : D = 0.010, L = 0.060 ksf, Tributary Width = 5.0 ft, (DECK)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.717 : 1	Maximum Shear Stress Ratio	=	0.404 : 1
Section used for this span		5.5x13.5	Section used for this span		5.5x13.5
fb: Actual	=	1,721.46 psi	fv: Actual	=	107.14 psi
F'b	=	2,400.00 psi	F'v	=	265.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	5.034 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	0.375 in	Ratio =	544 >=360	Span: 1 : L Only
Max Upward Transient Deflection	-0.238 in	Ratio =	402 >=360	Span: 2 : L Only
Max Downward Total Deflection	0.564 in	Ratio =	361 >=240	Span: 1 : +D+L
Max Upward Total Deflection	-0.359 in	Ratio =	266 >=240	Span: 2 : +D+L

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	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 17.0 ft	1	0.298	0.158	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	8.95	643.2	2,160.0	1.87	37.7	238.5
Length = 4.0 ft	2	0.013	0.158	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.40	28.7	2,160.0	0.14	37.7	238.5
+D+L					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 17.0 ft	1	0.717	0.404	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	23.97	1,721.5	2,400.0	5.30	107.1	265.0
Length = 4.0 ft	2	0.084	0.404	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.80	201.1	2,400.0	1.01	107.1	265.0
+D+Lr					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0

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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

DESCRIPTION: MF-09

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 17.0 ft	1	0.343	0.180	1.25	1.00	1.00	1.00	1.000	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	1.000	1.00	1.00	1.00	0.40	28.7	3,000.0	0.14	59.5	331.3
+D+0.750Lr+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 = 17.0 ft	1	0.581	0.320	1.25	1.00	1.00	1.00	1.000	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	1.000	1.00	1.00	1.00	2.20	158.0	3,000.0	0.79	106.1	331.3
+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 = 17.0 ft	1	0.526	0.295	1.15	1.00	1.00	1.00	1.000	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	1.000	1.00	1.00	1.00	2.20	158.0	2,760.0	0.79	89.8	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 = 17.0 ft	1	0.100	0.053	1.60	1.00	1.00	1.00	1.000	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	1.000	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		0.0000	0.000
	2	0.0000	7.978	+D+L	-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	

UPSTATE engineering, inc.
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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14 Upstate Engineering, Inc.

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
Load Combination : IBC 2018

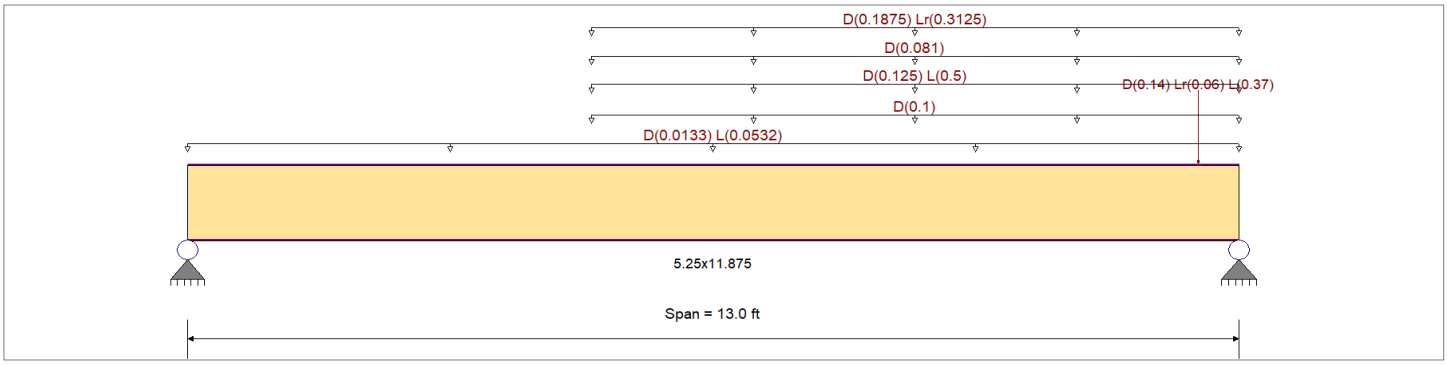
Wood Species : iLevel Truss Joist
Wood Grade : TimberStrand LSL 1.55E

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

Fb +	2,325.0 psi
Fb -	2,325.0 psi
Fc - Prll	2,050.0 psi
Fc - Perp	800.0 psi
Fv	310.0 psi
Ft	1,070.0 psi

E : Modulus of Elasticity

Ebend- xx	1,550.0 ksi
Eminbend - xx	787.82 ksi
Density	45.010 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 = 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	=	1,629.85 psi	fv: Actual	=	118.12 psi
F'b	=	2,327.70 psi	F'v	=	310.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	7.401 ft	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 M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
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	2.33	56.1	279.0
+D+L					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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
+D+Lr					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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

UPSTATE engineering, inc.
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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

DESCRIPTION: MF-10

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+0.750Lr+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 = 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					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
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

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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14 Upstate Engineering, Inc.

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
Load Combination : IBC 2018

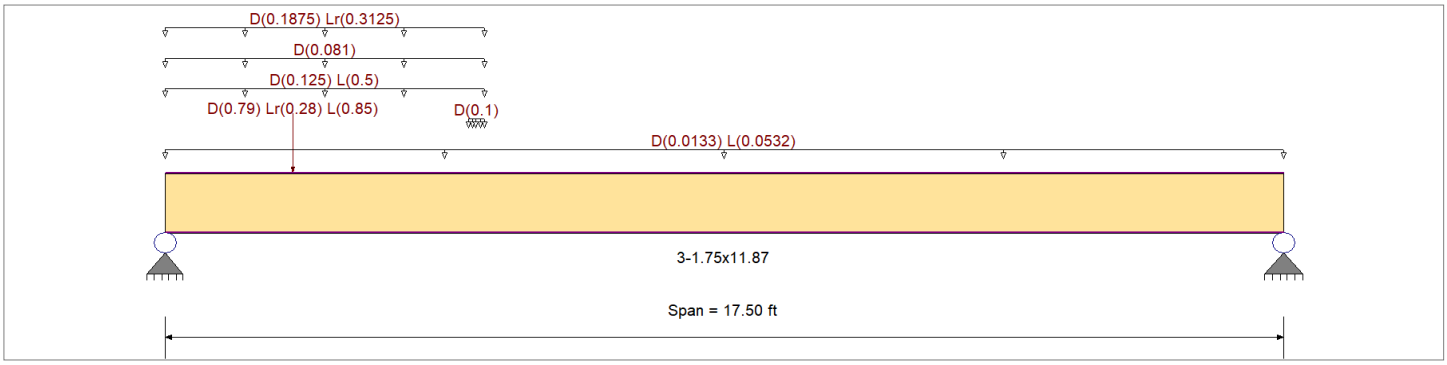
Wood Species : iLevel Truss Joist
Wood Grade : TimberStrand LSL 1.55E

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

Fb +	2,325.0 psi
Fb -	2,325.0 psi
Fc - Prll	2,050.0 psi
Fc - Perp	800.0 psi
Fv	310.0 psi
Ft	1,070.0 psi

E : Modulus of Elasticity

Ebend- xx	1,550.0 ksi
Eminbend - xx	787.82 ksi
Density	45.010 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 = 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	=	1,230.36 psi	fv: Actual	=	119.39 psi
F'b	=	2,328.31 psi	F'v	=	310.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	4.407 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	0.325 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 M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
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	2.13	51.3	279.0
+D+L					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	0.528	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	4.96	119.4	310.0
+D+Lr					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	0.286	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	3.42	82.3	387.5

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

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

DESCRIPTION: MF-11

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+0.750Lr+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	0.443	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					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	0.392	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					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	0.082	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

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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

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
Load Combination : IBC 2018

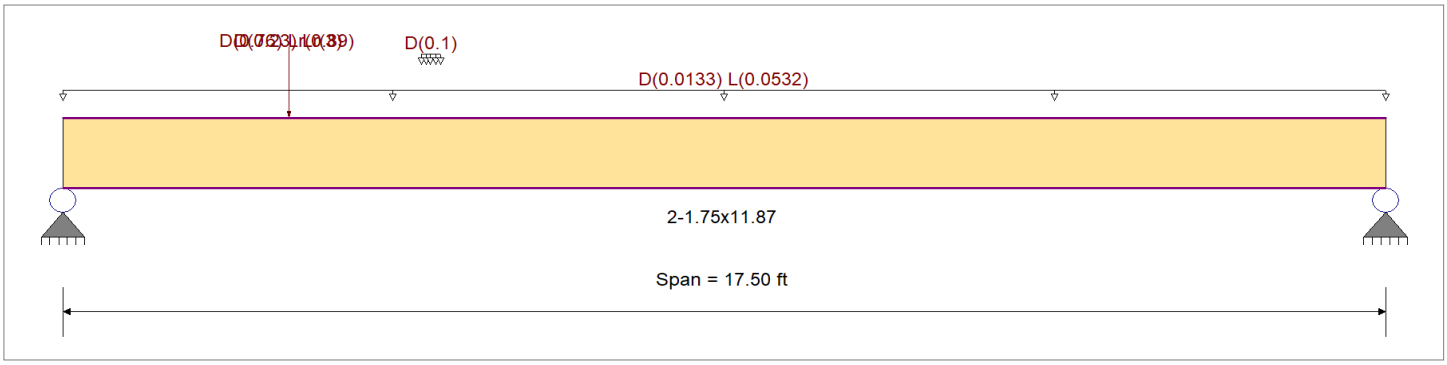
Wood Species : iLevel Truss Joist
Wood Grade : TimberStrand LSL 1.55E

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

Fb +	2,325.0 psi
Fb -	2,325.0 psi
Fc - Prll	2,050.0 psi
Fc - Perp	800.0 psi
Fv	310.0 psi
Ft	1,070.0 psi

E : Modulus of Elasticity

Ebend- xx	1,550.0 ksi
Eminbend - xx	787.82 ksi
Density	45.010 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 = 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	=	3.002 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	0.504 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 / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values 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					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	0.271	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					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	0.625	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					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	0.548	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

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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Wood Beam

Project File: 1651 gravity - 4d architects.ec6

DESCRIPTION: MF-12

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values 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

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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Cantilevered Retaining Wall

Project File: 1651 gravity - 4d architects.ec6

DESCRIPTION: 10' MAX CANT'D (#5 BARS)

Code References

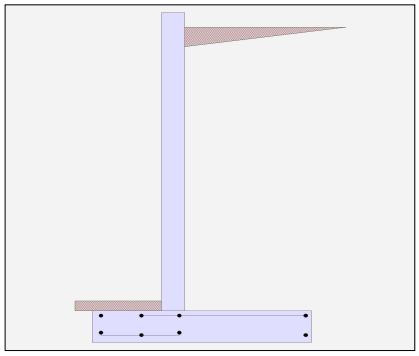
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

Retained Height	=	9.71 ft
Wall height above soil	=	0.50 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	4.00 in
Water table above bottom of footing	=	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	=	300.0 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 (Strength Level)	=	0.0 psf

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

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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

Cantilevered Retaining Wall

Project File: 1651 gravity - 4d architects.ec6

DESCRIPTION: 10' MAX CANT'D (#5 BARS)

Design Summary

Wall Stability Ratios

Overturning	=	4.07	OK
Sliding	=	1.50	OK
Global Stability	=	1.87	

Total Bearing Load	=	7,798	lbs
...resultant ecc.	=	3.24	in

Eccentricity within middle third

Soil Pressure @ Toe	=	811 psf	OK
Soil Pressure @ Heel	=	1,368 psf	OK
Allowable	=	1,500 psf	

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	1,135 psf	
ACI Factored @ Heel	=	1,915 psf	
Footing Shear @ Toe	=	10.1 psi	OK
Footing Shear @ Heel	=	5.2 psi	OK
Allowable	=	82.2 psi	

Sliding Calcs

Lateral Sliding Force	=	2,037.9	lbs
less 100% Passive Force	-	151.0	lbs
less 100% Friction Force	-	2,913.2	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

		Bottom		
		Stem OK		
Design Height Above Ftg	ft =	0.00		
Wall Material Above "Ht"	=	Concrete		
Design Method	=	SD	SD	SD
Thickness	=	8.00		
Rebar Size	=	# 5		
Rebar Spacing	=	10.00		
Rebar Placed at	=	Edge		
Design Data				
fb/FB + fa/Fa	=	**0.876**		
Total Force @ Section				
Service Level	lbs =			
Strength Level	lbs =	2,638.9		
Moment....Actual				
Service Level	ft-# =			
Strength Level	ft-# =	8,539.4		
Moment.....Allowable	=	9,745.5		
Shear.....Actual				
Service Level	psi =			
Strength Level	psi =	35.5		
Shear.....Allowable	psi =	82.2		
Anet (Masonry)	in2 =			
Wall Weight	psf =	100.0		
Rebar Depth 'd'	in =	6.19		

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 =	60,000.0

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

Cantilevered Retaining Wall

Project File: 1651 gravity - 4d architects.ec6

DESCRIPTION: 10' MAX CANT'D (#5 BARS)

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.3233 in2/ft		
(4/3) * As :	0.4311 in2/ft	Min Stem T&S Reinf Area 1.960 in2	
200bd/fy : 200(12)(6.1875)/60000 :	0.2475 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 :	
	==========	One layer of :	Two layers of :
Required Area :	0.3233 in2/ft	#4@ 12.50 in	#4@ 25.00 in
Provided Area :	0.372 in2/ft	#5@ 19.38 in	#5@ 38.75 in
Maximum Area :	1.0059 in2/ft	#6@ 27.50 in	#6@ 55.00 in

Footing Data

Toe Width	=	2.00 ft
Heel Width	=	4.33
Total Footing Width	=	6.33
Footing Thickness	=	13.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	1.00 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

		Toe	Heel	
Factored Pressure	=	1,135	1,915	psf
Mu' : Upward	=	2,435	10,939	ft-#
Mu' : Downward	=	478	15,200	ft-#
Mu: Design	=	1,957 OK	4,261	ft-# OK
phiMn	=	8,599	9,499	ft-#
Actual 1-Way Shear	=	10.13	5.24	psi
Allow 1-Way Shear	=	82.16	82.16	psi

Toe Reinforcing = # 4 @ 8.00 in
Heel Reinforcing = # 4 @ 8.00 in
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@ 8.54 in, #5@ 13.24 in, #6@ 18.80 in, #7@ 25.64 in, #8@ 33.76 in, #9@ 42.73 in, #10@ 54.27 in

Heel: #4@ 8.54 in, #5@ 13.24 in, #6@ 18.80 in, #7@ 25.64 in, #8@ 33.76 in, #9@ 42.73 in, #10@ 54.27 in

Key: No key defined

Min footing T&S reinf Area 1.78 in2
Min footing T&S reinf Area per foot 0.28 in2 /ft

If one layer of horizontal bars:	If two layers of horizontal bars:
#4@ 8.55 in	#4@ 17.09 in
#5@ 13.25 in	#5@ 26.50 in
#6@ 18.80 in	#6@ 37.61 in

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

Cantilevered Retaining Wall

Project File: 1651 gravity - 4d architects.ec6

DESCRIPTION: 10' MAX CANT'D (#5 BARS)

Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#	.....RESISTING..... Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	2,037.9	3.60	7,330.6			
HL Act Pres (be water tbl)						
Hydrostatic Force						
Buoyant Force =						
Surcharge over Heel =						
Surcharge Over Toe =						
Adjacent Footing Load =						
Added Lateral Load =						
Load @ Stem Above Soil =						
=						
Soil Over HL (ab. water tbl)				3,915.2	4.50	17,617.8
Soil Over HL (bel. water tbl)					4.50	17,617.8
Water Table						
Sloped Soil Over Heel =						
Surcharge Over Heel =						
Adjacent Footing Load =						
Axial Dead Load on Stem =				345.0	2.33	805.0
* Axial Live Load on Stem =				515.0	2.33	1,201.7
Soil Over Toe =				73.3	1.00	73.3
Surcharge Over Toe =						
Stem Weight(s) =				1,020.8	2.33	2,381.9
Earth @ Stem Transitions =						
Footing Weight =				1,029.1	3.17	3,258.7
Key Weight =					1.00	
Vert. Component =				899.6	6.33	5,697.0
Total =	2,037.9	**O.T.M.** =	7,330.6	**Total =** 7,283.0 lbs	**R.M.=**	29,833.7

Resisting/Overturning Ratio = **4.07**
Vertical Loads used for Soil Pressure = 7,798.0 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 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.

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Project Descr: NEW SFR

Cantilevered Retaining Wall

Project File: 1651 gravity - 4d architects.ec6

DESCRIPTION: 10' MAX CANT'D (#5 BARS)

Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom
Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #5 bar specified in this stem design segment (25.4.2.3a) =	21.36 in
Development length for #5 bar specified in this stem design segment =	16.43 in
Hooked embedment length into footing for #5 bar specified in this stem design segment =	8.33 in
As Provided =	0.3720 in2/ft
As Required =	0.3233 in2/ft

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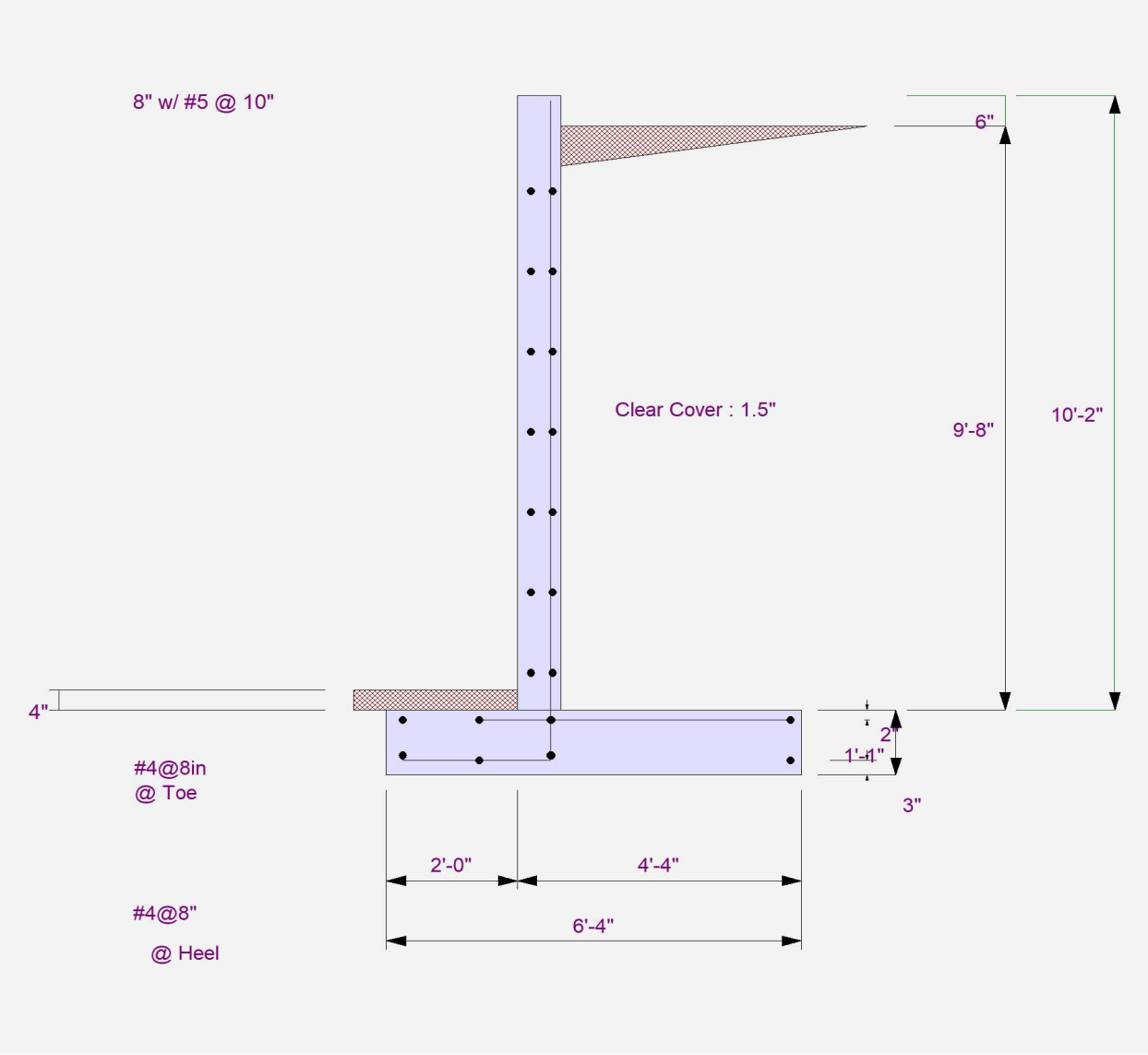
Project Descr: NEW SFR

Cantilevered Retaining Wall

Project File: 1651 gravity - 4d architects.ec6

DESCRIPTION: 10' MAX CANT'D (#5 BARS)



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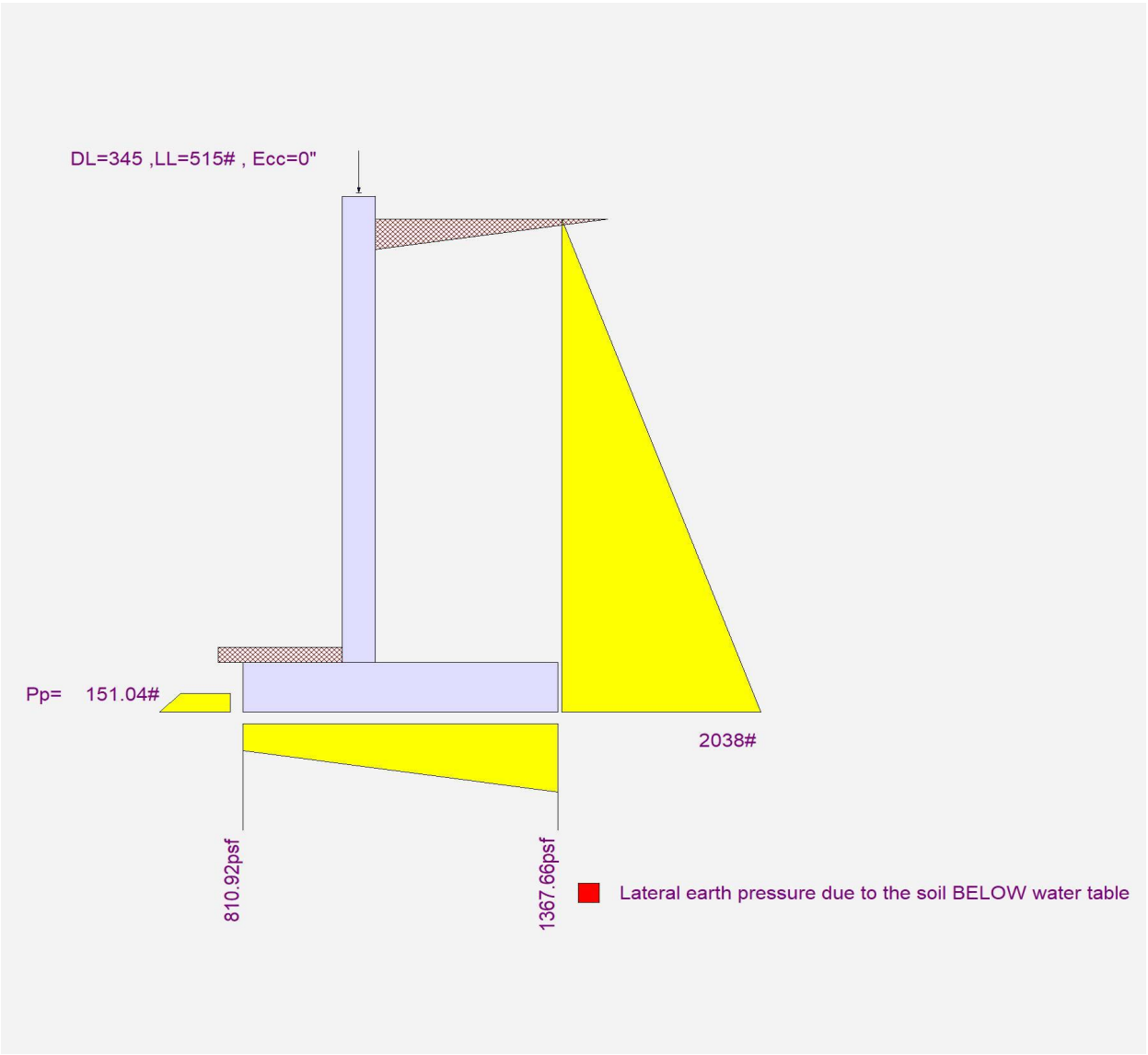
Cantilevered Retaining Wall

Project File: 1651 gravity - 4d architects.ec6

DESCRIPTION: 10' MAX CANT'D (#5 BARS)



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

Cantilevered Retaining Wall

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14 Upstate Engineering, Inc.

DESCRIPTION: 8' MAX CANT'D

Code Reference

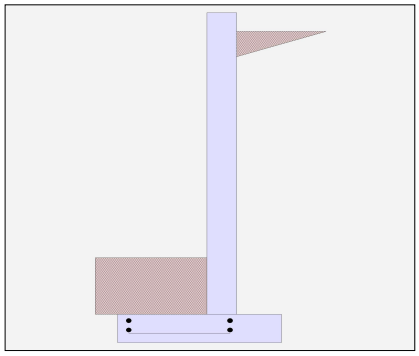
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

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 (Strength Level)	=	0.0 psf

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

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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Cantilevered Retaining Wall

Project File: 1651 gravity - 4d architects.ec6

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

		Bottom		
		Stem OK		
Design Height Above Ftg	ft =	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

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

Cantilevered Retaining Wall

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14 Upstate Engineering, Inc.

DESCRIPTION: 8' MAX CANT'D

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
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 :	
	==========	One layer of :	Two layers of :
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

		Toe	Heel	
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:	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

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

Cantilevered Retaining Wall

Project File: 1651 gravity - 4d architects.ec6

DESCRIPTION: 8' MAX CANT'D

Summary of Overturning & Resisting Forces & Moments

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#		.....RESISTING..... 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	=			
					Footing Weight	=	412.5	1.83	756.4
					Key Weight	=			
					Vert. Component	=	525.8	3.67	1,928.0
Total	=	1,191.1	**O.T.M.** =	3,275.5	**Total =**		3,238.6 lbs	**R.M.=**	8,299.6

Resisting/Overturning Ratio = **2.53**
Vertical Loads used for Soil Pressure = 3,753.6 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 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.

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Engineer: amg
Project ID: 1651
Project Descr: NEW SFR

Cantilevered Retaining Wall

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 in2/ft
As Required =	0.2950 in2/ft

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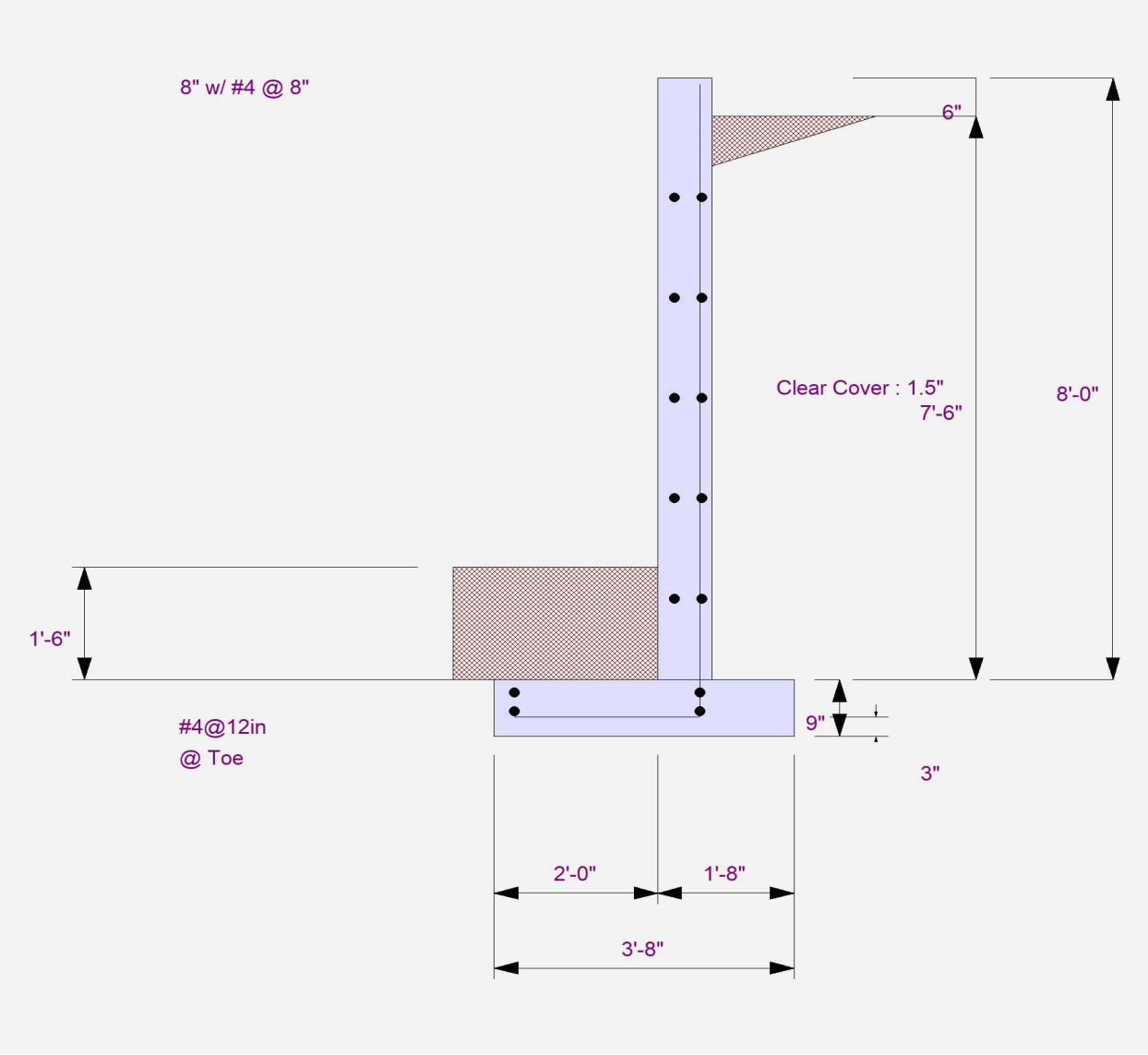
Cantilevered Retaining Wall

Project File: 1651 gravity - 4d architects.ec6

DESCRIPTION: 8' MAX CANT'D



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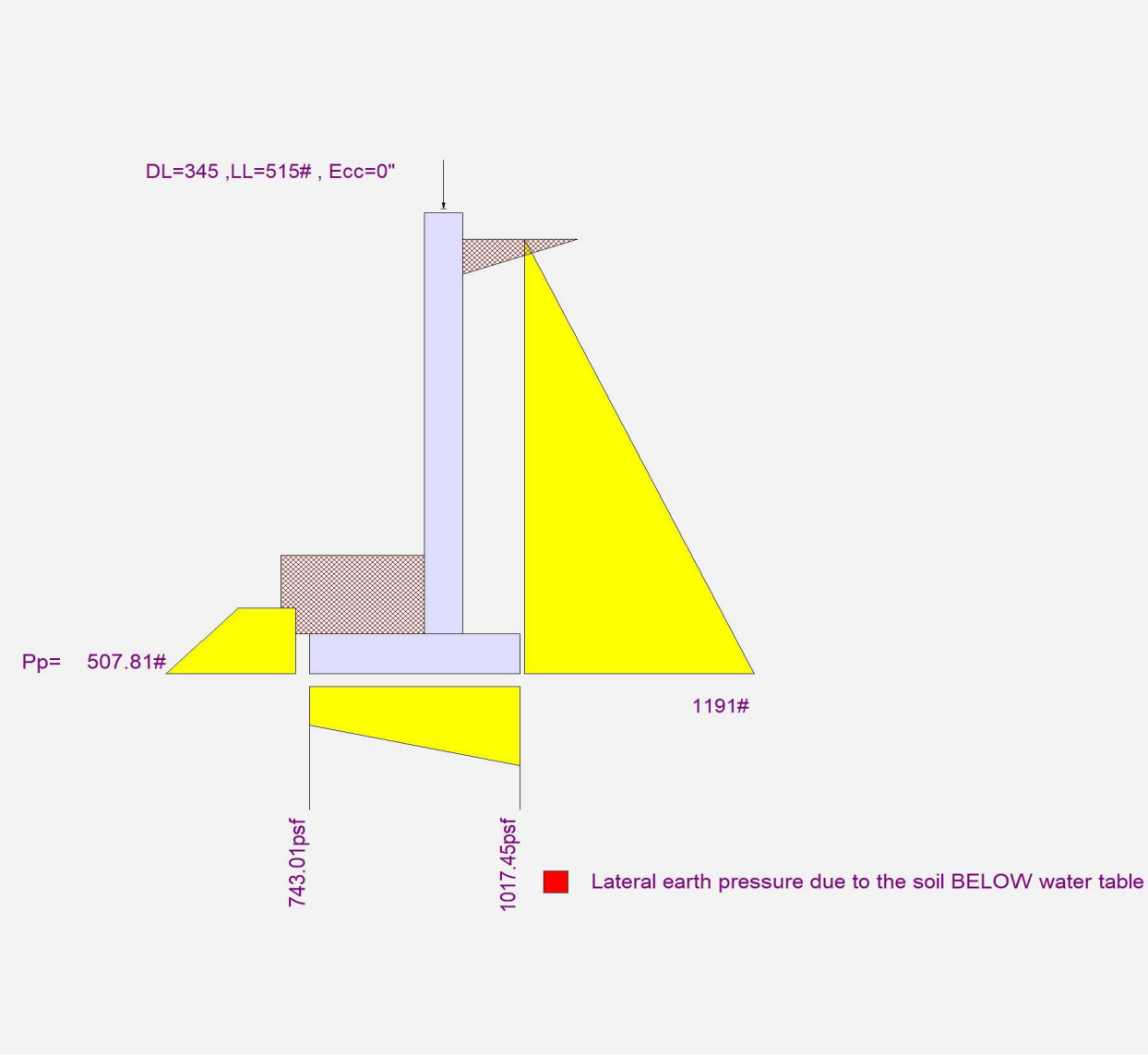

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SERVICES@UPST8.COM TEL: (425) 354-4105 FAX: JUST DON'T

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

Cantilevered Retaining Wall

Project File: 1651 gravity - 4d architects.ec6

LIC# : KW-06013781, Build:20.23.2.14 Upstate Engineering, Inc.

DESCRIPTION: 6' MAX CANT'D

Code Reference

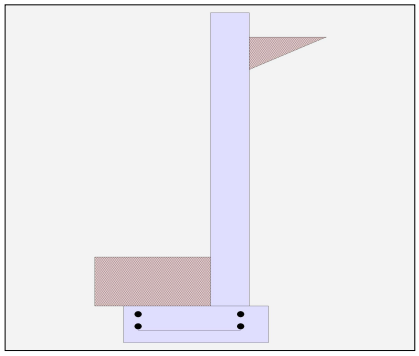
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

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 (Strength Level)	=	0.0 psf

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

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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

		Bottom		
		Stem OK		
Design Height Above Ftg	ft =	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**		
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		
Shear.....Actual				
Service Level	psi =			
Strength Level	psi =	11.3		
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

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Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
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 :	
	==========	One layer of :	Two layers of :
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

		Toe		Heel	
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:	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

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Summary of Overturning & Resisting Forces & Moments

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#		.....RESISTING..... 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	=			
					Total =		1,632.9 lbs	**R.M.=**	2,751.7

Resisting/Overturning Ratio = **1.93**
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.

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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 in2/ft
As Required =	0.1728 in2/ft

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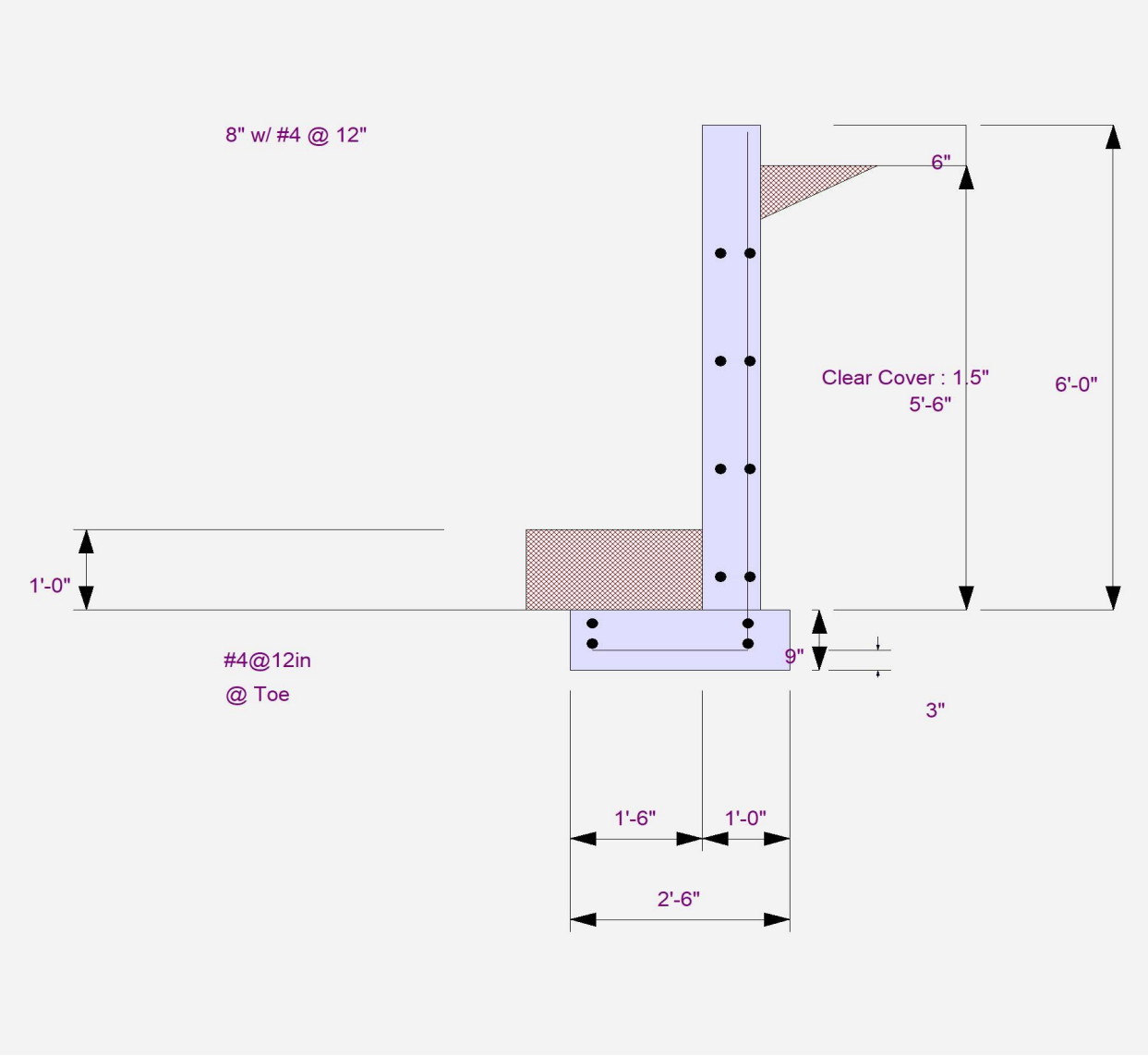

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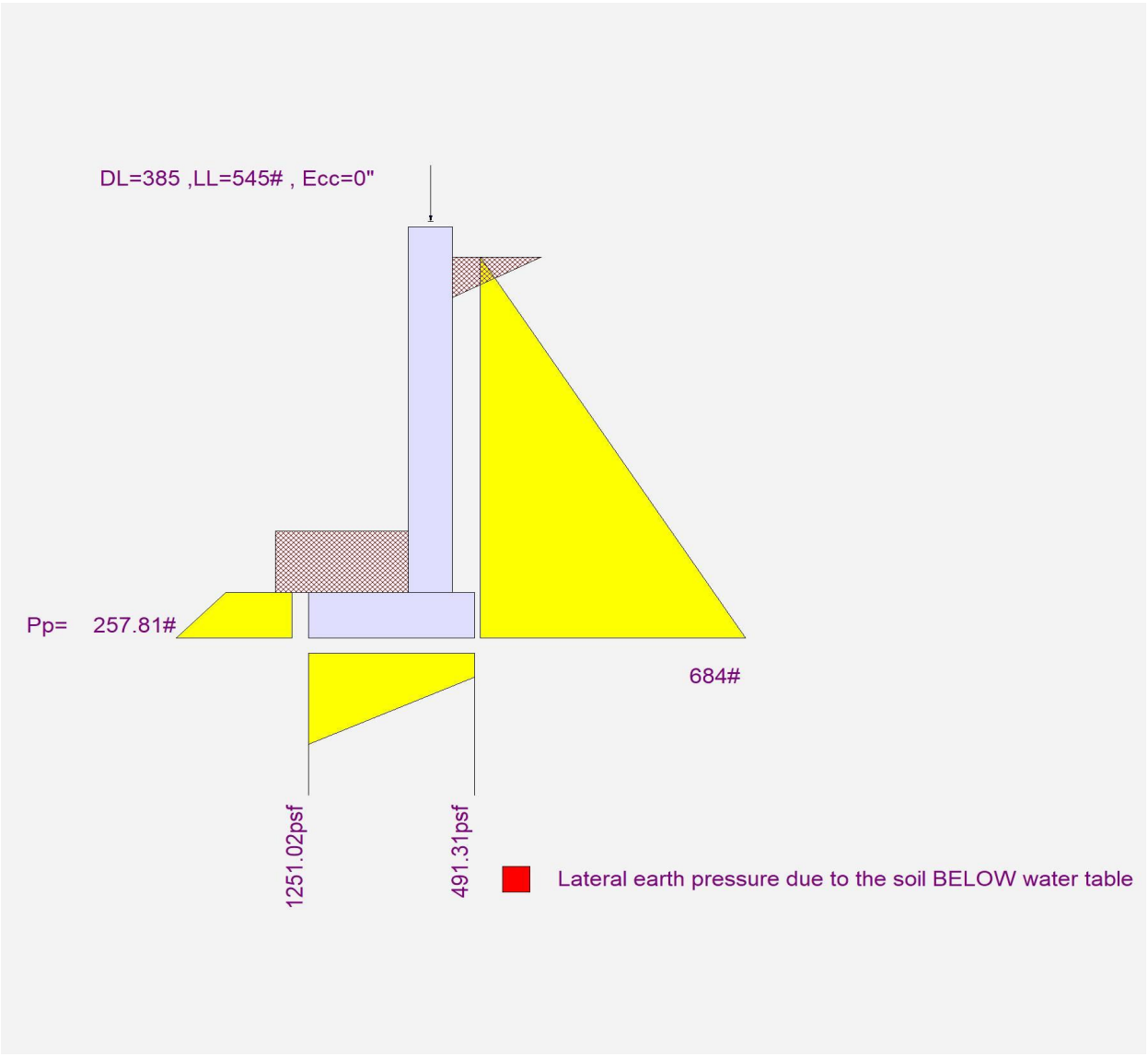

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SHEARWALL & HOLDOWN NOTES (U.N.O.) :

(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 blkg) 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
Job #: 1651

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