



I.L. GROSS
STRUCTURAL ENGINEERS

Lorenzini Waterfront Residence

Mercer Island, WA

New Single-Family Residence

STRUCTURAL DESIGN CALCULATIONS
FOR Robert Edson Swain Architecture

CD FRAMING REVISION CALCULATIONS



December 10, 2021



Revision Summary:

The Structural plans have been revised to accommodate the revisions to the architectural plans as requested by the owner.

Sheet Revision List:

- S2.0 – Foundations and wall layouts revised for planning changes and new elevator in east wing
- S2.1 – Walls updated for new bathroom and entry layouts to accommodate new elevator. Framing revised to accommodate updated floor assemblies with flush finishes at bathrooms and terrace areas.
- S2.2 – Framing updated around low roofs at entry and master bathroom.
- S2.3 – Infill framing removed due to reduced footprint of enclosed garage area.
- S3.0 – Updated foundation details for revised floor assemblies and acoustical break.
- S3.1- Foundation details updated for new floor assemblies and interior concrete wall construction at stairs.
- S3.2 – Details removed that are no longer applicable due revisions at detached garage. New detail for foundation wall at entry.
- S4.1 – New and updated details for terrace framing with stone tile
- S4.2 – New details for updated framing at east wing and low roof areas.
- S5.0 – New detail 23 added for steel beam at edge of terrace.
- S5.1 – Details updated for revised floor assembly depths

CD Changes to Roof Framing

C New/Revised Entry DL216 SL25

Span 5'2" + 1.5' o.k.

Typ Joists → 2x8 (sloped) @ 24" o.k.

7'-6" Joists → 2x8 (sloped) @ 24" o.k.

20" OUTRIGGER → w/ scupper end
2x3 doubled onto Ripped 2x8 @ 24"
Reg'd at scupper

Ripped 2x8 o.k. @ typ roof

Header @ Window

Span 2'

TL 2x4

(2) 2x4 o.k.

R = 20 lbs
110 lbs

MAIN BM

Span 10'

TL 3x2 FR + 5' Pitched Roof

GL 3x8x9 o.k.

R₁ = R₂ = 250 lbs
1010 lbs

@ Master Bath Extension

5'-4" Rafters 2x8

2x8 @ 24" o.k.

Vanity Wnd. Header

TL 2x3 Span 7'

DL 2x8

LL 2x5

4x6

R = 100 lbs
150 lbs

11' Full span option → 4x8 o.k.



I.L. GROSS
STRUCTURAL
ENGINEERS

ENTRY ROOF FRAMING

SHEET TITLE

L2 LAKE Δ CD

PROJECT

RES

CLIENT

SCALE

MARK

DESIGNED BY

CHECKED

10/2024

DATE



SHEET

Multiple Simple Beam

Lic. #: KW-06002858

Description : Entry Roof Revisions

Wood Beam Design : R1 5.5'

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

BEAM Size : **2x8, Sawn, Braced @ 1/3 Points**

Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

Wood Species : DouglasFir-Larch

Wood Grade : No.2

Fb - Tension	900.0 psi	Fc - Prll	1,350.0 psi	Fv	180.0 psi	Ebend- xx	1,600.0 ksi	Density	31.210 pcf
Fb - Compr	900.0 psi	Fc - Perp	625.0 psi	Ft	575.0 psi	Eminbend - xx	580.0 ksi		

Applied Loads

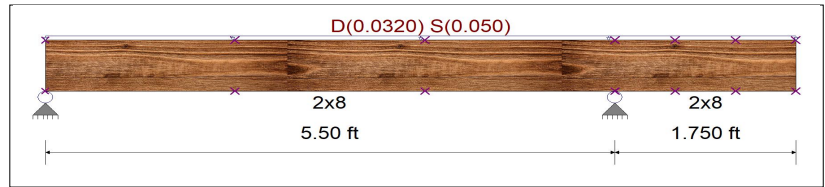
Unif Load: D = 0.0160, S = 0.0250 k/ft, Trib= 2.0 ft

Design Summary

Max fb/Fb Ratio = **0.187** : 1
 fb : Actual : 228.72 psi at 2.475 ft in Span # 1
 Fb : Allowable : 1,220.84 psi
 Load Comb : +D+S

Max fv/FvRatio = **0.134** : 1
 fv : Actual : 27.72 psi at 4.923 ft in Span # 1
 Fv : Allowable : 207.00 psi
 Load Comb : +D+S

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.08			0.12			
Right Support	0.15			0.24			



Max Deflections

Transient Downward	0.010 in	Total Downward	0.017 in
Ratio	6386	Ratio	3894
	LC: S Only		LC: +D+S
Transient Upward	-0.007 in	Total Upward	-0.011 in
Ratio	6122	Ratio	3732
	LC: S Only		LC: +D+S

Wood Beam Design : R2 7.5'

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

BEAM Size : **2x8, Sawn, Braced @ 1/3 Points**

Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

Wood Species : DouglasFir-Larch

Wood Grade : No.2

Fb - Tension	900.0 psi	Fc - Prll	1,350.0 psi	Fv	180.0 psi	Ebend- xx	1,600.0 ksi	Density	31.210 pcf
Fb - Compr	900.0 psi	Fc - Perp	625.0 psi	Ft	575.0 psi	Eminbend - xx	580.0 ksi		

Applied Loads

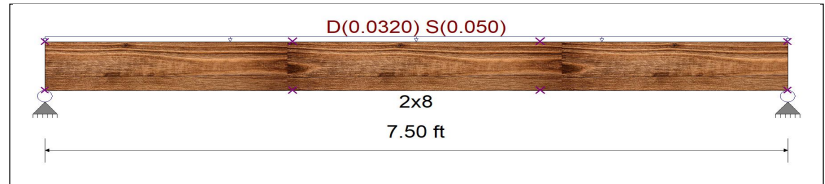
Unif Load: D = 0.0160, S = 0.0250 k/ft, Trib= 2.0 ft

Design Summary

Max fb/Fb Ratio = **0.435** : 1
 fb : Actual : 526.52 psi at 3.750 ft in Span # 1
 Fb : Allowable : 1,209.97 psi
 Load Comb : +D+S

Max fv/FvRatio = **0.172** : 1
 fv : Actual : 35.63 psi at 0.000 ft in Span # 1
 Fv : Allowable : 207.00 psi
 Load Comb : +D+S

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.12			0.19			
Right Support	0.12			0.19			



Max Deflections

Transient Downward	0.047 in	Total Downward	0.077 in
Ratio	1916	Ratio	1168
	LC: S Only		LC: +D+S
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Multiple Simple Beam

Lic. #: KW-06002858

Wood Beam Design : Outrigger check w/ scupper

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

BEAM Size : **2x3, Sawn, Braced @ 1/3 Points**

Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

Wood Species : DouglasFir-Larch

Wood Grade : No.2

Fb - Tension 900.0 psi Fc - Prll 1,350.0 psi Fv 180.0 psi Ebend- xx 1,600.0 ksi Density 31.210 pcf
 Fb - Compr 900.0 psi Fc - Perp 625.0 psi Ft 575.0 psi Eminbend - xx 580.0 ksi

Applied Loads

Unif Load: D = 0.0160, S = 0.0250 k/ft, Trib= 1.0 ft

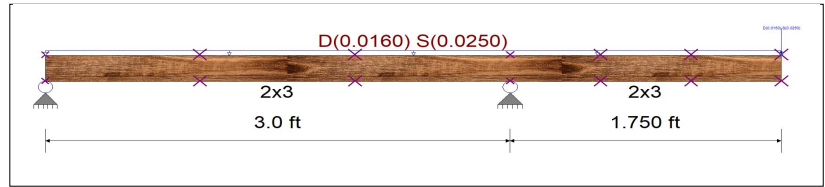
Point: D = 0.0150, S = 0.0250 k @ 4.750 ft

Design Summary

Max fb/Fb Ratio = **0.659** : 1
 fb : Actual : 1,019.73 psi at 3.000 ft in Span # 1
 Fb : Allowable : 1,547.44 psi
 Load Comb : +D+S

Max fv/FvRatio = **0.200** : 1
 fv : Actual : 41.40 psi at 3.000 ft in Span # 1
 Fv : Allowable : 207.00 psi
 Load Comb : +D+S

Max Reactions (k) D L Lr S W E H
 Left Support 0.01 0.01
 Right Support 0.08 0.13



Max Deflections

Transient Downward	0.093 in	Total Downward	0.150 in
Ratio	450	Ratio	280
	LC: S Only		LC: +D+S
Transient Upward	-0.013 in	Total Upward	-0.020 in
Ratio	2861	Ratio	1791
	LC: S Only		LC: +D+S

Wood Beam Design : Outrigger check (typ)

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

BEAM Size : **2x3, Sawn, Braced @ 1/3 Points**

Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

Wood Species : DouglasFir-Larch

Wood Grade : No.2

Fb - Tension 900.0 psi Fc - Prll 1,350.0 psi Fv 180.0 psi Ebend- xx 1,600.0 ksi Density 31.210 pcf
 Fb - Compr 900.0 psi Fc - Perp 625.0 psi Ft 575.0 psi Eminbend - xx 580.0 ksi

Applied Loads

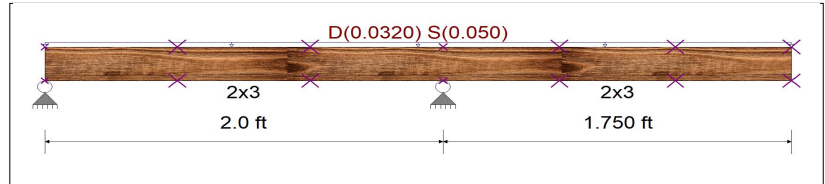
Unif Load: D = 0.0160, S = 0.0250 k/ft, Trib= 2.0 ft

Design Summary

Max fb/Fb Ratio = **0.622** : 1
 fb : Actual : 964.32 psi at 2.000 ft in Span # 1
 Fb : Allowable : 1,549.19 psi
 Load Comb : +D+S

Max fv/FvRatio = **0.280** : 1
 fv : Actual : 57.91 psi at 2.000 ft in Span # 1
 Fv : Allowable : 207.00 psi
 Load Comb : +D+S

Max Reactions (k) D L Lr S W E H
 Left Support 0.01 0.01
 Right Support 0.11 0.18



Max Deflections

Transient Downward	0.066 in	Total Downward	0.108 in
Ratio	640	Ratio	390
	LC: S Only		LC: +D+S
Transient Upward	-0.005 in	Total Upward	-0.009 in
Ratio	4384	Ratio	2673
	LC: S Only		LC: +D+S

Multiple Simple Beam

Lic. #: KW-06002858

Wood Beam Design : New Window Header

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

BEAM Size : **2-2x4, Sawn, Braced @ 1/3 Points**

Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

Wood Species : DouglasFir-Larch

Wood Grade : No.2

Fb - Tension 900.0 psi Fc - Prll 1,350.0 psi Fv 180.0 psi Ebend- xx 1,600.0 ksi Density 31.210 pcf
 Fb - Compr 900.0 psi Fc - Perp 625.0 psi Ft 575.0 psi Eminbend - xx 580.0 ksi

Applied Loads

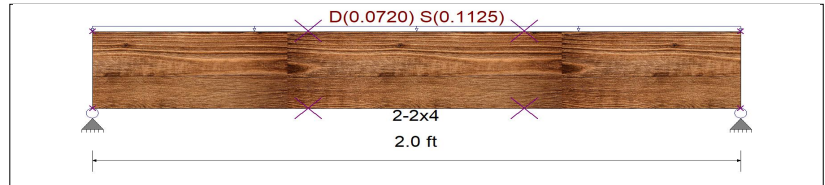
Beam self weight calculated and added to loads
 Unif Load: D = 0.0160, S = 0.0250 k/ft, Trib= 4.50 ft

Design Summary

Max fb/Fb Ratio = **0.118** : 1
 fb : Actual : 182.96 psi at 1.000 ft in Span # 1
 Fb : Allowable : 1,551.38 psi
 Load Comb : +D+S

Max fv/FvRatio = **0.092** : 1
 fv : Actual : 19.03 psi at 0.000 ft in Span # 1
 Fv : Allowable : 207.00 psi
 Load Comb : +D+S

Max Reactions (k) D L Lr S W E H
 Left Support 0.07 0.11
 Right Support 0.07 0.11



Max Deflections

Transient Downward 0.002 in Total Downward 0.004 in
 Ratio 9999 Ratio 6089
 LC: S Only LC: +D+S
 Transient Upward 0.000 in Total Upward 0.000 in
 Ratio 9999 Ratio 9999
 LC: LC:

Wood Beam Design : Hallway Roof Beam

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

BEAM Size : **3.125x9, GLB, Braced @ 1/3 Points**

Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

Wood Species : DF/DF

Wood Grade : 24F - V4

Fb - Tension 2,400.0 psi Fc - Prll 1,650.0 psi Fv 265.0 psi Ebend- xx 1,800.0 ksi Density 31.210 pcf
 Fb - Compr 1,850.0 psi Fc - Perp 650.0 psi Ft 1,100.0 psi Eminbend - xx 930.0 ksi

Applied Loads

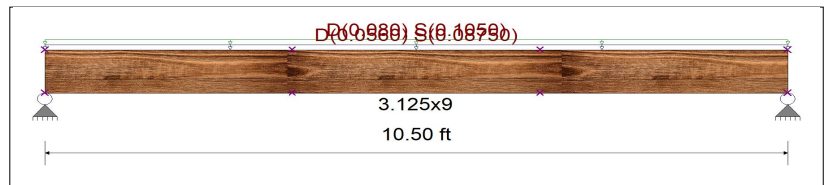
Beam self weight calculated and added to loads
 Unif Load: D = 0.0160, S = 0.0250 k/ft, Trib= 3.50 ft
 Unif Load: D = 0.0160, S = 0.0210 k/ft, Trib= 5.0 ft

Design Summary

Max fb/Fb Ratio = **0.481** : 1
 fb : Actual : 1,311.62 psi at 5.250 ft in Span # 1
 Fb : Allowable : 2,727.00 psi
 Load Comb : +D+S

Max fv/FvRatio = **0.264** : 1
 fv : Actual : 80.57 psi at 9.765 ft in Span # 1
 Fv : Allowable : 304.75 psi
 Load Comb : +D+S

Max Reactions (k) D L Lr S W E H
 Left Support 0.75 1.01
 Right Support 0.75 1.01



Max Deflections

Transient Downward 0.155 in Total Downward 0.269 in
 Ratio 813 Ratio 468
 LC: S Only LC: +D+S
 Transient Upward 0.000 in Total Upward 0.000 in
 Ratio 9999 Ratio 9999
 LC: LC:

Multiple Simple Beam

Lic. #: KW-06002858

Wood Beam Design : New BM at Master Closet

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

BEAM Size : **3.125x12, GLB, Braced @ 1/3 Points**

Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

Wood Species : DF/DF

Wood Grade : 24F - V4

Fb - Tension	2,400.0 psi	Fc - Prll	1,650.0 psi	Fv	265.0 psi	Ebend- xx	1,800.0 ksi	Density	31.210 pcf
Fb - Compr	1,850.0 psi	Fc - Perp	650.0 psi	Ft	1,100.0 psi	Eminbend - xx	930.0 ksi		

Applied Loads

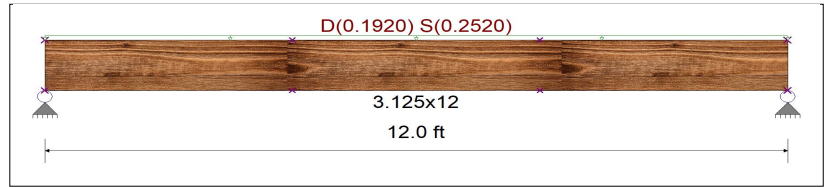
Beam self weight calculated and added to loads
 Unif Load: D = 0.0160, S = 0.0210 k/ft, Trib= 12.0 ft

Design Summary

Max fb/Fb Ratio = **0.482** : 1
 fb : Actual : 1,302.13 psi at 6.000 ft in Span # 1
 Fb : Allowable : 2,703.61 psi
 Load Comb : +D+S

Max fv/FvRatio = **0.299** : 1
 fv : Actual : 91.15 psi at 11.040 ft in Span # 1
 Fv : Allowable : 304.75 psi
 Load Comb : +D+S

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	1.20			1.51			
Right Support	1.20			1.51			



Max Deflections

Transient Downward	0.146 in	Total Downward	0.262 in
Ratio	986	Ratio	550
	LC: S Only		LC: +D+S
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Multiple Simple Beam

Lic. #: KW-06002858

Description : CD Master Bath Roof Revisions

Wood Beam Design : R1

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

BEAM Size : **2x8, Sawn, Braced @ 1/3 Points**

Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

Wood Species : DouglasFir-Larch

Wood Grade : No.2

Fb - Tension	900.0 psi	Fc - Prll	1,350.0 psi	Fv	180.0 psi	Ebend- xx	1,600.0 ksi	Density	31.210 pcf
Fb - Compr	900.0 psi	Fc - Perp	625.0 psi	Ft	575.0 psi	Eminbend - xx	580.0 ksi		

Applied Loads

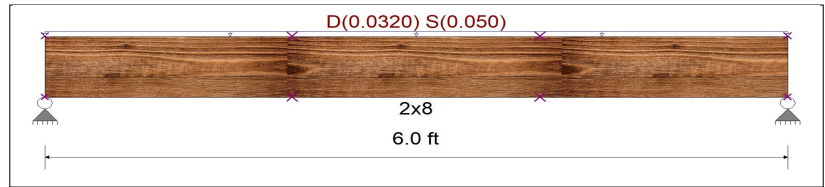
Unif Load: D = 0.0160, S = 0.0250 k/ft, Trib= 2.0 ft

Design Summary

Max fb/Fb Ratio = **0.277** : 1
 fb : Actual : 336.97 psi at 3.000 ft in Span # 1
 Fb : Allowable : 1,218.44 psi
 Load Comb : +D+S

Max fv/FvRatio = **0.131** : 1
 fv : Actual : 27.14 psi at 5.400 ft in Span # 1
 Fv : Allowable : 207.00 psi
 Load Comb : +D+S

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.10			0.15			
Right Support	0.10			0.15			



Max Deflections

Transient Downward	0.019 in	Total Downward	0.032 in
Ratio	3743	Ratio	2282
LC: S Only		LC: +D+S	
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
LC:		LC:	

Wood Beam Design : Vanity Header

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

BEAM Size : **4x6, Sawn, Braced @ 1/3 Points**

Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

Wood Species : DouglasFir-Larch

Wood Grade : No.2

Fb - Tension	900.0 psi	Fc - Prll	1,350.0 psi	Fv	180.0 psi	Ebend- xx	1,600.0 ksi	Density	31.210 pcf
Fb - Compr	900.0 psi	Fc - Perp	625.0 psi	Ft	575.0 psi	Eminbend - xx	580.0 ksi		

Applied Loads

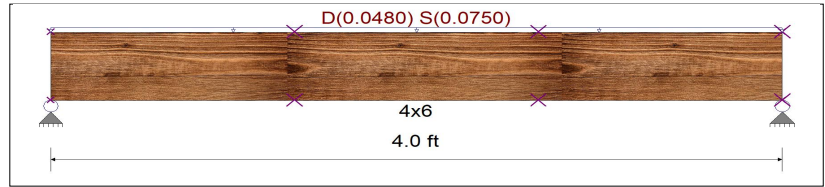
Unif Load: D = 0.0160, S = 0.0250 k/ft, Trib= 3.0 ft

Design Summary

Max fb/Fb Ratio = **0.125** : 1
 fb : Actual : 167.29 psi at 2.000 ft in Span # 1
 Fb : Allowable : 1,343.52 psi
 Load Comb : +D+S

Max fv/FvRatio = **0.072** : 1
 fv : Actual : 14.82 psi at 0.000 ft in Span # 1
 Fv : Allowable : 207.00 psi
 Load Comb : +D+S

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.10			0.15			
Right Support	0.10			0.15			



Max Deflections

Transient Downward	0.006 in	Total Downward	0.009 in
Ratio	8581	Ratio	5232
LC: S Only		LC: +D+S	
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
LC:		LC:	

Multiple Simple Beam

Lic. #: KW-06002858

Wood Beam Design : 11' Vanity Header

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

BEAM Size : **4x8, Sawn, Braced @ 1/3 Points**

Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

Wood Species : DouglasFir-Larch

Wood Grade : No.2

Fb - Tension	900.0 psi	Fc - Prll	1,350.0 psi	Fv	180.0 psi	Ebend- xx	1,600.0 ksi	Density	31.210 pcf
Fb - Compr	900.0 psi	Fc - Perp	625.0 psi	Ft	575.0 psi	Eminbend - xx	580.0 ksi		

Applied Loads

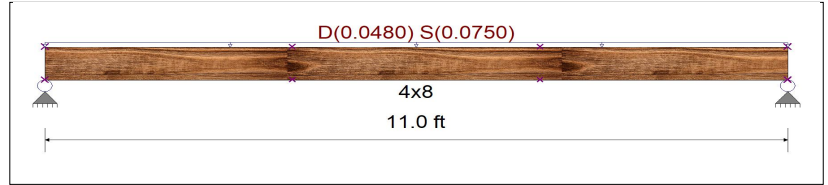
Unif Load: D = 0.0160, S = 0.0250 k/ft, Trib= 3.0 ft

Design Summary

Max fb/Fb Ratio = **0.544** : 1
 fb : Actual : 728.10 psi at 5.500 ft in Span # 1
 Fb : Allowable : 1,337.81 psi
 Load Comb : +D+S

Max fv/FvRatio = **0.173** : 1
 fv : Actual : 35.72 psi at 0.000 ft in Span # 1
 Fv : Allowable : 207.00 psi
 Load Comb : +D+S

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.26			0.41			
Right Support	0.26			0.41			



Max Deflections

Transient Downward	0.140 in	Total Downward	0.229 in
Ratio	945	Ratio	576
	LC: S Only		LC: +D+S
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

10/20/21 CD REVISIONS

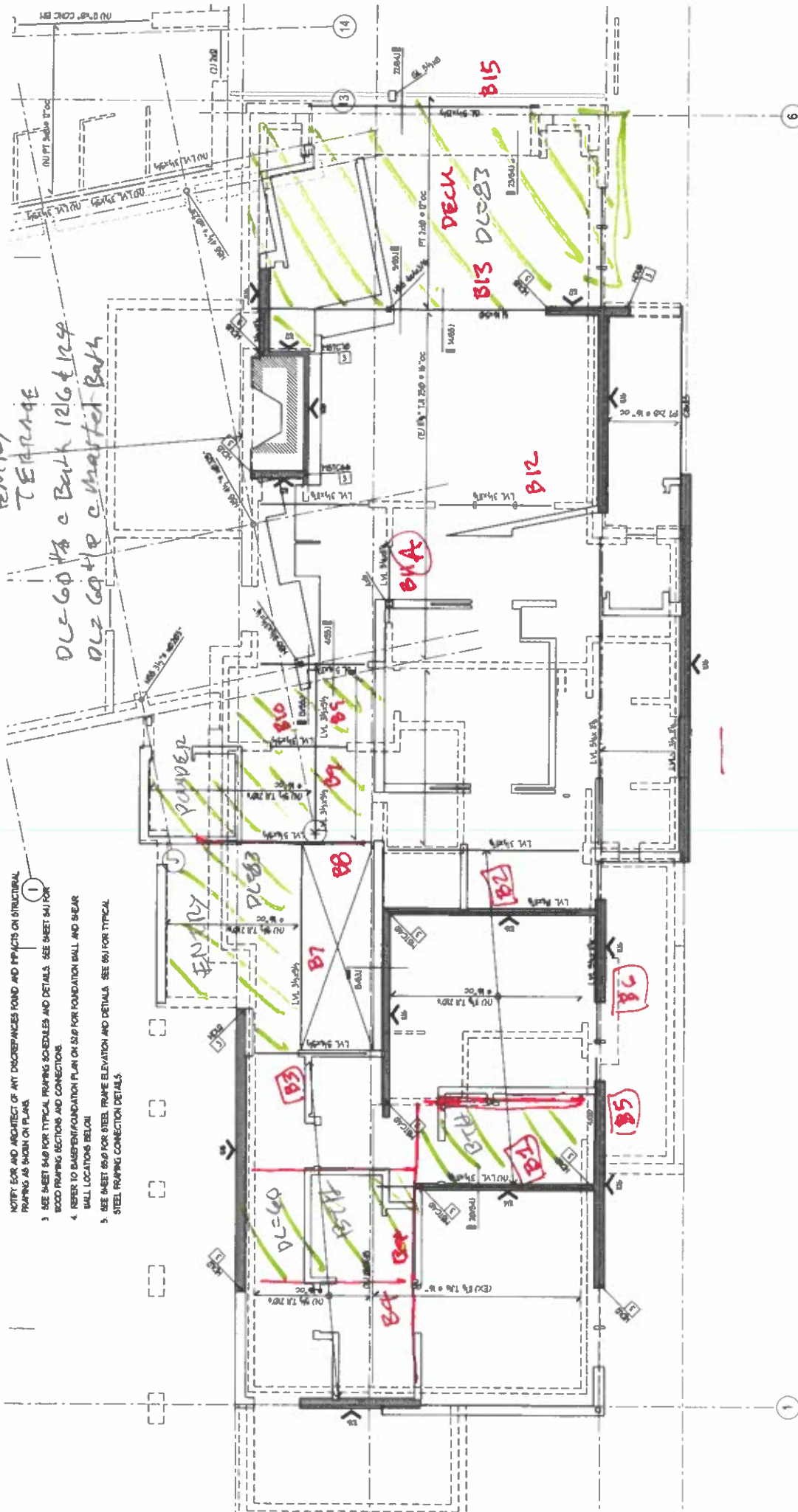
MAIN FLOOR FRAMING
EAST WING KEY

AREAS W/ FLUSH SET REVISED DL
TILE FLOOR

DL=60 3/4 c Powder
ENTRY TERRACE

DL=60 1/8 c Bath 12/6 & 12/4
DL=60 1/8 c Master Bath

- 1. NOTIFY EOR AND ARCHITECT OF ANY DISCREPANCIES FOUND AND IMPACTS ON STRUCTURAL FRAMING AS SHOWN ON PLANS.
- 2. SEE SHEET 64/0 FOR TYPICAL FRAMING SCHEDULES AND DETAILS. SEE SHEET 64/1 FOR GOOD FRAMING SECTIONS AND CONNECTIONS.
- 3. REFER TO SUBSEMENT FOUNDATION PLAN ON SLP FOR FOUNDATION WALL AND SHEAR WALL LOCATIONS BELOW.
- 4. REFER TO SUBSEMENT FOR STEEL FRAME ELEVATION AND DETAILS. SEE 66/1 FOR TYPICAL STEEL FRAMING CONNECTION DETAILS.



1 MAIN FLOOR FRAMING PLAN

1/4" = 1'-0"

Revised CD Framing of Media Room (C Bath 126)
FR24

DL 60# c Tile Bath
w/ Recessed Floor
LL 40

J1 - Span 12'

TA = typ Floor 0-5'
Tile Floor 5'-12'
+ WW c 5' x 90 PIF
9/2" TJI 210's c 16"

BM-C

Span 12'
TA = 16" tNc + 9' WW
DL = 170
LL = 53 PIF

13' x 11 1/2' LVL
OR 3 1/2' x 11 1/2'
w/ Bath Framing
rotated L
to Bath

R1 = R2 = 1660 lbs
370 kL

J2 - Span 12'

TA = typ Floor 0-2'
tile floor 2'-12'

9/2" TJI 210's c 16"

BM-D

Span 19'
TA = 12' F (typ) 0-8'
7' F + 5' tile 8'-14'
3' F + 9' tile 14'-16'
8' F + 4' tile 16'-18'
9' WW + 12' R 8'-19'

DL = 216/696/594/384
LL = 480 -
SL = 0/252/0

+P1 c 5' = 650 lbs
690 kL +P2 c 14' = 1060 lbs
320 kL

BM-A (D/S c Walkend)

Span 24'
TA = 6' F (typ)
DL = 108
LL = 240 PIF LVL 3 1/2' x 9 1/2'

R1 = R2 = 220 lbs
480 kL

+P3 c 16' = 650 lbs
690 kL

BM-B c Show Wah

Span 12', TA = 1.33' F (Tile 4'-12')
+ 8' WW 4'-12'

DL 24/160
LL 53

+P1 c 1
(3M-A) = 220 lbs
480 kL

LVL 3 1/2' x 9 1/2' on on 11 3/8

R1 = 390 lbs
490 kL R2 = 650 lbs
690 kL

W10x54

R1 = 4.9 kN
5.2 kL

R2 = 7.2 kN
4.8 kL

(Use 4x4 x 3.6 DL)
Support



I.L. GROSS
STRUCTURAL
ENGINEERS

CD Revisions @ Media/Bath rooms

SHEET TITLE
L2 W

PROJECT
RES

CLIENT

SCALE

MARK

DESIGNED BY

CHECKED

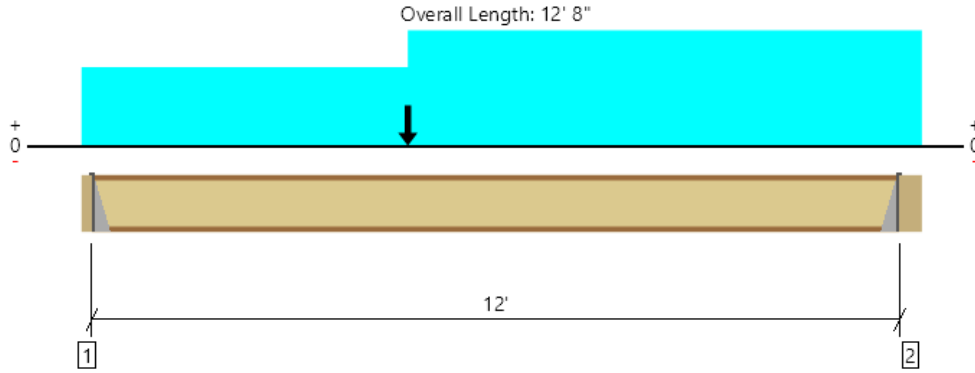
10/2021

DATE



SHEET

Main Floor, East Wing- 9.5" joists with Tile
 1 piece(s) 9 1/2" TJI® 210 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	807 @ 12' 2 1/2"	1005 (1.75")	Passed (80%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	807 @ 12' 2 1/2"	1330	Passed (61%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2443 @ 6' 1 7/8"	3000	Passed (81%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.139 @ 6' 1 7/8"	0.300	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.323 @ 6' 2 13/16"	0.600	Passed (L/446)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	52	40	Passed	--	--

System : Floor
 Member Type : Joist
 Building Use : Residential
 Building Code : IBC 2015
 Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling, bridging or blocking at max. 8' o.c., Pour Flooring Overlay.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Hanger on 9 1/2" HF ledgerOnMasonry	2.50"	Hanger ¹	1.75" / - ²	342	385	727	See note ¹
2 - Hanger on 9 1/2" DF beam	5.50"	Hanger ¹	1.75" / - ²	511	357	868	See note ¹

- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- ¹ See Connector grid below for additional information and/or requirements.
- ² Required Bearing Length / Required Bearing Length with Web Stiffeners

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	4' o/c	
Bottom Edge (Lu)	12' o/c	

- TJI joists are only analyzed using Maximum Allowable bracing solutions.
- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie							
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories	
1 - Top Mount Hanger	ITS2.06/9.5	2.00"	4-10dx1.5	2-10dx1.5	2-Strong-Grip		
2 - Top Mount Hanger	ITS2.06/9.5	2.00"	4-10dx1.5	2-10dx1.5	2-Strong-Grip		

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

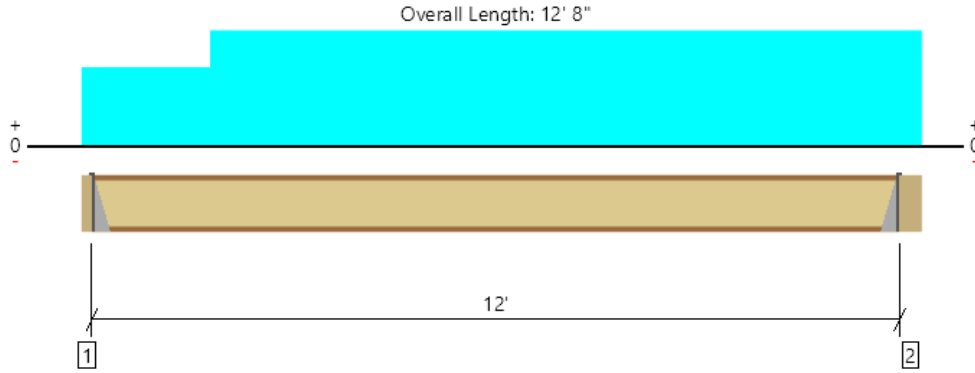
Vertical Loads	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	5' to 12' 8"	16"	60.0	40.0	Bathroom w/ tile
2 - Uniform (PSF)	0 to 5'	16"	18.0	50.0	Hallway Floor
3 - Point (PLF)	5'	16"	90.0	-	interior wall

Member Notes
East Wing - 9.5" joists checks at Tile floor

ForteWEB Software Operator	Job Notes
Mark Speidel I.L. Gross Structural Engineers, LLC (425) 640-7333 marks@ilgross.com	



Main Floor, East Wing- 9.5" joists with Tile J2
 1 piece(s) 9 1/2" TJI® 210 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	794 @ 12' 2 1/2"	1005 (1.75")	Passed (79%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	794 @ 12' 2 1/2"	1330	Passed (60%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2366 @ 6' 3"	3000	Passed (79%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.130 @ 6' 2 3/8"	0.300	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.316 @ 6' 2 11/16"	0.600	Passed (L/456)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	52	40	Passed	--	--

System : Floor
 Member Type : Joist
 Building Use : Residential
 Building Code : IBC 2015
 Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling, bridging or blocking at max. 8' o.c., Pour Flooring Overlay.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Hanger on 9 1/2" HF ledgerOnMasonry	2.50"	Hanger ¹	1.75" / - ²	392	356	748	See note ¹
2 - Hanger on 9 1/2" DF beam	5.50"	Hanger ¹	1.75" / - ²	509	346	855	See note ¹

- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- ¹ See Connector grid below for additional information and/or requirements.
- ² Required Bearing Length / Required Bearing Length with Web Stiffeners

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	4' 1" o/c	
Bottom Edge (Lu)	12' o/c	

- TJI joists are only analyzed using Maximum Allowable bracing solutions.
- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie							
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories	
1 - Top Mount Hanger	ITS2.06/9.5	2.00"	4-10dx1.5	2-10dx1.5	2-Strong-Grip		
2 - Top Mount Hanger	ITS2.06/9.5	2.00"	4-10dx1.5	2-10dx1.5	2-Strong-Grip		

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

Vertical Loads	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	2' to 12' 8"	16"	60.0	40.0	Bathroom w/ tile
2 - Uniform (PSF)	0 to 2'	16"	18.0	50.0	Hallway Floor

Member Notes
East Wing - 9.5" joists checks at Tile floor J2

ForteWEB Software Operator	Job Notes
Mark Speidel I.L. Gross Structural Engineers, LLC (425) 640-7333 marks@ilgross.com	



Multiple Simple Beam

Lic. #: KW-06002858

Description : CD REVISIONS Main Floor - framing around Bath 124 and 126

Wood Beam Design : BM-A (DS)

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

BEAM Size : **2-1.75x9.5, Microllam LVL, Braced @ 1/3 Points**

Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

Wood Species : Trus Joist

Wood Grade : MicroLam LVL 2.0 E

Fb - Tension 2,600.0 psi Fc - Prll 2,510.0 psi Fv 285.0 psi Ebend- xx 2,000.0 ksi Density 42.010 pcf
 Fb - Compr 2,600.0 psi Fc - Perp 750.0 psi Ft 1,555.0 psi Eminbend - xx 1,016.54 ksi

Applied Loads

Unif Load: D = 0.0180, L = 0.040 k/ft, Trib= 6.0 ft

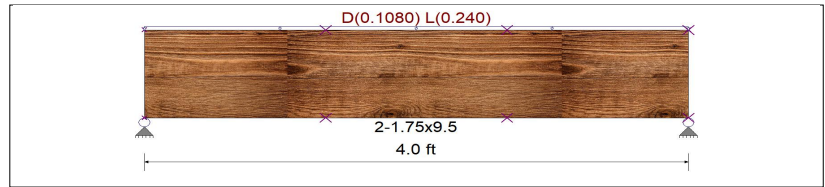
Design Summary

Max fb/Fb Ratio = **0.061** : 1
 fb : Actual : 158.65 psi at 2.000 ft in Span # 1
 Fb : Allowable : 2,592.55 psi
 Load Comb : +D+L

Max fv/FvRatio = **0.067** : 1
 fv : Actual : 19.05 psi at 0.000 ft in Span # 1
 Fv : Allowable : 285.00 psi
 Load Comb : +D+L

Max Reactions (k) D L Lr S W E H

Left Support	0.22	0.48					
Right Support	0.22	0.48					



Max Deflections

Transient Downward	0.003 in	Total Downward	0.004 in
Ratio	9999	Ratio	9999
LC: L Only		LC: +D+L	
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
LC:		LC:	

Wood Beam Design : BM-B at shower wall

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

BEAM Size : **2-1.75x9.5, Microllam LVL, Braced @ 1/3 Points**

Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

Wood Species : Trus Joist

Wood Grade : MicroLam LVL 2.0 E

Fb - Tension 2,600.0 psi Fc - Prll 2,510.0 psi Fv 285.0 psi Ebend- xx 2,000.0 ksi Density 42.010 pcf
 Fb - Compr 2,600.0 psi Fc - Perp 750.0 psi Ft 1,555.0 psi Eminbend - xx 1,016.54 ksi

Applied Loads

Beam self weight calculated and added to loads
 Unif Load: D = 0.0180, L = 0.050 k/ft, 0.0 ft to 4.50 ft, Trib= 1.330 ft
 Unif Load: D = 0.060, L = 0.040 k/ft, 4.50 to 12.0 ft, Trib= 1.330 ft
 Point: D = 0.220, L = 0.480 k @ 9.0 ft

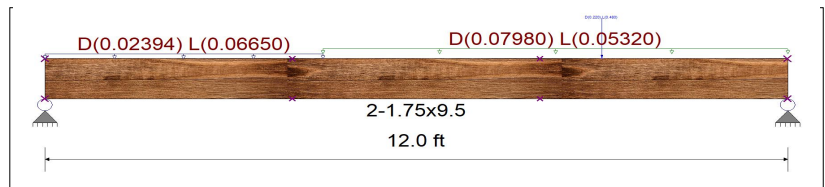
Design Summary

Max fb/Fb Ratio = **0.315** : 1
 fb : Actual : 811.23 psi at 7.480 ft in Span # 1
 Fb : Allowable : 2,575.13 psi
 Load Comb : +D+L

Max fv/FvRatio = **0.196** : 1
 fv : Actual : 55.80 psi at 11.240 ft in Span # 1
 Fv : Allowable : 285.00 psi
 Load Comb : +D+L

Max Reactions (k) D L Lr S W E H

Left Support	0.39	0.49					
Right Support	0.65	0.69					



Max Deflections

Transient Downward	0.095 in	Total Downward	0.182 in
Ratio	1512	Ratio	790
LC: L Only		LC: +D+L	
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
LC:		LC:	

Multiple Simple Beam

Lic. #: KW-06002858

Wood Beam Design : BM-C

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

BEAM Size : **1.75x11.87, Microllam LVL, Braced @ 1/3 Points**

Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

Wood Species : Trus Joist Wood Grade : MicroLam LVL 2.0 E
 Fb - Tension 2,600.0 psi Fc - Prll 2,510.0 psi Fv 285.0 psi Ebend- xx 2,000.0 ksi Density 42.010 pcf
 Fb - Compr 2,600.0 psi Fc - Perp 750.0 psi Ft 1,555.0 psi Eminbend - xx 1,016.54 ksi

Applied Loads

Beam self weight calculated and added to loads
 Unif Load: D = 0.060, L = 0.040 k/ft, Trib= 1.330 ft
 Unif Load: D = 0.010 k/ft, Trib= 9.0 ft

Design Summary

Max fb/Fb Ratio = **0.523** : 1
 fb : Actual : 1,202.97 psi at 6.000 ft in Span # 1
 Fb : Allowable : 2,299.98 psi
 Load Comb : +D+L
 Max fv/FvRatio = **0.292** : 1
 fv : Actual : 83.33 psi at 11.040 ft in Span # 1
 Fv : Allowable : 285.00 psi
 Load Comb : +D+L



Max Reactions (k) D L Lr S W E H
 Left Support 1.06 0.32
 Right Support 1.06 0.32

Max Deflections			
Transient Downward	0.051 in	Total Downward	0.220 in
Ratio	2818	Ratio	654
LC: L Only		LC: +D+L	
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
LC:		LC:	

Steel Beam Design : BM-D

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16

STEEL Section : **W10x54, Braced @ 1/3 Points**

Using Allowable Strength Design with ASCE 7-16 Load Combinations, Major Axis Bending

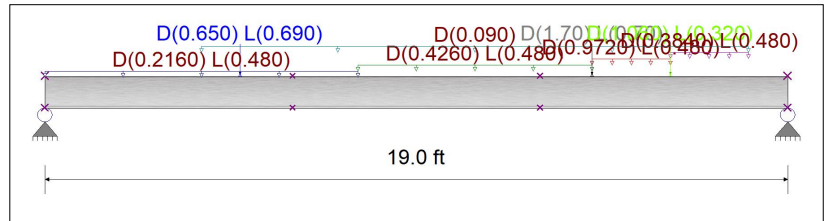
Fy = 50.0 ksi E = 29,000.0 ksi

Applied Loads

Beam self weight calculated and added to loads
 Unif Load: D = 0.0180, L = 0.040 k/ft, 0.0 ft to 8.0 ft, Trib= 12.0 ft
 Unif Load: D = 0.4260, L = 0.480 k/ft, 8.0 to 14.0 ft, Trib= 1.0 ft
 Unif Load: D = 0.9720, L = 0.480 k/ft, 14.0 to 16.0 ft, Trib= 1.0 ft
 Unif Load: D = 0.3840, L = 0.480 k/ft, 16.0 to 18.0 ft, Trib= 1.0 ft
 Point: D = 0.650, L = 0.690 k @ 5.0 ft
 Point: D = 1.70, L = 0.70 k @ 14.0 ft
 Point: D = 1.060, L = 0.320 k @ 16.0 ft
 Unif Load: D = 0.090 k/ft, 4.0 to 18.0 ft

Design Summary

Max fb/Fb Ratio = **0.346** : 1
 Mu : Applied 57.481 k-ft at 10.513 ft in Span # 1
 Mn / Omega : Allow 166.168 k-ft
 Load Comb : +D+L
 Max fv/FvRatio = **0.170** : 1
 Vu : Applied 12.682 k at 19.000 ft in Span # 1
 Vn / Omega : Allow 74.740 k
 Load Comb : +D+L



Max Reactions (k) D L Lr S W E H
 Left Support 5.07 5.29
 Right Support 7.62 5.06

Max Deflections			
Transient Downward	0.192 in	Total Downward	0.432 in
Ratio	1185	Ratio	528
LC: L Only		LC: +D+L	
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
LC:		LC:	

Wood Beam Design : BM-C w/ Framign rotated at Bath 124

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

BEAM Size : **2-1.75x11.87, Microllam LVL, Braced @ 1/3 Points**

Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

Wood Species : Trus Joist Wood Grade : MicroLam LVL 2.0 E
 Fb - Tension 2,600.0 psi Fc - Prll 2,510.0 psi Fv 285.0 psi Ebend- xx 2,000.0 ksi Density 42.010 pcf
 Fb - Compr 2,600.0 psi Fc - Perp 750.0 psi Ft 1,555.0 psi Eminbend - xx 1,016.54 ksi

Applied Loads

Beam self weight calculated and added to loads
 Unif Load: D = 0.060, L = 0.040 k/ft, Trib= 3.0 ft

Multiple Simple Beam

Lic. # : KW-06002858

Design Summary

Max fb/Fb Ratio = **0.411** : 1
 fb : Actual : 1,055.92 psi at 6.000 ft in Span # 1
 Fb : Allowable : 2,567.55 psi
 Load Comb : +D+L
 Max fv/FvRatio = **0.257** : 1
 fv : Actual : 73.14 psi at 11.040 ft in Span # 1
 Fv : Allowable : 285.00 psi
 Load Comb : +D+L

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	1.69	0.72					
Right Support	1.69	0.72					



Max Deflections

Transient Downward	0.058 in	Total Downward	0.193 in
Ratio	2499	Ratio	745
	LC: L Only		LC: +D+L
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Powder Room Framing / ENTRY FRAMING @ MAIN FLOOR

DL 283, LL 40
 Sost depth: 7/8"
 J1 - span = 4' + 5 1/2'

DL 283
 LL 40 PST
 2x8 @ 16" o/c OK

J2 - span = 11'
134 x 7 1/4" LVL @ 16" o/c

B7 - Flush BM STAIRS

span = 14'
 TA = 2' F + 3' Railing + 2' F 0-8'
 DL = 181 + 207
 LL = 170 + 100
 R1 = 2.0 k/ft
 R2 = 1.5 k/ft
 LVL 5 1/4 x 9 1/4
 OR W6 x 15

B8
 span = 10'
 TA = 2' F 0-5' (DL 283)
 2' F + 2' stair 5'-9" (5' + 19")
 DL = 166 / 22
 LL = 80 / 280 P/L
 R1 = 2.6 k/ft
 R2 = 1.5 k/ft
 LVL 5 1/4 x 9 1/4 OR W6 x 15

R1 = 3.2 k/ft
 R2 = 2.0 k/ft

R1 = 2.9 k/ft
 R2 = 1.7 k/ft

B9
 span = 5 1/2'
 TA = 5 1/2' stone floor
 1' Typ floor
 DL 283
 DL 218

DL 275
 LL = 260 P/L
LVL 3 1/2 x 7 1/4

R1 = R2 = 1.3 k/ft
 0.7 k/ft

B3 - e Stairs
 span = 9'

TA = 2' F + 3' WW 0-8"
 1' WW + 1' stone floor 5'-9"

DL = 126 / 101
 LL = 90 / 80
 R1 = 1.2 k/ft
 R2 = 1.3 k/ft
 LVL 5 1/2 x 13 k/ft
 (B7) 0.9 k/ft

R1 = 1.2 k/ft
 R2 = 1.3 k/ft
 0.9 k/ft

LVL 5 1/4 x 7 1/4

B10
 span = 5 1/2'
 TA = 2' F (stone) 0-3 1/2'
 2' F (Typ) 3 1/2 - 5 1/2'

DL = 166 / 36
 LL = 80
 R1 = 3 1/2' 2.6 k/ft
 2 x B9 1.4 k/ft

LVL 3 1/2 x 7 1/4 on

R1 = 1.4 k/ft
 R2 = 0.7 k/ft
 R1 = 1.9 k/ft
 R2 = 1.1 k/ft



I.L. GROSS
 STRUCTURAL
 ENGINEERS

REVIEWED E. WING FRAMING

SHEET TITLE
 LZ LAKE J CD

PROJECT
 RES

CLIENT

SCALE

MARK

DESIGNED BY

CHECKED

DATE

SHEET

Multiple Simple Beam

Lic. #: KW-06002858

Description : CD REVISIONS Main Floor - East Wing Beams p.2

Steel Beam Design : BM-7 at Stairs (Revised)

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16

STEEL Section : W6x15, Fully Braced

Using Allowable Strength Design with ASCE 7-10 Load Combinations, Major Axis Bending

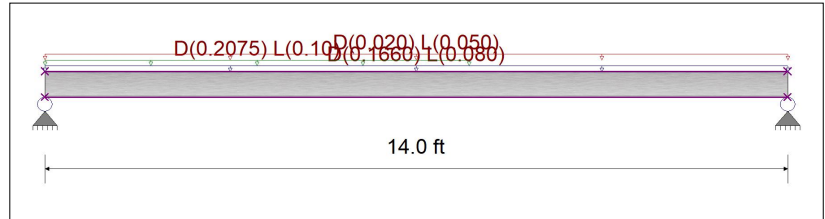
Fy = 50.0 ksi E = 29,000.0 ksi

Applied Loads

Beam self weight calculated and added to loads
 Unif Load: D = 0.0830, L = 0.040 k/ft, Trib= 2.0 ft
 Unif Load: D = 0.0830, L = 0.040 k/ft, 0.0 to 8.0 ft, Trib= 2.50 ft
 Unif Load: D = 0.020, L = 0.050 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.513** : 1
 Mu : Applied 13.000 k-ft at 6.393 ft in Span # 1
 Mn / Omega : Allow 25.365 k-ft
 Load Comb : +D+L
 Max fv/FvRatio = **0.148** : 1
 Vu : Applied 4.075 k at 0.000 ft in Span # 1
 Vn / Omega : Allow 27.554 k
 Load Comb : +D+L



Max Reactions (k)	D	L	Lr	S	W	E
Left Support	2.59	1.48				
Right Support	1.88	1.14				

Max Deflections	H	
Transient Downward	0.197 in	Total Downward 0.535 in
Ratio	852	313
	LC: L Only	LC: +D+L
Transient Upward	0.000 in	Total Upward 0.000 in
Ratio	9999	Ratio 9999
	LC:	LC:

Steel Beam Design : BM-8 (Revised)

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16

STEEL Section : W6x15, Fully Braced

Using Allowable Strength Design with ASCE 7-10 Load Combinations, Major Axis Bending

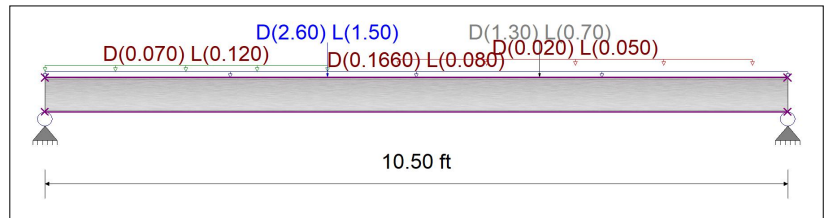
Fy = 50.0 ksi E = 29,000.0 ksi

Applied Loads

Unif Load: D = 0.0830, L = 0.040 k/ft, Trib= 2.0 ft
 Unif Load: D = 0.0350, L = 0.060 k/ft, 0.0 to 4.0 ft, Trib= 2.0 ft
 Unif Load: D = 0.020, L = 0.050 k/ft, 5.0 to 10.0 ft, Trib= 1.0 ft
 Point: D = 2.60, L = 1.50 k @ 4.0 ft
 Point: D = 1.30, L = 0.70 k @ 7.0 ft

Design Summary

Max fb/Fb Ratio = **0.684** : 1
 Mu : Applied 17.342 k-ft at 4.025 ft in Span # 1
 Mn / Omega : Allow 25.365 k-ft
 Load Comb : +D+L
 Max fv/FvRatio = **0.189** : 1
 Vu : Applied 5.212 k at 0.000 ft in Span # 1
 Vn / Omega : Allow 27.554 k
 Load Comb : +D+L



Max Reactions (k)	D	L	Lr	S	W	E
Left Support	3.17	2.04				
Right Support	2.85	1.73				

Max Deflections	H	
Transient Downward	0.145 in	Total Downward 0.384 in
Ratio	866	328
	LC: L Only	LC: +D+L
Transient Upward	0.000 in	Total Upward 0.000 in
Ratio	9999	Ratio 9999
	LC:	LC:

Wood Beam Design : BM-9

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

BEAM Size : 3-1.75x7.25, Microllam LVL, Fully Braced

Using Allowable Stress Design with ASCE 7-10 Load Combinations, Major Axis Bending

Wood Species :	Trus Joist	Wood Grade :	MicroLam LVL 2.0 E	Density	42.010 pcf
Fb - Tension	2,600.0 psi	Fc - Prll	2,510.0 psi	Fv	285.0 psi
Fb - Compr	2,600.0 psi	Fc - Perp	750.0 psi	Ft	1,555.0 psi
				Ebend-xx	2,000.0 ksi
				Eminbend-xx	1,016.54 ksi

Applied Loads

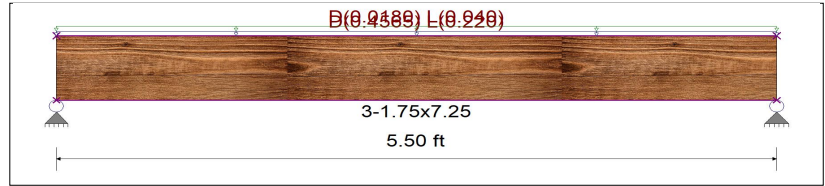
Beam self weight calculated and added to loads
 Unif Load: D = 0.0830, L = 0.040 k/ft, Trib= 5.50 ft
 Unif Load: D = 0.0180, L = 0.040 k/ft, Trib= 1.0 ft

Multiple Simple Beam

Lic. #: KW-06002858

Design Summary

Max fb/Fb Ratio = **0.283** : 1
 fb : Actual : 735.60 psi at 2.750 ft in Span # 1
 Fb : Allowable : 2,600.00 psi
 Load Comb : +D+L
 Max fv/FvRatio = **0.223** : 1
 fv : Actual : 63.57 psi at 0.000 ft in Span # 1
 Fv : Allowable : 285.00 psi
 Load Comb : +D+L
 Max Reactions (k) D L Lr S W E H



Max Deflections			
Transient Downward	0.016 in	Total Downward	0.046 in
Ratio	4089	Ratio	1425
LC: L Only		LC: +D+L	
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
LC:		LC:	

Wood Beam Design : BM-10

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

BEAM Size : **3-1.75x7.25, Microllam LVL, Fully Braced**

Using Allowable Stress Design with ASCE 7-10 Load Combinations, Major Axis Bending

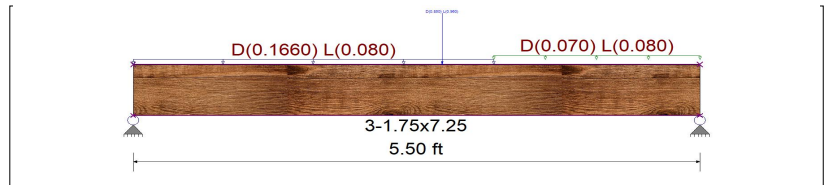
Wood Species : Trus Joist Wood Grade : MicroLam LVL 2.0 E
 Fb - Tension 2,600.0 psi Fc - Prll 2,510.0 psi Fv 285.0 psi Ebend- xx 2,000.0 ksi Density 42.010 pcf
 Fb - Compr 2,600.0 psi Fc - Perp 750.0 psi Ft 1,555.0 psi Eminbend - xx 1,016.54 ksi

Applied Loads

Beam self weight calculated and added to loads
 Unif Load: D = 0.0830, L = 0.040 k/ft, 0.0 ft to 3.50 ft, Trib= 2.0 ft
 Unif Load: D = 0.0350, L = 0.040 k/ft, 3.50 to 5.50 ft, Trib= 2.0 ft
 Point: D = 0.850, L = 0.960 k @ 3.0 ft

Design Summary

Max fb/Fb Ratio = **0.333** : 1
 fb : Actual : 866.32 psi at 3.007 ft in Span # 1
 Fb : Allowable : 2,600.00 psi
 Load Comb : +D+L
 Max fv/FvRatio = **0.199** : 1
 fv : Actual : 56.86 psi at 4.913 ft in Span # 1
 Fv : Allowable : 285.00 psi
 Load Comb : +D+L
 Max Reactions (k) D L Lr S W E H



Max Deflections			
Transient Downward	0.022 in	Total Downward	0.047 in
Ratio	2986	Ratio	1418
LC: L Only		LC: +D+L	
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
LC:		LC:	

Wood Beam Design : BM-11A REVISED under closet WALL

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

BEAM Size : **3-1.75x11.87, Microllam LVL, Fully Braced**

Using Allowable Stress Design with ASCE 7-10 Load Combinations, Major Axis Bending

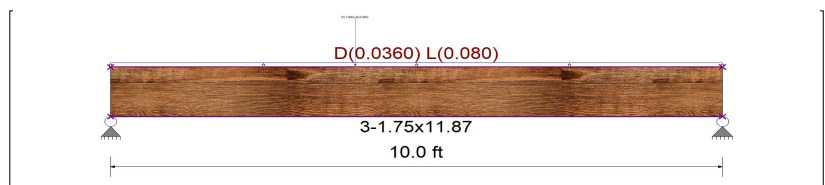
Wood Species : Trus Joist Wood Grade : MicroLam LVL 2.0 E
 Fb - Tension 2,600.0 psi Fc - Prll 2,510.0 psi Fv 285.0 psi Ebend- xx 2,000.0 ksi Density 42.010 pcf
 Fb - Compr 2,600.0 psi Fc - Perp 750.0 psi Ft 1,555.0 psi Eminbend - xx 1,016.54 ksi

Applied Loads

Beam self weight calculated and added to loads
 Unif Load: D = 0.0180, L = 0.040 k/ft, Trib= 2.0 ft
 Point: D = 1.840, S = 2.250 k @ 4.0 ft

Design Summary

Max fb/Fb Ratio = **0.340** : 1
 fb : Actual : 1,017.88 psi at 4.000 ft in Span # 1
 Fb : Allowable : 2,990.00 psi
 Load Comb : +D+S
 Max fv/FvRatio = **0.196** : 1
 fv : Actual : 64.30 psi at 0.000 ft in Span # 1
 Fv : Allowable : 327.75 psi
 Load Comb : +D+S
 Max Reactions (k) D L Lr S W E H



Max Deflections			
Transient Downward	0.053 in	Total Downward	0.104 in
Ratio	2276	Ratio	1152
LC: S Only		LC: +D+S	
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
LC:		LC:	

Multiple Simple Beam

Lic. #: KW-06002858

Description : CD REVISIONS Main Floor - Powder Room Floor Framing

Wood Beam Design : J1- 5.5' span

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

BEAM Size : **2x8, Sawn, Braced @ 1/3 Points**

Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

Wood Species : DouglasFir-Larch

Wood Grade : No.2

Fb - Tension	900.0 psi	Fc - Prll	1,350.0 psi	Fv	180.0 psi	Ebend- xx	1,600.0 ksi	Density	31.210 pcf
Fb - Compr	900.0 psi	Fc - Perp	625.0 psi	Ft	575.0 psi	Eminbend - xx	580.0 ksi		

Applied Loads

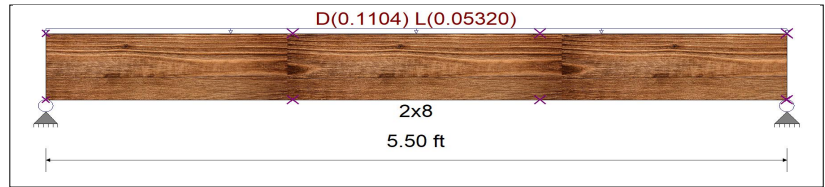
Unif Load: D = 0.0830, L = 0.040 k/ft, Trib= 1.330 ft

Design Summary

Max fb/Fb Ratio = **0.531** : 1
 fb : Actual : 564.88 psi at 2.750 ft in Span # 1
 Fb : Allowable : 1,064.69 psi
 Load Comb : +D+L

Max fv/FvRatio = **0.271** : 1
 fv : Actual : 48.81 psi at 0.000 ft in Span # 1
 Fv : Allowable : 180.00 psi
 Load Comb : +D+L

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.30	0.15					
Right Support	0.30	0.15					



Max Deflections

Transient Downward	0.014 in	Total Downward	0.044 in
Ratio	4568	Ratio	1485
LC: L Only		LC: +D+L	
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
LC:		LC:	

Wood Beam Design : J2- 11' span

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

BEAM Size : **1.75x7.25, Microllam LVL, Braced @ 1/3 Points**

Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

Wood Species : Trus Joist

Wood Grade : MicroLam LVL 2.0 E

Fb - Tension	2,600.0 psi	Fc - Prll	2,510.0 psi	Fv	285.0 psi	Ebend- xx	2,000.0 ksi	Density	42.010 pcf
Fb - Compr	2,600.0 psi	Fc - Perp	750.0 psi	Ft	1,555.0 psi	Eminbend - xx	1,016.54 ksi		

Applied Loads

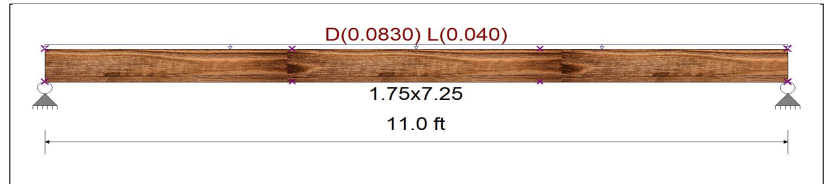
Unif Load: D = 0.0830, L = 0.040 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.582** : 1
 fb : Actual : 1,456.19 psi at 5.500 ft in Span # 1
 Fb : Allowable : 2,501.70 psi
 Load Comb : +D+L

Max fv/FvRatio = **0.251** : 1
 fv : Actual : 71.45 psi at 0.000 ft in Span # 1
 Fv : Allowable : 285.00 psi
 Load Comb : +D+L

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.46	0.22					
Right Support	0.46	0.22					



Max Deflections

Transient Downward	0.119 in	Total Downward	0.366 in
Ratio	1107	Ratio	360
LC: L Only		LC: +D+L	
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
LC:		LC:	

Multiple Simple Beam

Wood Beam Design : B9

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

BEAM Size : **2-1.75x7.25, Microllam LVL, Braced @ 1/3 Points**

Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

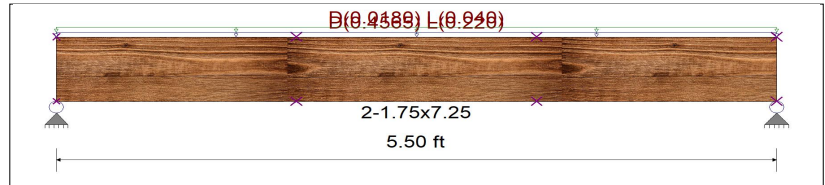
Wood Species :	Trus Joist		Wood Grade :	MicroLam LVL 2.0 E		Density	42.010 pcf
Fb - Tension	2,600.0 psi	Fc - Prll	2,510.0 psi	Fv	285.0 psi	Ebend- xx	2,000.0 ksi
Fb - Compr	2,600.0 psi	Fc - Perp	750.0 psi	Ft	1,555.0 psi	Eminbend - xx	1,016.54 ksi

Applied Loads

Beam self weight calculated and added to loads
 Unif Load: D = 0.0830, L = 0.040 k/ft, Trib= 5.50 ft
 Unif Load: D = 0.0180, L = 0.040 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.424** : 1
 fb : Actual : 1,097.92 psi at 2.750 ft in Span # 1
 Fb : Allowable : 2,592.17 psi
 Load Comb : +D+L
 Max fv/FvRatio = **0.333** : 1
 fv : Actual : 94.88 psi at 0.000 ft in Span # 1
 Fv : Allowable : 285.00 psi
 Load Comb : +D+L



Max Reactions (k)	D	L	Lr	S	W	E
Left Support	1.33	0.72				
Right Support	1.33	0.72				

Max Deflections			
Transient Downward	0.024 in	Total Downward	0.069 in
Ratio	2726	Ratio	955
LC: L Only		LC: +D+L	
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
LC:		LC:	

Wood Beam Design : B3 at stairs

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

BEAM Size : **3-1.75x7.25, Microllam LVL, Braced @ 1/3 Points**

Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

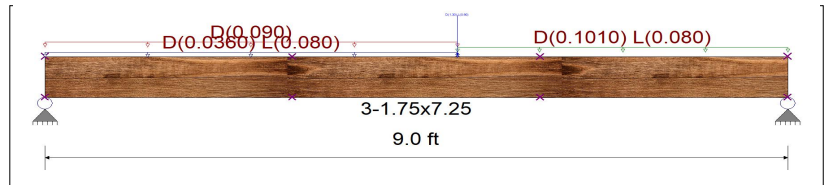
Wood Species :	Trus Joist		Wood Grade :	MicroLam LVL 2.0 E		Density	42.010 pcf
Fb - Tension	2,600.0 psi	Fc - Prll	2,510.0 psi	Fv	285.0 psi	Ebend- xx	2,000.0 ksi
Fb - Compr	2,600.0 psi	Fc - Perp	750.0 psi	Ft	1,555.0 psi	Eminbend - xx	1,016.54 ksi

Applied Loads

Beam self weight calculated and added to loads
 Unif Load: D = 0.0180, L = 0.040 k/ft, 0.0 ft to 5.0 ft, Trib= 2.0 ft
 Unif Load: D = 0.1010, L = 0.080 k/ft, 5.0 to 9.0 ft, Trib= 1.0 ft
 Unif Load: D = 0.090 k/ft, 0.0 to 5.0 ft, Trib= 1.0 ft
 Point: D = 1.30, L = 0.90 k @ 5.0 ft

Design Summary

Max fb/Fb Ratio = **0.697** : 1
 fb : Actual : 1,809.51 psi at 5.010 ft in Span # 1
 Fb : Allowable : 2,594.39 psi
 Load Comb : +D+L
 Max fv/FvRatio = **0.277** : 1
 fv : Actual : 79.06 psi at 8.400 ft in Span # 1
 Fv : Allowable : 285.00 psi
 Load Comb : +D+L



Max Reactions (k)	D	L	Lr	S	W	E
Left Support	1.17	0.76				
Right Support	1.26	0.86				

Max Deflections			
Transient Downward	0.106 in	Total Downward	0.263 in
Ratio	1022	Ratio	410
LC: L Only		LC: +D+L	
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
LC:		LC:	

Multiple Simple Beam

Lic. #: KW-06002858

Wood Beam Design : B10

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

BEAM Size : **2-1.75x7.25, Microllam LVL, Braced @ 1/3 Points**

Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

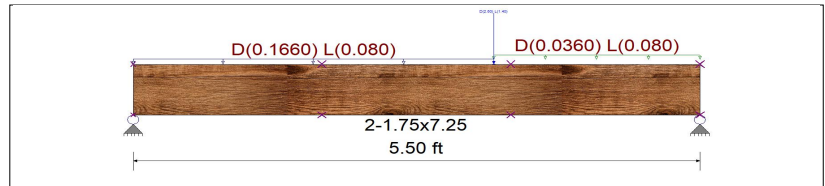
Wood Species :	Truss Joist		Wood Grade :	MicroLam LVL 2.0 E		Density	42.010 pcf
Fb - Tension	2,600.0 psi	Fc - Prll	2,510.0 psi	Fv	285.0 psi	Ebend- xx	2,000.0 ksi
Fb - Compr	2,600.0 psi	Fc - Perp	750.0 psi	Ft	1,555.0 psi	Eminbend - xx	1,016.54 ksi

Applied Loads

Beam self weight calculated and added to loads
 Unif Load: D = 0.0830, L = 0.040 k/ft, 0.0 ft to 3.50 ft, Trib= 2.0 ft
 Unif Load: D = 0.0180, L = 0.040 k/ft, 3.50 to 5.50 ft, Trib= 2.0 ft
 Point: D = 2.60, L = 1.40 k @ 3.50 ft

Design Summary

Max fb/Fb Ratio = **0.877** : 1
 fb : Actual : 2,272.97 psi at 3.502 ft in Span # 1
 Fb : Allowable : 2,592.17 psi
 Load Comb : +D+L
 Max fv/FvRatio = **0.613** : 1
 fv : Actual : 174.81 psi at 4.913 ft in Span # 1
 Fv : Allowable : 285.00 psi
 Load Comb : +D+L



Max Reactions (k)	D	L	Lr	S	W	E
Left Support	1.38	0.73				
Right Support	1.92	1.11				

Max Deflections			
Transient Downward	0.042 in	Total Downward	0.118 in
Ratio	1582	Ratio	559
LC: L Only		LC: +D+L	
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
LC:		LC:	

Steel Beam Design : B7 at Stairs (STEEL)

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16

STEEL Section : **W6x15, Braced @ 1/3 Points**

Using Allowable Strength Design with ASCE 7-16 Load Combinations, Major Axis Bending

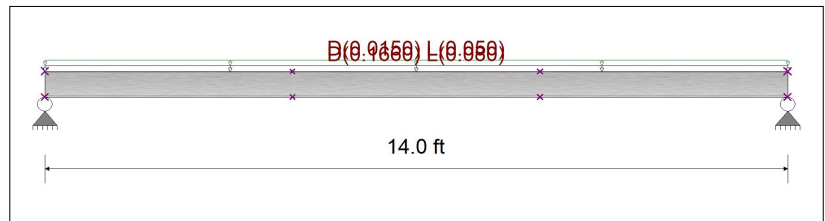
Fy = 50.0 ksi E = 29,000.0 ksi

Applied Loads

Unif Load: D = 0.0830, L = 0.040 k/ft, Trib= 2.0 ft
 Unif Load: D = 0.0150, L = 0.050 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.300** : 1
 Mu : Applied : 7.620 k-ft at 7.000 ft in Span # 1
 Mn / Omega : Allow : 25.365 k-ft
 Load Comb : +D+L
 Max fv/FvRatio = **0.079** : 1
 Vu : Applied : 2.177 k at 0.000 ft in Span # 1
 Vn / Omega : Allow : 27.554 k
 Load Comb : +D+L



Max Reactions (k)	D	L	Lr	S	W	E
Left Support	1.27	0.91				
Right Support	1.27	0.91				

Max Deflections			
Transient Downward	0.134 in	Total Downward	0.320 in
Ratio	1255	Ratio	524
LC: L Only		LC: +D+L	
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
LC:		LC:	

Multiple Simple Beam

Lic. #: KW-06002858

Steel Beam Design : B8 (Steel)

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16

STEEL Section : **W6x15, Braced @ 1/3 Points**

Using Allowable Strength Design with ASCE 7-16 Load Combinations, Major Axis Bending

Fy = 50.0 ksi E = 29,000.0 ksi

Applied Loads

Unif Load: D = 0.0830, L = 0.040 k/ft, 0.0 ft to 5.0 ft, Trib= 2.0 ft

Unif Load: D = 0.0180, L = 0.040 k/ft, 5.0 to 9.0 ft, Trib= 2.0 ft

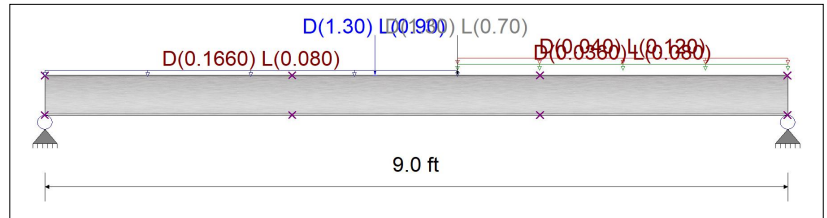
Unif Load: D = 0.020, L = 0.060 k/ft, 5.0 to 9.0 ft, Trib= 2.0 ft

Point: D = 1.30, L = 0.90 k @ 4.0 ft

Point: D = 1.30, L = 0.70 k @ 5.0 ft

Design Summary

Max fb/Fb Ratio = **0.434** : 1
 Mu : Applied 11.019 k-ft at 4.260 ft in Span # 1
 Mn / Omega : Allow 25.365 k-ft
 Load Comb : +D+L
 Max fv/FvRatio = **0.119** : 1
 Vu : Applied 3.289 k at 9.000 ft in Span # 1
 Vn / Omega : Allow 27.554 k
 Load Comb : +D+L



Max Reactions (k) D L Lr S W E H

Left Support 1.97 1.28

Right Support 1.77 1.52

Max Deflections			
Transient Downward	0.072 in	Total Downward	0.174 in
Ratio	1502		619
	LC: L Only		LC: +D+L
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Multiple Simple Beam

Steel Beam Design : BM-13 over exercise RM REVISED

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16

STEEL Section : **W16x50, Fully Braced**

Using Allowable Stress Design with ASCE 7-10 Load Combinations, Major Axis Bending

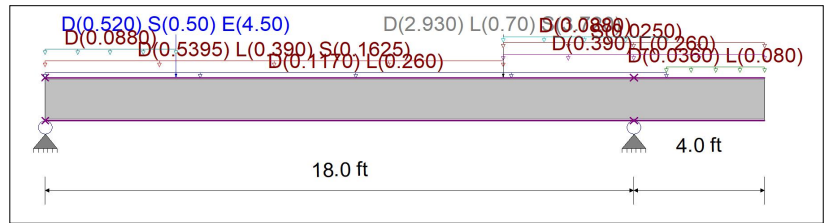
Fy = 50.0 ksi E = 29,000.0 ksi

Applied Loads

Beam self weight calculated and added to loads
 Unif Load: D = 0.0180, L = 0.040 k/ft, 0.0 ft to 19.0 ft, Trib= 6.50 ft
 Unif Load: D = 0.0180, L = 0.040 k/ft, 19.0 to 22.0 ft, Trib= 2.0 ft
 Unif Load: D = 0.0830, L = 0.060, S = 0.0250 k/ft, 0.0 to 14.0 ft, Trib= 6.50 ft
 Unif Load: D = 0.060, L = 0.040 k/ft, 14.0 to 22.0 ft, Trib= 6.50 ft
 Point: D = 0.520, S = 0.50, E = 4.50 k @ 4.0 ft
 Point: D = 2.930, L = 0.70, S = 3.720 k @ 14.0 ft
 Unif Load: D = 0.0880 k/ft, 0.0 to 4.0 ft
 Unif Load: S = 0.0250 k/ft, 14.0 to 22.0 ft
 Unif Load: D = 0.0880 k/ft, 14.0 to 19.0 ft

Design Summary

Max fb/Fb Ratio = **0.332 : 1**
 Mu : Applied 76.161 k-ft at 8.820 ft in Span # 1
 Mn / Omega : Allow 229.541 k-ft
 Load Comb : +1.092D+0.750L+0.750S+1.024E
 Max fv/FvRatio = **0.147 : 1**
 Vu : Applied 18.184 k at 18.000 ft in Span # 1
 Vn / Omega : Allow 123.880 k
 Load Comb : +1.092D+0.750L+0.750S+1.024E



Max Reactions (k)	D	L	Lr	S	W	E
Left Support	7.48	5.79		2.61		3.50
Right Support	10.86	7.63		4.09		1.00

Max Deflections	Transient	Ratio	Total	Ratio
Transient Downward	0.079 in	2742	0.216 in	1001
Ratio				
LC: L Only	+0.750L+0.750S+0.5250E			
Transient Upward	-0.052 in	1830	-0.148 in	646
Ratio				
LC: L Only	+0.750L+0.750S+0.5250E			

Wood Beam Design : BM-14 cant patio support

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

BEAM Size : **6x10, Sawn, Fully Braced**

Using Allowable Stress Design with ASCE 7-10 Load Combinations, Major Axis Bending

Wood Species : Douglas Fir - Larch

Wood Grade : No.2

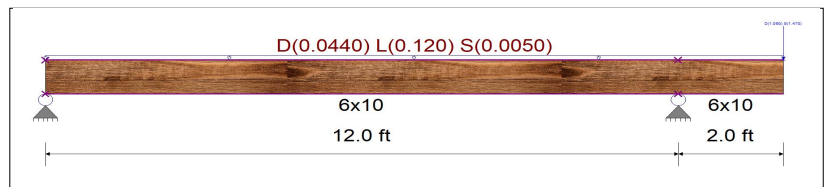
Fb - Tension	900.0 psi	Fc - Prll	1,350.0 psi	Fv	180.0 psi	Ebend- xx	1,600.0 ksi	Density	31.210 pcf
Fb - Compr	900.0 psi	Fc - Perp	625.0 psi	Ft	575.0 psi	Eminbend - xx	580.0 ksi		

Applied Loads

Beam self weight calculated and added to loads
 Unif Load: D = 0.0220, L = 0.060, S = 0.00250 k/ft, Trib= 2.0 ft
 Point: D = 1.090, S = 1.470 k @ 14.0 ft

Design Summary

Max fb/Fb Ratio = **0.734 : 1**
 fb : Actual : 760.13 psi at 12.000 ft in Span # 1
 Fb : Allowable : 1,035.00 psi
 Load Comb : +D+S
 Max fv/FvRatio = **0.365 : 1**
 fv : Actual : 75.59 psi at 12.000 ft in Span # 1
 Fv : Allowable : 207.00 psi
 Load Comb : +D+S



Max Reactions (k)	D	L	Lr	S	W	E
Left Support	0.14	0.70		-0.22		
Right Support	1.72	0.98		1.76		

Max Deflections	Transient	Ratio	Total	Ratio
Transient Downward	0.084 in	650	0.110 in	434
Ratio				
LC: S Only	+D+S			
Transient Upward	-0.072 in	1154	-0.091 in	1586
Ratio				
LC: L Only	+D+S			

Multiple Simple Beam

Steel Beam Design : BM-15 at Terrace Edge REVISED

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16

STEEL Section : **W8x35, Fully Braced**

Using Allowable Strength Design with ASCE 7-10 Load Combinations, Major Axis Bending

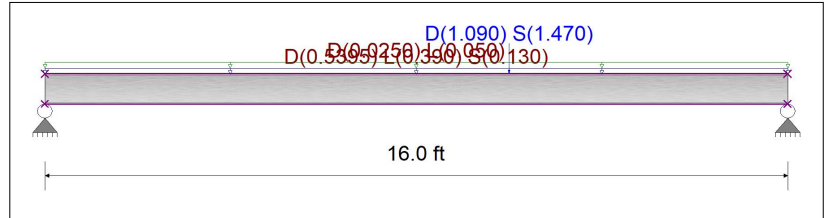
Fy = 50.0 ksi E = 29,000.0 ksi

Applied Loads

Beam self weight calculated and added to loads
 Unif Load: D = 0.0830, L = 0.060, S = 0.020 k/ft, Trib= 6.50 ft
 Unif Load: D = 0.0250, L = 0.050 k/ft, Trib= 1.0 ft
 Point: D = 1.090, S = 1.470 k @ 10.0 ft

Design Summary

Max fb/Fb Ratio = **0.459 : 1**
 Mu : Applied 39.773 k-ft at 8.800 ft in Span # 1
 Mn / Omega : Allow 86.577 k-ft
 Load Comb : +D+0.750L+0.750S
 Max fv/FvRatio = **0.190 : 1**
 Vu : Applied 9.587 k at 16.000 ft in Span # 1
 Vn / Omega : Allow 50.344 k
 Load Comb : +D+0.750L+0.750S



Max Reactions (k)	D	L	Lr	S	W	E
Left Support	5.21	3.52		1.59		
Right Support	5.48	3.52		1.96		

Max Deflections	H	
Transient Downward	0.177 in	Total Downward 0.494 in
Ratio	1084	388
	LC: L Only	LC: +D+0.750L+0.750S
Transient Upward	0.000 in	Total Upward 0.000 in
Ratio	9999	Ratio 9999
	LC:	LC:

Steel Beam Design : BM-13 over exercise RM REVISED W/o Cant end

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16

STEEL Section : **W16x50, Fully Braced**

Using Allowable Strength Design with ASCE 7-10 Load Combinations, Major Axis Bending

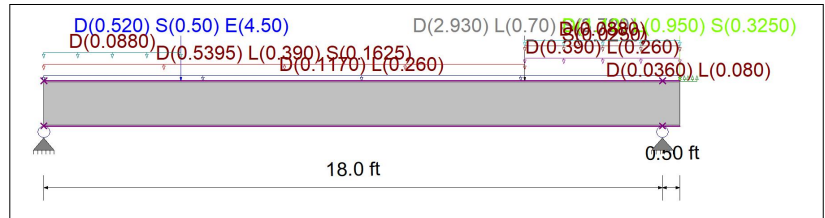
Fy = 50.0 ksi E = 29,000.0 ksi

Applied Loads

Beam self weight calculated and added to loads
 Unif Load: D = 0.0180, L = 0.040 k/ft, 0.0 ft to 18.50 ft, Trib= 6.50 ft
 Unif Load: D = 0.0180, L = 0.040 k/ft, 19.0 to 18.50 ft, Trib= 2.0 ft
 Unif Load: D = 0.0830, L = 0.060, S = 0.0250 k/ft, 0.0 to 14.0 ft, Trib= 6.50 ft
 Unif Load: D = 0.060, L = 0.040 k/ft, 14.0 to 18.50 ft, Trib= 6.50 ft
 Point: D = 0.520, S = 0.50, E = 4.50 k @ 4.0 ft
 Point: D = 2.930, L = 0.70, S = 3.720 k @ 14.0 ft
 Point: D = 1.10, L = 0.950, S = 0.3250 k @ 18.50 ft
 Unif Load: D = 0.0880 k/ft, 0.0 to 4.0 ft
 Unif Load: S = 0.0250 k/ft, 14.0 to 18.50 ft
 Unif Load: D = 0.0880 k/ft, 14.0 to 18.50 ft

Design Summary

Max fb/Fb Ratio = **0.343 : 1**
 Mu : Applied 78.774 k-ft at 9.000 ft in Span # 1
 Mn / Omega : Allow 229.541 k-ft
 Load Comb : +1.092D+0.750L+0.750S+1.024E
 Max fv/FvRatio = **0.148 : 1**
 Vu : Applied 18.350 k at 0.000 ft in Span # 1
 Vn / Omega : Allow 123.880 k
 Load Comb : +1.092D+0.750L+0.750S+1.024E



Max Reactions (k)	D	L	Lr	S	W	E
Left Support	7.66	5.92		2.61		3.50
Right Support	10.03	7.17		4.32		1.00

Max Deflections	H	
Transient Downward	0.083 in	Total Downward 0.225 in
Ratio	2603	960
	LC: L Only	+0.750L+0.750S+0.5250E
Transient Upward	-0.007 in	Total Upward -0.020 in
Ratio	1644	Ratio 594
	LC: L Only	+0.750L+0.750S+0.5250E

CD Retention - New Framing & Private Terrace
DL = 83, LL = 60, SL = 20 #2

Joists span = 13'

3 1/2" x 7 1/4" LVL @ 16" o/c

B15 @ Deck Edge

Span = 16

TA = 6 1/2' D + Railing

DL = 565 +PL @ 10' = 1.7k_s
LL = 390 p/l 1.0k_L
SL = 130 1.76k_s

W8 x 35

R₁ = 5.43k_s R₂ = 5.86k_s
3.9k_L 4.15k_L
1.2k_s 2.14k_s

B13 @ Transition of Exercise Room

Span = 19'-3" ± 3'

TA = 6 1/2' R + 6 1/2' D @ 14' + PL @ 4' = 1.5k_s + PL @ 14' = 2.9k_s
6 1/2' R + 6' Bth + 9' WW 18'-19' 1.5k_s 3.7k_s
2' R + 6' Bth only 19'-21' 4.5k_s

DL = 653 / 612 / 420
LL = 650 / 520 / 340 W16 x 50 ok
SL = 163 / 25 / 25

R₁ = 8.1k_s R₂ = 10.3k_s
6.2k_L 7.2k_L
2.8k_s 3.9k_s
2.6k_s 1.0k_s



I.L. GROSS
STRUCTURAL
ENGINEERS

Private Terrace CD Rev.

SHEET TITLE

L2 0

PROJECT

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DESIGNED BY

CHECKED

10/2021

DATE



SHEET

Multiple Simple Beam

Lic. #: KW-06002858

Description : Private Terrace Framing Changes

Wood Beam Design : Deck Joists

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

BEAM Size : **3.50 X 6.90, GLB, Braced @ 1/3 Points**

Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

Wood Species : Trus Joist

Wood Grade : MicroLam LVL 2.0 E

Fb - Tension 2,600.0 psi Fc - Prll 2,510.0 psi Fv 285.0 psi Ebend- xx 2,000.0 ksi Density 42.010 pcf
 Fb - Compr 2,600.0 psi Fc - Perp 750.0 psi Ft 1,555.0 psi Eminbend - xx 1,016.54 ksi

Applied Loads

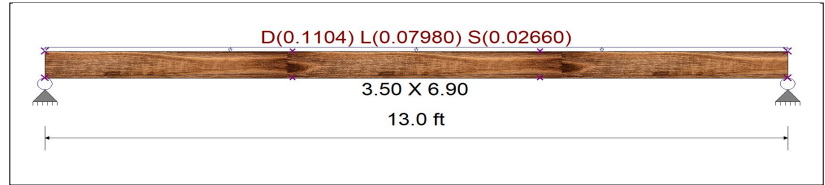
Unif Load: D = 0.0830, L = 0.060, S = 0.020 k/ft, Trib= 1.330 ft

Design Summary

Max fb/Fb Ratio = **0.672** : 1
 fb : Actual : 1,736.00 psi at 6.500 ft in Span # 1
 Fb : Allowable : 2,581.44 psi
 Load Comb : +D+L

Max fv/FvRatio = **0.246** : 1
 fv : Actual : 70.13 psi at 12.437 ft in Span # 1
 Fv : Allowable : 285.00 psi
 Load Comb : +D+L

Max Reactions (k)	D	L	Lr	S	W	E
Left Support	0.72	0.52		0.17		
Right Support	0.72	0.52		0.17		



Max Deflections

Transient Downward	0.269 in	Total Downward	0.641 in
Ratio	579	Ratio	243
LC: L Only		LC: +D+L	
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
LC:		LC:	

Steel Beam Design : B15 at Deck Edge

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16

STEEL Section : **W8x35, Braced @ 1/3 Points**

Using Allowable Strength Design with ASCE 7-16 Load Combinations, Major Axis Bending

Fy = 50.0 ksi E = 29,000.0 ksi

Applied Loads

Beam self weight calculated and added to loads

Unif Load: D = 0.0830, L = 0.060, S = 0.020 k/ft, Trib= 6.50 ft

Unif Load: D = 0.0250, L = 0.050 k/ft, Trib= 1.0 ft

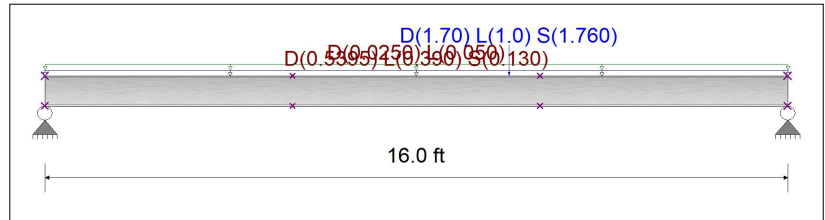
Point: D = 1.70, L = 1.0, S = 1.760 k @ 10.0 ft

Design Summary

Max fb/Fb Ratio = **0.521** : 1
 Mu : Applied 45.149 k-ft at 9.387 ft in Span # 1
 Mn / Omega : Allow 86.577 k-ft
 Load Comb : +D+0.750L+0.750S

Max fv/FvRatio = **0.210** : 1
 Vu : Applied 10.573 k at 16.000 ft in Span # 1
 Vn / Omega : Allow 50.344 k
 Load Comb : +D+0.750L+0.750S

Max Reactions (k)	D	L	Lr	S	W	E
Left Support	5.43	3.90		1.70		
Right Support	5.86	4.15		2.14		



Max Deflections

Transient Downward	0.214 in	Total Downward	0.552 in
Ratio	897	Ratio	347
LC: L Only		LC: +D+0.750L+0.750S	
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
LC:		LC:	

FAMILY Terrace Framing Changes for 2 1/2" STONE

Joists span 8' typ

DL=83

LL=60

SL=25

2x8 @ 12" o/c
OR 2x10 @ 16"

@ Great Room Deck

Joists span = 10'

1 3/4 x 7 1/4" LVL @ 16" o/c

Support Floor BM

(A) Span = 1' + 10' + 5'

TA = 7 1/2' Deck

DL=623

LL=450 P/L

SL=188

GL 5 1/2 x 9 1/2

R1 = 3.3 k_v
2.4 L
1.05

R2 = 6.2 k_v
4.4 L
1.25

R3 = 1.6 k_v
1.1 L
.55

Joists span = 12'

3 1/2 x 7 1/4" LVL @ 16" o/c

Header & Pool Wall (conc)

span = 36

TA = 6'0" + wall wt

DL=798

LL=410 P/L

SL=150

8" x 12" BM w/
(2) #5 B & (2) #4 T
##3 TIES @ 6" o/c

(B) Span = 1' + 10' + 5'

TA = 8'0" - 11'0"

6' 11" - 16'0"

DL=664 / 500

LL=480 / 300 P/L

SL=200 / 150

GL 5 1/2 x 9 1/2

R1 = 3.4 k_v
2.5 L
1.05

R2 = 6.5 k_v
4.6 L
1.95

R3 = 1.3 k_v
.9 L
.45

(C) Span = 11'

TA = 5'0"

DL=415

LL=300 P/L

SL=125

GL 3 1/2 x 10 1/2
OR 5'0" x 9"

R1 = R2 = 2.3 k_v
1.2 L
.75



I.L. GROSS
STRUCTURAL
ENGINEERS

Family Terrace CD Framing Revisions

SHEET TITLE

L2 15

PROJECT

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MARK

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CHECKED

10/2021

DATE



SHEET

Multiple Simple Beam

Lic. #: KW-06002858

Description : CD REVISIONS Main Floor - Family Terrace and Great Room Deck

Wood Beam Design : DJ 1

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

BEAM Size : **2x8, Sawn, Fully Braced**

Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

Wood Species : DouglasFir-Larch

Wood Grade : No.2

Fb - Tension	900.0 psi	Fc - Prll	1,350.0 psi	Fv	180.0 psi	Ebend- xx	1,600.0 ksi	Density	31.210 pcf
Fb - Compr	900.0 psi	Fc - Perp	625.0 psi	Ft	575.0 psi	Eminbend - xx	580.0 ksi		

Applied Loads

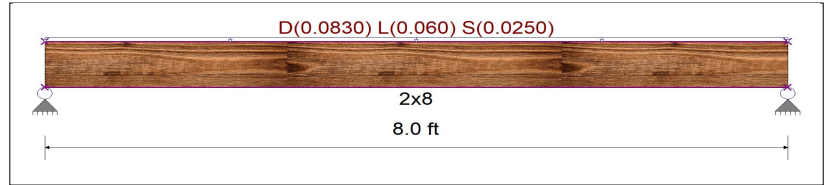
Unif Load: D = 0.0830, L = 0.060, S = 0.0250 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.841** : 1
 fb : Actual : 1,044.70 psi at 4.000 ft in Span # 1
 Fb : Allowable : 1,242.00 psi
 Load Comb : +D+L

Max fv/FvRatio = **0.374** : 1
 fv : Actual : 67.33 psi at 0.000 ft in Span # 1
 Fv : Allowable : 180.00 psi
 Load Comb : +D+L

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.33	0.24		0.10			
Right Support	0.33	0.24		0.10			



Max Deflections

Transient Downward	0.073 in	Total Downward	0.178 in
Ratio	1316	Ratio	538
	LC: L Only		LC: +D+0.750L+0.750S
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC: L Only		LC: L Only

Wood Beam Design : Deck Beam A

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

BEAM Size : **5.125x9, GLB, Fully Braced**

Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

Wood Species : DF/DF

Wood Grade : 24F - V8

Fb - Tension	2,400.0 psi	Fc - Prll	1,650.0 psi	Fv	265.0 psi	Ebend- xx	1,800.0 ksi	Density	31.210 pcf
Fb - Compr	2,400.0 psi	Fc - Perp	650.0 psi	Ft	1,100.0 psi	Eminbend - xx	930.0 ksi		

Applied Loads

Beam self weight calculated and added to loads

Unif Load: D = 0.0830, L = 0.060, S = 0.0250 k/ft, Trib= 7.50 ft

Design Summary

Max fb/Fb Ratio = **0.667** : 1
 fb : Actual : 1,601.72 psi at 4.267 ft in Span # 2
 Fb : Allowable : 2,400.00 psi
 Load Comb : +D+L

Max fv/FvRatio = **0.666** : 1
 fv : Actual : 176.60 psi at 9.267 ft in Span # 2
 Fv : Allowable : 265.00 psi
 Load Comb : +D+L

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	3.32	2.36		0.98			
Right Support	6.17	4.39		1.83			



Max Deflections

Transient Downward	0.109 in	Total Downward	0.269 in
Ratio	1100	Ratio	446
	LC: L Only		LC: +D+0.750L+0.750S
Transient Upward	-0.037 in	Total Upward	-0.091 in
Ratio	650	Ratio	264
	LC: L Only		LC: +D+0.750L+0.750S

Multiple Simple Beam

Wood Beam Design : Deck Beam B

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

BEAM Size : **5.125x9, GLB, Fully Braced**

Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

Wood Species : DF/DF

Wood Grade : 24F - V8

Fb - Tension 2,400.0 psi Fc - Prll 1,650.0 psi Fv 265.0 psi Ebend- xx 1,800.0 ksi Density 31.210 pcf
 Fb - Compr 2,400.0 psi Fc - Perp 650.0 psi Ft 1,100.0 psi Eminbend - xx 930.0 ksi

Applied Loads

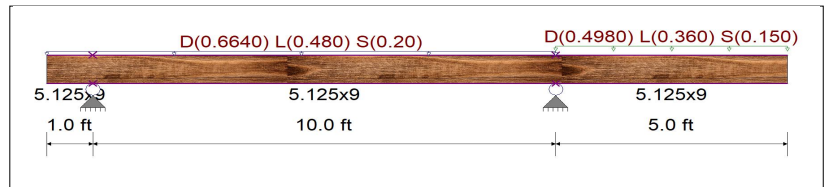
Beam self weight calculated and added to loads

Unif Load: D = 0.0830, L = 0.060, S = 0.0250 k/ft, -1.0 ft to 10.0 ft, Trib= 8.0 ft

Unif Load: D = 0.0830, L = 0.060, S = 0.0250 k/ft, 10.0 to 15.0 ft, Trib= 6.0 ft

Design Summary

Max fb/Fb Ratio = **0.784** : 1
 fb : Actual : 1,881.84 psi at 10.000 ft in Span # 2
 Fb : Allowable : 2,400.00 psi
 Load Comb : +D+L
 Max fv/FvRatio = **0.834** : 1
 fv : Actual : 221.05 psi at 10.000 ft in Span # 2
 Fv : Allowable : 265.00 psi
 Load Comb : +D+L



Max Reactions (k) D L Lr S W E H

Left Support	3.44	2.45		1.02			
Right Support	6.51	4.63		1.93			

Max Deflections

Transient Downward	0.104 in	Total Downward	0.256 in
Ratio	1155	Ratio	469
	LC: L Only		LC: +D+0.750L+0.750S
Transient Upward	-0.036 in	Total Upward	-0.088 in
Ratio	668	Ratio	270
	LC: L Only		LC: +D+0.750L+0.750S

Wood Beam Design : Deck Beam C

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

BEAM Size : **5.125x9, GLB, Fully Braced**

Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

Wood Species : DF/DF

Wood Grade : 24F - V8

Fb - Tension 2,400.0 psi Fc - Prll 1,650.0 psi Fv 265.0 psi Ebend- xx 1,800.0 ksi Density 31.210 pcf
 Fb - Compr 2,400.0 psi Fc - Perp 650.0 psi Ft 1,100.0 psi Eminbend - xx 930.0 ksi

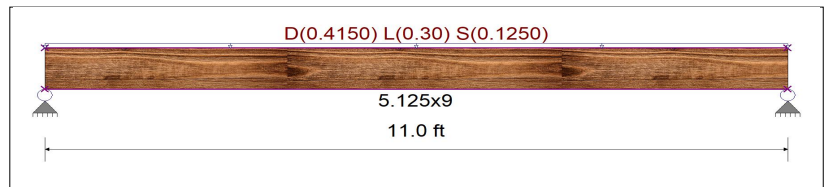
Applied Loads

Beam self weight calculated and added to loads

Unif Load: D = 0.0830, L = 0.060, S = 0.0250 k/ft, Trib= 5.0 ft

Design Summary

Max fb/Fb Ratio = **0.792** : 1
 fb : Actual : 1,901.89 psi at 5.500 ft in Span # 1
 Fb : Allowable : 2,400.00 psi
 Load Comb : +D+L
 Max fv/FvRatio = **0.424** : 1
 fv : Actual : 112.38 psi at 0.000 ft in Span # 1
 Fv : Allowable : 265.00 psi
 Load Comb : +D+L



Max Reactions (k) D L Lr S W E H

Left Support	2.34	1.65		0.69			
Right Support	2.34	1.65		0.69			

Max Deflections

Transient Downward	0.177 in	Total Downward	0.440 in
Ratio	744	Ratio	300
	LC: L Only		LC: +D+0.750L+0.750S
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Multiple Simple Beam

Lic. #: KW-06002858

Wood Beam Design : 10' Joists at Great Room Deck

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

BEAM Size : **1.75x7.25, Microllam LVL, Fully Braced**

Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

Wood Species : Trus Joist Wood Grade : MicroLam LVL 2.0 E
 Fb - Tension 2600 psi Fc - Prll 2510 psi Fv 285 psi Ebend- xx 2000 ksi Density 42.01 pcf
 Fb - Compr 2600 psi Fc - Perp 750 psi Ft 1555 psi Eminbend - xx 1016.535 ksi

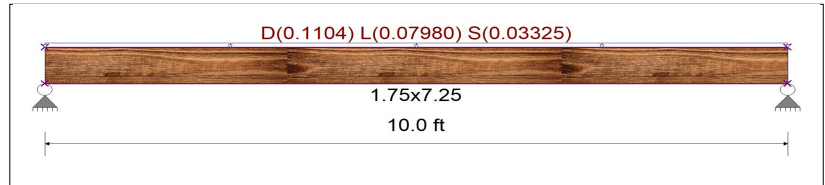
Applied Loads

Beam self weight calculated and added to loads

Unif Load: D = 0.0830, L = 0.060, S = 0.0250 k/ft, Trib= 1.330 ft

Design Summary

Max fb/Fb Ratio = **0.702** : 1
 fb : Actual : 1,897.09 psi at 5.000 ft in Span # 1
 Fb : Allowable : 2,704.00 psi
 Load Comb : +D+L
 Max fv/FvRatio = **0.354** : 1
 fv : Actual : 100.86 psi at 9.400 ft in Span # 1
 Fv : Allowable : 285.00 psi
 Load Comb : +D+L



Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.57	0.40		0.17			
Right Support	0.57	0.40		0.17			

Max Deflections

Transient Downward	0.162 in	Total Downward	0.405 in
Ratio	738	Ratio	296
	LC: L Only		LC: +D+0.750L+0.750S
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : 12' Joists at Great Room Deck

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

BEAM Size : **2-1.75x7.25, Microllam LVL, Fully Braced**

Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

Wood Species : Trus Joist Wood Grade : MicroLam LVL 2.0 E
 Fb - Tension 2,600.0 psi Fc - Prll 2,510.0 psi Fv 285.0 psi Ebend- xx 2,000.0 ksi Density 42.010 pcf
 Fb - Compr 2,600.0 psi Fc - Perp 750.0 psi Ft 1,555.0 psi Eminbend - xx 1,016.54 ksi

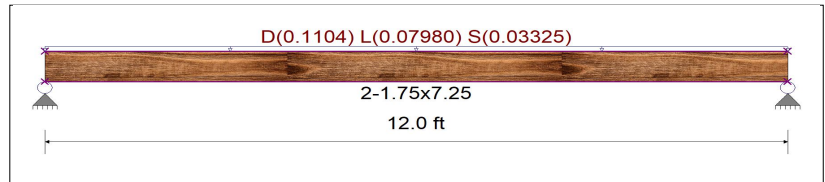
Applied Loads

Beam self weight calculated and added to loads

Unif Load: D = 0.0830, L = 0.060, S = 0.0250 k/ft, Trib= 1.330 ft

Design Summary

Max fb/Fb Ratio = **0.515** : 1
 fb : Actual : 1,391.98 psi at 6.000 ft in Span # 1
 Fb : Allowable : 2,704.00 psi
 Load Comb : +D+L
 Max fv/FvRatio = **0.221** : 1
 fv : Actual : 63.07 psi at 11.400 ft in Span # 1
 Fv : Allowable : 285.00 psi
 Load Comb : +D+L



Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.71	0.48		0.20			
Right Support	0.71	0.48		0.20			

Max Deflections

Transient Downward	0.168 in	Total Downward	0.427 in
Ratio	855	Ratio	336
	LC: L Only		LC: +D+0.750L+0.750S
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Multiple Simple Beam

Lic. #: KW-06002858

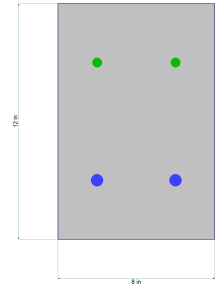
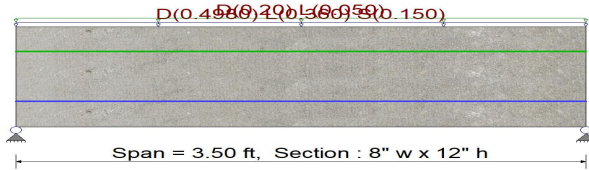
Concrete Beam Design : Concrete Header in Pool/Bathroom Wall

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16

Rectangular Beam : 8.0 in wide x 12.0 in high

Using Ultimate Strength Design with ASCE 7-16 Load Combinations, Major Axis Bending

f'c = 3.0 ksi fy Main Stl = 60.0 ksi E Main Stl = 29,000.0 ksi Density 145.0 pcf
 E Conc = 3,122.0 ksi fy Stirrups = 40.0 ksi E Stirrups = 29,000.0 ksi ϕ Values Bending 0.90
 fr = 410.792 ksi β = 0.850 Shear 0.750



Cross Section & Reinforcing Details

2-#5 at 3.0 in from Bottom, from 0.0 to 3.50 ft in this span

2-#4 at 3.0 in from Top, from 0.0 to 3.50 ft in this span

Shear Stirrup Requirements

Stirrup Bar Size = # 3

Number of Resisting Legs Per Stirrup = 2

No Stirrups Required from 0.00 to 3.50 ft along span, Condition : Vu < PhiVc/2

Applied Loads

Beam self weight calculated and added to loads

Unif Load: D = 0.0830, L = 0.060, S = 0.0250 k/ft, Trib= 6.0 ft

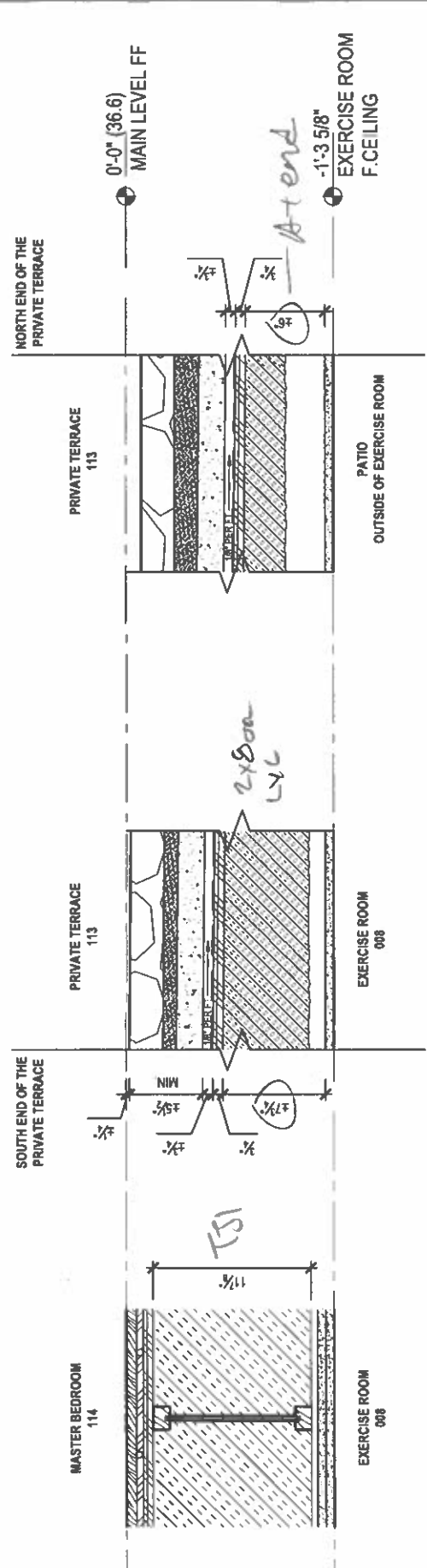
Unif Load: D = 0.20, L = 0.050 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = 0.112 : 1
 Mu : Applied 2.580 k-ft at 1.750 ft in Span # 1
 Mn * Phi : Allowable 23.066 k-ft
 Load Comb : +1.20D+1.60L+0.50S

Reactions (k)	D	Lr	L	S	W	E	H
Left Support	1.39		0.72	0.26			
Right Support	1.39		0.72	0.26			
Max Deflections							
Transient Downward	0.000	in	Total Downward	0.001	in		
Ratio	9999		Ratio	9999			
	LC: L Only		LC: +D+0.750L+0.750S				
Transient Upward	0.000	in	Total Upward	0.000	in		
Ratio	9999		Ratio	9999			
	LC:		LC:				

Original 02-16-15 m



- 3/4" HARDWOOD FLOOR
- 1/2" QUIK TRAK BOARD
- 3/4" PLYWOOD SUBFLOOR
- FRAMING PER STRUCTURE - 2.15
- W/ ACOUSTIC INSULATION, TBD
- 1/2" GAP FOR LOW PROFILE RSIC CLIP
- (2) 5/8" GWB - 5.6

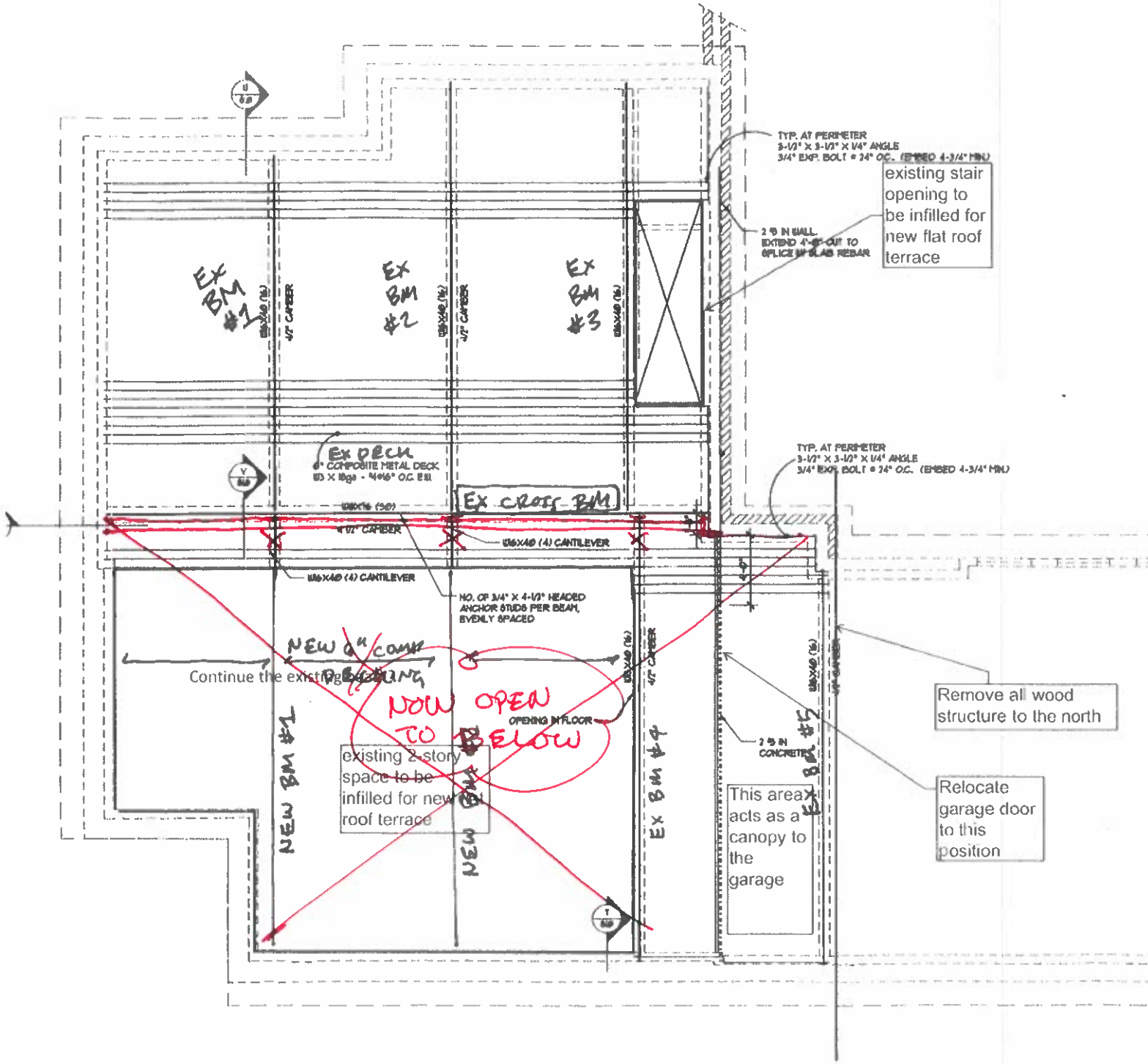
Ins - 1.5
 mde - 1.0
17.9 #/ft

- 2 1/2" STONE, TBD = 35
- MIN. 1" MORTAR = 11
- MIN. 2" HIGH STRENGTH CONC SLAB - 24
- ±3/4" WATERPROOFING - 1.5
- DRAINAGE MAT
- WATERPROOF MEMBRANE
- 3/4" PLYWOOD SUBFLOOR - 2.5
- 1/8" PER FT. SLOPED OR TAPERED FRAMING PER STRUCTURE - 3.5
- W/ MIN. R-38 CLOSE CELL SPRAY FOAM
- ICYNENE PROSEAL, R7/INCH - 2.2
- 5/8" GWB 2.8

Σ 28 2.5 #/ft

- 2 1/2" STONE, TBD = 35
- MIN. 1" MORTAR = 11
- MIN. 2" HIGH STRENGTH CONC SLAB = 24
- ±3/4" WATERPROOFING = 1.5
- DRAINAGE MAT
- WATERPROOF MEMBRANE
- 3/4" PLYWOOD SUBFLOOR - 2.5
- 1/8" PER FT. SLOPED OR TAPERED FRAMING PER STRUCTURE
- W/ 2" CLOSE CELL SPRAY FOAM
- ICYNENE PROSEAL, R7/INCH - 2.2
- 5/8" GREENBOARD 2.8

DETACHED GARAGE
 NEW / REVISED FRAMING
 11/20/24 CD REVISIONS



NEW INFILL FRAMING & Open Space

BM-2

Span = 22'
TA = 10' 0-14'
0' 14'-22'

DL = 600/360
LL = 600/360
SL = 250/150

W16x26 OK

~~BM DELETED~~

R₁ = 6.5k_D
6.3k_L
2.6k_S

R₂ = 5.3k_D
5.0k_L
2.1k_S

BM-2

Span = 22'
TA = 10'

DL = 600
LL = 600 PIF
SL = 250

~~BM DELETED~~

W16x26 OK

R₁ = R₂ = 6.9k_D
6.6k_L
2.7k_S

REVISED

EX CROSS BM (W18x76)

Span = 35'
TA = 4' + 3' PARAPET
DL = 240 85
LL = 240 PIF
SL = 100

P₁ @ 10' = 6.56k_D
~~11.8k_D~~ 4.30k_L
~~6.9k_L~~ 2.5k_S
4.16k_S 2.5k_S

P₂ @ 20' = 7.84k_D
~~14.7k_D~~ 5.15k_L
~~8.65k_L~~ 7.35k_S
5.76k_S 3.06k_S

P₃ @ 30' = 6.01k_D
~~3.42k_L~~ 3.86k_L
2.30k_S

P₄ @ 31' = ~~6.13k_D~~
~~3.49k_L~~
2.33k_S

Revised U_{red} → K_{LL} = 0.70
U_{red} = 42

LL Red - K_{LL} = 0.62

eg uniform U_{red} = 37 #/p

EX BM IS 96% STRESSED

Δ = 1.91" total

ex C = 1.5"

∴ Δ = 0.41" = L/1020 ✓

REVISED BM IS 63% STRESSED

Δ = 1.24" w/ ex C = 1.5" Δ = 0.24"

= L/1700 ✓ OK

EX GARAGE BEAM CHECK FOR CD REVISIONS



I.L. GROSS
STRUCTURAL ENGINEERS

SHEET TITLE

L2 LAKE HOUSE

SCALE

N/S

DATE

1/2024

PROJECT

RES

DESIGNED BY

CLIENT

CHECKED

SHEET

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Project Title: **Lorenzini Waterfront Home**
 Engineer: **Mark Speidel**
 Project ID:
 Project Descr: **SFR Remodeling**

ASCE Live and Roof Live Load Reduction

File: Lorenzini Residence.ec6
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Lic. # : KW-06002858

Live Load Reduction Per ASCE 7-16, Section 4.7 & 4.8

Description	Load Type	Lo	A _T : Trib Area	K _{LL}	Roof Pitch	R1	R2	Reduced L -or- Lr
LL Reduction at Ex Garag	Floor Live	60.0 psf	850.0 sq ft	2		0.6138		36.828 psf
REVISED LL Reduction at	Floor Live	60.0 psf	573.0 sq ft	2		0.6931		41.586 psf

Composite Steel Beam

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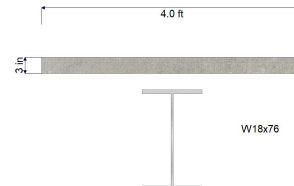
DESCRIPTION: **REVISED Cross Support Beam w/ updated loading**

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : ASCE 7-10

Material Properties

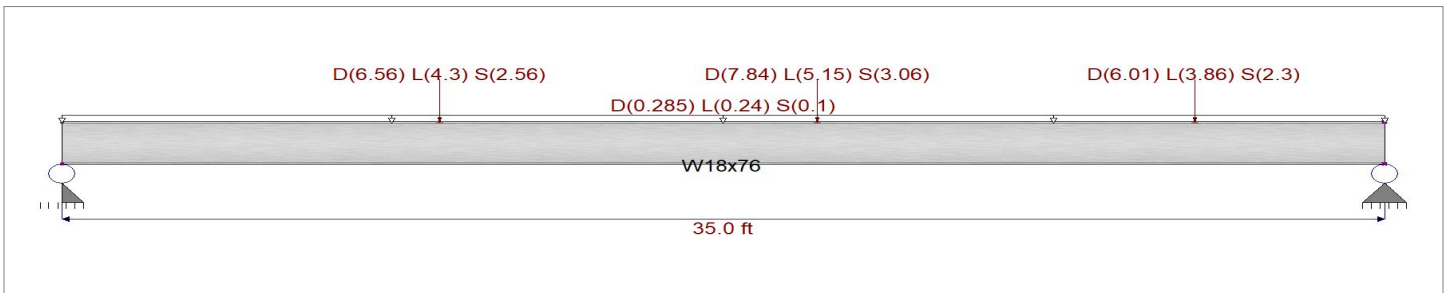
Analysis Method : **Allowable Stress Design**
 Beam Bracing : **Beam is Fully Braced against lateral-torsional buckling by attached s**
 Load Combination **ASCE 7-10**
 Fy : Steel Yield : **50.0 ksi** E: Modulus : **29,000.0 ksi**



Beam is **UNSHORED** for Concrete Placement

Composite Beam Section Data

Total Slab Thickness	6.0 in	Concrete f'c	3.0 ksi	Stud Diameter	5/8" in
Effective Width	4.0 ft	Concrete Density	145.0 pcf	Qn : Stud Capacity	10.180 k
Metal Deck ...	ASC, 3W Hi Form	Rib Height	3.0 in	Top Width	7.250 in
Ribs :	Perpendicular	Rib Spacing	12.0 in	Btm Width	4.750 in



Applied Loads

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

Beam self weight calculated and added to loads
 Load for Span Number 1

Uniform Load : D = 0.2850, L = 0.240, S = 0.10 k/ft, Tributary Width = 1.0 ft, Post Composite Only
 Point Load : D = 6.560, L = 4.30, S = 2.560 k @ 10.0 ft, Post Composite Only
 Point Load : D = 7.840, L = 5.150, S = 3.060 k @ 20.0 ft, Post Composite Only
 Point Load : D = 6.010, L = 3.860, S = 2.30 k @ 30.0 ft, Post Composite Only

DESIGN SUMMARY

MAX Bending Ratio =	0.628 : 1	MAX Shear Ratio =	0.202 : 1
Steel section	W18x76	Vu : Applied	31.233 k
Composite		Vn/Omega : Allow	154.70 k
% Composite Action	25 %	Location of maximum	35.0 ft
Mu : Applied	292.453 k-ft	Load Combination	+D+0.750L+0.750S
Mn / Omega : Allow	465.784 k-ft		
Location of maximum	19.833 ft		
Load Combination	+D+0.750L+0.750S		
Pre-Composite			
Mu : Applied	11.624 k-ft		
Mn * Phi : Allowable	406.687 k-ft		

Design OK

DEFLECTIONS

FINAL Composite	
Max Downward	1.296 in
Max Upward	0.000 in
Defl Ratio	324
	+D+0.750L+0.750S
Transient Composite	
Max Downward	0.480 in
Max Upward	0.000 in
Defl Ratio	875
	L Only
NonComposite	
Max Downward	0.067 in
Max Upward	0.000 in
Defl Ratio	6253
	PreCompDL+PreCompLL

Shear Stud Requirements

From Support 0 to 19.83 ft use 10 studs.
 From 19.83 ft to Support 1 use 10 studs.

Maximum Forces & Stresses for Load Combinations

Composite Steel Beam

Lic. #: KW-06002858

DESCRIPTION: REVISED Cross Support Beam w/ updated loading

Load Comb & Design Length	Span #	Max Stress Ratios		Bending Summary		Shear Summary	
		M	V	Mu-Applied	MnTr / Omega	Va	Vn / Omega
Pre Composite : D + Const L Span L = 35 ft	1	0.029	0.009	11.62	406.69	1.33	154.70
Final Composite : D Only Span L = 35 ft	1	0.357	0.098	166.38	465.78	15.22	154.70
Final Composite : +D+L Span L = 35 ft	1	0.592	0.163	275.82	465.78	25.25	154.70
Final Composite : +D+S Span L = 35 ft	1	0.483	0.132	225.04	465.78	20.44	154.70
Final Composite : +D+0.750L Span L = 35 ft	1	0.533	0.147	248.46	465.78	22.74	154.70
Final Composite : +D+0.750L+0.750S Span L = 35 ft	1	0.628	0.172	292.45	465.78	26.66	154.70
Final Composite : +0.60D Span L = 35 ft	1	0.214	0.059	99.83	465.78	9.13	154.70

Maximum Deflections for Load Combinations - Unfactored Loads

Load Combination	Location in Span (ft)	FINAL	DEFLECTIONS (in)		Added Post Composite	Ixx - Used in^4
			Pre-Composite	NonComposite Removed		
Precomposite	Downward	17.733	0.000	0.0672		1,330.00
Precomposite	Upward	0.000	0.000			1,330.00
NonComposite Removed	Downward	17.733	0.000	0.0672		0.00
NonComposite Removed	Upward	0.000	0.000			0.00
Final Composite : D Only	Downward	17.733	0.677	0.0672	0.067	1,697.81
Final Composite : D Only	Upward	0.000	0.000			1,697.81
Final Composite : +D+L	Downward	17.733	1.157	0.0672	0.067	1,697.81
Final Composite : +D+L	Upward	0.000	0.000			1,697.81
Final Composite : +D+S	Downward	17.733	0.932	0.0672	0.067	1,697.81
Final Composite : +D+S	Upward	0.000	0.000			1,697.81
Final Composite : +D+0.750L	Downward	17.733	1.037	0.0672	0.067	1,697.81
Final Composite : +D+0.750L	Upward	0.000	0.000			1,697.81
Final Composite : +D+0.750L+0.750S	Downward	17.733	1.228	0.0672	0.067	1,697.81
Final Composite : +D+0.750L+0.750S	Upward	0.000	0.000			1,697.81
Final Composite : +0.60D	Downward	17.733	0.406	0.0403	0.040	1,697.81
Final Composite : +0.60D	Upward	0.000	0.000			1,697.81
Final Composite : L Only	Downward	17.733	0.480			1,697.81
Final Composite : L Only	Upward	0.000	0.000			1,697.81
Final Composite : S Only	Downward	17.733	0.256			1,697.81
Final Composite : S Only	Upward	0.000	0.000			1,697.81

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	26.657	31.233
Precomposite Loads	1.328	1.328
NonComposite Removed	1.328	1.328
Final Composite : D Only	15.220	17.822
Final Composite : +D+L	25.250	29.502
Final Composite : +D+S	20.439	24.023
Final Composite : +D+0.750L	22.743	26.582
Final Composite : +D+0.750L+0.750S	26.657	31.233
Final Composite : +0.60D	9.132	10.693
Final Composite : L Only	10.030	11.680
Final Composite : S Only	5.219	6.201

Steel Section Properties : W18x76

Depth	=	18.200 in	I xx	=	1,330.00 in^4	I yy	=	152.000 in^4
Web Thick	=	0.425 in	S xx	=	146.00 in^3	S yy	=	27.600 in^3
Flange Width	=	11.000 in	R xx	=	7.730 in	R yy	=	2.610 in
Flange Thick	=	0.680 in	Zx	=	163.000 in^3	Zy	=	42.200 in^3
Area	=	22.300 in^2	J	=	2.830 in^4			
Weight	=	75.909 plf						

Composite Section Properties

Span Number	Analysis Plastic N. A. Location	Analysis Type	% Shear Connection	Plastic N.A. from Bottom	Sum Qn Shear (k)	# Studs per 1/2 Span	Mn - Capacity k-ft	Moment of Inertia		
								I-Steel	I-Trans	I-Lwr Bound
	PNA in Flange		100.0	17.520	367.200	37	1,007.13	1,330.0	3,044.0	2,351.8
	PNA in Web		95.0	17.093	348.840	35	987.29	1,330.0	3,044.0	2,323.8
	PNA in Web		90.0	16.661	330.480	33	976.63	1,330.0	3,044.0	2,293.9
	PNA in Web		85.0	16.229	312.120	31	965.30	1,330.0	3,044.0	2,262.2

Composite Steel Beam

Lic. # : KW-06002858

DESCRIPTION: **REVISED Cross Support Beam w/ updated loading**

Composite Section Properties

Span Number	Plastic N. A. Location	Analysis Type	% Shear Connection	Plastic N.A. from Bottom	Sum Qn Shear (k)	# Studs per 1/2 Span	Mn - Capacity k-ft	Moment of Inertia		
								I-Steel	I-Trans	I-Lwr Bound
	PNA in Web		80.0	15.797	293.760	29	953.32	1,330.0	3,044.0	2,228.4
	PNA in Web		75.0	15.365	275.400	28	940.67	1,330.0	3,044.0	2,192.6
	PNA in Web		70.0	14.933	257.040	26	927.36	1,330.0	3,044.0	2,154.7
	PNA in Web		65.0	14.501	238.680	24	913.40	1,330.0	3,044.0	2,114.5
	PNA in Web		60.0	14.069	220.320	22	898.77	1,330.0	3,044.0	2,071.9
	PNA in Web		55.0	13.637	201.960	20	883.48	1,330.0	3,044.0	2,026.9
	PNA in Web		50.0	13.205	183.600	19	867.53	1,330.0	3,044.0	1,979.2
	PNA in Web		45.0	12.773	165.240	17	850.92	1,330.0	3,044.0	1,928.9
	PNA in Web		40.0	12.341	146.880	15	833.64	1,330.0	3,044.0	1,875.7
	PNA in Web		35.0	11.909	128.520	13	815.71	1,330.0	3,044.0	1,819.6
	PNA in Web		30.0	11.477	110.160	11	797.11	1,330.0	3,044.0	1,760.3
	PNA in Web		25.0	11.045	91.800	10	777.86	1,330.0	3,044.0	1,697.8

Span 1

CD revisions to Shear walls 11/2021

Lorenzini House

Shear wall analysis

LRFD Wood Shear Wall Design

	loads		
wall weight=	12 psf	roof weight=	14.5 psf
conc wall=	75 psf	floor weight=	16.5 psf

SW SCHEDULE	CAP (plf)
W6	416
W4	600
W3	780
W2	1020
2W4	1215
2W3	1560
TOO HIGH	1600

Holdowns	Capacity	Straps	Capacity
ABs ok	0.6 k	LSTA24	1.2 k
HDU2	3.5 k	LSTA36	2 k
HDU4	5.9 k	MSTC40	3.9 k
HDU5	7.3 k	MSTC66	7.5 k
HDU8	10.2 k	MST72	8.7 k
HDU11	14.4 k	HDU8	10.2 k

Capacities are adjusted fro LRFD values

SW - A		N/S Direction	
Roof- Upper Floor			
H=	12.0	Mot=	59.3 k-ft
L=	46.0	C=	1.3 k
Vapp=	4.9	Mres=	206.2 k-ft
WW=	6.0	T=	0.0 k
TA=	5.0	AR=	1.2
Weight=	3.0	Co=	1.0
Shear VLF=	107.4		W6 LSTA24

SW - B		N/S Direction	
Roof- Upper Floor			
H=	10.0	Mot=	25.2 k-ft
L=	8.0	C=	3.2 k
Vapp=	2.5	Mres=	7.6 k-ft
WW=	0.9	T=	2.2 k
TA=	10.0	AR=	1.1
Weight=	1.0	Co=	1.0
Shear VLF=	315.0		W6 MSTC40

Upper- Main Floor			
H=	6.0	Mot=	92.8 k-ft
L=	46.0	C=	2.0 k
Vapp=	0.7	Mres=	306.1 k-ft
WW=	8.9	T=	0.0 k
TA=	2.0	AR=	1.2
Weight=	4.4	Co=	1.0
Shear VLF=	121.5		W6 ABs ok

Upper- Main Floor			
H=	6.0	Mot=	45.3 k-ft
L=	12.0	C=	3.8 k
Vapp=	0.8	Mres=	18.3 k-ft
WW=	1.6	T=	2.3 k
TA=	2.0	AR=	1.2
Weight=	1.4	Co=	1.0
Shear VLF=	279.2		W6 HDU2

Foundation Wall at CrawlSpace

SW - C E/W Direction

High Roof - low Roof

H=	3.5	Mot=	17.89 k-ft
L=	8.0	C=	2.236 k
Vapp=	5.1	Mres=	3.3 k-ft
WW=	0.3	T=	1.8 k
TA=	5.0	AR=	1.2
Weight=	0.5	Co=	1.0
Shear VLF= 638.8		W3 LSTA36	

SW - D N/S Direction

Low Roof - Foundation

H=	9.0	Mot=	33.0 k-ft
L=	24.0	C=	1.4 k
Vapp=	3.7	Mres=	50.5 k-ft
WW=	2.3	T=	0.0 k
TA=	6.0	AR=	1.2
Weight=	1.9	Co=	1.0
Shear VLF= 152.9		W6 ABs ok	

Upper- Main Floor

H=	10.0	Mot=	58.6 k-ft
L=	8.0	C=	7.325 k
Vapp=	0.4	Mres=	10.6 k-ft
WW=	1.2	T=	6.0 k
TA=	8.0	AR=	1.1
Weight=	1.5	Co=	1.0
Shear VLF= 688.8		W3 HDU5	

Main Floor - Foundation

H=	5.0	Mot=	110.5 k-ft
L=	9.0	C=	12.28 k
Vapp=	0.8	Mres=	15.3 k-ft
WW=	1.7	T=	10.6 k
TA=	2.0	AR=	1.2
Weight=	1.7	Co=	1.0
Shear VLF= 701.1		W3 HDU11	

SW - E N/S Direction

Roof- Upper Floor

H=	10.0	Mot=	20.2 k-ft
L=	10.0	C=	2.0 k
Vapp=	2.0	Mres=	8.0 k-ft
WW=	1.1	T=	1.2 k
TA=	4.0	AR=	1.1
Weight=	0.5	Co=	1.0

Shear VLF= 202.0

W6 LSTA36

Upper- Main Floor

H=	9.0	Mot=	43.7 k-ft
L=	40.0	C=	1.1 k
Vapp=	0.6	Mres=	157.3 k-ft
WW=	5.0	T=	0.0 k
TA=	4.0	AR=	1.2
Weight=	2.9	Co=	1.0

Shear VLF= 65.3

W6 ABs ok

SW - F N/S Direction

Roof- Upper Floor

H=	10.0	Mot=	37.0 k-ft
L=	12.0	C=	3.1 k
Vapp=	3.7	Mres=	15.3 k-ft
WW=	1.3	T=	1.8 k
TA=	8.0	AR=	1.1
Weight=	1.3	Co=	1.0

Shear VLF= 308.3

W6 LSTA36

Upper- Main Floor

H=	9.0	Mot=	75.8 k-ft
L=	20.0	C=	3.8 k
Vapp=	0.6	Mres=	68.7 k-ft
WW=	3.2	T=	0.4 k
TA=	8.0	AR=	1.2
Weight=	3.6	Co=	1.0

Shear VLF= 215.5

W6 ABs ok

8" CMU Wall at Basement

SW - G N/S Direction

Roof- Upper Floor

H=	12.0	Mot=	44.4 k-ft
L=	20.0	C=	2.2 k
Vapp=	3.7	Mres=	41.6 k-ft
WW=	2.6	T=	0.2 k
TA=	6.0	AR=	1.2
Weight=	1.6	Co=	0.8

Shear VLF= 231.3

W6 LSTA24

Upper- Main Floor

H=	9.0	Mot=	85.2 k-ft
L=	16.0	C=	5.3 k
Vapp=	0.8	Mres=	49.5 k-ft
WW=	4.1	T=	2.2 k
TA=	2.0	AR=	1.2
Weight=	2.0	Co=	1.0

Shear VLF= 283.1

W6 HDU2

Concrete Wall at Basement

SW - H E/W Direction

Roof- Upper Floor

H=	11.0	Mot=	11.9 k-ft
L=	8.0	C=	1.5 k
Vapp=	1.1	Mres=	5.5 k-ft
WW=	1.0	T=	0.8 k
TA=	4.0	AR=	1.1
Weight=	0.4	Co=	1.0

Shear VLF= 135.0

W6 HDU2

Upper- Main Floor

H=	9.0	Mot=	43.7 k-ft
L=	22.0	C=	2.0 k
Vapp=	2.5	Mres=	45.8 k-ft
WW=	3.1	T=	0.0 k
TA=	2.0	AR=	1.2
Weight=	1.1	Co=	1.0

Shear VLF= 160.5

W6 ABs ok

Concrete Wall at basement

SW - I E/W Direction

Roof- Upper Floor

H=	10.0	Mot=	25.1 k-ft
L=	11.0	C=	2.3 k
Vapp=	2.5	Mres=	9.7 k-ft
WW=	1.2	T=	1.8 k
TA=	4.0	AR=	1.1
Weight=	0.6	Co=	0.8

Shear VLF= 285.2

W6 LSTA36

Drag Strut Below

SW - J E/W Direction

Roof- Upper Floor

H=	10.0	Mot=	17.3 k-ft
L=	14.0	C=	1.2 k
Vapp=	1.7	Mres=	15.7 k-ft
WW=	1.5	T=	0.1 k
TA=	4.0	AR=	1.2
Weight=	0.7	Co=	0.8

Shear VLF= 154.5

W6 LSTA24

Drag Strut Below

SW - L N/S Direction

Roof- Upper Floor

H=	12.0	Mot=	48.0 k-ft
L=	17.0	C=	2.8 k
Vapp=	4.0	Mres=	26.3 k-ft
WW=	2.2	T=	1.6 k
TA=	4.0	AR=	1.2
Weight=	0.9	Co=	0.8

Shear VLF= 294.1

W6 LSTA36

Upper- Main Floor

H=	9.0	Mot=	93.0 k-ft
L=	16.0	C=	5.8 k
Vapp=	1.0	Mres=	41.0 k-ft
WW=	3.8	T=	3.3 k
TA=	2.0	AR=	1.2
Weight=	1.4	Co=	1.0

Shear VLF= 312.5

W6 HDU2

Concrete Wall at Garage foundation

SW - K E/W Direction

Roof- Upper Floor

H=	12.0	Mot=	33.0 k-ft
L=	6.0	C=	5.5 k
Vapp=	2.8	Mres=	3.7 k-ft
WW=	0.8	T=	4.9 k
TA=	6.0	AR=	1.0
Weight=	0.5	Co=	1.0

Shear VLF= 458.3

W4 MSTC66

Upper- Main Floor

H=	9.0	Mot=	67.5 k-ft
L=	10.0	C=	6.7 k
Vapp=	1.1	Mres=	12.6 k-ft
WW=	1.7	T=	5.5 k
TA=	2.0	AR=	1.1
Weight=	0.8	Co=	1.0

Shear VLF= 383.0

W6 HDU4

Concrete Wall at Basement

SW - M E/W Direction

Roof- Upper Floor

H=	11.0	Mot=	39.6 k-ft
L=	7.0	C=	5.7 k
Vapp=	3.6	Mres=	4.2 k-ft
WW=	0.8	T=	5.1 k
TA=	4.0	AR=	1.1
Weight=	0.4	Co=	1.0

Shear VLF= 514.3

W4 MSTC66

Upper- Main Floor

H=	6.0	Mot=	67.2 k-ft
L=	12.0	C=	5.6 k
Vapp=	1.0	Mres=	20.4 k-ft
WW=	1.6	T=	3.9 k
TA=	8.0	AR=	1.2
Weight=	1.8	Co=	1.0

Shear VLF= 383.3

W6 HDU4

SW - N N/S Direction

Roof- Upper Floor

H=	10.0	Mot=	42.8 k-ft
L=	7.0	C=	6.1 k
Vapp=	4.3	Mres=	3.9 k-ft
WW=	0.8	T=	5.6 k
TA=	4.0	AR=	1.1
Weight=	0.4	Co=	1.0

Shear VLF= 611.4

W3 MSTC66

Upper- Main Floor

H=	6.0	Mot=	76.3 k-ft
L=	14.0	C=	5.4 k
Vapp=	1.3	Mres=	25.8 k-ft
WW=	1.7	T=	3.6 k
TA=	8.0	AR=	1.2
Weight=	2.0	Co=	1.0

Shear VLF= 398.6

W6 HDU4

SW - Q E/W Direction

Main Floor - Crawlspace

H=	6.0	Mot=	6.0 k-ft
L=	22.0	C=	0.3 k
Vapp=	1.0	Mres=	22.0 k-ft
WW=	1.4	T=	0.0 k
TA=	2.0	AR=	1.2
Weight=	0.6	Co=	1.0

Shear VLF= 45.5

W6 ABs ok

Concrete Foundation Wall

SW - S N/S Direction

Main Floor - Crawlspace

H=	8.0	Mot=	13.8 k-ft
L=	18.0	C=	0.8 k
Vapp=	1.7	Mres=	22.5 k-ft
WW=	1.6	T=	0.0 k
TA=	4.0	AR=	1.2
Weight=	0.9	Co=	1.0

Shear VLF= 95.6

W6 ABs ok

SW - O+P rev E/W Direction

Main Floor- Basement

H=	9.0	Mot=	44.1 k-ft
L=	13.0	C=	3.4 k
Vapp=	4.9	Mres=	10.4 k-ft
WW=	1.3	T=	2.6 k
TA=	2.0	AR=	1.2
Weight=	0.3	Co=	1.0

Shear VLF= 376.9

W6 HDU2

SW - P E/W Direction

Main Floor- Basement

H=	9.0	Mot=	0.0 k-ft
L=	6.0	C=	0.0 k
Vapp=	0.0	Mres=	2.2 k-ft
WW=	0.6	T=	0.0 k
TA=	2.0	AR=	1.1
Weight=	0.2	Co=	1.0

Shear VLF= 0.0

W6 ABs ok

DELETED Nov-21

SW - R E/W Direction

Main Floor- Basement

H=	9.0	Mot=	16.7 k-ft
L=	14.0	C=	1.2 k
Vapp=	1.9	Mres=	12.1 k-ft
WW=	1.4	T=	0.3 k
TA=	2.0	AR=	1.2
Weight=	0.4	Co=	1.0

Shear VLF= 132.9

W6 ABs ok

SW - T E/W Direction

Main Floor- Basement

H=	9.0	Mot=	14.1 k-ft
L=	17.0	C=	0.8 k
Vapp=	1.6	Mres=	17.8 k-ft
WW=	1.7	T=	0.0 k
TA=	2.0	AR=	1.2
Weight=	0.4	Co=	1.0

Shear VLF= 92.4

W6 ABs ok

SW - U E/W Direction

Roof- Upper Floor		
H=	12.0	Mot= 23.0 k-ft
L=	4.0	C= 5.8 k
Vapp=	1.9	Mres= 1.5 k-ft
WW=	0.5	T= 6.2 k
TA=	4.0	AR= 0.9
Weight=	0.2	Co= 1.0
Shear VLF=	548.6	W4 HDU5

CMU Wall at FP BOX

Upper- Main Floor		
H=	9.0	Mot= 49.3 k-ft
L=	6.0	C= 8.2 k
Vapp=	1.0	Mres= 6.1 k-ft
WW=	1.1	T= 7.2 k
TA=	8.0	AR= 1.1
Weight=	0.9	Co= 1.0
Shear VLF=	486.7	W4 HDU5

CMU Wall at FP BOX

SW - X N/S Direction

Roof- Main Floor		
H=	8.0	Mot= 8.8 k-ft
L=	4.5	C= 2.0 k
Vapp=	1.1	Mres= 1.2 k-ft
WW=	0.4	T= 1.7 k
TA=	2.5	AR= 1.0
Weight=	0.1	Co= 1.0
Shear VLF=	244.4	W6 HDU2

SW - Z N/S Direction

Roof- Main Floor		
H=	9.0	Mot= 11.7 k-ft
L=	6.0	C= 2.0 k
Vapp=	1.3	Mres= 2.3 k-ft
WW=	0.6	T= 1.6 k
TA=	2.5	AR= 1.1
Weight=	0.2	Co= 1.0
Shear VLF=	216.7	W6 HDU2

SW - V E/W Direction

Roof- Upper Floor		
H=	6.0	Mot= 27.1 k-ft
L=	5.0	C= 5.4 k
Vapp=	4.5	Mres= 1.5 k-ft
WW=	0.3	T= 5.1 k
TA=	4.0	AR= 1.1
Weight=	0.3	Co= 1.0
Shear VLF=	904.0	W2 HDU4

Upper- Main Floor

Upper- Main Floor		
H=	9.0	Mot= 79.5 k-ft
L=	6.0	C= 13.3 k
Vapp=	1.3	Mres= 5.6 k-ft
WW=	0.9	T= 12.3 k
TA=	8.0	AR= 1.1
Weight=	1.0	Co= 1.0
Shear VLF=	970.0	W2 HDU11

SW - Y E/W Direction

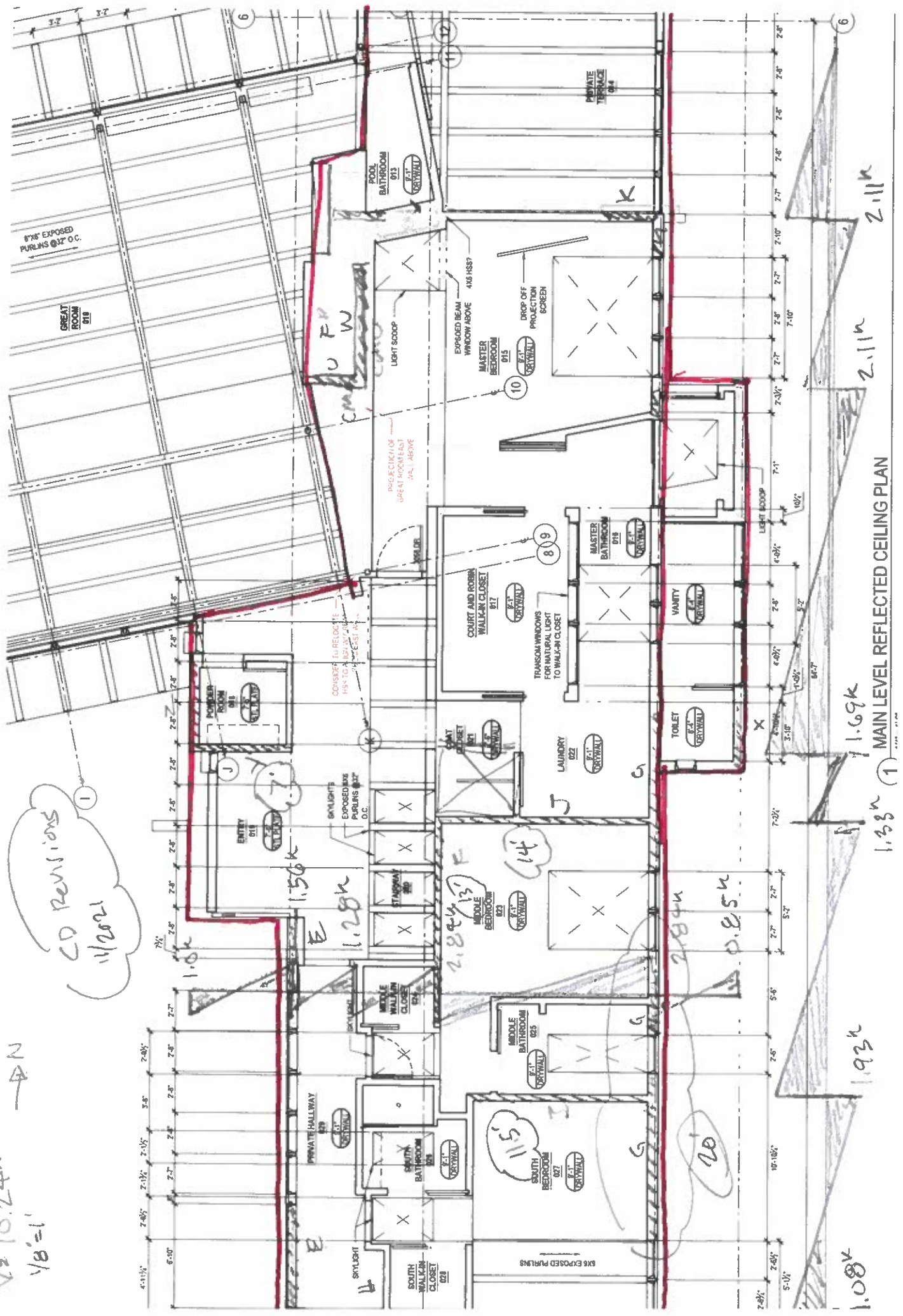
Roof- Main Floor		
H=	9.0	Mot= 19.8 k-ft
L=	6.0	C= 3.3 k
Vapp=	2.2	Mres= 2.7 k-ft
WW=	0.6	T= 2.9 k
TA=	4.0	AR= 1.1
Weight=	0.3	Co= 1.0
Shear VLF=	366.7	W6 HDU2

SW - AA E/W Direction

Terrace- Basement		
H=	9.0	Mot= 5.4 k-ft
L=	7.0	C= 0.8 k
Vapp=	0.6	Mres= 3.7 k-ft
WW=	0.7	T= 0.4 k
TA=	4.0	AR= 1.1
Weight=	0.4	Co= 0.7
Shear VLF=	122.4	W6 ABs ok

EAST WING HIGH ROOF
 V2 10.24h
 1/8"=1'

CD Revisions
 11/20/21



MAIN LEVEL REFLECTED CEILING PLAN

1.08k

1.93k

1.33k

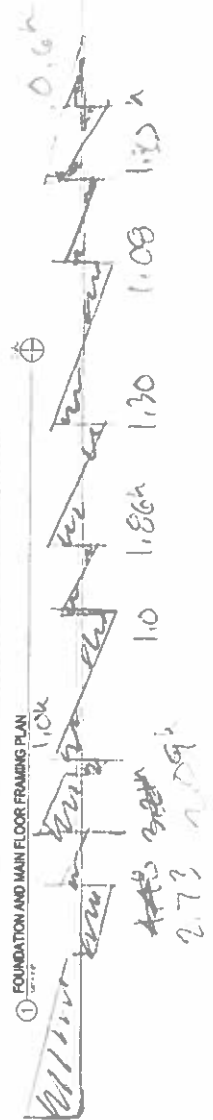
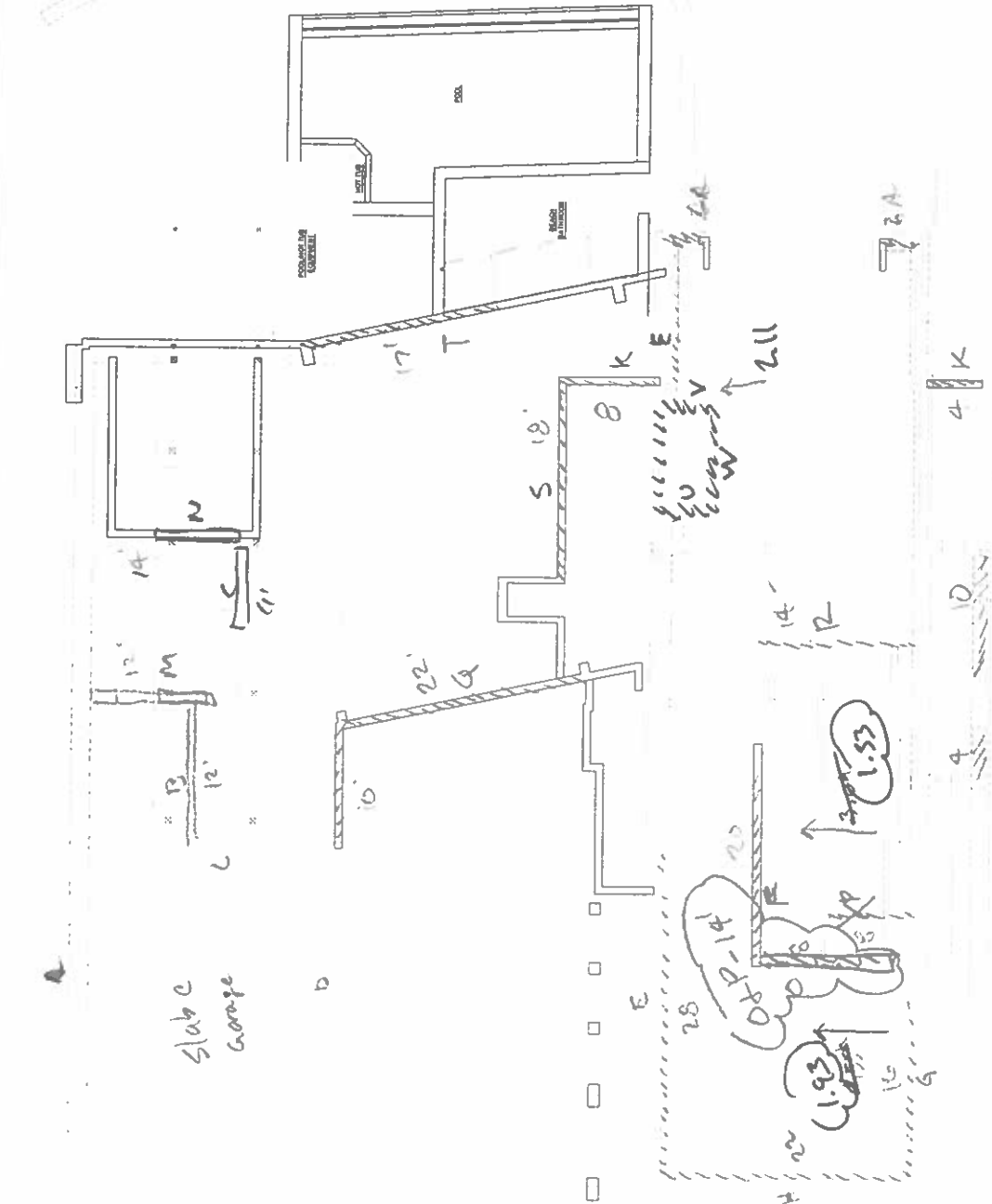
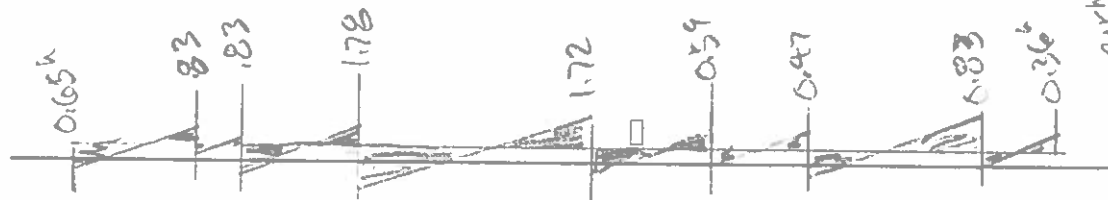
1.69k

2.11k

2.11k

$V_{MIN} = 9.724$ (SEISMIC)

(Revised floor)



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1ST FLOOR/
 FOUNDATION
 PLAN

S2.0