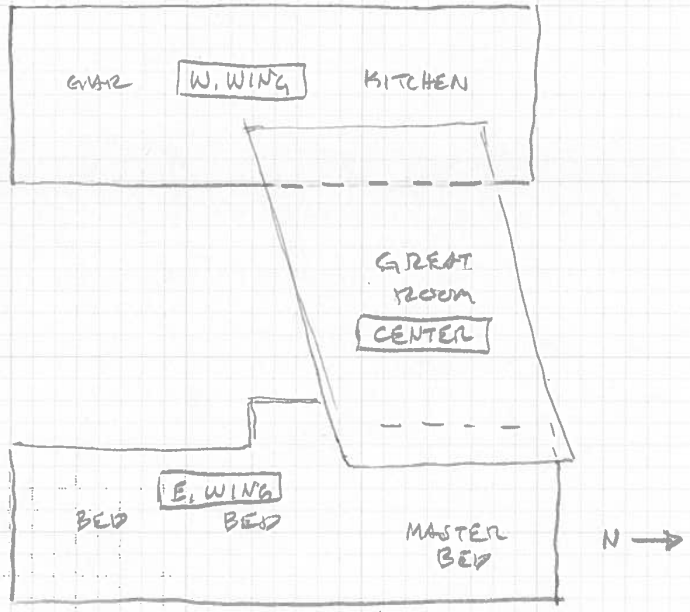
LORENZINI WATERFRONT HOUSE – HIGH ROOF LATERAL DESIGN
HOUSE IS 'U' SHAPED W/ CENTER ROOF SET ABOVE SIDE ROOFS & OPPOSING PITCHES

ROOF SHEAR DISTRIBUTION

ROOF WT BY WINGS
W. WING = 24.9^k = 24.6%
CENTER WING = 39.4^k = 39.0%
E. WING = 36.8^k = 36.4%

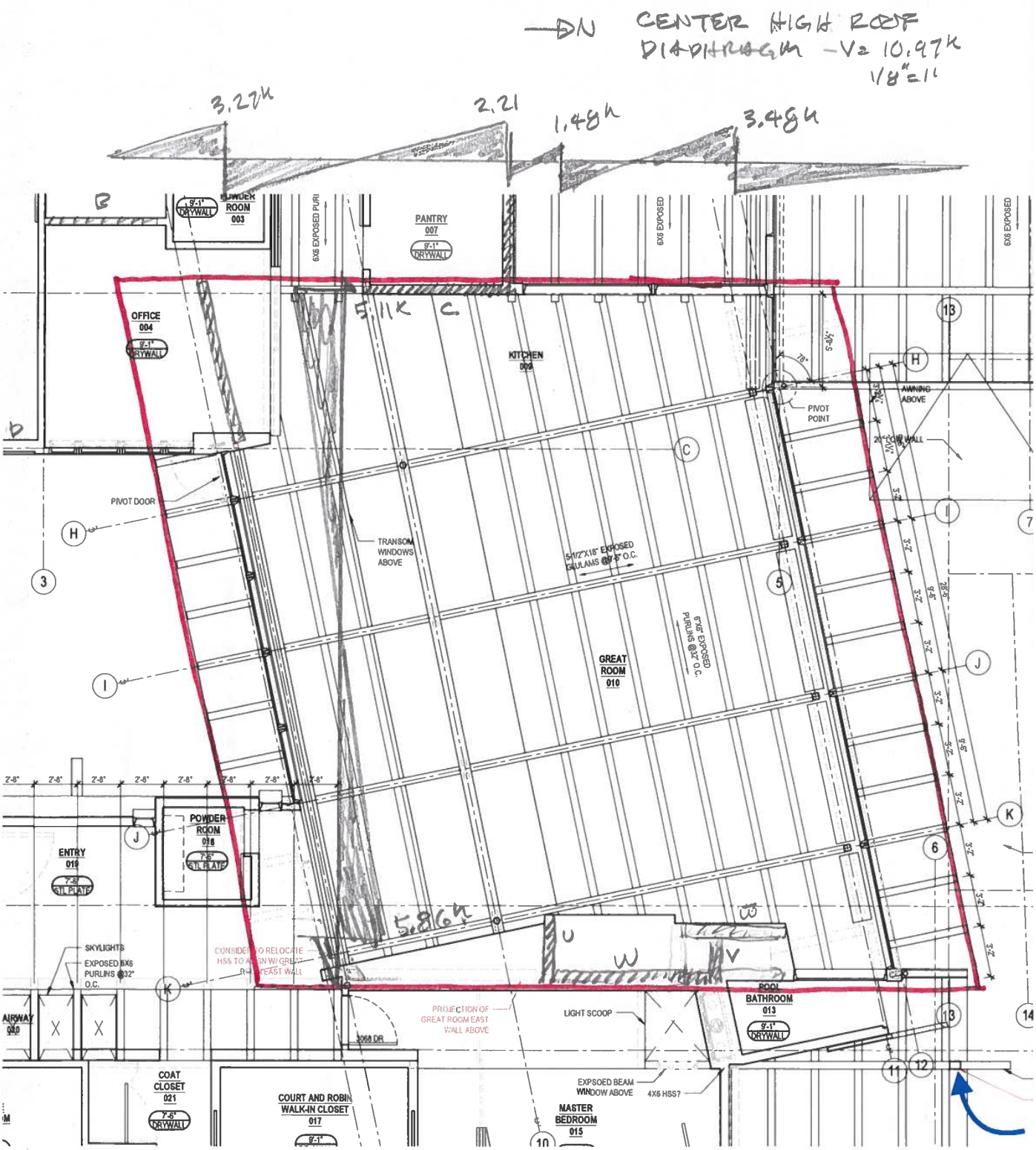
Resulting DIAPHRAGM LOADS
V_R = 28.12^k
∴ WEST = 6.92^k
CENTER = 10.77^k
EAST = 10.24^k

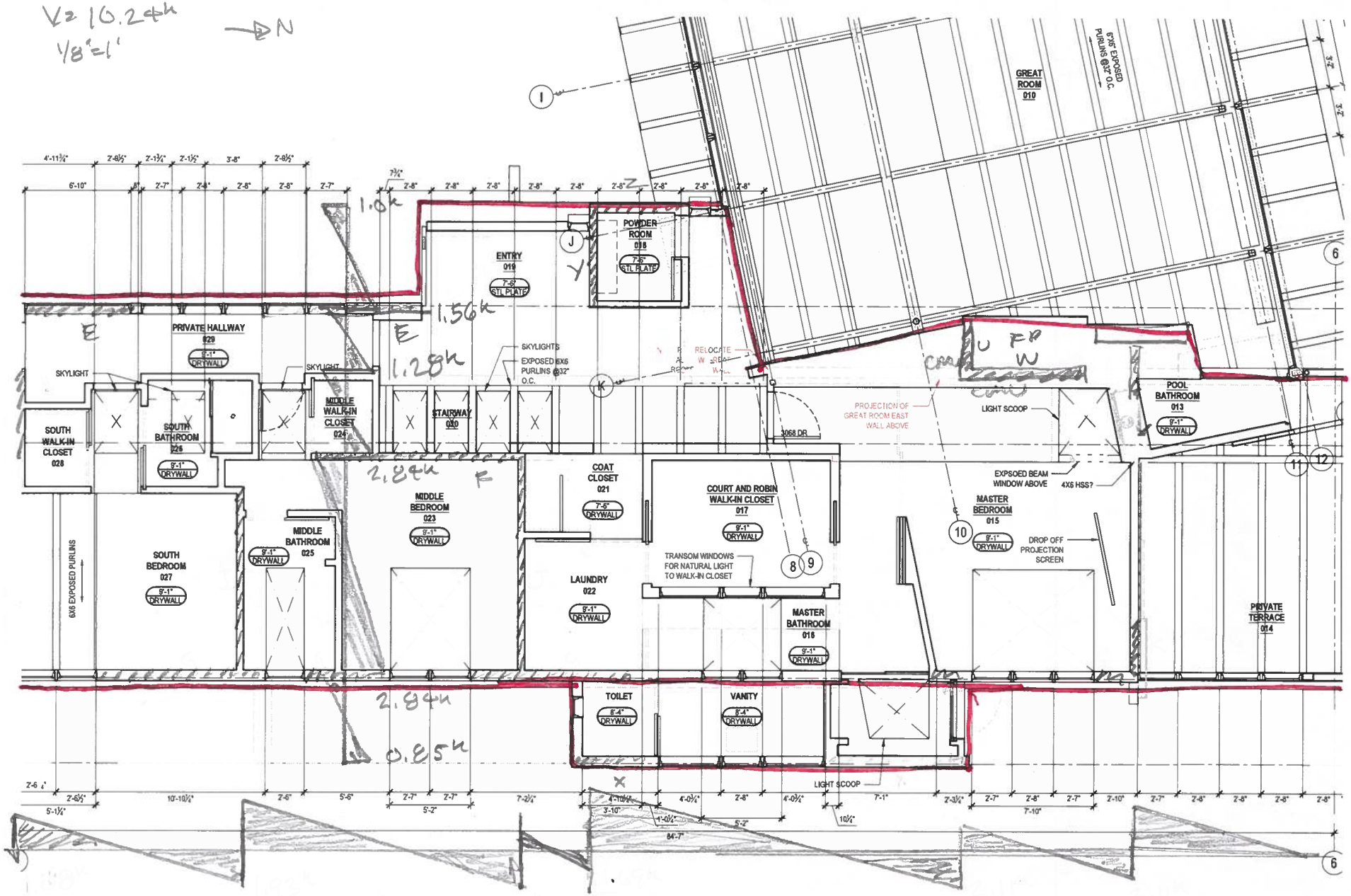
(BASED ON R=6.5



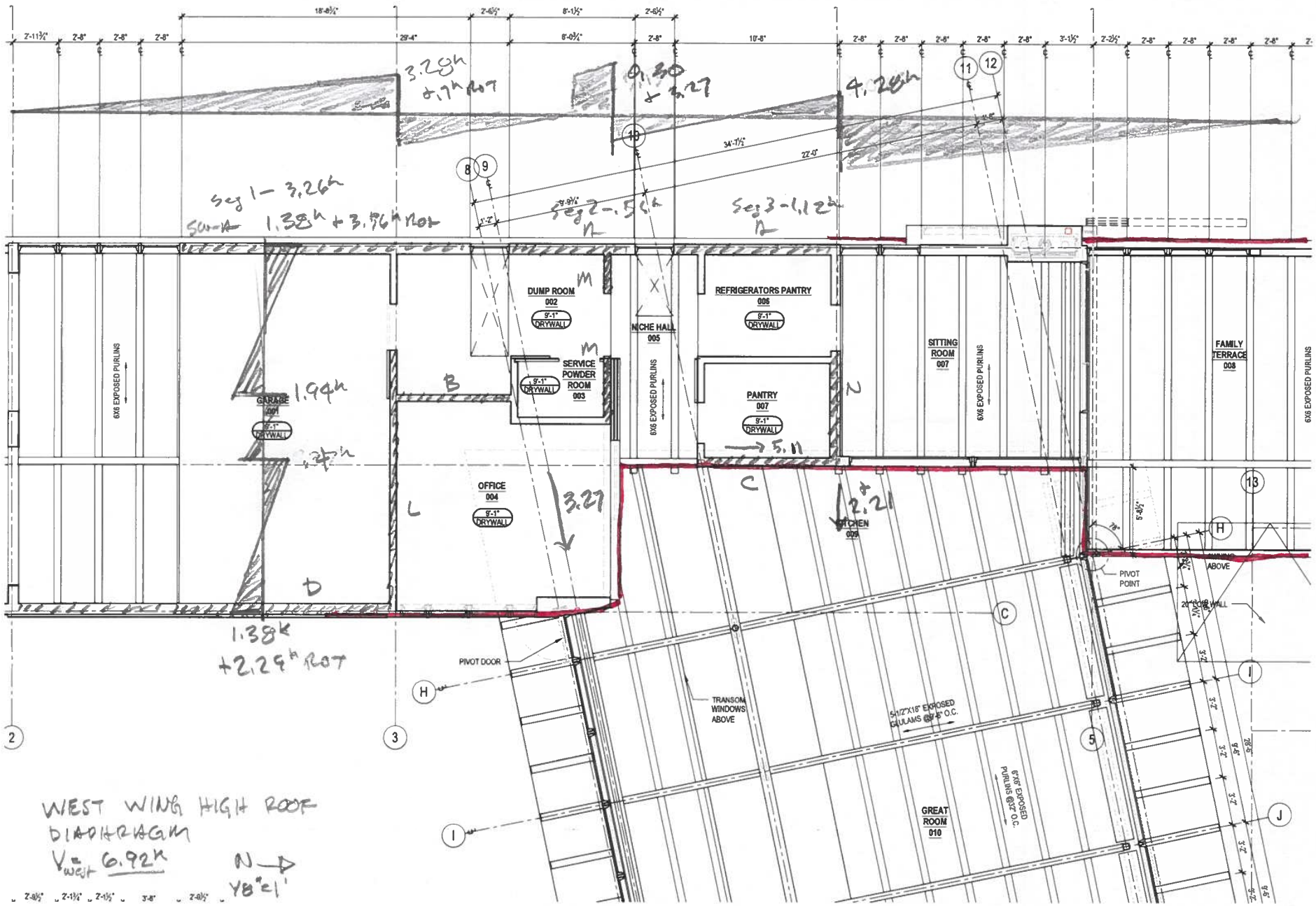
CENTER 'HIGH' ROOF LATERAL LOADS ARE RESISTED BY SHEAR WALLS AT INTERSECTIONS W/ WING ROOFS AND AT FULL PLACE ELEMENTS EFP.
STEEL FRAME & TRUSSES AT CENTER WING ARE NOT DESIGNED TO RESIST LATERAL LOADS BY THEMSELVES

PER ASCE 7 SEC 12.3.3.4, DUE TO RE-ENTRANT CORNER CONDITION DESIGN FORCES IN COLLECTORS & THEIR CONNECTIONS ARE INCREASED BY 25% (TYPE 2 HORIZONTAL IRREGULARITY)


DN CENTER HIGH ROOF
DIAPHRAGM – V= 10.97K
1/8"=1'
3.27K
2.21
1.49K
3.49K
5.11K
5.86K
POWDER ROOM 003
PANTRY 007
KITCHEN 008
OFFICE 004
GREAT ROOM 010
POWDER ROOM 018
ENTRY 019
AIRWAY 040
COAT CLOSET 021
COURT AND ROBIN WALK-IN CLOSET 017
MASTER BEDROOM 015
POOL BATHROOM 013
PIVOT DOOR
TRANSOM WINDOWS ABOVE
PIVOT POINT
AWNING ABOVE
SKYLIGHTS
EXPOSED 6X6 PURLINS @32" O.C.
PROJECTION OF GREAT ROOM EAST WALL ABOVE
LIGHT SCOOP
EXPSOED BEAM WINDOW ABOVE
4X6 HSS?
6X6 EXPOSED PURLINS @32" O.C.
5-1/2"X18" EXPOSED GLULAMS @8'-0" O.C.

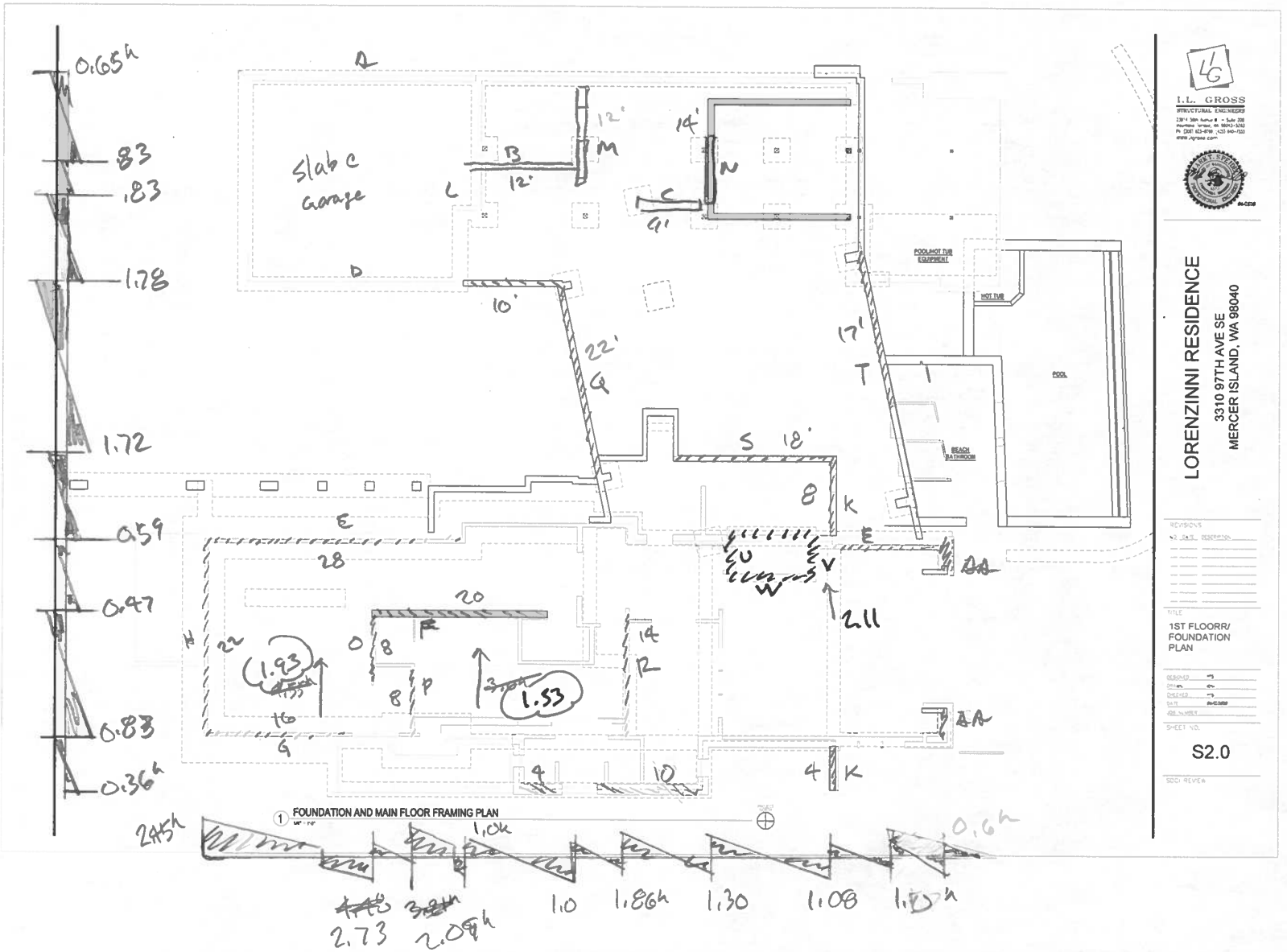


1 MAIN LEVEL REFLECTED CEILING PLAN


3.29k
+1.7k ROT
4.30k
+3.27
4.28k
Seg 1 - 3.26k
SW-A 1.38k + 3.96k ROT
Seg 2 - .5k
Seg 3 - 1.12k
DUMP ROOM 002
8'-1" DRYWALL
NICHE HALL 005
REFRIGERATORS PANTRY 006
SERVICE POWDER ROOM 003
PANTRY 007
SITTING ROOM 007
FAMILY TERRACE 008
GARAGE 001
1.94k
OFFICE 004
KITCHEN 009
3.27
5.11
2.21
6X6 EXPOSED PURLINS
PIVOT POINT
PIVOT DOOR
TRANSOM WINDOWS ABOVE
5-1/2"X18" EXPOSED GLULAMS @ 8' O.C.
6"X6" EXPOSED PURLINS @ 2' O.C.
GREAT ROOM 010
1.38k
+2.25k ROT
WEST WING HIGH ROOF
DIAPHRAGM
V = 6.92k
N
Y8"=1'

$V_{MAIN} = 9.72^k$ (SEISMIC)

(Revised 3/2024)



L.L. GROSS
STRUCTURAL ENGINEERS

LORENZINNI RESIDENCE
3310 97TH AVE SE
MERCER ISLAND, WA 98040

REVISIONS

TITLE
1ST FLOORR/ FOUNDATION PLAN

SHEET NO.
S2.0

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**

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**

Foundation Wall at CrawlSpace

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=	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**

SW - C	E/W Direction			
Higth 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=	14.0	C=	2.6 k
Vapp=	3.7	Mres=	20.8 k-ft
WW=	1.5	T=	1.2 k
TA=	8.0	AR=	1.2
Weight=	1.5	Co=	1.0
Shear VLF=	264.3		**W6 LSTA24**

Upper- Main Floor			
H=	9.0	Mot=	75.8 k-ft
L=	20.0	C=	3.8 k
Vapp=	0.6	Mres=	72.9 k-ft
WW=	3.5	T=	0.1 k
TA=	8.0	AR=	1.2
Weight=	3.8	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=	12.0	C=	2.1	k
Vapp=	2.5	Mres=	11.5	k-ft
WW=	1.3	T=	1.4	k
TA=	4.0	AR=	1.1	
Weight=	0.6	Co=	0.8	
Shear VLF=	261.5		**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**	

SW - O	E/W Direction			
Main Floor- Basement				
H=	9.0	Mot=	25.2	k-ft
L=	6.0	C=	4.2	k
Vapp=	2.8	Mres=	2.2	k-ft
WW=	0.6	T=	3.8	k
TA=	2.0	AR=	1.1	
Weight=	0.2	Co=	1.0	
Shear VLF=	466.7		**W4 HDU4**	

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 - P	E/W Direction			
Main Floor- Basement				
H=	9.0	Mot=	18.9	k-ft
L=	8.0	C=	2.4	k
Vapp=	2.1	Mres=	3.9	k-ft
WW=	0.8	T=	1.9	k
TA=	2.0	AR=	1.1	
Weight=	0.2	Co=	1.0	
Shear VLF=	262.5		**W6 HDU2**	

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 - 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 - 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 - 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 - V	E/W Direction		
Roof- Upper Floor			
H=	11.0	Mot=	49.7 k-ft
L=	5.0	C=	9.9 k
Vapp=	4.5	Mres=	2.1 k-ft
WW=	0.6	T=	9.8 k
TA=	4.0	AR=	1.0
Weight=	0.3	Co=	1.0
Shear VLF=	927.2		**W2 HDU8**
Upper- Main Floor			
H=	9.0	Mot=	102.1 k-ft
L=	6.0	C=	17.0 k
Vapp=	1.3	Mres=	6.5 k-ft
WW=	1.2	T=	15.9 k
TA=	8.0	AR=	1.1
Weight=	1.0	Co=	1.0
Shear VLF=	970.0		**W2 NG**

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 - 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 - 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 - 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**

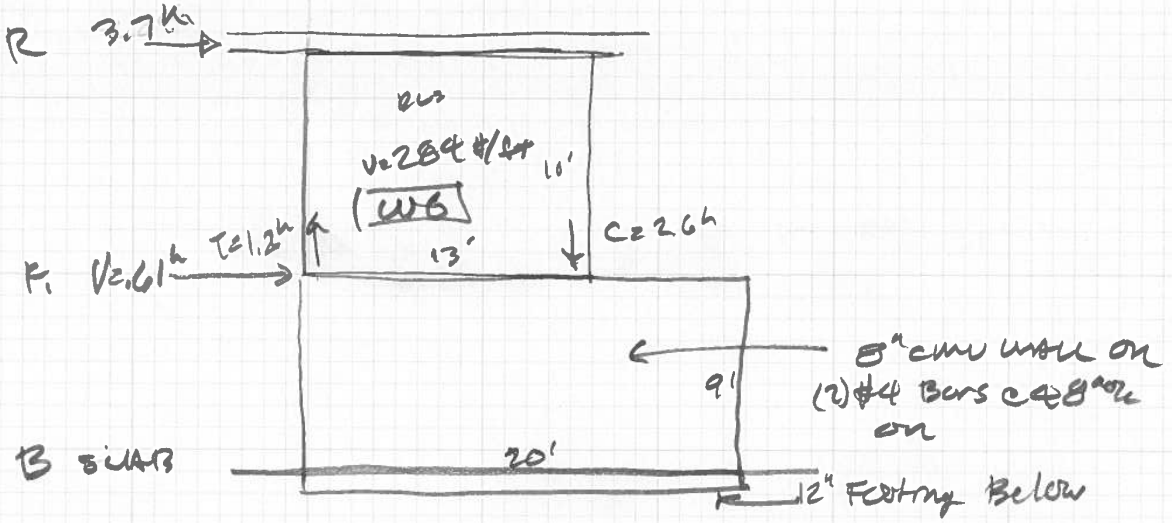
Diaphragm Checks for Collector elements at High Roofs

Shear Wall	Force Applied	Multiplier per 12.3.3.4	diaphragm capacity	Collector Length	Check		Load Applied to SW
A	1.38	1.25	0.61	43	OK		1.794
B	1.94	1.25	0.61	8	OK		2.522
C center	5.11	1.25	0.61	10		10.5	6.643
C west	1.4	1.25	0.61	10	OK		1.82
D	3.67	1.25	0.61	24	OK		4.771
E	1.56	1.25	0.61	11	OK		2.028
F	2.84	1.25	0.61	13	OK		3.692
G	2.84	1.25	0.61	39	OK		3.692
H	1.08	1.25	0.61	8	OK		1.404
I	1.93	1.25	0.61	12	OK		2.509
J	1.33	1.25	0.61	14	OK		1.729
K	2.11	1.25	0.61	12	OK		2.743
L	3.98	1.25	0.61	17	OK		5.174
M	3.57	1.25	0.61	12	OK		4.641
N	4.28	1.25	0.61	7.5		8.8	5.564
U	1.48	1.25	0.61	3		3.0	1.924
V	3.48	1.25	0.61	4		7.1	4.524
W	5.86	1.25	0.61	8		12.0	7.618
X	0.85	1.25	0.61	4	OK		1.105
Y	1.69	1.25	0.61	6	OK		2.197
Z	1	1.25	0.61	6	OK		1.3

SHEAR WALL F - WOOD TO CMU LATERAL SAMPLE

$V_R = 2.84^k$ (R=6.5, WOOD ECW) from Diaphragm D.&L
$= 3.69^k$ w/ R=5

$V_F = 0.47^k$ (w/ R=6.5) $= 0.61^k$ w/ R=5



SHEAR WALL-F w/ R=5.0 For CMU		6/2021
SHEET TITLE	SCALE	DATE
Lake Hare	MRH	
PROJECT	DESIGNED BY	
JRES		
CLIENT	CHECKED	SHEET

I.L. GROSS STRUCTURAL ENGINEERS

www.ilgross.com

Mark Speidel, PE, SE
I.L. Gross Structural Engineers LLC
23914 56th Ave W Suite 200
Mountlake Terrace, WA
www.ilgross.com

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

Masonry Shear Wall

Lic. # : KW-06002858 I.L. GROSS STRUCTURAL ENGINEERS

DESCRIPTION: Masonry SW-F with R=5.0

Code References

Calculations per TMS 402-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-16

General Information

Wall Material	MASONRY		f'm	1.50	ksi	Block Class	
Total Wall Height	9.0	ft	Fy - Rebar	60.0	ksi	Concrete Density	150.0 pcf
Base Wall Length	20.0	ft	Fy - HJR	70.0	ksi	Min. Bending As %	0.00180
R: Resp. Mod Factor	5.0		Em	3,120.0	ksi		
Ie: Seismic Import. Factor	1.0		Phi - Shear	0.80		Phi : Axial & Flexure	0.90

Wall Data

	Bottom
Analysis Height	0.00 ft
Wall Offset	(datum) ft
Wall Length	20.0 ft
Effective Length 'd'	232.0 in
Nominal Block Thickness	8 in
Solid Grout?	Partial Groute

Reinforcing in Field of Wall

Vertical Bar Size #	4
Vertical Bar Spacing	32 in
Horiz. joint reinf. area (HJR)	0.55 in
HJR Spacing	48 in
Bond beam reinf. area	0.4 in
Spacing of bond beams	48 in

In each chord cell:

Vertical rebar size #	4
# Chord Cells @ Each End	2

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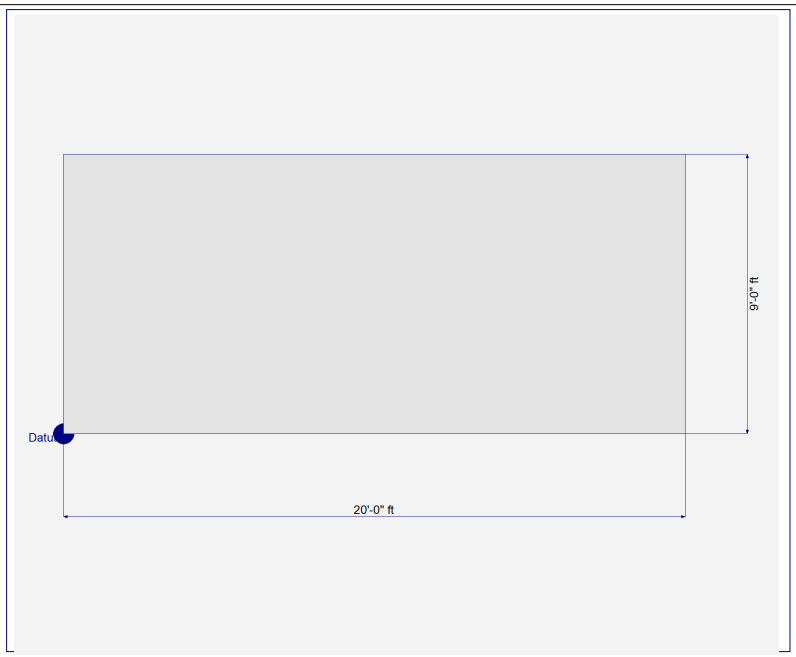
I.L. GROSS STRUCTURAL ENGINEERS

DESCRIPTION: Masonry SW-F with R=5.0

Wall Sketch



Applied Concentrated Vertical Loads

Load Location (ft)		Load Magnitude (kips)				
X Location	Y Location	Dead Load	Roof Live Load	Live Load	Snow Load	Earth Load
	9.0	1.560		3.60		

Applied Distributed Vertical Loads

Load Location (ft)			Load Magnitude (kips)				
Start Location	End Location	Height of Application	Dead Load	Roof Live Load	Live Load	Snow Load	Earth Load
	20.0	9.0	0.1360		0.320		
	13.0	9.0	0.2480			0.2520	

Applied Concentrated Lateral Loads

	Load Magnitude (kips)					
Load "Y" Location (ft)	Dead Load	Roof Live Load	Floor Live Load	Wind Load	Seismic Load	Earth Load
9.0					3.690	
9.0					0.620	

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Masonry Shear Wall

DESCRIPTION: Masonry SW-F with R=5.0

SHEAR ANALYSIS

	Bottom Level
Special Boundary Elements Req'd?	Not Req'd
Vu : Story Shear	4.310 k
for Load Combination	+1.20D+L+0.20S+E
Controlling Mu/(Vud)	1.00
Vn Masonry	119.988 k
Vn Steel	27.0 k
Vn Masonry + Vn Steel	146.988 k
Vn Max	146.678 k
Phi Vn	117.342 k
Ratio: Vu/PhiVn (controlling)	
Vertical As >= Av/3	OK
Vertical Bar Spacing <= 96"	OK

AXIAL ANALYSIS

	Bottom Level
H / d Ratio	0.47
Pu	39.920 k
for Load Combination	+1.20D+1.60L+0.50S
Phi Pn	)D+1.60L+0.50S k
Ratio: Pu/PhiPn (controlling)	**0.02817**

BENDING ANALYSIS

	Bottom Level
"a" : Flexural compression	2.62 in
Length of defined chord zone is >= the "a" dimension of the masonry (the compression zone)	OK
"d" : Eff depth to tension reinf	232.0
As-flex < As-max ?	0.400 <= 15.676
Mu	95.594 k
for Load Combination	+1.20D+1.60L+0.50S
Phi Mn	415.239 k
Ratio: Mu/PhiMn (controlling)	**0.2302**

Force Summary

Load Combination / Wall Level	Values for Wall section Vu (k)	Mu (k)	Pu (k)	Resultant Ecc (ft)	Overturning Ratio	Uplift (k) Left	Right
+1.40D							
Wall Level : 1		37.638	25.995	1.448			
+1.20D+1.60L							
Wall Level : 1		89.861	38.282	2.347			
+1.20D+1.60L+0.50S							
Wall Level : 1		95.594	39.920	2.395			
+1.20D+L							
Wall Level : 1		68.261	32.282	2.115			

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Masonry Shear Wall

Lic. # : KW-06002858 — I.L. GROSS STRUCTURAL ENGINEERS

DESCRIPTION: Masonry SW-F with R=5.0

Force Summary

Load Combination / Wall Level	Values for Wall section Vu (k)	Mu (k)	Pu (k)	Resultant Ecc (ft)	Overturning Ratio	Uplift (k) Left	Right
+1.20D							
Wall Level : 1		32.261	22.282	1.448			
+1.20D+L+1.60S							
Wall Level : 1		86.606	37.523	2.308			
+1.20D+1.60S							
Wall Level : 1		50.606	27.523	1.839			
+1.20D+L+0.50S							
Wall Level : 1		73.994	33.920	2.181			
+0.90D							
Wall Level : 1		24.196	16.711	1.448			
+1.20D+L+0.20S+E							
Wall Level : 1	4.310	31.764	32.937	0.964	9.739		
+0.90D+E							
Wall Level : 1	4.310	14.594	16.711	0.873	5.217	1.028	1.028

Footing Information

Footing Dimensions

Dist. Left	2.0 ft	f'c	2.50 ksi	Rebar Cover	3.0 in
Wall Length	20.0 ft	Fy	60.0 ksi	Footing Thickness	12.0 in
Dist. Right	2.0 ft			Width	1.50 ft
Total Ftg Length	24.0 ft				

Max Factored Soil Pressures

@ Left Side of Footing	3,553.56 psf	
.... governing load comb	+1.20D+1.60L+0.50S	
@ Right Side of Footing	1,396.82 psf	
.... governing load comb	+1.20D+L+0.20S+E	

Max UNfactored Soil Pressures

@ Left Side of Footing	2,507.34 psf
.... governing load comb	+D+L
@ Right Side of Footing	1,064.82 psf
.... governing load comb	+D+0.750L+0.750S+0.5250E

Footing One-Way Shear Check...

vu @ Left End of Footing	47.552 psi
vu @ Right End of Footing	19.416 psi
vn * phi : Allowable	85.0 psi

Overturning Stability...

	@ Left End of Ftg	@ Right End of Ftg
Overturning Moment	33.365 k-ft	33.365 k-ft
Resisting Moment	148.663 k-ft	180.924 k-ft
Stability Ratio	4.456 : 1	5.423 : 1
.... governing load comb	+0.60D+0.70E	+0.60D+0.70E

Footing Bending Design...

	@ Left End	@ Right End
Mu	10.464 k-ft	4.284 k-ft
Ru	95.697 psi	39.173 psi
As % Req'd	0.00180 in^2	0.00180 in^2
As Req'd in Footing Width	0.3888 in^2	0.3888 in^2

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Project Title: Lorenzini Waterfront Home
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Project Descr: SFR Remodeling

Multiple Simple Beam

Description : Rev2 Permit Corr Calcs

Wood Beam Design : Garage Ceiling Joists

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

BEAM Size : **2x6, 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

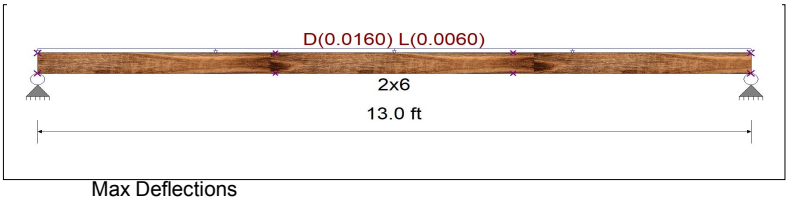
Unif Load: D = 0.0080, L = 0.0030 k/ft, Trib= 2.0 ft

Design Summary

Max fb/Fb Ratio = **0.652** : 1
fb : Actual : 737.45 psi at 6.500 ft in Span # 1
Fb : Allowable : 1,131.87 psi
Load Comb : +D+L

Max fv/FvRatio = **0.135** : 1
fv : Actual : 24.27 psi at 12.567 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	0.10	0.04					
Right Support	0.10	0.04					



Max Deflections

Transient Downward	0.116 in	Total Downward	0.427 in
Ratio	1339	Ratio	365
	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 : Garage Ceiling Beam

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

BEAM Size : **2-2x8, 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

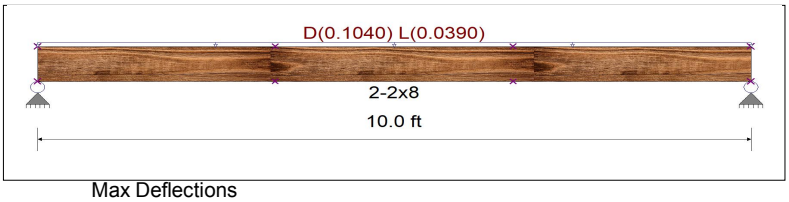
Unif Load: D = 0.0080, L = 0.0030 k/ft, Trib= 13.0 ft

Design Summary

Max fb/Fb Ratio = **0.760** : 1
fb : Actual : 816.17 psi at 5.000 ft in Span # 1
Fb : Allowable : 1,073.87 psi
Load Comb : +D+L

Max fv/FvRatio = **0.241** : 1
fv : Actual : 43.39 psi at 9.400 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	0.52	0.20					
Right Support	0.52	0.20					

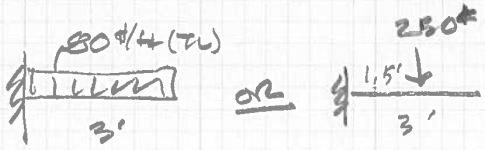


Max Deflections

Transient Downward	0.058 in	Total Downward	0.212 in
Ratio	2073	Ratio	565
	LC: L Only		LC: +D+L
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

'FLOATING' STAIR DESIGN

TREAD WT = 20#/FT
LL = 60 #/FT
or (1) 250# PL



$M_u = 1.2D + 1.6L = 120\ plf \times 3' \times \frac{3'}{2} = 540\#' = 6.48k''$

$M_{u_2} = 1.2D + 1.6(PL)L = 24 \times 3 \times 1.5 + 400 \times 1.5 = 708\#' = 8.49k''$ ← governs

$.9F_y = 45\ ksi$ (for GR A992 W sections)

$S_x\ min = 0.19\ in^3$

$\Delta_{TL} = \ell/240 = 0.15'' = \frac{20 \times 3' \times 36^3}{8EI} + \frac{250\# \times 18''^2}{6EI}(3 \times 36 - 18)$

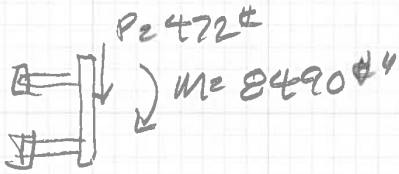
$= \frac{349920}{EI} + \frac{1215000}{EI} = \frac{.054}{I} \leq .15$

$I\ min = 0.36\ in^4$

WT 4x14 $S_x = 1.28 > 0.19$ ✓
$I = 4.23 > .36$

WT 4x14 IS OK

EMBED PL



½" x 2" x 7" EMBED PL w/ (4) ¾ x 6" STUDS OK
(See Profis output)

Floating Stair Calculation		4/2021
SHEET TITLE	SCALE	DATE
Lorenemi	MARK	
PROJECT	DESIGNED BY	
Bob Swarm		
CLIENT	CHECKED	SHEET

I.L. GROSS STRUCTURAL ENGINEERS

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Company:	I.L. Gross Structural Engineers	Page:	1
Specifier:	Mark Speidel	Project:	Lorenzini Residence
Address:	23914 56th Ave West Mountleke Terrace, WA	Sub-Project I Pos. No.:	Floating Stair Embed
Phone I Fax:	425-640-7333 |	Date:	6/7/2021
E-Mail:	marks@ilgross.com		

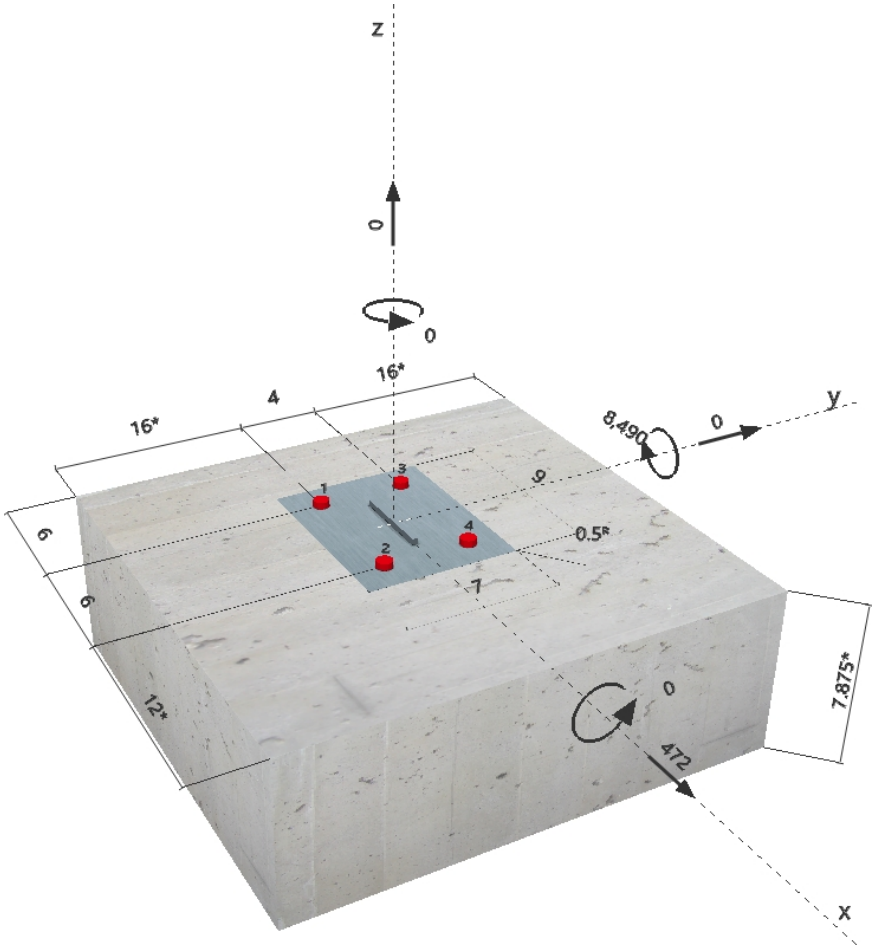
Specifier's comments: Embed PL into CMU wall for floating stair tread

1 Input data

Anchor type and diameter:	**AWS D1.1 GR. B 3/4**
Effective embedment depth:	h_{ef} = 5.000 in.
Material:	
Proof:	Design method ACI 318-14 / CIP
Stand-off installation:	e_b = 0.000 in. (no stand-off); t = 0.500 in.
Anchor plate:	l_x x l_y x t = 9.000 in. x 7.000 in. x 0.500 in.; (Recommended plate thickness: not calculated
Profile:	Rectangular plates and bars (AISC); (L x W x T) = 4.000 in. x 0.250 in. x 0.000 in.
Base material:	cracked concrete, 2000, f_c' = 2,000 psi; h = 7.875 in.
Reinforcement:	tension: condition B, shear: condition A; edge reinforcement: >= No. 4 bar

R - The anchor calculation is based on a rigid baseplate assumption.

Geometry [in.] & Loading [lb, in.lb]



Company:	I.L. Gross Structural Engineers	Page:	2
Specifier:	Mark Speidel	Project:	Lorenzini Residence
Address:	23914 56th Ave West Mountleke Terrace, WA	Sub-Project I Pos. No.:	Floating Stair Embed
Phone I Fax:	425-640-7333 |	Date:	6/7/2021
E-Mail:	marks@ilgross.com		

2 Proof I Utilization (Governing Cases)

		Design values [lb]		Utilization	
Loading	**Proof**	**Load**	**Capacity**	**β_N / β_V [%]**	**Status**
Tension	Concrete Breakout Strength	1,294	9,001	15 / -	OK
Shear	Concrete edge failure in direction x+	472	9,960	- / 5	OK

Loading	**β_N**	**β_V**	**ζ**	**Utilization $\beta_{N,V}$ [%]**	**Status**
Combined tension and shear loads	0.144	0.047	5/3	5	OK

3 Warnings

- Please consider all details and hints/warnings given in the detailed report!

Fastening meets the design criteria!

4 Remarks; Your Cooperation Duties

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