STRUCTURAL CALCULATIONS

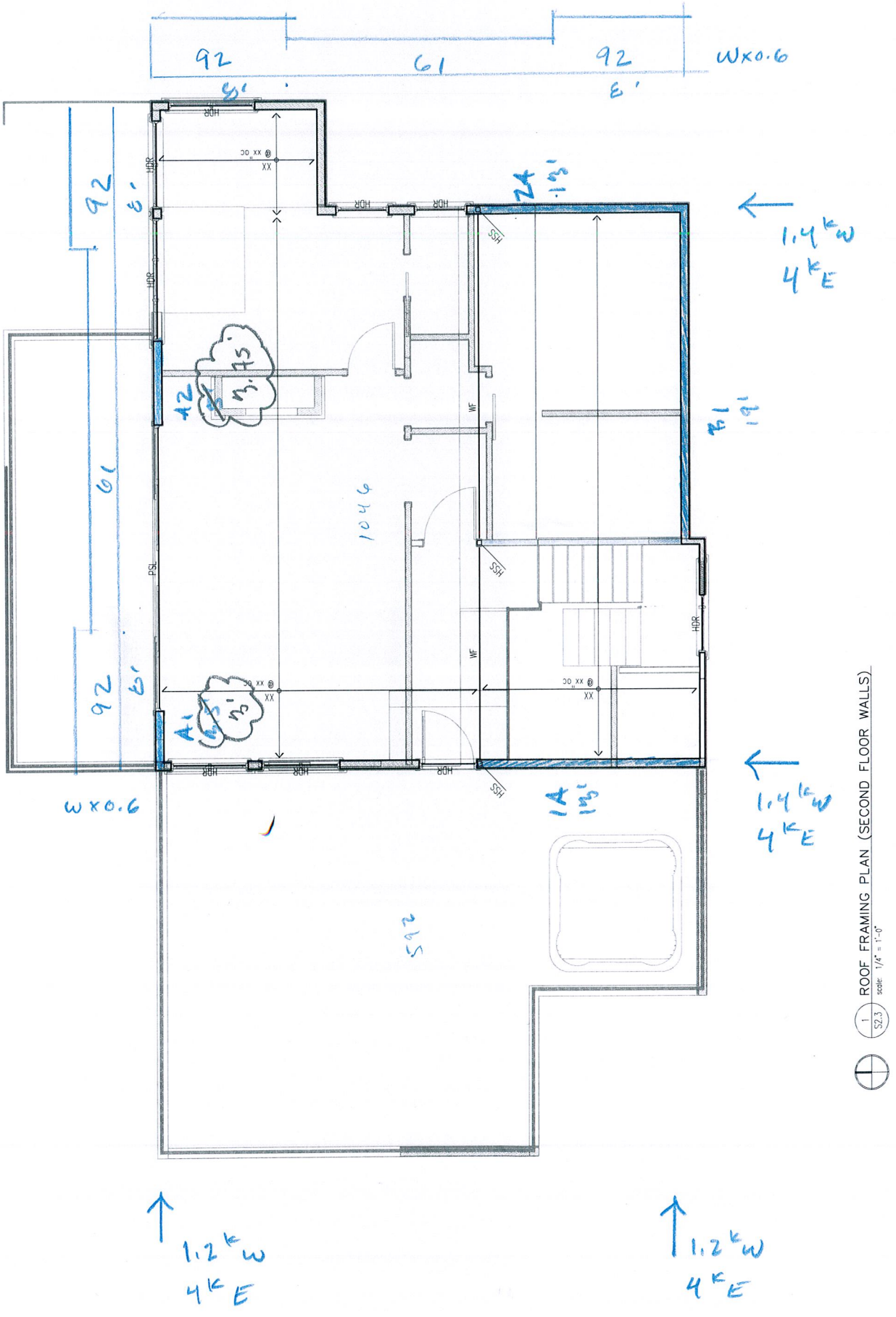
Project:
Werelius Residence
8452 North Mercer Way
Mercer Island, WA

Architect:
H2D Architecture and Design
23020 Edmonds Way, #113
Edmonds, WA 98020

Structural Engineer:
Harriott Valentine Engineers, Inc.
1932 First Avenue, Suite 720
Seattle, WA 98101
tel. 206-624-4760

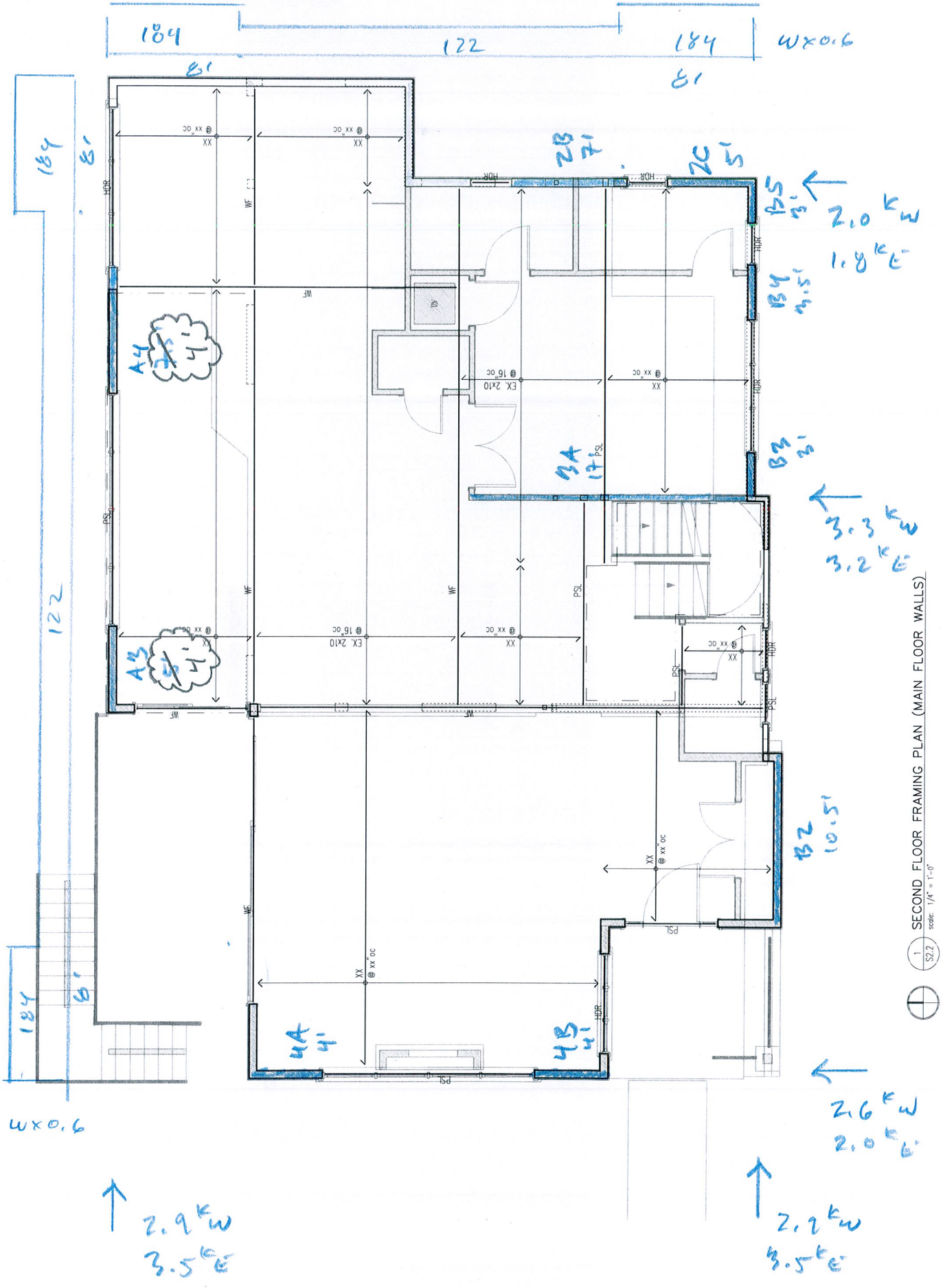
5/1/20

ROOF LATERAL LOADS

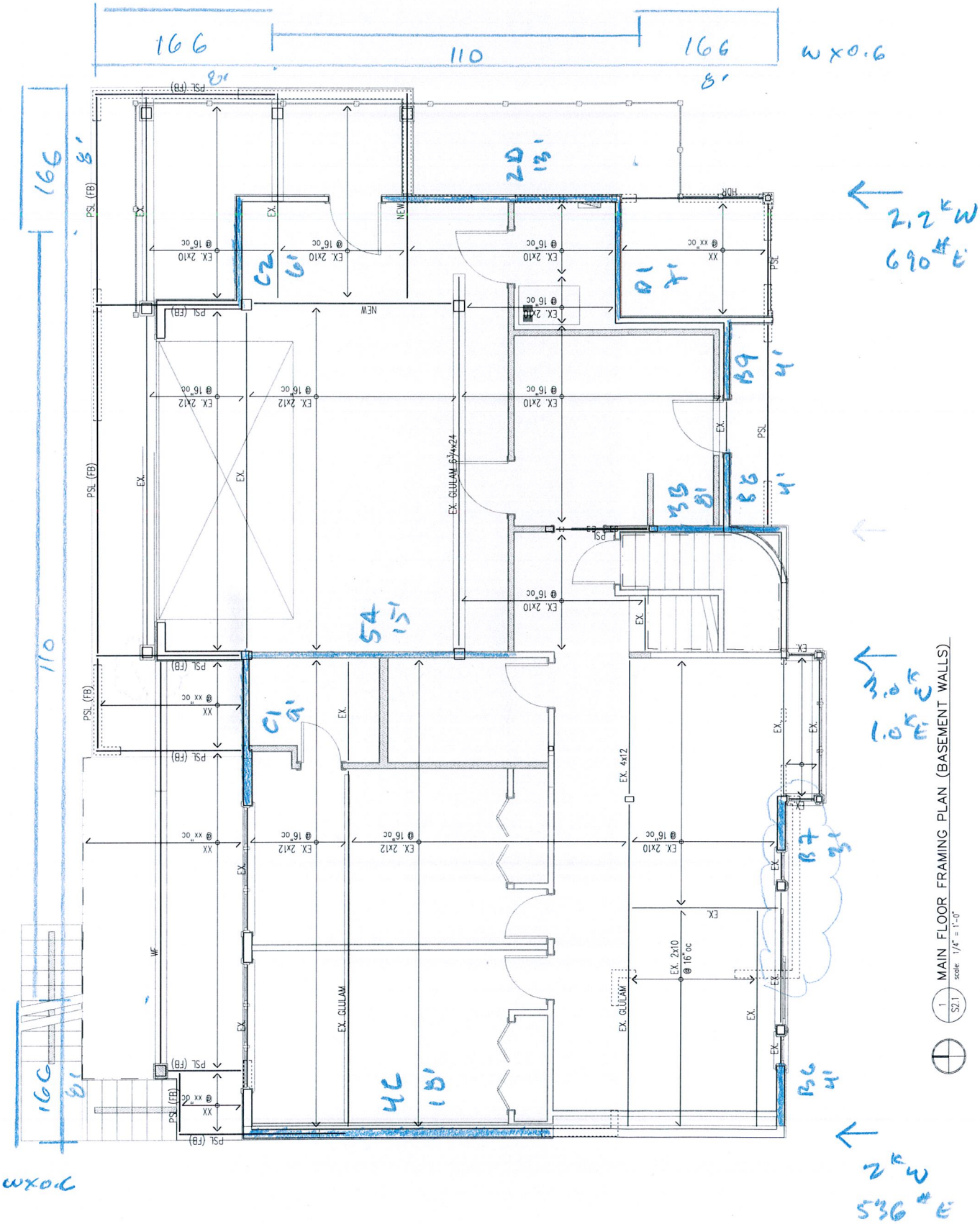


1 S2.3 ROOF FRAMING PLAN (SECOND FLOOR WALLS)
scale: 1/4" = 1'-0"

UPPER LEVEL LOADS



MAIN CARRIER LOADS



1 / S2.1 MAIN FLOOR FRAMING PLAN (BASEMENT WALLS)
scale: 1/4" = 1'-0"

WIND DESIGN

ASCE 7-10
Simplified Envelope Method (Chapter 28)

ps = λ Kzt I ps30

λ = adjustment factor = 1.00
I = importance factor = 1.00
Kzt = topographic factor = 1.60

Part of Figure 28.6-1 - Adjustment Factor for Building Height and Exposure, λ

Mean Roof Height	Exposure		
(ft)	B	C	D
15	**1.00**	1.21	1.47
16	**1.00**	1.23	1.49
17	**1.00**	1.24	1.50
18	**1.00**	1.26	1.52
19	**1.00**	1.27	1.53
20	**1.00**	1.29	1.55
21	**1.00**	1.30	1.56
22	**1.00**	1.31	1.57
23	**1.00**	1.33	1.59
24	**1.00**	1.34	1.60
25	**1.00**	1.35	1.61
26	**1.00**	1.36	1.62
27	**1.00**	1.37	1.63
28	**1.00**	1.38	1.64
29	**1.00**	1.39	1.65
30	**1.00**	1.40	1.66

Zone
Computation

a = 10% of least horizontal dimension or 0.4 x h, whichever is smaller, but not less than either 4% of least horizontal dimension or 3 feet.

w = 31.00 ft x 0.1 = 3.10 ft
h = 29.50 ft x 0.4 = 11.80 ft
w = 31.00 ft x 0.04 = 1.24 ft

a = 4.00 ft
2a = **8.00** ft

Zone B - end zone of roof
Zone A - end zone of wall

Zone D - interior zone of roof
Zone C - interior zone of wall

Part of Figure 28.6-1 - Method 2
Design Wind Pressure, ps30

Basic Speed	Roof Angle	Roof Pitch	Horizontal Pressures (psf) A	B	C	D
110	0 to 5	flat	19.2	-10.0	12.7	-5.9
	10	2	21.6	-9.0	14.4	-5.2
	15	3	24.1	-8.0	16.0	-4.6
	20	4	26.6	-7.0	17.7	-3.9
	25	6	24.1	3.9	17.4	4.0
	30 to 45	7 to 12	21.6	14.8	17.2	11.8

Design Wind Pressure, ps

Basic Speed	Roof Angle	Roof Pitch	Horizontal Pressures (psf) A	B	C	D	
110	0 to 5	flat	**30.7**	**-16.0**	**20.3**	**-9.4**	<<<
	10	2	34.6	-14.4	23.0	-8.3	
	15	3	38.6	-12.8	25.6	-7.4	
	20	4	42.6	-11.2	28.3	-6.2	
	25	6	38.6	6.2	27.8	6.4	
	30 to 45	7 to 12	34.6	23.7	27.5	18.9	

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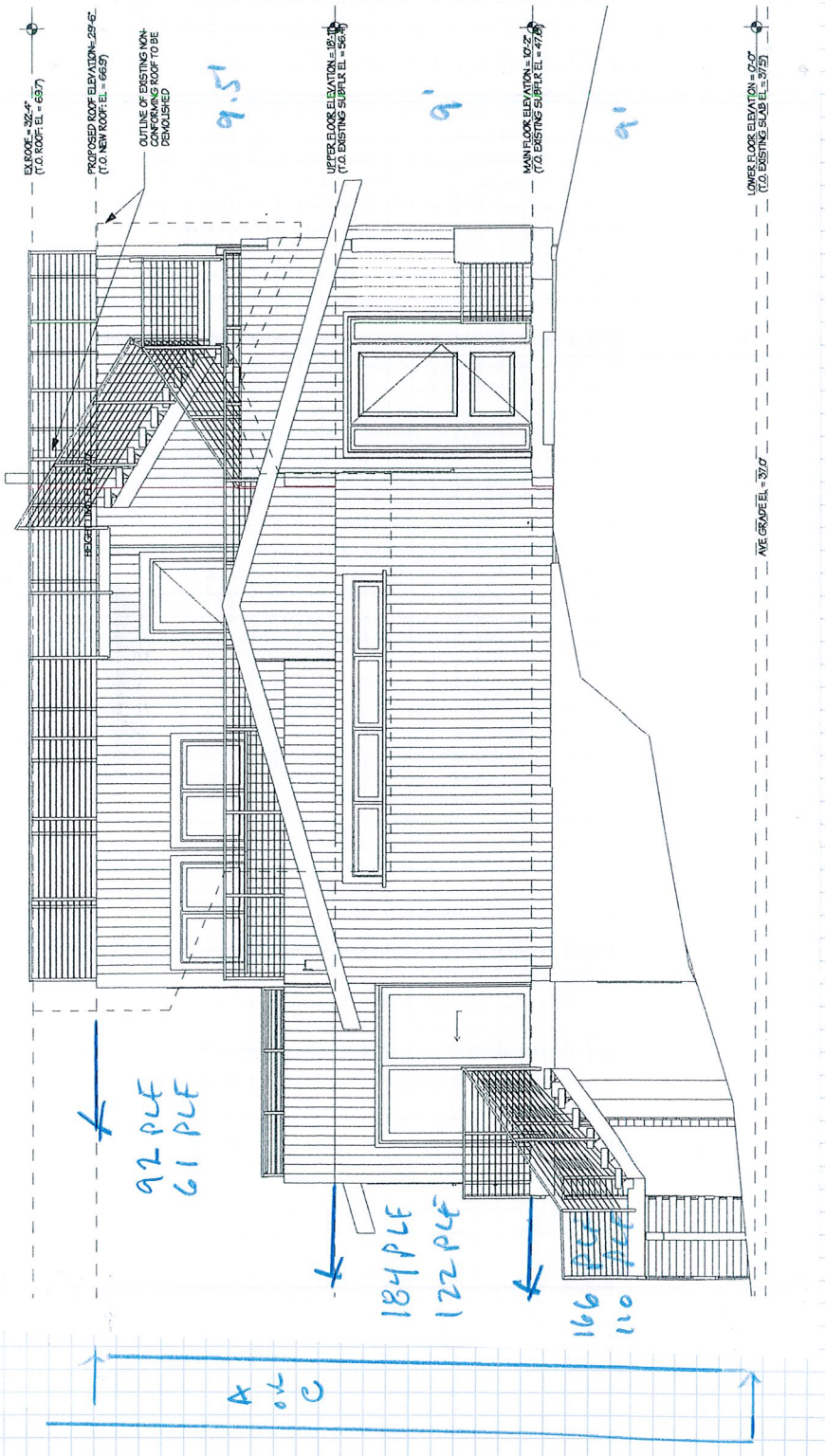
WIND LOADS WX 0.6



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WEYERHAEUSER Project

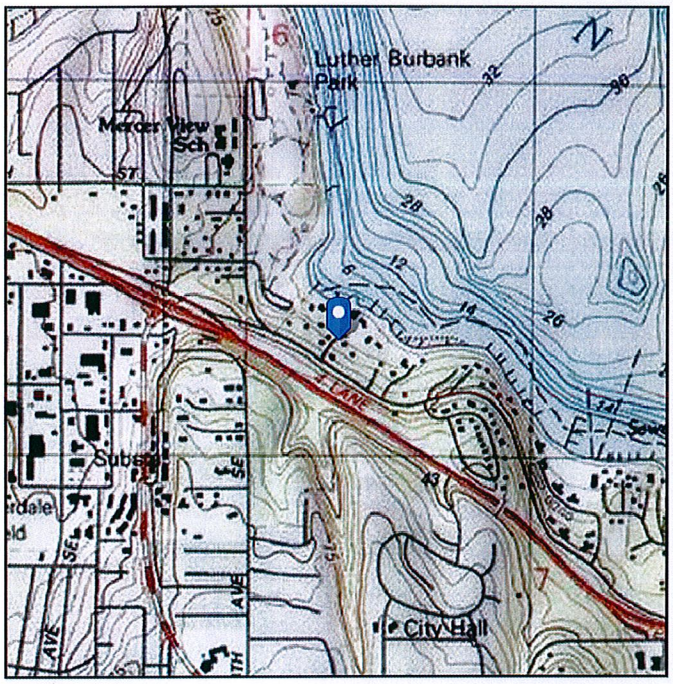
5/31/19 Date

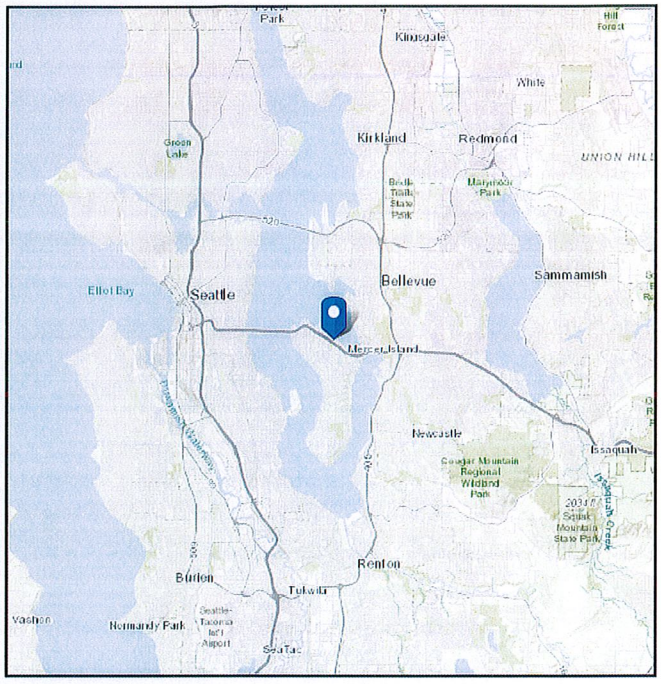
ASCE 7 Hazards Report

Address:
8452 N Mercer Way
Mercer Island, Washington
98040

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: D - Default (see Section 11.4.3)

Elevation: 41.35 ft (NAVD 88)
Latitude: 47.585278
Longitude: -122.223595





Wind

Results:

Wind Speed:	98 Vmph
10-year MRI	67 Vmph
25-year MRI	74 Vmph
50-year MRI	78 Vmph
100-year MRI	83 Vmph
Data Source:	ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4
Date Accessed:	Wed May 29 2019

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is not in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2.

Mountainous terrain, gorges, ocean promontories, and special wind regions should be examined for unusual wind conditions.

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Seismic

Site Soil Class: D - Default (see Section 11.4.3)

Results:

S_S :	1.391	S_{D1} :	N/A
S_1 :	0.484	T_L :	6
F_a :	1.2	PGA :	0.595
F_v :	N/A	PGA_M :	0.714
S_{MS} :	1.669	F_{PGA} :	1.2
S_{M1} :	N/A	I_e :	1
S_{DS} :	1.113	C_v :	1.378

Ground motion hazard analysis may be required. See ASCE/SEI 7-16 Section 11.4.8.

Data Accessed: Wed May 29 2019

Date Source: USGS Seismic Design Maps

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SEISMIC DESIGN

ASCE 7-10
Equivalent Lateral Force Procedure

Occupancy Category	II		Table 1-1
Seismic Design Category	D		Table 11.6-1
Importance Factor	1.00		Table 11.5-1
Site Class	D		Table 20.3-1
S_S	139.10	%g	(from USGS Seismic Hazard Curves, 2008 data)
S_1	48.40	%g	(from USGS Seismic Hazard Curves, 2008 data)
F_a	1.00		Table 11.4-1
F_v	1.50		Table 11.4-2
C_t	0.02		Table 12.8-2
x	0.75		Table 12.8-2
h_n	30.00	feet	(height to highest level)
$S_{MS} = Fa*Ss$	1.3910		Eq. 11.4-1
$S_{M1} = Fv*S1$	0.7260		Eq. 11.4-2
$S_{DS} = (2/3)*S_{MS}$	0.9273	g	Eq. 11.4-3
$S_{D1} = (2/3)*S_{M1}$	0.4840	g	Eq. 11.4-4
Period $T_a = C_t*h_n\text{^}x$	0.2564	s	Eq. 12.8-7
T_o	0.1044	s	per section 11.4.5
T_S	0.5219	s	per section 11.4.5
S_a	0.9273	g	per section 11.4.5
R	6.5		Table 12.2-1
Ωo	2.5		Table 12.2-1
C_d	4		Table 12.2-1
Section 9.5.5 ok?	Yes		Table 12.6-1

Equivalent Lateral Force Procedure (section 12.8)

Cs	0.1427		Eq. 12.8-2
W, weight	172,920	lb	per table below
Q_E	24,670	lb	Eq. 12.8-1

Vertical Force Distribution (section 12.8.3)
k = 1.00

Level	Hx	Floor Area	Seismic Dead Ld	Floor Wt.	Wall Length	Wall Wt.	Total Wt.	WxHx	Cvx	(LRFD) Q_E	(ASD) $0.7Q_E$
	(ft)	(ft2)	(psf)	(k)	(ft)	(k)	(k)	(k-ft)	(%)	(k)	(k)
rood	29.50	1100	44	48.4	140	5.9	54.3	1601.3	46.3	11.42	8.00
upper	19.00	2000	29	58.0	200	15.4	73.4	1395.4	40.4	9.96	6.97
main	10.20	2000	15	30.0	200	15.2	45.2	461.0	13.3	3.29	2.30
							172.92	3457.66	100.00	24.67	**17.27**

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LATERAL FORCE DISTRIBUTION (SEISMIC)

North-South
Walls Below Roof

va' = allowable shear values multiplied by (1.25-0.125 * h/l)
for wall aspect ratios greater than 2:1

WALL	F (lb)	V (abv)	V (total)	L (ft)	v (plf)	SW	va	h (ft)	h/l	va'	M ot (lbft)	M ot (abv)	M ot (total)	OT (lb)	DL max (lb)	T (lb)	HD	TL (lb)	C (lb)	POST
A1	1777	0	1777	3.00	770	SW5	910	9.50	3.17	777	21946	0	21946	7315	0	7315	HHDQ11	9300	16615	(5)2x6
A2	2221	0	2221	3.75	770	SW5	910	9.50	2.53	849	27429	0	27429	7314	0	7314	HHDQ11	9300	16614	(5)2x6
B1	4000	0	4000	19.00	274	SW2	353	9.50	0.50	----	49400	0	49400	2600	0	2600	(2)CS16	0	2600	(2)2x6

rho = 1.30 per ASCE 7-05 12.3.4.2

East-West
Walls Below Roof

va' = allowable shear values multiplied by (1.25-0.125 * h/l)
for wall aspect ratios greater than 2:1

WALL	F (lb)	V (abv)	V (total)	L (ft)	v (plf)	SW	va	h (ft)	h/l	va'	M ot (lbft)	M ot (abv)	M ot (total)	OT (lb)	DL max (lb)	T (lb)	HD	TL (lb)	C (lb)	POST
1A	4000	0	4000	13.00	400	SW3	455	9.50	0.73	----	49400	0	49400	3800	0	3800	HDU4	0	3800	(2)2x6
2A	4000	0	4000	13.00	400	SW3	455	9.50	0.73	----	49400	0	49400	3800	0	3800	(2)CS16	0	3800	(2)2x6

rho = 1.30 per ASCE 7-05 12.3.4.2

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LATERAL FORCE DISTRIBUTION (SEISMIC)

North-South
Walls Below Upper Floor

va' = allowable shear values multiplied by (1.25-0.125 * h/l)
for wall aspect ratios greater than 2:1

WALL	F (lb)	V (abv)	V (total)	L (ft)	v (plf)	SW	va	h (ft)	h/l	va'	M ot (lbft)	M ot (abv)	M ot (total)	OT (lb)	DL max (lb)	T (lb)	HD	TL (lb)	C (lb)	POST
A3	1750	1240	2990	4.00	972	SW6	910	9.00	2.25	----	34983	0	34983	8746	0	8746	HHDQ11	1500	10246	(4)2x6
A4	1750	1860	3610	4.00	1173	SW6	910	9.00	2.25	----	42237	0	42237	####	0	10559	HHDQ11	1500	12059	(4)2x6
B2	1838	473	2311	10.50	286	SW2	353	9.00	0.86	----	27039	0	27039	2575	0	2575	(2)CS16	0	2575	(2)2x6
B3	525	135	660	3.00	286	SW2	353	9.00	3.00	309	7722	0	7722	2574	0	2574	(2)CS16	1000	3574	(3)2x6
B4	613	158	771	3.50	286	SW2	353	9.00	2.57	328	9021	0	9021	2577	0	2577	(2)CS16	1000	3577	(3)2x6
B5	525	135	660	3.00	286	SW2	353	9.00	3.00	309	7722	0	7722	2574	0	2574	(2)CS16	0	2574	(2)2x6

rho = 1.30 per ASCE 7-05 12.3.4.2

East-West
Walls Below Upper Floor

va' = allowable shear values multiplied by (1.25-0.125 * h/l)
for wall aspect ratios greater than 2:1

WALL	F (lb)	V (abv)	V (total)	L (ft)	v (plf)	SW	va	h (ft)	h/l	va'	M ot (lbft)	M ot (abv)	M ot (total)	OT (lb)	DL max (lb)	T (lb)	HD	TL (lb)	C (lb)	POST
2B	750	1667	2417	5.00	628	SW5	910	9.00	1.80	----	28275	0	28275	5655	0	5655	(4)CS16	0	5655	HSS
2C	1050	2333	3383	7.00	628	SW5	910	9.00	1.29	----	39585	0	39585	5655	0	5655	(4)CS16	0	5655	HSS
3A	3200	2514	5714	17.00	0	SW3	455	9.00	0.53	----	66854	0	66854	3933	0	3933	(3)CS1	0	3933	(3)2x6
4A	1000	742	1742	4.00	566	SW4	595	9.00	2.25	576	20381	0	20381	5095	0	5095	(4)CS16	9000	14095	HSS
4B	1000	742	1742	4.00	566	SW4	595	9.00	2.25	576	20381	0	20381	5095	0	5095	(4)CS16	9000	14095	HSS

rho = 1.30 per ASCE 7-05 12.3.4.2

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LATERAL FORCE DISTRIBUTION (SEISMIC)

North-South
Walls Below Main Floor

va' = allowable shear values multiplied by (1.25-0.125 * h/l)
for wall aspect ratios greater than 2:1

WALL	F (lb)	V (abv)	V (total)	L (ft)	v (plf)	SW	va	h (ft)	h/l	va'	M ot (lbft)	M ot (abv)	M ot (total)	OT (lb)	DL max (lb)	T (lb)	HD	TL (lb)	C (lb)	POST
C1	690	3960	4650	9.00	672	SW5	910	9.00	1.00	----	54405	0	54405	6045	0	6045	HDU8	1000	7045	(4)2x6
C2	460	2640	3100	6.00	672	SW5	910	9.00	1.50	----	36270	0	36270	6045	0	6045	HDU8	0	6045	(4)2x6
B6	209	1321	1530	4.00	497	SW4	595	9.00	2.25	576	17896	0	17896	4474	0	4474	HDU4	0	4474	(3)2x6
B7	157	990	1147	3.00	497	SW4	595	9.00	3.00	521	13425	0	13425	4475	0	4475	HDU4	0	4475	(3)2x6
B8	209	1046	1255	4.00	408	SW4	595	9.00	2.25	576	14678	0	14678	3669	0	3669	HDU4	0	3669	(3)2x6
B9	209	1046	1255	4.00	408	SW4	595	9.00	2.25	576	14678	0	14678	3669	0	3669	HDU4	0	3669	(3)2x6
D1	366	0	366	7.00	68	SW1	241	9.00	1.29	----	4282	0	4282	612	0	612	HDU2	0	612	(2)2x6

rho = 1.30 per ASCE 7-05 12.3.4.2

East-West
Walls Below Main Floor

va' = allowable shear values multiplied by (1.25-0.125 * h/l)
for wall aspect ratios greater than 2:1

WALL	F (lb)	V (abv)	V (total)	L (ft)	v (plf)	SW	va	h (ft)	h/l	va'	M ot (lbft)	M ot (abv)	M ot (total)	OT (lb)	DL max (lb)	T (lb)	HD	TL (lb)	C (lb)	POST
2D	690	5800	6490	13.00	649	SW5	595	9.00	0.69	----	75933	0	75933	5841	0	5841	HDU8	0	5841	(4)2x6
3B	348	5714	6062	8.00	985	SW6	910	9.00	1.13	----	70925	66854	137779	####	0	17222	HDU14	0	17222	6x8
5A	652	0	652	15.00	57	SW1	241	9.00	0.60	----	7628	0	7628	509	0	509	HDU2	0	509	(2)2x6
4C	536	3484	4020	18.00	290	SW2	353	9.00	0.50	----	47034	20381	67415	3745	0	3745	HDU5	0	3745	(3)2x6

rho = 1.30 per ASCE 7-05 12.3.4.2

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LATERAL FORCE DISTRIBUTION (WIND)

North-South
Walls Below Roof

va' = allowable shear values multiplied by (1.25-0.125 * h/l)
for wall aspect ratios greater than 2:1

WALL	F (lb)	V (abv)	V (total)	L (ft)	v (plf)	SW	va	h (ft)	h/l	va'	M ot (lbft)	M ot (abv)	M ot (total)	OT (lb)	DL max (lb)	T (lb)	HD	TL (lb)	C (lb)	POST
A1	494	0	494	3.00	165	SW1	2241	9.50	3.17	1914	6101	0	6101	2034	0	2034		9300	11334	
A2	706	0	706	3.75	188	SW1	241	9.50	2.53	----	8719	0	8719	2325	0	2325		9300	11625	
B1	1200	0	1200	19.00	63	SW1	241	9.50	0.50	----	14820	0	14820	780	0	780		0	780	

East-West
Walls Below Roof

va' = allowable shear values multiplied by (1.25-0.125 * h/l)
for wall aspect ratios greater than 2:1

WALL	F (lb)	V (abv)	V (total)	L (ft)	v (plf)	SW	va	h (ft)	h/l	va'	M ot (lbft)	M ot (abv)	M ot (total)	OT (lb)	DL max (lb)	T (lb)	HD	TL (lb)	C (lb)	POST
1A	1400	0	1400	13.00	108	SW1	241	9.50	0.73	----	17290	0	17290	1330	0	1330		0	1330	
2A	1400	0	1400	13.00	108	SW1	241	9.50	0.73	----	17290	0	17290	1330	0	1330		0	1330	

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LATERAL FORCE DISTRIBUTION (WIND)

North-South
Walls Below Upper Floor

va' = allowable shear values multiplied by (1.25-0.125 * h/l)
for wall aspect ratios greater than 2:1

WALL	F (lb)	V (abv)	V (total)	L (ft)	v (plf)	SW	va	h (ft)	h/l	va'	M ot (lbft)	M ot (abv)	M ot (total)	OT (lb)	DL max (lb)	T (lb)	HD	TL (lb)	C (lb)	POST
A3	1160	384	1544	4.00	386	SW2	353	9.00	2.25	----	18065	0	18065	4516	0	4516		1500	6016	
A4	1740	576	2316	4.00	579	SW2	353	9.00	2.25	----	27097	0	27097	6774	0	6774		1500	8274	
B2	1522	126	1648	10.50	157	SW1	241	9.00	0.86	----	19282	0	19282	1836	0	1836		0	1836	
B3	435	36	471	3.00	157	SW1	241	9.00	3.00	211	5511	14820	20331	6777	0	6777		1000	7777	
B4	508	42	550	3.50	157	SW1	241	9.00	2.57	224	6435	0	6435	1839	0	1839		1000	2839	
B5	435	36	471	3.00	157	SW1	241	9.00	3.00	211	5511	14820	20331	6777	0	6777		0	6777	

East-West
Walls Below Upper Floor

va' = allowable shear values multiplied by (1.25-0.125 * h/l)
for wall aspect ratios greater than 2:1

WALL	F (lb)	V (abv)	V (total)	L (ft)	v (plf)	SW	va	h (ft)	h/l	va'	M ot (lbft)	M ot (abv)	M ot (total)	OT (lb)	DL max (lb)	T (lb)	HD	TL (lb)	C (lb)	POST
2B	1167	583	1750	5.00	350	SW2	353	9.00	1.80	----	20479	17290	37769	7554	0	7554		0	7554	
2C	833	817	1650	7.00	236	SW1	241	9.00	1.29	----	19301	17290	36591	5227	0	5227		0	5227	
3A	3300	880	4180	17.00	246	SW2	353	9.00	0.53	----	48906	0	48906	2877	0	2877		0	2877	
4A	1300	260	1560	4.00	390	SW3	455	9.00	2.25	441	18252	0	18252	4563	0	4563		9000	13563	
4B	1300	260	1560	4.00	390	SW3	455	9.00	2.25	441	18252	0	18252	4563	0	4563		9000	13563	

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LATERAL FORCE DISTRIBUTION (WIND)

North-South
Walls Below Main Floor

va' = allowable shear values multiplied by (1.25-0.125 * h/l)
for wall aspect ratios greater than 2:1

WALL	F (lb)	V (abv)	V (total)	L (ft)	v (plf)	SW	va	h (ft)	h/l	va'	M ot (lbft)	M ot (abv)	M ot (total)	OT (lb)	DL max (lb)	T (lb)	HD	TL (lb)	C (lb)	POST
C1	1560	2316	3876	9.00	431	SW3	455	9.00	1.00	----	45349	0	45349	5039	0	5039		1000	6039	
C2	1040	1544	2584	6.00	431	SW3	455	9.00	1.50	----	30233	0	30233	5039	0	5039		0	5039	
B6	473	942	1415	4.00	354	SW3	455	9.00	2.25	441	16552	0	16552	4138	0	4138		0	4138	
B7	354	706	1060	3.00	353	SW3	455	9.00	3.00	398	12405	0	12405	4135	0	4135		0	4135	
B8	472	746	1218	4.00	305	SW2	353	9.00	2.25	342	14251	0	14251	3563	0	3563		0	3563	
B9	472	746	1218	4.00	305	SW2	353	9.00	2.25	342	14251	0	14251	3563	0	3563		0	3563	
D1	827	0	827	7.00	118	SW1	241	9.00	1.29		9676	0	9676	1382	0	1382		0	1382	

East-West
Walls Below Main Floor

va' = allowable shear values multiplied by (1.25-0.125 * h/l)
for wall aspect ratios greater than 2:1

WALL	F (lb)	V (abv)	V (total)	L (ft)	v (plf)	SW	va	h (ft)	h/l	va'	M ot (lbft)	M ot (abv)	M ot (total)	OT (lb)	DL max (lb)	T (lb)	HD	TL (lb)	C (lb)	POST
2D	2200	3400	5600	13.00	431	SW3	455	9.00	0.69	----	65520	0	65520	5040	0	5040		0	5040	
3B	1043	4180	5223	8.00	653	SW5	910	9.00	1.13	----	61109	48906	110015	####	0	13752		0	13752	
5A	1956	0	1956	15.00	130	SW1	241	9.00	0.60	----	22885	0	22885	1526	0	1526		0	1526	
4C	2000	3120	5120	18.00	284	SW2	353	9.00	0.50	----	59904	18252	78156	4342	0	4342		0	4342	

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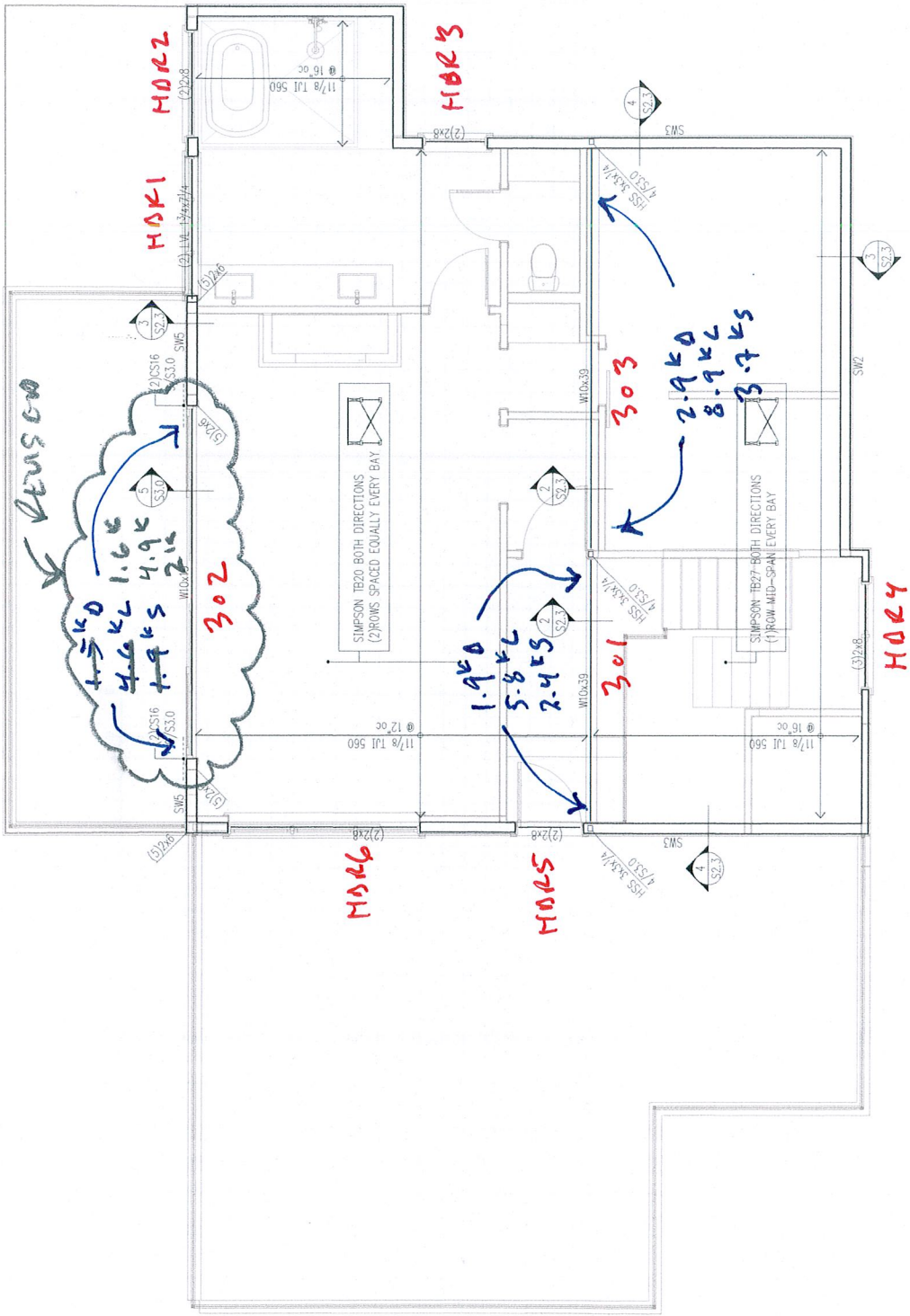

ROOF FRAMING

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Project

Date

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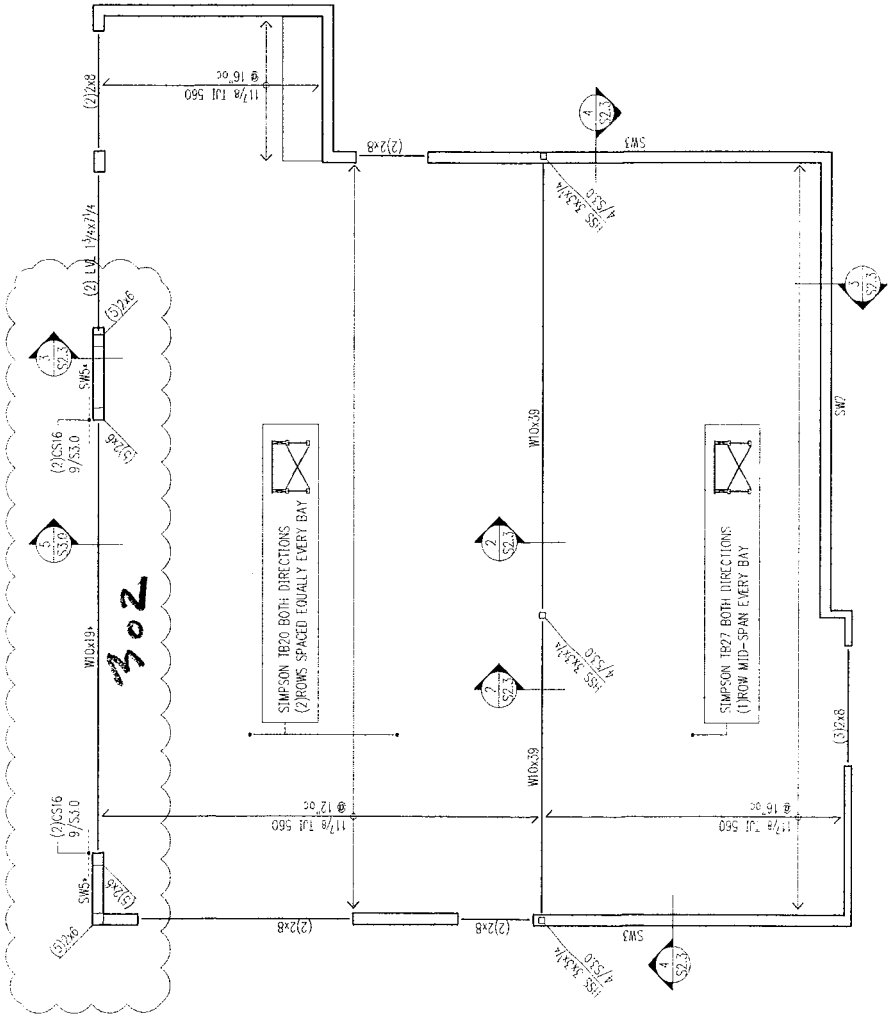
Harriott Valentine Engineers Inc.

ROOF FRAMING - REVISIONS



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WERELUS
4/2/20

PAVERS DELETED

UPPER ROOF

DEAD 20 PSF + ~~24 PSF PAVERS~~
LIVE 60 PSF
SNOW 25 PSF

JOISTS

ℓ = 19'

W = 16" oc (~~20~~ 44 + 60 + 25)

~~59~~ PLF D + 60 PLF L + 33 PLF S

~~144~~ PLF D + .75(L+S)

M = ~~5~~ K-Ft 6.5

V = ~~1.1~~ K 1.4

11 7/8 TJI 560 @ 16" oc

M_R = 9.5 K-Ft

V_R = 2.05 K

Δ = ~~.60~~" = ℓ/375

.76" = ℓ/296

USE @ 12" oc

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WENLIUS Project

5/16/19 Date

ROOF FRAMING

DEAD 20 PSF
LIVE 60 PSF
SNOW 25 PSF

3.01

ℓ = 12'
w = 320 PLF D
960 PLF L
400 PLF S
M_D = 5.8 K.FT
M_L = 17.3 K.FT
M_S = 7.2 K.FT
$M_{D+.75L+.75S}$ = 24.1 K.FT
V_D = 1.9 K
V_L = 5.8 K
V_S = 2.4 K

W10x39 I = 209
$\frac{M_{RX}}{\Omega}$ = 117 K.FT
L_D = 6.99'
$\frac{M_{RX}}{\Omega}$ = 111 K.FT
L_r = 24.2' OK
Δ = 0.1" OK

3.02

REVISED 4/2/20

ℓ = ~~12~~ 18'
w = 180 PLF D
540 PLF L
225 PLF S
M_D = ~~6.5~~ K.FT 7.3
M_L = ~~19.5~~ K.FT 21.9
M_S = ~~8.1~~ K.FT 9.1
$M_{D+.75L+.75S}$ = ~~27.2~~ K.FT 30.5 K.FT
V_D = ~~1.9~~ K 1.6 K
V_L = ~~4.6~~ K 4.9 K
V_S = ~~1.9~~ K 2.0 K

W10x19 I = 96.3
$\frac{M_{RX}}{\Omega}$ = 32.8 K.FT
L_r = 9.72'
CBRACE
Δ = ~~0.5~~" OK
.6" = $\frac{\ell}{336}$ OK

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WEYERLIUS Project
12/10/19 Date
Page ___ of ___

ROOF FRAMING

303

ℓ = 19'

w = 15.5' (70 + 60 + 25)
D L S

= 310 PLF + 930 PLF + 388 PLF

M = 58.6 K·FT

V_D = 2.9 K

V_L = 8.9 K

V_S = 3.7 K

~~W12 x 26~~

~~M_R 92.8 K·FT~~
~~Ω_2 =~~

~~Δ = .7" = $\ell/335$~~

W 10 x 39 I = 209

$\frac{M_{RX}}{\Omega_2}$ = 111 K·FT

L_K = 24.2' OK

Δ = 0.6" = $\ell/362$

HEADERS

HD1G1 ℓ = 7'

w = ~~440~~ 180 PLF D + ~~600~~ 540 PLF L + ~~250~~ 225 PLF S

M = ~~6.6~~ K·FT 4.6 K·FT

V_D = ~~4.5~~ K 630 #

V_L = ~~2.1~~ K 1.9 K

V_S = ~~845~~ # 988 #

(2) LVL 1¾ x 9¼

M_R = 7.11 K·FT

V_R = 4.8 K

Δ = .29" = $\ell/302$

HD2S ℓ = 5'

w = ~~440~~ 130 PLF D + ~~240~~ 390 PLF L + ~~117~~ 163 PLF S

M = ~~1.5~~ K·FT 1.7 K·FT

V_D = ~~995~~ # 325 #

V_L = ~~995~~ # 975 #

V_S = ~~283~~ # 408 #

(3) 2x8 OK

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WENELIUS

5-29-19

ROOF

HEADERS

HDR2 ℓ = 5'

w = 90 PLF D
270 PLF L
113 PLF S

M = 1.2 K-FT

V_D = 225 #

V_L = 675 #

V_S = 263 #

(2) 2x8 OK

NON-BEARING HEADERS HDR3, HDR5 HDR6

ℓ = 9'

w = 13 PLF D
40 PLF L
17 PLF S

M = 564 #-FT

V_D = 59 #

V_L = 180 #

V_S = 77 #

(2) 2x8 OK

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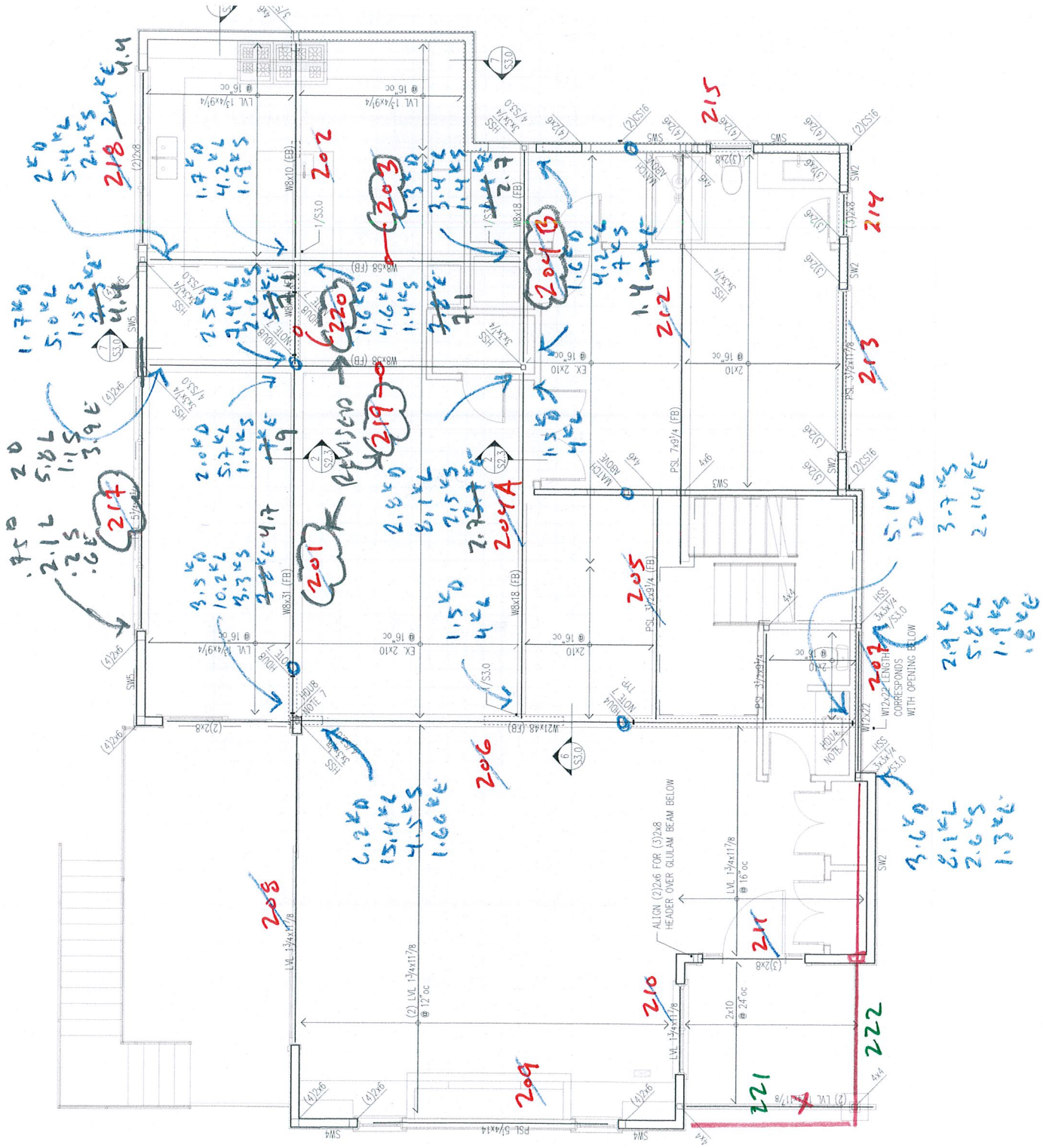
WEYERHAEUSER Project

12/10/19 Date



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Project

Date

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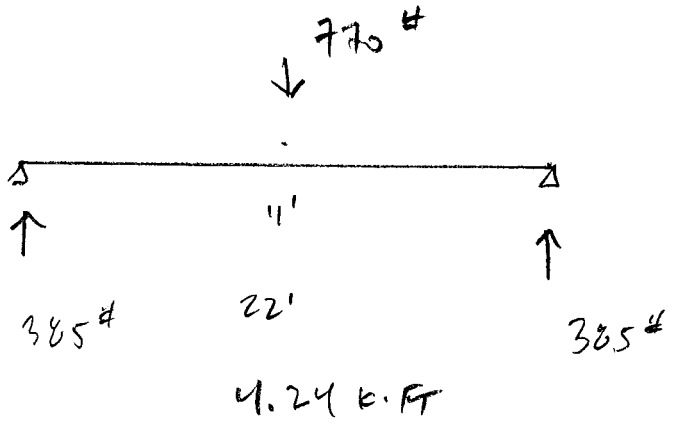
TRUSS

MID-BEAM



PSL 5¼ x 11⅞

M_R = 29.8 K·FT

V_R = 12 K

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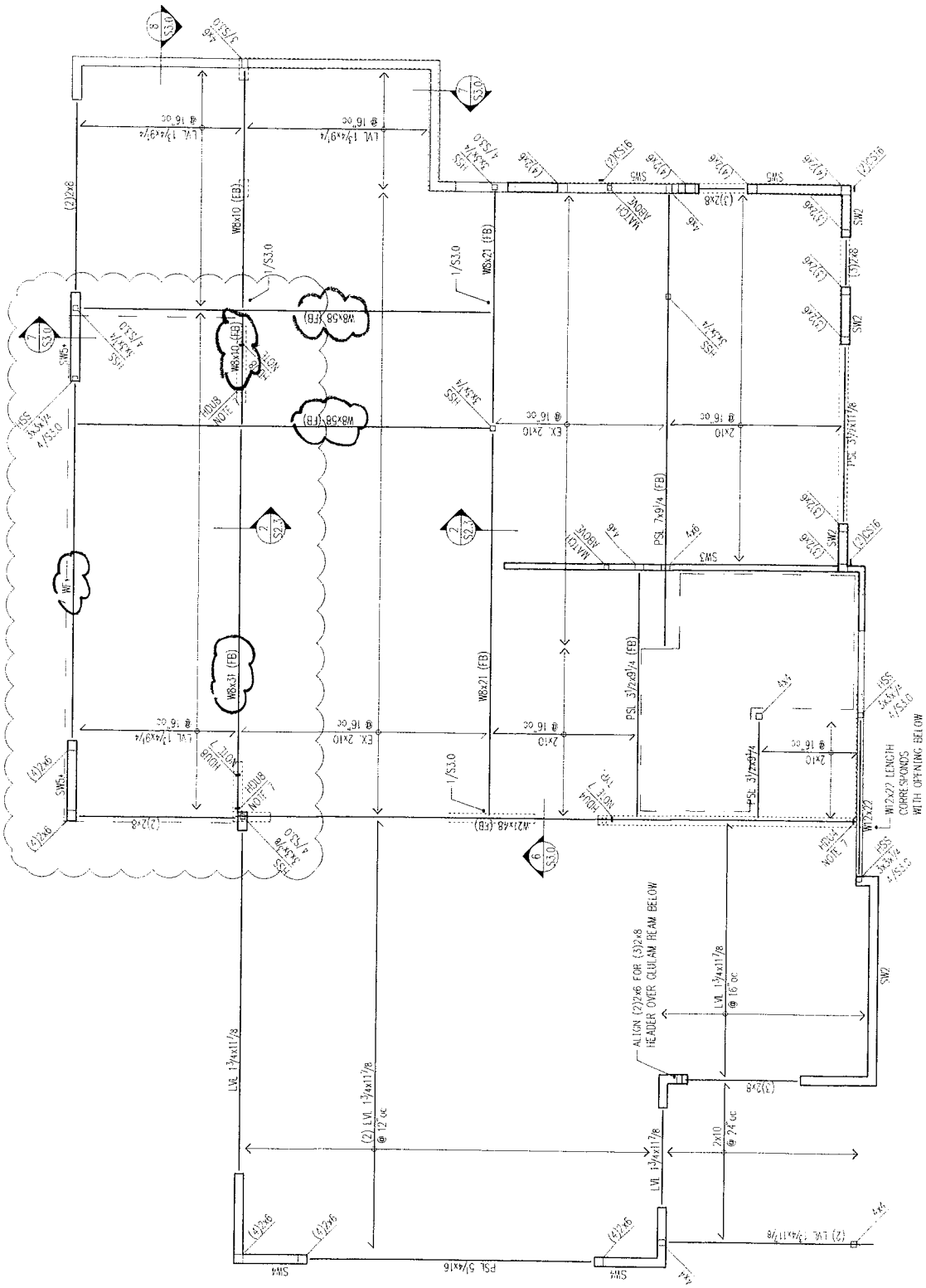
WEVECIUS

4/24/20

Harriott Valentine Engineers Inc.

UPPER FLOOR - REVISIONS



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WEDNESDAY
4/2/20

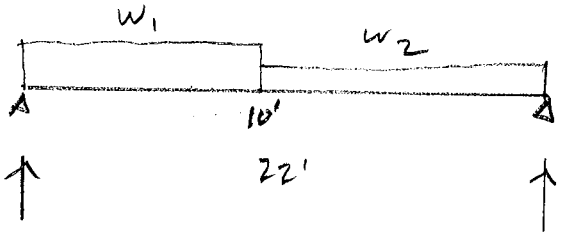
Harriott Valentine Engineers Inc.

UPPER FLOOR

HOT TUB 90"x110", 5500#

JACUZZI OUTDOOR TUB

=> 80 PSF



W_1: 100 PSF DEAD
60 PSF LIVE
25 PSF SNOW

W_2: 20 PSF D
60 PSF L
25 PSF S

D	838#	3.5 K-Ft	402#	TJI 11 7/8 SCOC @ 12" oc
L	666#	3.03 K-Ft	666#	M_{LL}: 9.5 K-Ft
S	275#	1.5 K-Ft	275#	V_{LL}: 2.0 K
D+L	1504#	7.13 K-Ft	1068#	Δ: 1.13" L/232 NG
D+S	1113#	5 K-Ft	677#	~~TYP~~ 1 3/4 x 11 7/8 LVL
D+.7(L+S)	1443#	7.35 K-Ft	1108#	M_{LL}: 8.9 K-Ft
				V_{LL}: 3.9 K
				Δ: 1.38 NG
				USE (2) 1 3/4 x 11 7/8 LVL
				@ 12" oc

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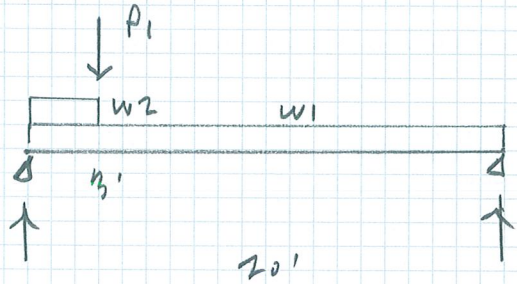
WEINSTEIN
5/16/19

SECOND FLOOR FRAMING



201

$S_{DS} = 1.11$

$\Omega = 2.5$ $\rho = 1.3$

$P_1 = 1.5^k$ D ✓ (+ ~~4.5~~ ^{k} E → 5.6^k)
4.6^k L ✓
1.9^k S ✓

4/12/20

W_1: 180 PLF D ✓
510 PLF L ✓
113 PLF S ✓

W_2: 180 PLF D ✓
540 PLF L ✓
225 PLF S ✓

W8x31

$\frac{M_{pr}}{\Omega} = 75.8$ k.ft
$L_p = 7.18'$
BRACE

$\Delta = 1.$

$(1.0 + .14 S_{DS})D + \Omega E$
1.16

$(1.0 + .105 S_{DS})D + .75\Omega E + .75L + .75S$
1.12

$(.6 - .14 S_{DS})D + \Omega E$
.44

D	3.5^k	-11 K.FT	2.0^k
L	10.2^k	-31.8 K.FT	5.7^k
S	3.3^k	-9 K.FT	1.4^k
D+L	13.7^k	-42.8 K.FT	7.7^k
D+S	6.7^k	-19.9 K.FT	3.4^k
D+.75(L+S)	13.6^k	-41.6 K.FT	7.3^k
ρE	4.7^k	-14.1 K.FT	$.9^k$
E	~~7.6~~	~~-11.3~~ K.FT	~~1~~
Ω_1	~~17.5~~	~~-38.6~~ K.FT	~~4.4~~
Ω_2	~~21.4~~	~~-59.3~~ K.FT	~~6.9~~
Ω_3	~~-7.9~~	21.4 K.FT	~~.9~~
	22.8	-63.9	9.2

$w_u = 127.8$

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WEKELIUS Project
12/10/19 Date
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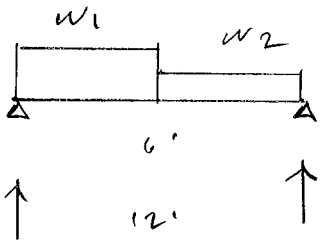
SECOND FLOOR FRAMING

202



D	1.7	4.6	1.4
L	4.2	11.5	3.3
S	1.9	5.1	1.5
D+L	5.9	16.1	4.7
D+S	3.6	9.7	2.9
D+.75(L+S)	6.3	17.1	5.0

W1 = 120 PLF D + 60 PLF + 90 ✓
540 PLF L + 0 + 240 ✓
225 PLF S + 113 PLF + 0

W2 = 75 PLF D + 60 + 60 ✓
300 PLF L + 0 + 120 ✓
125 PLF S + 100 + 0

W 8x10

$\frac{M_{DL}}{S2} = 21.9$

$\Delta = .5'' = \ell/240$

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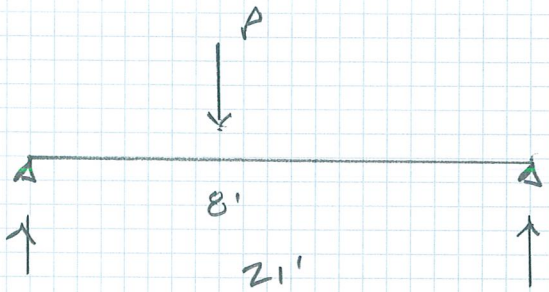
WEIGHTS
5/21/19

SECOND FLOOR FRAMING

203



$S_{DS} = 1.11$

$R = 2.5$

$P = 3.3^k D$

$8.8^k L$

$3.3^k S$

~~3.8^k~~ 7.1^k 4/2/20

D	2^k	-16.3 K·FT	1.3^k
L	5.4^k	-43.4 K·FT	3.4^k
S	2.4^k	-18.7 K·FT	1.4^k
D+L	7.5^k	-59.6 K·FT	4.6^k
D+S	4.4^k	-35 K·FT	2.7^k
E	~~2.4^k~~ 4.4^k	~~-18.7~~ -35 K·FT	~~1.4^k~~ 2.7^k
R_1	~~8.3^k~~ 13.4^k	~~-66~~ -106.4 K·FT	~~8.1^k~~ 8.2^k
R_2	~~12.5^k~~ 16.4^k	~~-100~~ -130 K·FT	~~7.7^k~~ 10.1^k
R_3	~~-5^k~~ 10.1^k	~~39.7~~ 80 K·FT	~~-3.1^k~~ 6.2^k

W8 × 58

$\frac{M_{DX}}{R} = 149$ K·FT

$L_R = 41.7'$ OK

$\Delta = .6''$ OK

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WERKLUS Project

12/10/19 Date

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SECOND FLOOR FRAMING

204A

ℓ = 19'

W: 158 PLF D
420 PLF L

M = 26.1 K·FT

V = 5.5 K

V_D = 1.5 K

V_L = 4 K

W 8 x 18 I = 61.9

$\frac{M_{PX}}{\Omega}$ = 42.4 K·FT

L_C = 13.5'

Prior

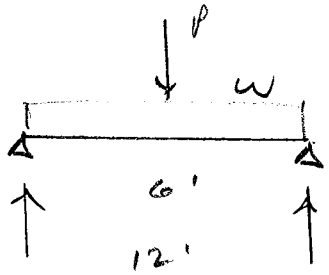
Δ = .9" = $\ell/241$

Δ_L = .69" = $\ell/332$ NG

W 8 x 21

Δ_L = .58" = $\ell/404$

204B



D	1.6 K	-6.7 K·FT	1.6 K
L	4.2 K	-17.7 K·FT	4.2 K
S	.7 K	-4.2 K·FT	.7 K
D + L	5.8 K	-24.4 K·FT	5.8 K
D + S	2.3 K	-10.9 K·FT	2.3 K
D + .75(L+S)	5.3 K	-23 K·FT	5.3 K
1.4 D	5.2 K	27.8	5.2 K
1.2 D + 1.6 L	3.6 K	-18.2 K·FT	3.6 K
1.2 D + 1.6 S	6.8 K	-31.7 K·FT	6.8 K
0.9 D - 1.6 W	2.7 K	17.1	2.7 K
0.9 D - 1.6 S	-1.0 K	7.4 K·FT	-1.0 K

P = 1.3 K D
3.4 K L
1.4 K S
4.4 K E 2.7 4/12/20

w: 158 PLF D
420 PLF L

W 8 x 21

$\frac{M_{PX}}{\Omega}$ = 50.9 K·FT

L_C = 14.8' OK

Δ = .3" OK

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WEECCIUS
12/10/19

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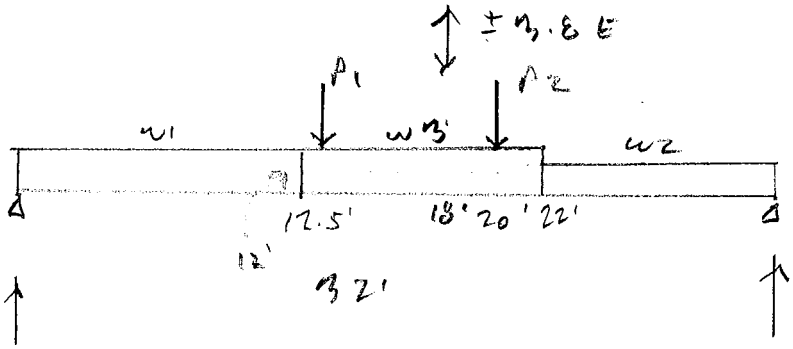
$S_{DS} = 1.11$
$S_2 = 2.5$

Second Floor Framing



206

D	6.2	60.6	5.1
L	15.4	140.5	12
S	4.5	35.8	3.7
D+L	21.6	201.1	17.1
D+S	10.7	96.4	8.8
D+.75(L+S)	21.1	192.8	16.9
E	1.06	29.9	2.14
Ω1		145	
Ω2		256	
Ω3		101	

P1: 3.0k D ✓
3.0k L ✓
.5k S

P2: 960# D ✓
960# L ✓

w1: 220 PLF D ✓
660 PLF L ✓
275 PLF S ✓

w2: 130 PLF D ✓
390 PLF L ✓
165 PLF S ✓

w3: 402 PLF D ✓
660 PLF L ✓
275 PLF S ✓

W21x44

W21x48

$\frac{M_{1x}}{\Omega 2} = 265$

Δ: 1.28" = L/300

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Wetherus
5/21/19

SECOND FLOOR FRAMING

2.05

ℓ: 12'

W: 4'(15+40)

60 PLF + 160 PLF

M: 3.96 K-FT

V_D: 360 #

V_L: 960 #

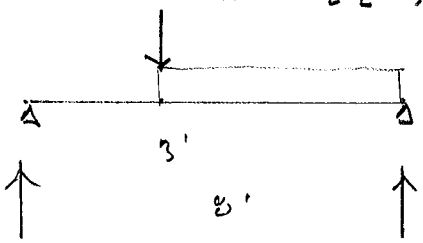
PSC 3½ × 11⅞

M_R: 19.9 K-FT

V_R: 8 K

Δ: .11"

2.07



$w = \frac{13'}{2}(44D + 25S + 60L)$

$= 286 + 164 + 390$

D	3.6	10.9	2.9
L	8.1	24.2	5.8
S	2.6	7.7	1.9
E	1.3	4.0	.5
D+L	11.7	35.1	8.7
D+S	6.2	18.6	4.8
D+.75(L+S)	11.6	34.8	8.7
R_1		22.6	
R_2		44	
R_3		14.8	

W12×22

$\frac{M_{MAX}}{R_2} = 7\frac{1}{8}$

Δ: .09 OK

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WERKEISS
5/21/19

SECOND FLOOR FRAMING

208 CONT. RIM OK

209

ℓ = ~~17'~~ 15'

W = 1102 PLF D + 666 PLF L + 275 PLF S

M = ~~36.2~~ K-FT 57.5 K-FT

V_D = ~~7.2~~ K 8.3 K

V_L = ~~4.8~~ K 5 K

V_S = ~~1.8~~ K 2.1 K

PSL 5 1/4 X ~~14~~ 5 1/4 X 16

M_R = ~~40.7~~ K-FT 52.4 K-FT

V_R = ~~14.2~~ K 16.2 K

Δ = ~~.8~~ = ℓ/372

.56 OK

210 (2) 2X8 @ 16

211

ℓ = 26'

W = 13/2' (44 D + 60 L + 25 S)

= 286 + 390 + 163

M = 3.1 K-FT

V_D = 858 #

V_L = 1170 #

V_S = 489 #

(3) 2X8

M_R = ~~3.8~~ K-FT

V_R = 5.26 K

Δ = 0.11" = ℓ/654

(2) 1 3/4 X 11 7/8 LVL

M_R = 17.8

V_R = 8

Δ =

DECK JOISTS NOW DESIGNED TO SPAN OVER THIS

BUT CHECK W/ JOIST DEFLECTION => W = 1607 PLF

D + .75L + .75S

M = 8.4 K-FT

Δ = .2" @ ℓ

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WEMBLEY Project

6/4/19 Date

SCOWS FRONT FRAMING

Z12

$\ell = 19'$

$w = 9'(40\ PSF\ L + 15\ PSF\ D)$

$= 360\ PLF\ L + 135\ PLF\ D$

$M = 22\ K\cdot FT$

$V = 4.7\ K$

PSL 5 1/2 x 11 7/8

M_{allow} 29.8

V_{allow} 12.1

$\Delta = 1'' = \ell/230$

use 9 x 11 7/8

Z13

$\ell = 8'$

$w = \frac{9}{2}(15\ PSF\ D) + \frac{9}{2}(40\ PSF\ L) + \frac{12}{12}(44\ PSF\ D) + \frac{12}{2}(60\ PSF\ L) + \frac{12}{2}(25\ PSF\ S)$

$= 331\ PLF\ D + 540\ PLF\ L + 150\ PLF\ S$

$M = 6.9\ K\cdot FT$

$V_D = 1.4\ K$

$V_L = 2.2\ K$

$V_S = 0.6\ K$

PSL 3 1/2 x 11 7/8

M_{allow} 19.9 K·FT

V_{allow} 8 K

$\Delta = .08'' < \ell/360$

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WINKELMAN

6/4/19

SECOND FLOOR FRAMING

2.7 ℓ = 14'

W = 4'(40 PSF + 15 PSF)

= 160 PLF + 60 PLF D

M = 5.4 ft-k

V_D = 420 #

V_L = 1.12 k

REVISED

DSC 2x12 @ 16" OC

δ = .2" O.K.

2.6 ℓ = 10'

w = 220 PLF

M = 2.8

V = 1.1 k

(3) 2x6

M_{LL} = 3.85 ft-k

V_{LL} = 3.2 k

δ = .3" < L/360 O.K.

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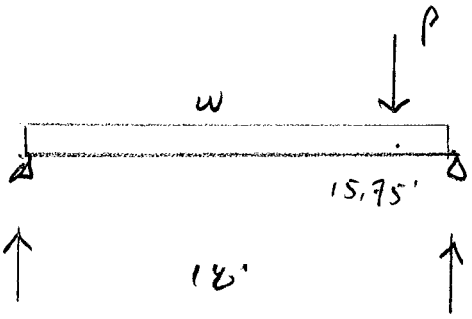
WORKING

6/14/19

Second Floor

217



P: 1.7^{K} D
5.0^{K} L
1.3^{K} S
4.4^{K} E

w: 160 PLF L
60 PLF D

D	.75	4.7	2
L	2.1	13.3	5.8
S	.2	2.5	1.1
E	.6	8.6	3.9
D+L	2.8	18	7.8
D+S	.9	6.9	3.2
D+.75(L+S)	2.4	16.3	7.2
$\sqrt{2}_1$	2.2	26.6	12
$\sqrt{2}_2$	3.5	37.5	14.7
$\sqrt{2}_3$	1.0	19.6	8.7

W10x19

$\frac{M_{px}}{\sqrt{2}} = 53.9$

$L_p = 3.09'$

$\Delta = .4'' \checkmark$

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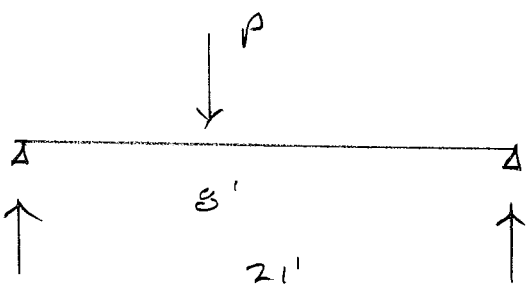
WEKELIUS
4/12/20

SECOND FLOOR FRAMING

219



$S_{DS} = 1.11$

$R = 2.5$

$P = 4.5^k$ D
13.1^k L
4.0^k S

~~6.0~~ E 7.1^k

4-2-20

W8x58

$\frac{M_{req}}{R} = 149^{k\cdot ft}$ NG.

$L_K = 41.7'$ OK

$\Delta = 0.8" = l_{/306}$ OK

W8x67 OK

D	2.8^k	$-22.2^{k\cdot ft}$	1.7^k
L	8.1^k	$-64.6^{k\cdot ft}$	5.0^k
S	2.5^k	$-19.7^{k\cdot ft}$	1.5^k
D+L	10.9^k	$-86.8^{k\cdot ft}$	6.7^k
D+S	5.3^k	$-41.9^{k\cdot ft}$	3.2^k
D+.75(L+S)	10.7^k	$-85.4^{k\cdot ft}$	6.6^k
E	~~4.4~~ ~~3.7~~	~~35~~ ~~-29.6~~	~~2.7~~ ~~2.3~~
R_1	~~14.3~~ ~~12.5~~	113 ~~-100~~	~~8.8~~ ~~7.7~~
R_2	~~19.3~~ ~~16~~	~~153.7~~ ~~-143.5~~	~~12~~ ~~11~~
R_3	~~9.8~~ ~~-8.1~~	~~77.7~~ ~~64.2~~	~~6~~ ~~-5~~

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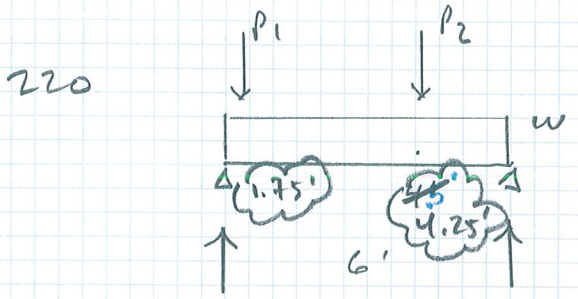
WERELIUS
12/10/19

SECOND FLOOR FRAMING



D	~~2.5~~ k	~~-2.3~~ k.ft	~~1.6~~ k
L	~~7.9~~ k	~~-6.8~~ k.ft	~~4.6~~ k
S	~~2.6~~ k	~~-2.1~~ k.ft	~~1.9~~ k
D+L	~~9.4~~ k	~~-9~~ k.ft	~~6.2~~ k
D+S	~~5.1~~ k	~~-4.4~~ k.ft	~~3~~ k
D+.75(S+L)	~~10~~ k	~~-9~~ k.ft	~~6~~ k
E	~~5.3~~ k	~~-5.6~~ k.ft	~~3.6~~ k
Ω_1	~~16.1~~ k	~~-16.4~~ k.ft	~~11.2~~ k
Ω_2	~~20.2~~ k	~~-18.7~~ k.ft	~~13.3~~ k
Ω_3	~~-12~~ k	~~13~~ k.ft	~~-8.7~~ k
D+L	8.8 k	13.6 k.ft	7.4 k
D+S	4.5 k	7.0 k.ft	3.7 k
Ω_2	22.5 k	37.6 k.ft	21 k

$S_{DS} = 1.11$

$\Omega = 2.5$

$w =$ 330 PLF D ✓

940 PLF L ✓

225 PLF S ✓

$P_1 =$ 1.5 k D ✓

4.6 k L ✓

1.9 k S ✓

~~4.5~~ k E ✓ 7.15 k

4/2/20

$P_2 =$ 630 # D ✓

1.9 k L ✓

758 # S ✓

~~4.5~~ k E ✓ 7.15 k

W8x10

$\frac{M_{px}}{\Omega} =$ 21.9 k.ft

$L_k =$ 8.56 ft ok

$\Delta =$ 0.07" ok

W8x31 ok

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SECOND FLOOR FRAMING

221

$\ell = 10'$

$w = 1102\ n + 666\ L + 275\ S$

$M_D = 13.8\ K\cdot FT$

$M_L = 8.3\ K\cdot FT$

$M_S = 3.4\ K\cdot FT$

$M_{D+.75L+.75S} = 22.6\ K\cdot FT$

$w_u = 1808\ PLF$

$V_D = 5.5^K$

$V_L = 3.3^K$

$V_S = 1.4^K$

$V_{D+.75L+.75S} = 9^K$

W 12 X 22

$\frac{M_{px}}{\Omega} = 73\ K\cdot FT$

$\Delta = 0.1'' \leq \frac{\ell}{}$

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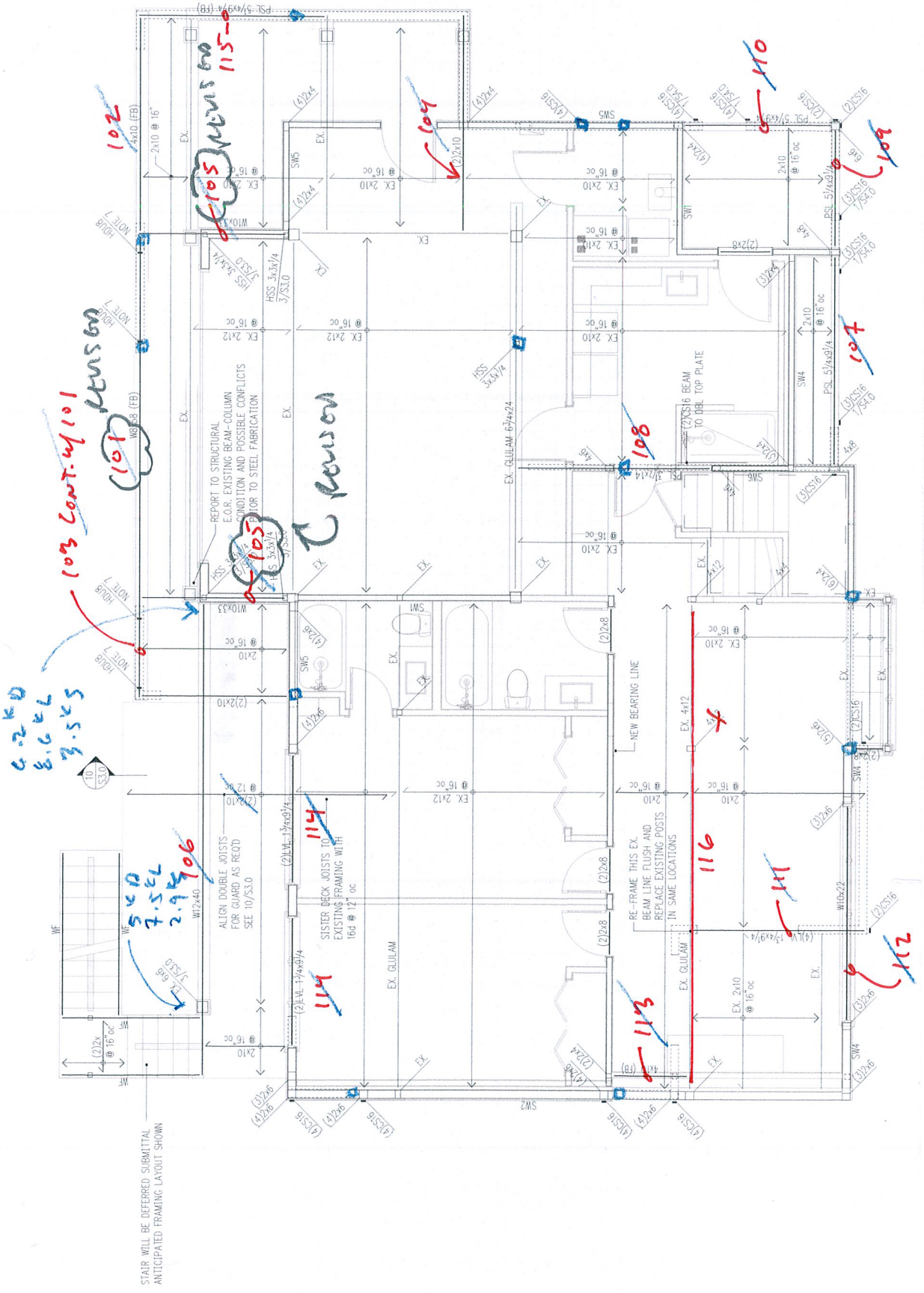
WEYERHAEUSER
4/17/20



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Date

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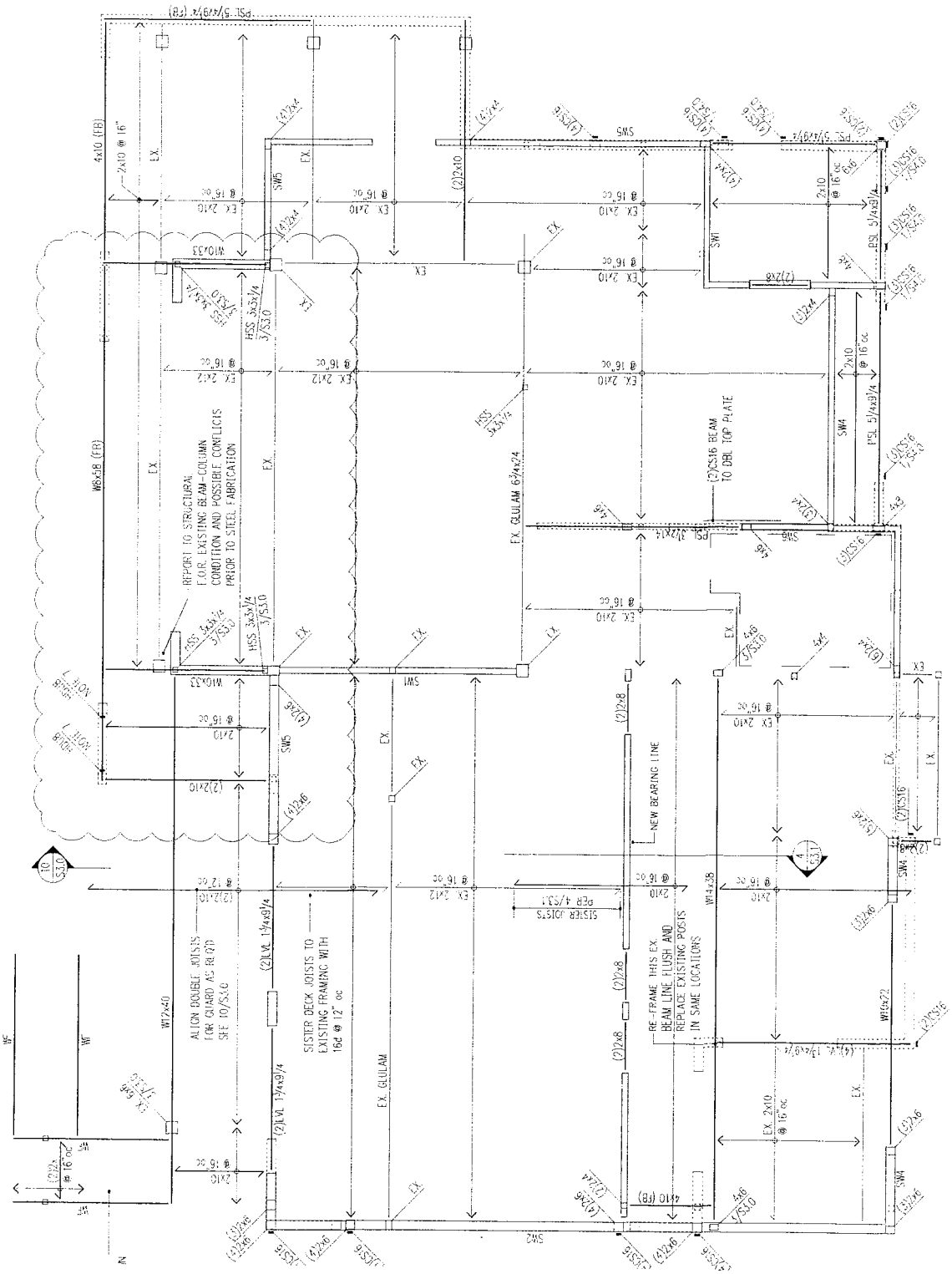
Harriott Valentine Engineers Inc.

MAIN FLOOR - REVISIONS



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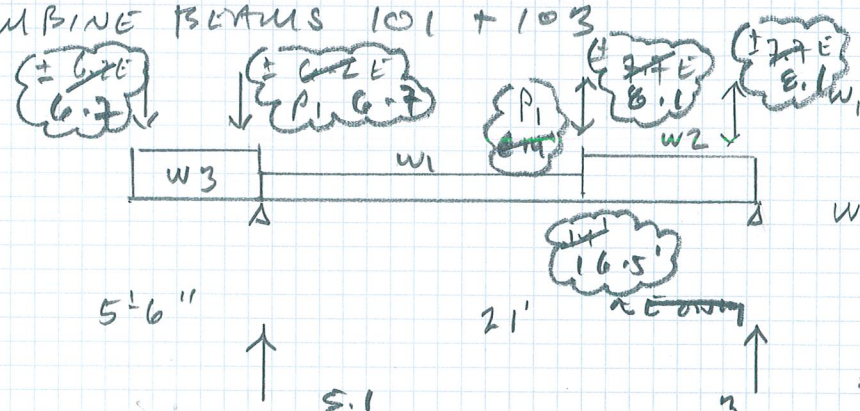
WINDOWS
4/2/20

MAIN FLOOR FRAMING

$S_{DS} = 1.11$

$\Omega = 2.5$

COMBINE BEAMS 101 + 103



$W_1 = 2'(150 + 40L)$
$= 30\ PLF\ D + 80\ PLF\ L$

$W_2 = 9'(250 + 40L + 25S)$
$+ 4'(150 + 40L)$
$+ 2'(150 + 40L)$
$= 315\ PLF\ D + 600\ PLF\ L$
$+ 225\ PLF\ S$

$W_3 = 9'(250 + 40L + 25S)$
$+ 4.5(150 + 60L + 25S)$
$= 293\ PLF\ D + 630\ PLF\ L$
$+ 338\ PLF\ S$

$P_1 = 2.2D + .42D = 2.62$
$3.2L + 1.12L = 4.3$
$2.4S$

		5.1		3
D	~~4.2~~ K-FT	~~6~~ K	~~16.8~~ K-FT	~~3.5~~ K
L	~~9.1~~ K-FT	9.3 K 4.6	~~29.2~~ K-FT	5.5 ~~6.3~~ K
S	~~5~~ K-FT	~~5.6~~ K	~~13.1~~ K-FT	2.3 ~~2.7~~ K
D+L	~~13.5~~ K-FT	~~17~~ K	~~46~~ K-FT	~~9.8~~ K
D+S	~~9.2~~ K-FT	~~11.6~~ K	~~29.9~~ K-FT	~~6.2~~ K
D+.75(L+S)	~~14.6~~ K-FT	~~16.5~~ K	~~46.5~~ K-FT	~~10.3~~ K
Ω_1	~~34.6~~ K-FT	~~15.4~~ K	~~72.7~~ K-FT	~~12.8~~ K
Ω_2	~~67.8~~ K-FT	~~26~~ K	71.2 ~~91.3~~ K-FT	~~17.4~~ K
Ω_3	~~-67.9~~ K-FT	~~-6.1~~ K	56 ~~-45.9~~ K-FT	~~-7.1~~ K
E	± 27.9	~~±3.5~~	~~±21.3~~	~~±4.5~~

W8×58 OK

$\frac{M_{px}}{\Omega} = 149\ K\text{-FT}$

$L_p = 7.42'$ OK

$\Delta_{CANT} = 0.4" = \ell/105$ OK

$\Delta = 0.42"$ OK

$\Omega_1 = (1.0 + 0.14 S_{DS})D + \Omega E$ (1.16)

$\Omega_2 = (1.0 + 0.105 S_{DS})D + .75\Omega E + .75L + .75S$ (1.17)

$\Omega_3 = (0.6 - 0.14 S_{DS})D + \Omega E$ (0.44)

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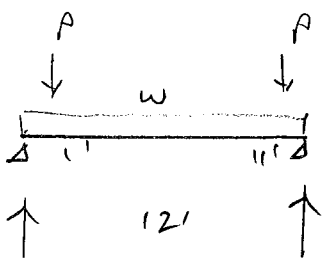
MAIN FLOOR EVALUATION

102



D	516	878	575
L	480	1440	480
S	562	562	562

$P = 562^{\#}S + 330^{\#}D$

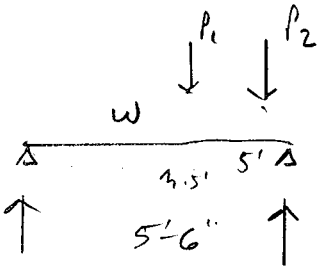
$w = 30\,PLF\,D + 80\,PLF\,L$

4x10

$M_R = 4.24$

$V_R = 3.24$

103



D	2.7	6.5	4.0
L	3.9	9.4	6.2
S	1.5	3.8	2.1
P E	±.7	±3.5	±7
D+L	6.6	15.9	10.2
D+S	4.2	10.3	6.1
D+(L+S+E).75	7.3	19.0	15.5
Ω_1		14.3	
Ω_2		19.2	
Ω_3	-160#		-11.7

$P_1 = 3.7^{k}D + 5.1^{k}L + 2.4^{k}S$ ~~$+ E^{k}$~~

$P_2 = .42^{k}D + 1.12^{k}L \pm 7.7^{k}E$

$w = 9'(44\,D + 80\,L + 25\,S) + 4.5'(15\,D + 40\,L)$

$= 464\,PLF\,D + 720\,PLF\,L + 225\,PLF\,S$

W ~~12x50~~ 10x33

combine w/ 101

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WINKELIUS

6/5/19

MAIN FLOOR FRAMING

104

$\ell = 6'$

$w = 10'(15+40) = 550$

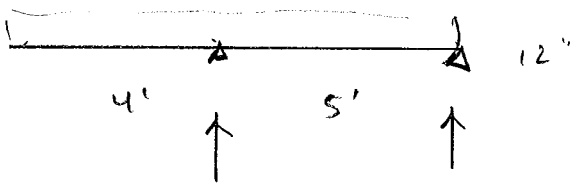
$M = 2.5$ k-ft

$V = 1.65$ k

(2) 2x10

LOWER DECK JOISTS

$w = 44$ PLF + 60 PLF + 125 PLF



D	352	356	136	110
L	480	486	188	150
S	200	203	113	63

2x12 @ 12

$M_{12} = 2.58$ k-ft

$V_{12} = 1.68$ k

$\Delta = .31" = \ell/155$ OK

CANT. w/ D+.75(L+S)

MAX UPLIFT = 593 #/FT

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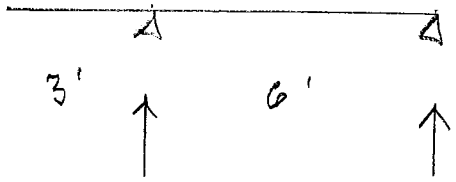
WERKEMA S

6/5/19

MAIN FLOOR FRAMING

RECTANGULAR BEAM 105

$P = 6^k D + 11^k L + 5.6^k S \pm 3.5^k E$



W 10 x 33

$\Delta = PL^3/3EI$

$I = 171$

$= 0.002"$ OK

$\frac{M_{px}}{\Omega} = 96.8$ k·ft

$L_p = 6.85'$ OK

D	18 k·ft	9 k	-3 k
L	33 k·ft	16.5 k	-5.5 k
S	16.8 k·ft	8.4 k	-2.5 k
E	± 10.5 k·ft	± 5.25 k	± 1.75 k
D + L	51 k·ft	25.5 k	-8.5 k
D + S	34.8 k·ft	17.4 k	-5.8 k
D + .75(L+S)	55.4 k·ft	27.7 k	-9.2 k
Ω_1	47.1 k·ft	23.6 k	7.9 k
Ω_2	78 k·ft	39 k	13 k
Ω_3	-18.3 k·ft	-9.2 k	-5.7 k

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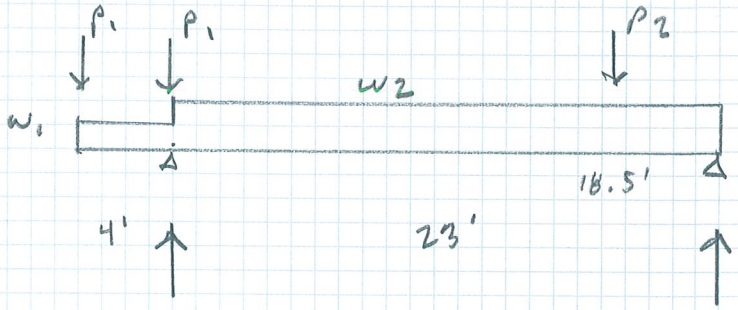
WEXLIUS
11/20/19

FIRST FLOOR FRAMING

106 AND CANTILEVER FOR STAIR



D	5^{k}	-29.7 K.FT	6.2^{k}
L	7.5^{k}	-40.6 K.FT	8.6 K
S	2.9^{k}	-16.8 K.FT	3.5^{k}
D+L	12.5^{k}	-70 K.FT	14.9 K
D+S	7.9^{k}	-46.5 K.FT	9.8 K
D+.75(L+S)	12.8^{k}	-72.7 K.FT	15.4 K
R1	6.2^{k}	-39 K.FT	8.6 K
R2	13.9^{k}	-81.2 K.FT	17.5^{k}
R3	1.9^{k}	-9 K.FT	1.3 K

P_1 = 115$^{\#}$ D ✓
306$^{\#}$ L ✓

P_2 = 2.7^{k} D ✓
3.9^{k} L ✓
1.5^{k} S ✓
17^{k} E ✓

W_1 = 38 PLF D ✓
100 PLF L ✓ 63 PLFS ✓

W_2 = 356 PLF D ✓
486 PLF L ✓
203 PLF S ✓

W 12 x 40 I = 307

$\frac{M_{max}}{\sqrt{2}}$ = 89.9

L_k = 21.1'

Δ = 0.8" = $\frac{\ell}{345}$ OK

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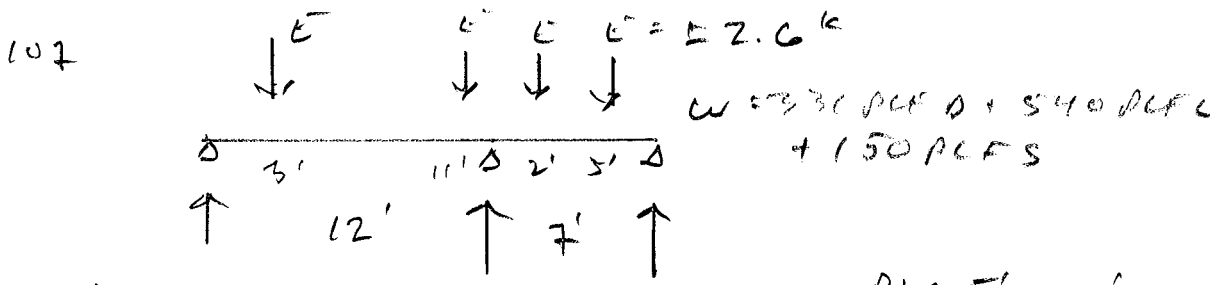
MAIN FLOOR FRAMING



D	4.6	4.0	4.1	.5
L	2.7	6.6	6.7	.9
S	.7	1.9	1.9	.25
PE'	-1.6	4.9	.7	1.3
D+L	4.3	10.6	10.8	1.4
D+S	2.3	5.9	7	.75
D+.75(L+S)	3	14.0	11.1	2.3

R_1 14.6

R_2 14.6

R_3 -2.4

PSL 5½ x 9¼

$M_{DL} = 18.6$ k-ft

$V_{DL} = 9.4$ k

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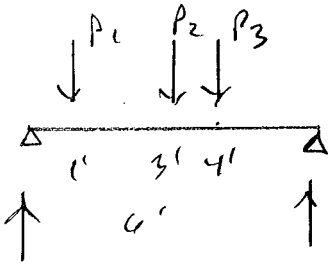
WEKELIUS

6/6/19

MAIN FLOOR FRAMING

108



D	10.2	10.2	4.2
L	3.5	10.3	3.5
S	5.1	5.1	1.0
D+L	13.7	20.5	7.7
D+S	15.3	15.3	5.2
D+(L+S).75	16.2	21.8	7.6

$P_1 = 10.7^{K}D + 14.7^{K}L + 6.1^{K}S$

$P_2 = 360^{\#}D\ 960^{\#}L$

$P_3 = 3.4^{K}D + 1.3^{K}L$

PSL 3 2 F 14

$M_{LL} = 27.16$

$V_{LL} = 9.5$

$\Delta = 0.1''$ @ ℄

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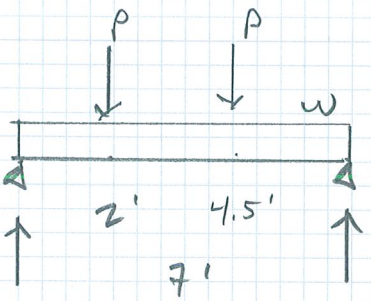
WEMBLIUS
6/6/19

MAIN FLOOR BEAMS

109



P = 2.6 K LIV

w = 158 PLF D ✓
540 PLF L ✓
150 PLF S ✓

D	553#	-1 K.FT	553#
L	1.9K	-3.3 K.FT	1.9K
S	525#	-.9 K.FT	525#
D+L	2.4K	-4.3 K.FT	2.4K
D+S	1.1K	-1.9 K.FT	1.1K
D+.75(L+S)	2.4K	-4.1 K.FT	2.4K
R_1	3.0K	-5.5 K.FT	-1.7K
R_2	4.2K	-6.9 K.FT	.7K
R_3	-2K	-6.1 K.FT	2.6K

PSL 5¼ x 9¼ I = 346

M_R = 18.6 K.FT

V_R = 9.39K

∴ = OK

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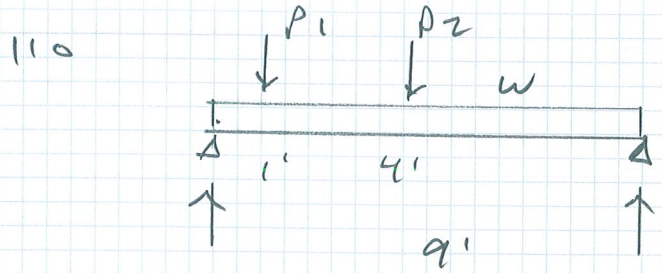
MAIN FLOOR ENTRANCE



$P_1 = 5.6^k$ LL ✓

$P_2 = 5.6^k$ LL ✓

$w = 53$ PSF D ✓

140 PLF L

PSL 5'4" x 9'4" $t = 3\frac{1}{2}$"

$M_L = 18.6$ K-FT

$V_L = 9.4^k$

$\Delta = 0$"

D	238#	-.54 K-FT	238#
L	630#	-1.4 K-FT	630#
D+L	869#	-2 K-FT	869#
R_1	4.9K	-4.9 K-FT	-4.4K
R_2	4.3K	-4.2 K-FT	-2.7K
R_3	-4.0K	~~-23.6 K-FT~~ -18.2 K-FT	4.8K

← P removed OK

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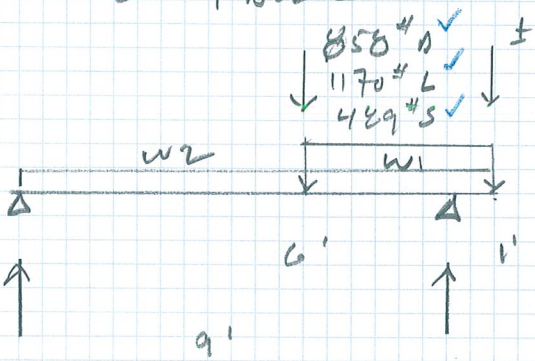
MAIN FLOOR

BEAM UNDER ENTRY DOOR

LL



W1: 286 PLF D
390 PLF L
163 PLF S

W2: 688 PLF D
1880 PLF L

(4) LVL 1¾ x 9¼

M_R = 22.4 K-FT

V_R = 15K

Δ = 0.13" @ L

D	715#	3 K-FT	1.97K
L	1.4K	4.9 K-FT	3.2K
S	235#	1.4 K-FT	906#
E	± 211#	± 1.9 K-FT	± 2.1K
D+L	2.1K	8.0 K-FT	5.1K
D+S	951#	4.5 K-FT	2.9K
D+.75(L+S)	1.9K	7.8 K-FT	5.0K
Ω_1	-213#	4.9 K-FT	7.6K
Ω_2	1.6K	5.8 K-FT	9.2K
Ω_3	843#	4.8 K-FT	-4.4K

$(1.0 + 0.14 S_{DS}) D + .7 \Omega E$ (1.16)

$(1.0 + \frac{0.105}{(1.12)} S_{DS}) D + .525 \Omega E + .75L + .75S$

$(0.6 - 0.14 S_{DS}) D + .7 \Omega E$ (0.44)

S_{DS} = 1.113

Ω = 2.5

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WEYERHAEUS Project

11/27/19 Date

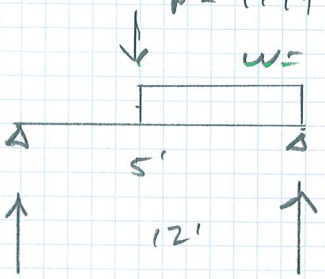
MAIN FLOOR FRAMING

BEAM SUPPORTING ENTRY BEAM

112

$P = 1.97^k D + 3.2^k L + .91^k S \pm 7.1^k E$

$w = 80 PLF L + 30 PLF D$



W 10 x 22

$\frac{M_{rx}}{\Omega} = 40.5 K \cdot FT$

$L_r = 13.8'$ OK

$\Delta = -.17"$ OK

D	1.21^k	6 K·FT	$.97^k$
L	2.03^k	10 K·FT	1.73^k
S	$.53^k$	2.6 K·FT	$.38^k$
E	$\pm 1.2^k$	5.6 K·FT	$\pm .9^k$
D+L	3.2^k	16 K·FT	2.7^k
D+S	1.7^k	8.7 K·FT	1.3^k
D+.75(L+S)	3.1^k	15.6 K·FT	2.6^k
R_1	4.5^k	22 K·FT	3.3^k
R_2	5.6^k	27.7 K·FT	4.3^k
R_3	-2.5^k	+2.6 K·FT	-1.8^k

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12/2/19 Date

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MAIN FLOOR FRAMING

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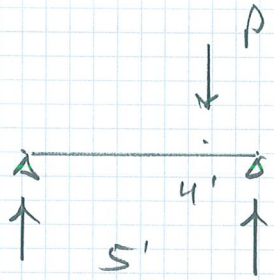

D	172	688	686
L	234	936	936
S	98	391	391
D+L	406	1624	1624
D+S	1270	1079	1079
D+.75(L+S)	421	1683	1683

W_u: 539 PLF

P = 858 #D
1170 #L
489 #S

4x10 GI: 300.1 EG

M_u = 4.24 K-FT

V_u = 3.24 K

Δ = 0.03" OK

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12/11/19 Date
Page ___ of ___

MAIN FLOOR FRAMING

114

$\ell = 7'$

$w = 93$ PLF D

270 PLF L

$M = 2.2$ F·FT

$V = 1.2^k$

(2) LVL $1\frac{3}{4} \times 11\frac{3}{4} \times 9\frac{1}{4}$

OK

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12/11/19 Date

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MAIN FLOOR FRAMING

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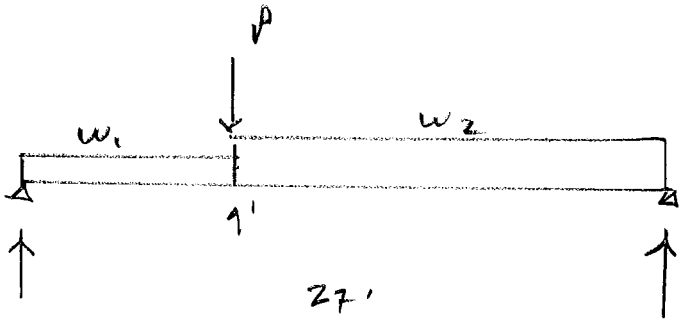

P: 715# D ✓
1.4k L ✓
235# S ✓
± 211" E ✓

w_1: 38 PLF D ✓
100 PLF L ✓

w_2: 105 PLF D ✓
280 PLF L ✓

W14x38

$\Delta = 0.5'' \leq \frac{L}{720}$ ✓

D	1.4k	11.5 k·ft	1.6k
L	3.4k	28.2 k·ft	4.0k
S	157#	1.4 k·ft	78#
E	108#	.97 k·ft	54#
D+L	4.8k	39.7 k·ft	5.5k
D+S	1.5k	12.7 k·ft	1.6k
D+.75(L+S)	4k	33.5 k·ft	4.6k
R_1	1.9k	15.4 k·ft	1.9k
R_2	4.5k	37 k·ft	5.0k
R_3	405#	-3.6 k·ft	581#

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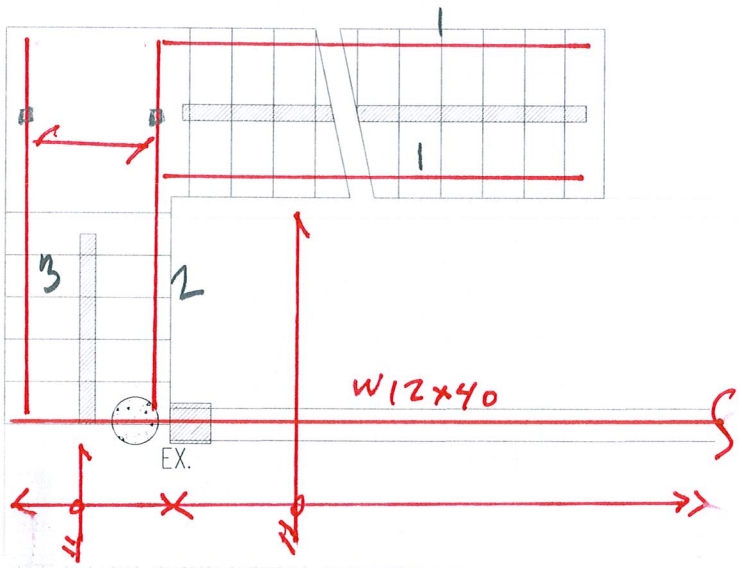
WEXLER LVS
12/18/19

STAIR DESIGN



(1)

$\ell = 9'$

$w = \frac{3\frac{1}{6}"}{2} \times (15+40) = 96.25$ PLF

$M = 974$ #.FT

$V = 433$ #

W 8x10

$\frac{M_{px}}{\Omega} = 21.9$ K.FT

$L_r = 8.56'$

$\Delta = 0.02"$ OK

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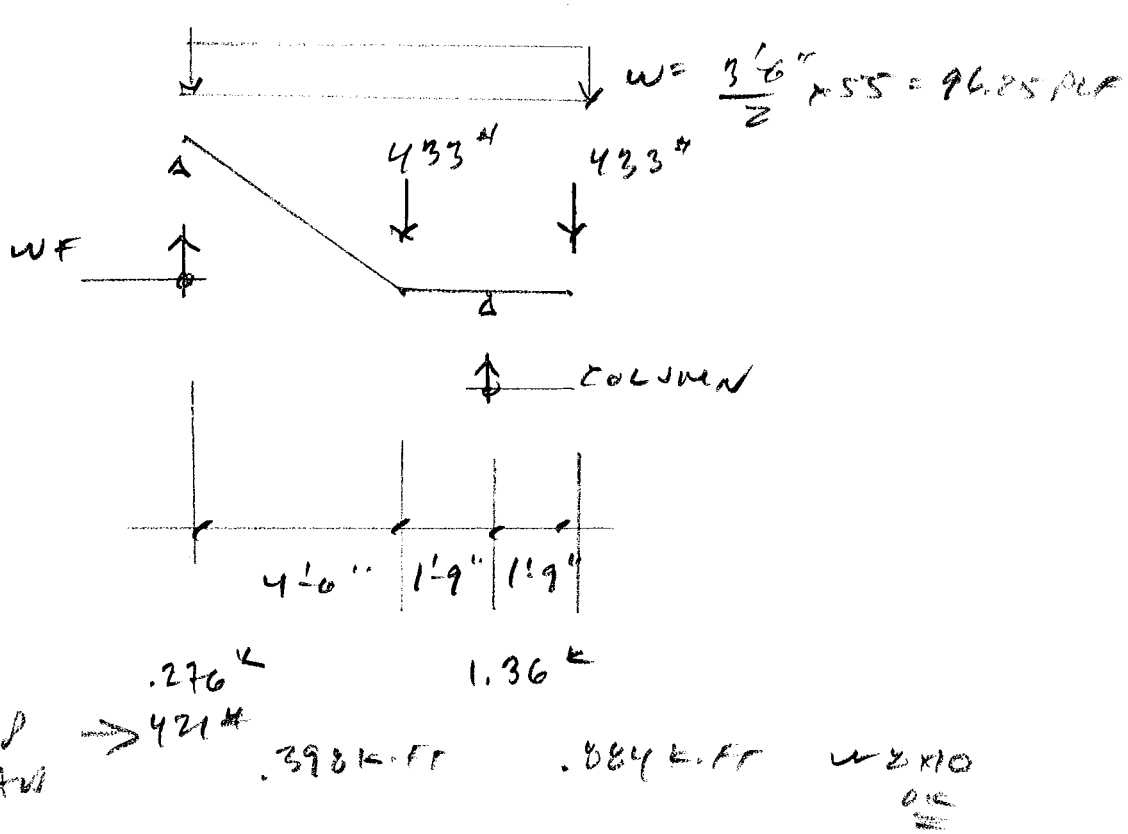
11/25/19 Date

STAIR DESIGN

(2)



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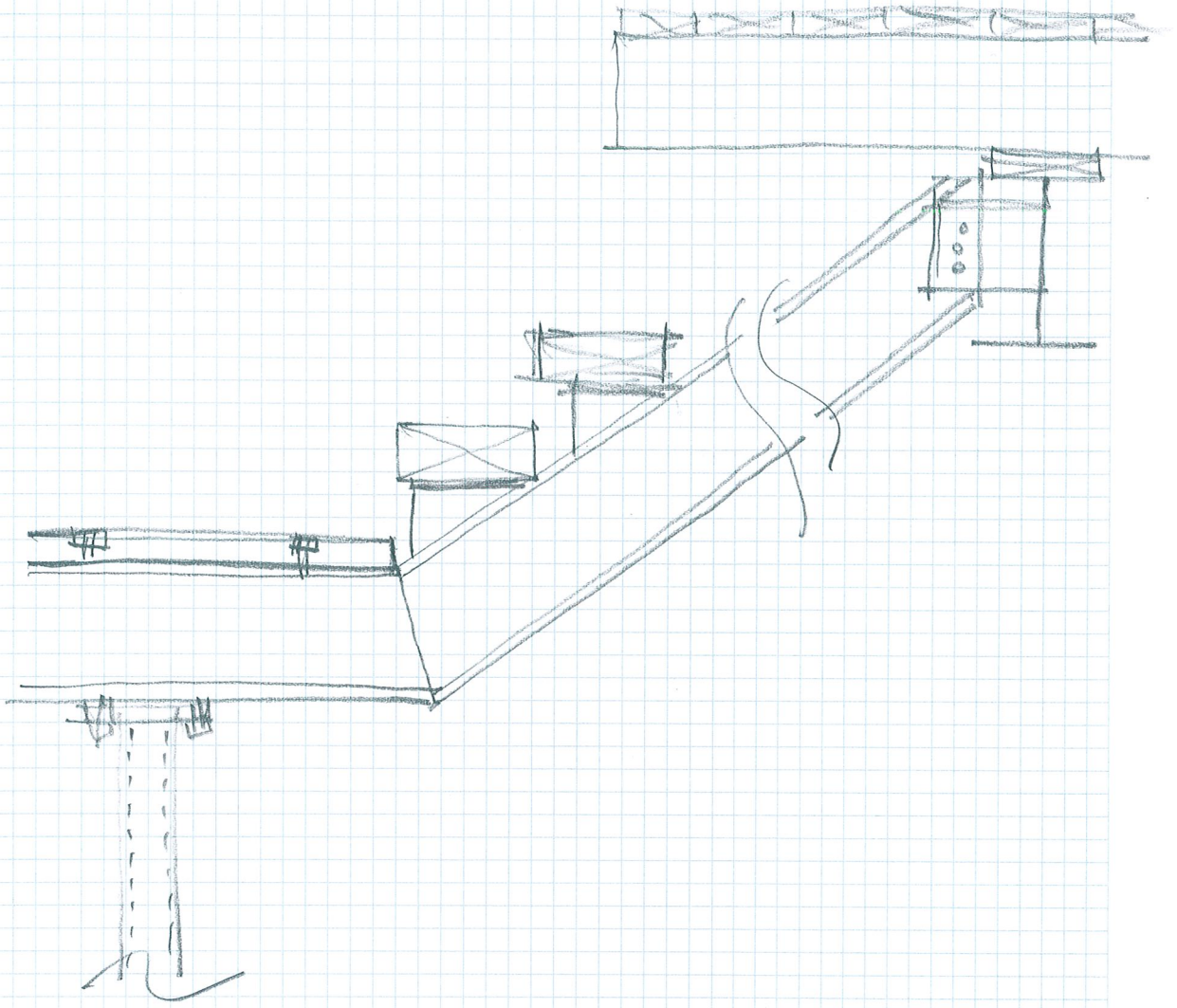
WWBECKIUS
11/25/19



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Project

Date

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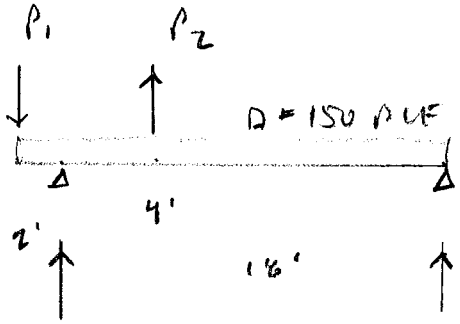
FOUNDATION

NEW FOOTING FOR STEEL SUPPORTS



P_1 = 9^k D ✓
16.5^k L ✓
8.4^k S ✓
± 5.25^k E ✓ (e.7)

P_2 = -3^k D ✓
-5.5^k L ✓
-2.8^k S ✓
± 1.75^k E ✓ (e.7)

D	9.3^k	19.3 k·ft	-.3^k
L	14^k	42.6 k·ft	-3^k
S	7^k	21.7 k·ft	1.6^k
E	4.5^k	13.5 k·ft	-1^k
D+L	23.3^k	61.9 k·ft	-3.3^k ← ATTACH FOOTING TO EX PAD & COLUMN OK
D+S	16.3^k	41 k·ft	1.3^k
D+.75(L+S)	25^k	67.5 k·ft	-1.4^k
D+E	13.8^k	32.8 k·ft	-1.3^k
D+.75(L+E+S)	28.4^k	77.7 k·ft	-2.1^k

(5) 2"ϕ PILES = 30^k OK

$M_u = 1.2D + 1.0E + L + .2S$

$23.16 + 19.29 + 42.6 + 4.3 = 89.35$ k·ft

$\frac{E}{.7}$

d = 12" (15" Below)

$A_s = \frac{M_u}{\phi f_y j d} = \frac{89.35(12)}{.9 \times 60 ksi \times 12} = 1.65 in^2$

(4) #6 Top & Bottom

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WERELIUS
4/13/20

FOUNDATION

GRADE BEAM SHEAR

$V_u \le \phi (V_c + 8\sqrt{f'_c}\, b_w d) = 135^k$

$V_c = 2\lambda\sqrt{f'_c}\, b_w d = 36^k \Rightarrow \phi V_c = .75(36) = 27^k$ OK

$A_{v,min}$ Req'd where $V_u > \phi V_c .5$

$A_{v,min} = 0.75\sqrt{f'_c}\,\frac{b_w}{f_{yt}} = .75\sqrt{7500}\,\frac{24}{40ksi} = .0225$

$50\,\frac{b_w}{f_{yt}} = 50\,\frac{(24)}{40ksi} = .03\ in^2$

USE #3 CLOSED TIES

SPACING = $16\,d_b$ OF FLEX STEEL = $16(.75) = 12"$

- OR -

$48\,d_b$ OF TIES = $.375(48) = 18"$

USE #

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WERKEMA
4/17/20

SPREAD FOOTING DESIGN -- SQUARE

for 2000 psf Allowable Bearing Pressure

f'c =	2,500 psi						
fy =	40 ksi						
1'-6" square							
P =	4.50 k	one-way:					
Pu =	7.34 k	phi Vc =	7.09 k		Vu =	1.53 k	o.k.
p =	2,000 psf	(2) #4 each way					
h =	9.00 in	phi Mn =	6.05 k-ft		Mu =	1.38 k-ft	o.k.
d =	5.25 in						
b =	18.00 in	two-way:					
bo =	35.00 in	phi Vc =	31.24 k		Vu =	5.60 k	o.k.
2'-0" square							
P =	8.00 k	one-way:					
Pu =	13.04 k	phi Vc =	9.45 k		Vu =	3.67 k	o.k.
p =	2,000 psf	(3) #4 each way					
h =	9.00 in	phi Mn =	9.03 k-ft		Mu =	3.26 k-ft	o.k.
d =	5.25 in						
b =	24.00 in	two-way:					
bo =	35.00 in	phi Vc =	31.24 k		Vu =	11.31 k	o.k.
2'-6" square							
P =	12.50 k	one-way:					
Pu =	20.38 k	phi Vc =	11.81 k		Vu =	6.62 k	o.k.
p =	2,000 psf	(3) #4 each way					
h =	9.00 in	phi Mn =	9.11 k-ft		Mu =	6.37 k-ft	o.k.
d =	5.25 in						
b =	30.00 in	two-way:					
bo =	35.00 in	phi Vc =	31.24 k		Vu =	18.64 k	o.k.
3'-0" square							
P =	18.00 k	one-way:					
Pu =	29.34 k	phi Vc =	14.18 k		Vu =	10.39 k	o.k.
p =	2,000 psf	(5) #4 each way					
h =	9.00 in	phi Mn =	14.95 k-ft		Mu =	11.00 k-ft	o.k.
d =	5.25 in						
b =	36.00 in	two-way:					
bo =	35.00 in	phi Vc =	31.24 k		Vu =	27.61 k	o.k.

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