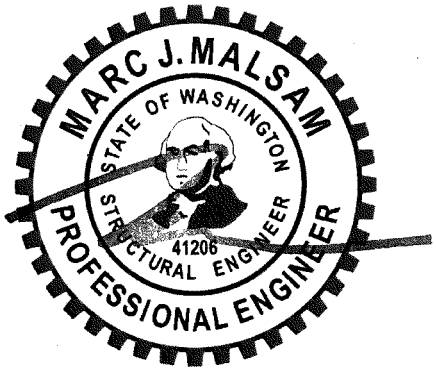
REVISED STRUCTURAL CALCULATIONS FOR:

KONERU RESIDENCE

6610 E MERCER WAY
MERCER ISLAND, WA

ARCHITECT: MCCULLOUGH ARCH

MARCH 07, 2023



MALSAM TSANG
STRUCTURAL ENGINEERING

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DESIGN CRITERIA IBC 2018

DEAD LOADS

FLAT ROOF		FLOOR	
Rigid Insulation	2 psf	1-1/8Gyp+1/4tile	18 psf
3/4" Plywood	2.4 psf	w/ hydro. tubing	- -
TJI @ 24" o.c.	1.5 psf	1 1/8" Plywood	3.6 psf
Gyp Board (5/8")	2.8 psf	Truss @ 16" o.c.	4.0 psf
MEP	1.5 psf	Gyp Board (5/8")	2.8 psf
Solar panel	4.5 psf	MEP	1.5 psf
(where occurs)	-		
Total	14.7 psf	Total	29.9 psf
Use	15.0 psf (Typ. roof)	Use	30.0 psf
Use	30.0 psf (Lower roof w/ pea gravel)		

MISC. LOADS	
16 Ga roof steel deck w/ 2" ave. pea gravel	28 psf
(where: washed pea gravel=9.5 psf per inch thk)	- -
3/4" Stucco (lath & plaster) wall fin.	8 psf

LIVE LOADS/OCCUPANCY

		ROOF SNOW	FLOOR LIVE		DECK LIVE	
Risk Category	II	Snow =	25 psf	Occupancy =	40 psf	Occupancy = 60 psf
Roof Deck	No	**Note:** 5 psf rain on snow	Stair/Corridor =	40 psf		
Common Access	No	surc. for rf slope 5deg or less				

SEISMIC CRITERIA ASCE 7-16 Ch. 11 & Ch. 12

Imp. Factor =	1.00	Seismic Ht, hn=	28 ft
Site Class =	E	T, Building=	0.24
R Value =	6.5	Ts=	0.63

Geo. Ground Hazard? **No w/ASCE 11.4.8 Excep's**

S_s =	1.45		F_a =	1.200	Table 11.4-1
S_1 =	0.5		F_v =	1.850	Table 11.4-2
S_{ms} =	1.740	x 2/3 =	S_{ds} =	**1.059**	Eqn. 11.4-3
S_{m1} =	0.925	x 2/3 =	S_{d1} =	**0.567**	Eqn. 11.4-4

C_{SULT} =	**0.163**	ASCE 7 12.8, ELF, procedure used.
C_{SALL} =	**0.114**	ASCE 7 12.9, MRSA, procedure not used.

T/Ts= 0.385 ≤ 1

Okay, Cs Eqn. 12.8-2

SEISMIC WEIGHT ASCE 7-16 12.7.2

Partitions = 15 psf

***Roof weight = 1/2 Partition + Roof DL**

***Floor weight = Full Partition + Floor DL**

FLAT ROOF 22.5 psf ROOF=37.0 psf (w/ gravel)

FLOOR 45.0 psf

SEISMIC DESIGN CATEGORY IBC 1613.2.5

Seismic DC= D

WIND CRITERIA ASCE 7-16 Ch. 27 Directional Procedure

V =	110 mph	K_d =	0.85
Exposure =	C	G =	0.85
h =	28 ft	K_{zt} =	1.00

Roof Slope = FLAT : 12 = 0 °

PRESSURE COEFFICIENTS (Cp)

Windward Wall =	0.8	Windward Roof =	N/A
Leeward Wall =	-0.5	Leeward Roof =	N/A

PRESSURE (PSF) $q = 0.00256 K_z K_{zt} K_d V^2$

Ht	K_z	q_z	$0.6xq_z$ [1]	q_h	P_{WW}	P_{LW}	P_{WALL}	P_{ROOF}
0-15	0.85	22.4	13.4		9.1	6.6	**15.7**	
15-20	0.90	23.7	14.2		9.7	6.6	**16.2**	
20-25	0.94	24.7	14.8		10.1	6.6	**16.7**	
25-30	0.98	25.8	15.5	15.5	10.5	6.6	**17.1**	**N/A**
30-35	1.02	26.9	16.1		11.0	6.6	**17.5**	
35-40	1.04	27.4	16.4		11.2	6.6	**17.8**	
40-45	1.07	28.2	16.9		11.5	6.6	**18.1**	
45-50	1.09	28.7	17.2		11.7	6.6	**18.3**	

[1] Per IBC 2018 1605.3.1 Basic Load Combinations

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KONERU RESIDENCE
Project

6610 E MERCER WAY

MERCER ISLAND, WA

8/17/2022
Date

0426-2021-03-01
Proj. No.

JCM
Design

DC1
Sheet

COMPONENTS & CLADDING ASCE 7-16 CHAPTER 30

WIND CRITERIA FROM DC1

V = 110 mph K_d = 0.85
Exposure = C K_{zt} = 1.00
h = 28 ft

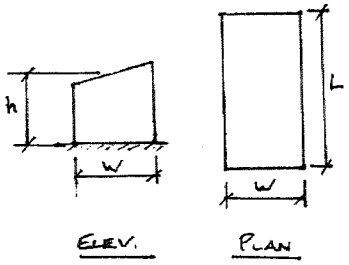
Roof Slope = FLAT : 12 = 0 °

Bldg Type = Enclosed Building

GC_{pi} = 0.18 Table 26.11-1

K_h = 0.968 Table 30.3-1
q_h = 25.5 Eqn 30.3-1
0.6 x q_h = 15.3 Per IBC 2018 Basic Load Combinations

BUILDING GEOMETRY



ELEV. PLAN

W = 63 ft
L = 132 ft
h = 28 ft

a = 6.3 ft

USE PART 1 FOR h < 60'

PART 1: h < 60'

CHAPTER 30.4

MONOSLOPE ROOF 3o < Q < 10o

ROOF PRESSURES				
ZONE	GCp(+)	GCp(-)	0.6p(+)	0.6p(-)
1	0.3	-1.1	7.3	-19.6
2	0.3	-1.3	7.3	-22.6
2'	0.3	-1.6	7.3	-27.2
3	0.3	-1.8	7.3	-30.3
3'	0.3	-2.6	7.3	-42.5

WALL PRESSURES				
ZONE	GCp(+)	GCp(-)	0.6p(+)	0.6p(-)
4	0.9	-0.99	16.5	-17.9
5	0.9	-1.26	16.5	-22.0

Note: When θ < 10°, GCp values are reduced by 10% per Figure 30.4-1 Note 5

CHAPTER 30.9 - PARAPETS

Note: parapet values assume parapet is at roof level

LOAD CASE A: 0.6p = 39.2
LOAD CASE B: 0.6p = 34.4

USE: 0.6p = 39.2

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DC1
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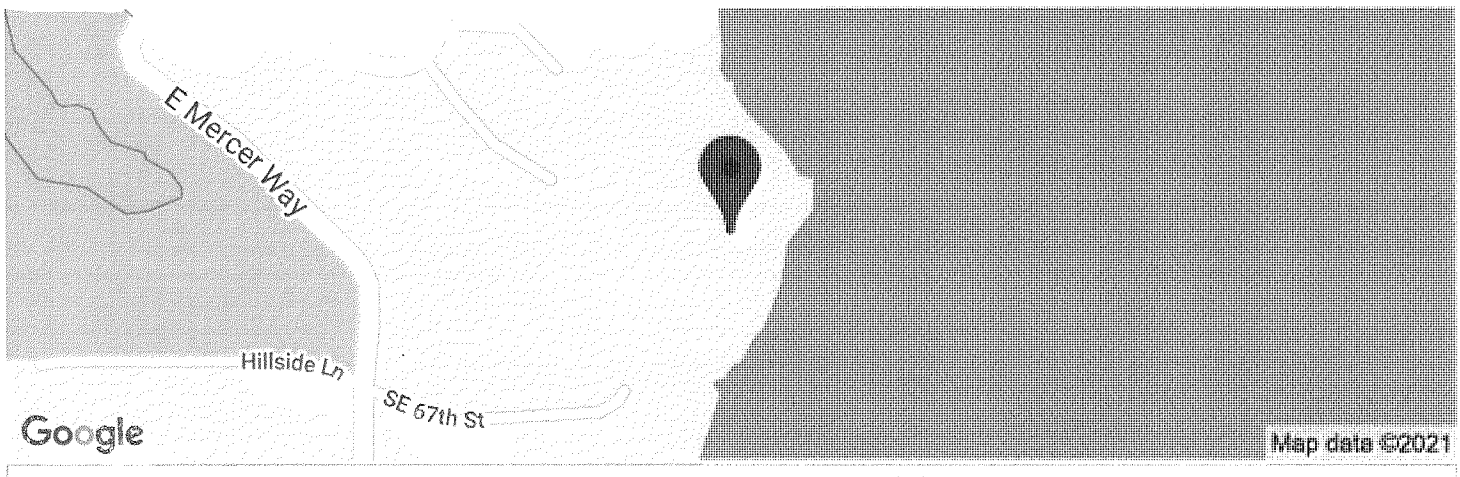
OSHPD

Koneru Residence

6610 E Mercer Way, Mercer Island, WA 98040, USA

Latitude, Longitude: 47.5437445, -122.2093429



Date	10/21/2021, 2:09:01 PM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	E - Soft Clay Soil

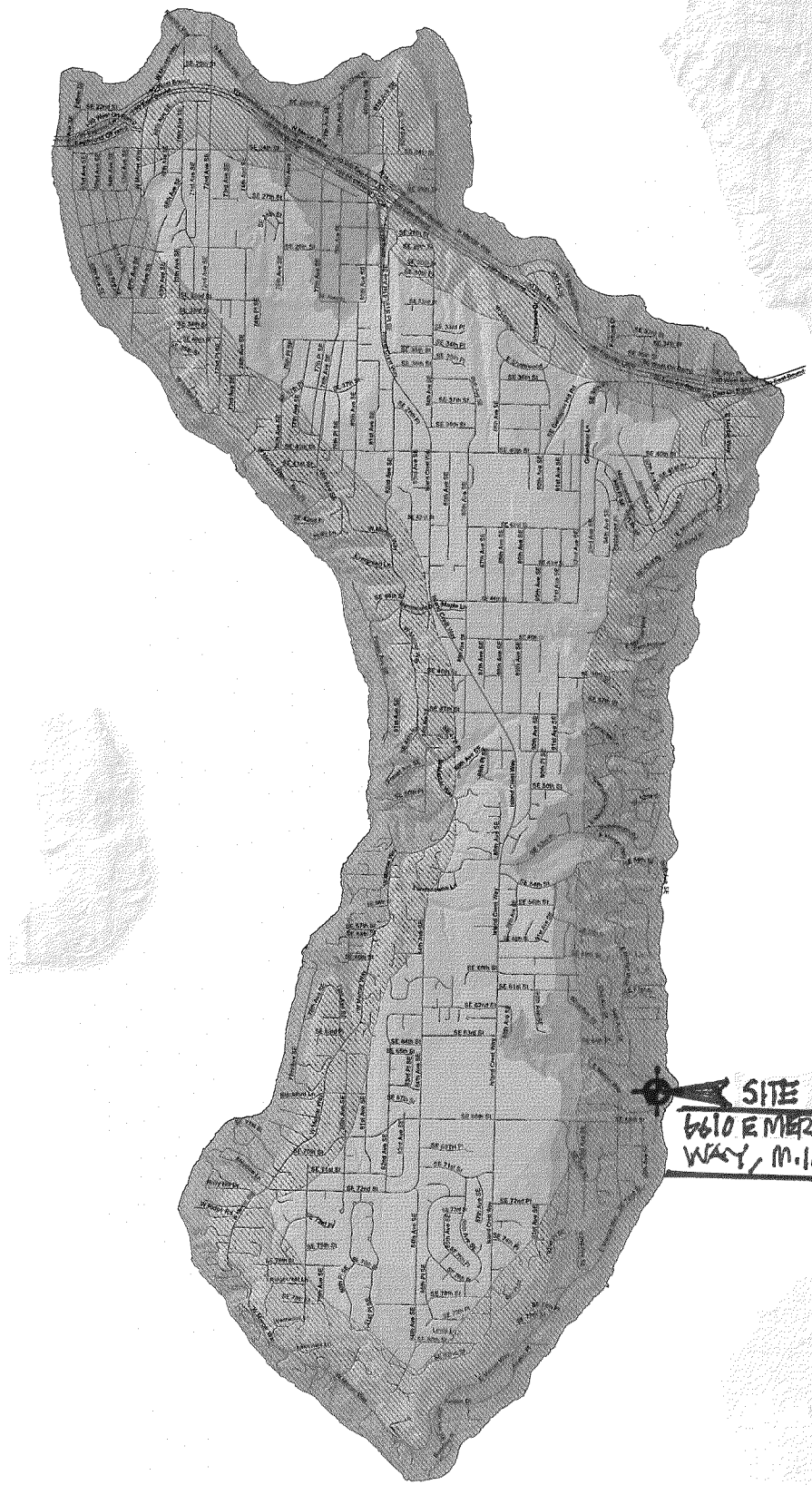
Type	Value	Description
S_S	1.448	MCE_R ground motion. (for 0.2 second period)
S_1	0.501	MCE_R ground motion. (for 1.0s period)
S_{MS}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	null -See Section 11.4.8	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	null -See Section 11.4.8	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.62	MCE_G peak ground acceleration
F_{PGA}	1.1	Site amplification factor at PGA
PGA_M	0.682	Site modified peak ground acceleration
T_L	6	Long-period transition period in seconds
SsRT	1.448	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.606	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	4.294	Factored deterministic acceleration value. (0.2 second)
S1RT	0.501	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.558	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	1.643	Factored deterministic acceleration value. (1.0 second)
PGAd	1.425	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.902	Mapped value of the risk coefficient at short periods
C_{R1}	0.899	Mapped value of the risk coefficient at a period of 1 s

Mercer Island Wind Exposure and Wind Speed-Up (Topographic Effect)

by Development Services Group (DSG), City of Mercer Island
April 2009

0 0.5 1 Kilometers 1:12,000
0 0.5 1 Miles
TN



WIND EXPOSURE CATEGORIES & WIND SPEED-UP FACTORS
(ICC Section 1609 & ASCE 7-05 Chapter 6)

It is the responsibility of the Owner (or their Design Professional) to review site conditions and determine the Kzt factor to be utilized for each specific project. The Kzt factors and wind exposure categories indicated on this map are the minimum values accepted by the City of Mercer Island without requiring the design professional to submit additional calculations and supporting topographic documentation (to verify the values utilized in their wind load determination).

Please note – The Kzt values indicated on this map are approximations based upon periodic calculations of representative samplings around Mercer Island. These values are intended for City of Mercer Island's plan review purposes only.

WIND EXPOSURE CATEGORIES:

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

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

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

GENERAL NOTES FOR WIND EXPOSURE AND WIND SPEED-UP MAP

This map is the Wind Exposure Category and Wind Speed-up (Topographic Effects) Map for the City of Mercer Island. This map shows the minimum wind exposure category and the minimum wind speed-up, "K_zt" factor, which will be accepted without site specific documentation and calculation.

Other wind speed phenomena may occur on Mercer Island that is not specifically indentified on this map. It is the responsibility of the Owner (or their Design Professional) to review site conditions and determine the appropriate design wind speed and exposure category for their specific project and location.

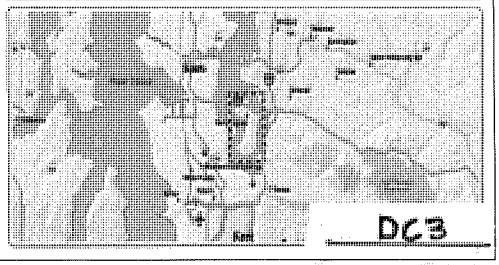
This map is for the sole use of the staff of the City of Mercer Island's Development Services Group (DSG) for the purposes of permit application evaluation. This map provides DSG staff a general assessment of Wind Exposure Category and Wind Speed-up (Topographic Effects). All areas have not been specifically evaluated and there may be locations that are not correctly represented on this map. It is the responsibility of individual property owners and map users to evaluate risk associated with their proposed development. No site-specific assessment of risk is implied or otherwise indicated by the City of Mercer Island with this map.

Information about data used for the map, references, and data limitation are all described the associated "Read Me" document. The digital version of this map is accompanied by a meta data file containing pertinent information about map construction. This data map is available on the City of Mercer Island website.

The City of Mercer Island is using guidance provided within ICC Section 1609 & ASCE 7-05 Chapter 6 regarding definitions used when creating this map.

DEFINITIONS:

K_zt factor	The topographic effect of wind speed-up at isolated hills, ridges, and escarpments constituting abrupt changes in the general topography, located in any exposure category, that meet all of the conditions noted in ASCE 7-05 Minimum Design Loads for Buildings and Other Structures, Section 6.5.7.
Exposure B	The wind exposure category that applies where the site in question is located a minimum of 1500 feet from the shoreline and the mean roof height is less than or equal to 30 feet per IBC 2006 section 1609.4.3.
Exposure C	The wind exposure category that applies where the site in question is located within 1500 feet from the shoreline per IBC 2006 section 1609.4.3.
Wind Speed	Minimum 85 mph 3-second gust per IRC Figure R301.2(4)



DC3

LATERAL ANALYSIS AND DESIGN:

① WIND ANALYSIS: — BOTH DIRECTIONS/EXPOSURES:

LEVEL	TRIB. HT (FT.)	$V_{WIND\,ALLOW}$ - FULL WIND (PLF)	$V_{WIND\,ALLOW}$ - WINDWARD (PLF)
ROOF DIAP.	$2.75+7+10/2$ $= 8.75'$	$= 17.1*2.75'+16.7*5'+10.2*1$ $= 146.7\ \#/'$	$= 10.5*2.75+10.1*5'+9.7*1 = 89.0\#/'$
UPPER FLR. DIAP.	$10/2+2+12/2$ $= 13.0'$	$= 16.2*4'+15.7*9' = 206.1\#/'$	$= 9.7*4'+9.1*9' = 120.7\#/'$

② SEISMIC ANALYSIS:

LEVEL	AREA(#)	WT.(K)	HT(FT)	$W_i H_i$ (K-FT)	DISTRIB.	$F_{i\,LIFT}$ (ALLOW.) DIAP. DES. FORCE (K)
ROOF DIAP.	$5580*26\,PSF + 1250*18.5\,PSF$	168.0 K	22	3695	0.55	26.00 ✓
UPPER FLOOR & LOWER ROOF DIAP.	$4385*45\,PSF + 760*37\,PSF + 515*38^{33} + 140*15 + 100'(12/2+2)*8$	250.0K	12	3000	0.45	21.50
		$\Sigma W_i = 418.0^K$		$\Sigma = 6695$		

$V_{SX\,ULT.} = 0.163\,(418.0) = 68.0$

$V_{SX\,ALLOW.} = 0.114\,(418.0) = 47.5$

ASCE 12.10.1;

INERTIAL DIAP. DES. FORCE

(EQN. 12-10.2)

$F_{PX} = 0.2\,S_{DS}\,I_e * W_{PX}$ — (ULT.)

$= 0.2*1.059*1.0*W_{PX}/1.4$

$F_{PX} = 0.15\,W_{PX}$ — (ALLOW.)

ROOF DIAP. ——— 25.35k — N/G

UPPER FLOOR & LOWER RF. DIAP ——— ✓ 37.75^K > 21.50

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PROJECT KONERU RES.

DATE 10/22/21

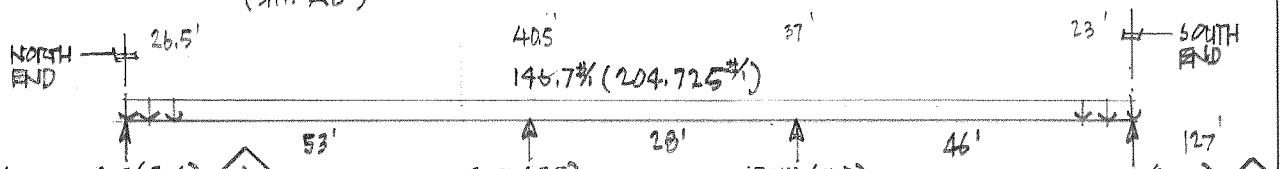
PROJECT NO 0426-2021-03

DESIGN JCM

SHEET L-1

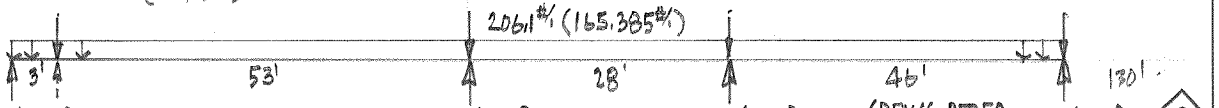
LATERAL DESIGN ; EAST-WEST EXPO. ; SEISMIC LOAD IN PARENTHESIS

UPPER FLR. RF. DIAP. / UPPER FLR. SW ;
ht = 10' (SHT. A8)



R (K) ;	3.9 (5.4) ①	5.94 (8.3)	5.43 (7.5)	3.37 (4.7) ②
ℓ (FT) ;	✓ 9+3 = 12	✓ 8+9+21 = 38	~~23.5~~+21 = 44.5	✓ 3.5+45 = 8
V (PLF) ;	325 (450)	156 (218)	122 (171)	✓ 421 (588)
SW ;	SW3-1	✓ ~~SW6~~ SW4	~~SW6~~ SW4	SW3-2
OT (K) ;	✓ 3.2 (4.5)	1.5 (2.1)	1.2 (1.7)	4.2 (5.8)
HD ;	✓ (3) CS16 OR MSTC66B3	(2) CS16	CS16	✓ (4) CS16
H/L ;	(1×450)×2×3/10 = 540#/' — OK!	N/A	N/A	✓ (1×450) 2×3.5/10 630#/' OK!

UPPER FLR. DIAP. / MAIN FLR. SW
ht = 12'-UNO (SHT. A6)



R ;	10 (10.3)	14.30 (15.0)	13.0 (13.7)	SDPWS-PERFD. SW-TAB 4.3.3.5 1.0	8.1 (8.5) ③
ℓ ;	✓ 5+12+6+6 = 29	13+16 = 29	13.5+24 = 37.5	6 (45+4.5)+20 = 29	
V ;	✓ 345 (355)	493 (517)	347 (365)		279 (293)
SW ;	✓ ~~SW3~~ SW2 for H/L	SW2	~~SW3~~ SW2		~~SW4~~ SW3
OT ;	✓ 4.1 (4.2) — UNSTACK	5.9 (6.2)	4.1 (4.3) — UNSTACK		3.3 (3.5)
			5.3 (6.0) STACK		7.5 (9.3)
HD ;	✓ HDU4	HDU8	HDU8		(2) HDU5 HDU4
H/L ;	✓ 450×2×5/12 = 375#/' — OK!	N/A	N/A		N/A HDU5

◇# — REDUNDANCY FACTOR, ρ CHECK ;

◇1 @ WORST CASE ;

$\frac{5.4 \times 1/2}{(5.4 + 8.3)} \times 100 = 20\% << 33\%$ — PER C12.3.4.2

◇2 : $\frac{4.7 \times 1/2}{(7.6 + 4.7)} \times 100 = 18\% << 33\%$

ρ = 1.0 ALL CASES !

REVD: 7/1/22
REVD: 4/27/22
10/29/21
DATE

KONERU RES.
PROJECT

0426-2021-03
PROJECT NO

JCM
DESIGN

L-2
SHEET

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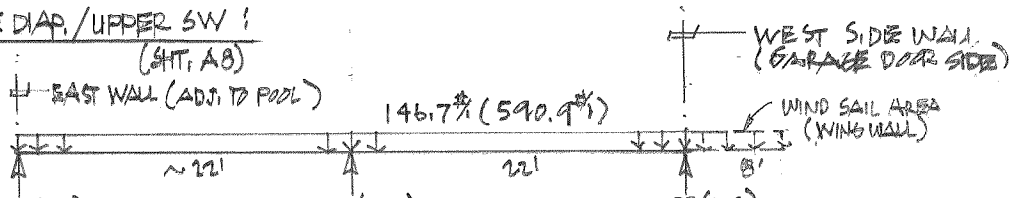
LATERAL DESIGN ; NORTH-SOUTH EXPO. ;

UPPER FLR. RF. DIAP. / UPPER SW ;

HE = 10' (SHT. A8)

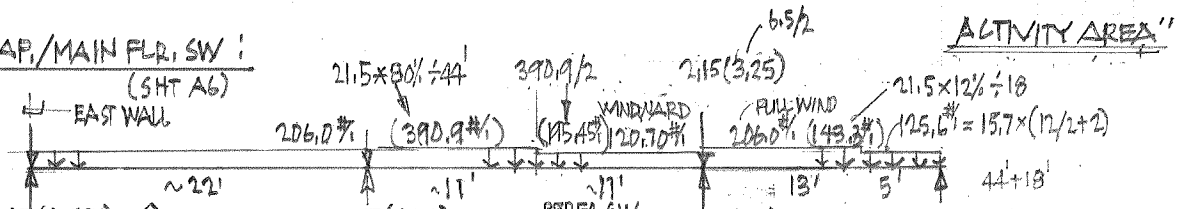


R ;		1.16 (6.5)		3.23 (13.0)		2.77 (6.5)
X ;	✓	9.5+6.4 = 15.9	✓	17+8.5+12.3+8.5+11.5 = 57.8	✓	23+6+11.4 = 40.4
V ;	✓	101 (409)	✓	56 (225)	✓	69 (161)
SW ;	✓	~~SW3~~ SW2	✓	~~SW6~~ SW4		SW6
OT ;	✓	1.0 (4.0)	✓	N/C (2.2)	✓	N/C (1.6)
HD ;	✓	(3) CS16 OR HDU4		(2) CS16		CS16
H/L ;		N/A		N/A		N/A

UPPER FLR. DIAP. / MAIN FLR. SW ;

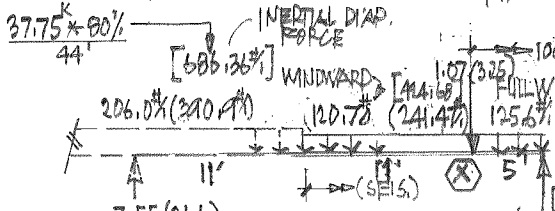
HE = 12' (SHT A6)

"ACTIVITY AREA"



R ;		3.87 (10.8) ④		7.55 (21.6)		5.45 (6.7) ⑤ 1.45 (1.30)
X ;		4.5+9×2+5.3 = 27.8		14.5+10+22.5+21 = 68		TO SQ (2+5) = 7 33
V ;		139 (398)		111 (318)		778 (957) 44 (40)
SW ;		SW2		SW4		SW2-2 SW6
OT ;		1.6 (4.6) ; 2.6 (8.6) UNSTACK STACK		1.3 (3.8) — UNSTACK		STACK — 9.3 (12.8) N/CRIT
HD ;		HDU5 HDU11		HDU5		HDU8 + HDU5 ON 6×8 —
H/L ;		600×2×4.5/12 = 450#/'		N/A		N/A —

PER FPO. SW SDPWS TAB. 4.3.3.5



GARAGE + MECH. + SERV. AREA

SEIS; V; = [390.9#/' / 2 × 11' + 21.5' × 8#/'] ÷ 16
= (241.89#/') — E.L.F.
OR = [686.36 / 2 × 11' + 37.75K × 8%] ÷ 16
= [424.68#/'] — INERTIAL DIAP. FORCE

R ;		7.55 (21.6)				3.03 (7.1)
X ;					✓	9.5+6.5 = 16
V ;					✓	190 (444)
SW ;					✓	~~SW3~~ SW2
OT ;					✓	2.2 (5.3)
HD ;					✓	HDU5
H/L ;						N/A

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KONERU RES.
PROJECT

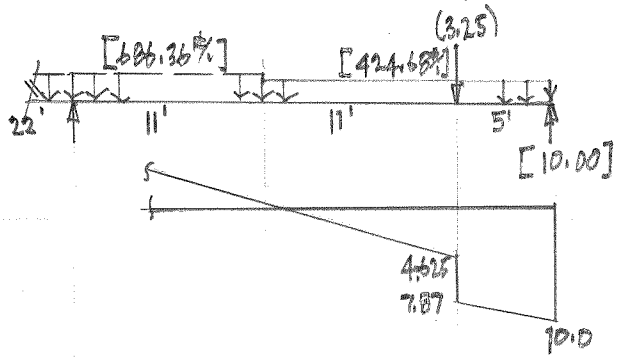
REVD: 7/1/22
11/2/21
DATE

0426-2021-03
PROJECT NO

JCM
DESIGN

L-3
SHEET

ⓧ – DIAP. CHK. DUE TO VERT. IRREG. / SW OFFSET;



$V_{DIAP} = \sim 7.8^{K}/54' * 25\%$

$= 181\#/' < 230\#/'$ – UNBLOCKED CASE-1 – OK!

ⓗ – REDUNDANCY FACTOR, ρ CHECK – CONT;

ⓖ $= \frac{10.8/4}{10.8+21.6+6.7+1.3} * 100 = 7.0\% << 33\%$ – ASCE 7-16 PER C12.3.4.2

ⓕ $= \frac{6.7/2}{10.8+21.6+6.7+1.3} * 100 = 8.3\% << 33\%$

1's $\rho = 1.0$ ALL CASES ∴

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KONERU RES.
PROJECT

REVD: 4/27/22
11/3/21
DATE

0426-2021-03
PROJECT NO

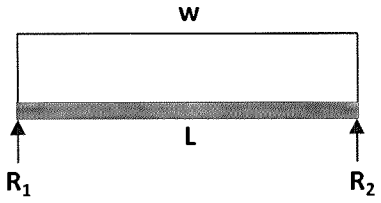
JCM
DESIGN

L-4
SHEET

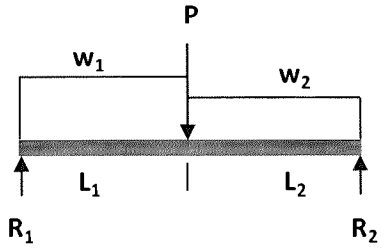
TYPICAL BEAM CASES

***ASSUME CASE 1 FOR ALL BEAMS U.N.O.**

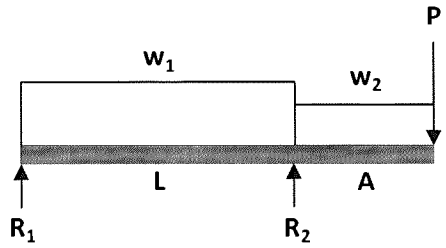
CASE #1: (C1)



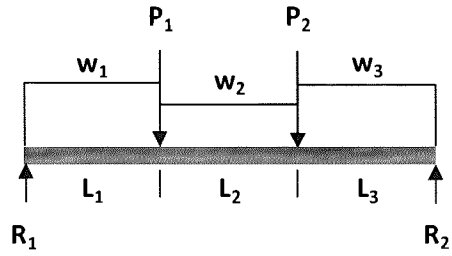
CASE #2: (C2)



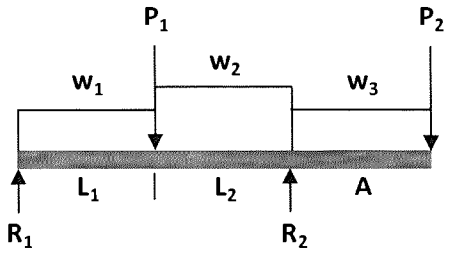
CASE #3: (C3)



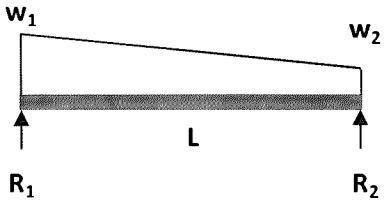
CASE #4: (C4)



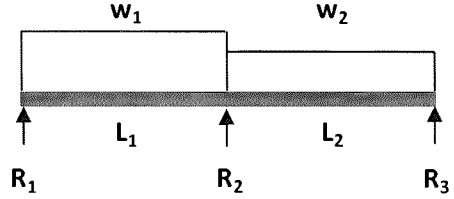
CASE #5: (C5)



CASE #6: (C6)



CASE #7: (C7)



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Project	KONERU RESIDENCE
	6610 E MERCER WAY
	MERCER ISLAND, WA
Date	10/19/2021
Proj. No.	0426-2021-03-01
Design	JCM
Sheet	DC4 — V1

VERTICAL DESIGN:

@ ROOF FRAMING - #200's (AB):

#201 - 11 7/8" TJI - 360's @ 24" oc:

└ DL = 15 PSF; SNOW = 25 PSF + 5 PSF = 30 PSF (RAIN ON SNOW SURC. FOR FLAT R.F. (≤ 5° SLOPE))

SEE FORTE WEB OUTPUT - OK!

✓ #202 - CHK W10x30 ADJ. BDRM-01 S.G.D.:

$W_T' = (15+30)\,20.5/2 + 30 = 460^{\#}$; $\ell = 20'$

$R = 4.50$; $M = 23.0 * 12 =$

$\Delta_{TL} = 0.336" \sim \frac{\ell}{714}$; $S_{x\,REQD} = 9.22$ - OK!

W10x30

✓ #203A - PSL 5 1/4 x 9 1/2 RM/BEAM:

$W = W_{\#21A} = 95^{\#/'}$; $\ell = 20'$

$R = 0.95$; $M = 4.75$

$\Delta_{TL} = 0.45" \sim \ell/526$ (2.0E PSL) - OK!

✓ #203B - RB2 RIM @ EAST WALL:

$W = 45\ PSF \times 11.5'/2 + 10^{\#/'} = 45^{\#/'}$

$\ell = 20.0'$

$R = 0.45$

$M = 2.25$

$f_v = 15$

$f_b = 0.32$

$\Delta_{TL} = 0.21 \sim \ell/1122$ - OK!

#204A/B - RB2 SKYLT BM. O/ TUB:

$W = (15+30)\,8/2 = 180$

$\ell = 19$

$R = 1.71$

$M = 8.11$

$f_v = 55$; $\Delta_{TL} = 0.69" \sim \ell/327$

$f_b = 1.18$ - OK!

#205 - RIM/BM @ BATH-1 EAST WALL:

$W = 0.465$ (SIM. #202); $\ell_{MAX} = 12.5$

$R = 2.9$

$M = 9.10$

$f_v = 73$; $\Delta_{TL} = 0.36" \sim \ell/416$

$f_b = 1.317$

OK? GL/PSL 5 1/4 x 9 1/2

#206 - RB2 DROPPED BM. O/ BDRM-1 HALLWAY:

$W = (15+30)\,4\,1/2 = 0.925$

$\ell_{MAX} = 9'$

$R = 4.2$

$M = 9.4$

$f_v = 11.7$

$f_b = 1.37$

$\Delta_{TL} = 0.155" \sim \ell/695$ - OK!

✓ #207 - RB2 SHADE POCKET BM. @ POOJA WEST WALL:

$W = (15+30)(22/2+1) = 540$; $\ell_{MAX} = 12'$

$R = 3.24$; $M = 9.72$

$f_v = 9.8$; $f_b = 1.42$

$\Delta_{TL} = 0.33 \sim \ell/433$ - OK! RB2

208 - BOT. FLUSH BM. SUPP. INVERTED TRUSS:

CHK. for DL+S LOAD COMBI.:

$W = (20+26)\frac{9}{2} + (20+30)\frac{22}{2} = 755^{\#/'}$; $\ell_{MAX} = 28.5'$

$R = 9.16$; $M = 61.4$

$f_v = 8.0$; $f_b = 1.10$

$\Delta_{TL} = 0.442" \sim \ell/692$

- GL 5 1/2 x 27 24F-V4

CONS. DES.

7/5/22, NO LONGER AN OPT.

RECHK for DEFL; DL + LL from STAIR LOAD; (C-4) (LL from ROOF &)

$\ell_1 = 6.5$; $\ell_2 = 15.5$; $\ell_3 = 6$

$P_1 = 1.45$; $P_2 = 1.05$

$W_1 = 820$ (40 x 3 1/2); $W_2 = 660$; $W_3 = 1060$

$R_1 = 10.6$; $R_2 = 12.5$; $M = 75.75$

$f_v = 10.2$; $\Delta_{TL} = 0.67 \sim \ell/501$ - OK?

$f_b = 1.136$

GL 5 1/2 x 27 24F-V4

209 - N/S ROOF BM. O/ BRIDGE:

CHK. for DL+S LOAD COMBI.:

$W = (20+30)\,41/2 = 1,025$; $\ell = 28.5$

$R = 14.6$; $M = 104.0$

$f_v = 10.9$; $f_b = 1.514$

$\Delta_{TL} = 0.68" \sim \ell/501$

OK? GL 5 1/2 x 30

CHK for DEFL, PER IBC 16-11 LOAD COMBI.: (C-4)

$\ell_1 = 6.5$; $\ell_2 = 15.5$; $\ell_3 = 6$ — $P_1 = 2.8$; $P_2 = 2.05$

$W_1 = 40 \times 41/2 = 820$; $W_2 = 40 \times \frac{28}{2} = 520$; $W_3 = 720 + 40 \times \frac{19}{2} = 1100$

$R_1 = 12.10$; $R_2 = 12.9$; $M = 74.6$

$\Delta_{TL} = 0.784" \sim \ell/428 \gg \ell/240$ - OK! GL 6 3/4 x 24

OR ALT. — USE B 3/4 x 24

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KONERU RES.
PROJECT

REVD: 7/1/22
11/5/21
DATE

0426-2021-03
PROJECT NO

JCM
DESIGN

V-2A
SHEET

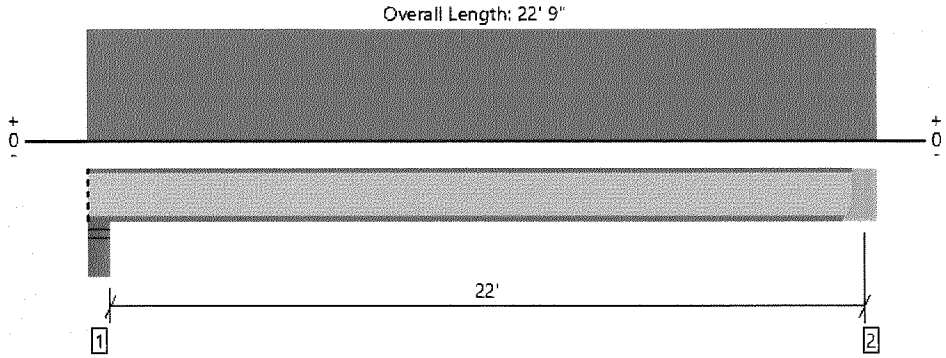
FORTE WEB

MEMBER REPORT

PASSED

Roof, #201 - Roof Rafters

1 piece(s) 11 7/8" TJI® 360 @ 24" 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)	994 @ 22' 5 1/2"	1242 (1.75")	Passed (80%)	1.15	1.0 D + 1.0 S (All Spans)
Shear (lbs)	994 @ 22' 5 1/2"	1961	Passed (51%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	5486 @ 11' 5"	7107	Passed (77%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.832 @ 11' 5"	1.104	Passed (L/319)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	1.248 @ 11' 5"	1.472	Passed (L/212)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - SPF	5.50"	5.50"	1.75"	343	685	1028	Blocking
2 - Hanger on 11 7/8" LSL beam	3.50"	Hanger[1]	1.75" / - [2]	340	680	1020	See note [1]

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- 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)	3' 10" o/c	
Bottom Edge (Lu)	22' 6" 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
2 - Face Mount Hanger	IUS2.37/11.88	2.00"	N/A	10-10dx1.5	2-Strong-Grip	

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

Vertical Load	Location	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 22' 9"	24"	15.0	30.0	Default Load

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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Joseph Marquez Malsam-Tsang Engineering (206) 602-5122 JosephM@malsam-tsang.com	

Weyerhaeuser

7/1/2022 9:05:16 PM UTC
ForteWEB v3.2, Engine: V8.2.0.17, Data: V8.1.0.16
File Name: Koneru Res

ROOF FRMG \ CONT.:

✓ #210 - FLUSH BEAM LIV/OUTDOOR PORCH!

W = (15+30) 19/2 + 50 = 0.48; ℓ = 28.5'
R = 6.84; M = 48.74 × 12 = 585 K-IN
ΔTL = 0.99" ~ ℓ/345
Sx REQD = M/(Fy/Ωb) = 19.54 IN³ — OK!

W10×45

✓ #211A - GLB RB2 RIM:

W ≃ 45#; ℓ = 28.5'
R = 0.64; fv = 22
M = 4.6; fb = 0.67
ΔTL = 0.76" ~ ℓ/450

✓ #211B - GLB 5 1/2 × 15 RIM/BM:

W = (20+30+45) 2/2 = 95; ℓ = 28.5'
R = 1.43
M = 10.2
fv = 27
fb = 0.73
ΔTL = 0.50" ~ ℓ/675 — OK!

#212 - 2ND FLR RF. AWNING/VISOR RAFTERS:

W = (15+30) 12/12 = 0.045; ℓ = 13'
R = 0.30
M = 0.95
fv = 42
fb = 1.293
ΔTL = 0.596" ~ ℓ/262 - OK! LVL 1 3/4 × 5 1/2 AT 12" OC

#213A/B - RF. AWNING HIGH RIM/BEAM:

W = (15+30) 13/2 = 0.295, ℓ = 29
R = 4.278; M = 31.01 × 12 =
CHK W12×30: d = 12"; bf = 6 1/2"; tw = 1/4; tf = 7/16"
Ix = 238; Sx = 38.6

ΔTL = 0.68" ~ ℓ/512 — OK! W12×30
Sx READ = M/(Fy/Ωb) = 12.43

USE W12×35

#214 - HIGH STEEL BEAM/RIM SUPP. TRUSS END:

W = (20+25) 9/2 = 205 #/
ℓ = 28.5 \ SLOPE > 5 DEG.
R = 2.92
M = 20.815 × 12 = 250 K-IN

CHK. for W12×30: Ix = 238; Sx = 38.6

ΔTL = 0.44" ~ ℓ/776 — OK
Sx REQD = 8.341 IN³ — OK! — W12×30

USE W12×35

#215A/B - CANT. STEEL BM. - HIGH; (C-3):

ℓ = 19.5; A = 13.0; P = R #213A/B = 4.28
W's ≃ 0.05
R1 = -2.58
R2 = 8.50
M- = - 59.9 × 12 =

CHK W12×35:

Ix = 285; Sx = 45.6

DL+LR LOAD COMBIN.: P = (20+20) 13/2 × 29/2 = 3.77

ΔTL @ CANT. END = 1.44" ~ 2A/216 > 2A/120; IBC TAB. 1604.3 — OK!

LIVE ROOF COMBIN.:

P = 3.77/2 = 1.885

ΔLr @ CANT. END = 0.72" ~ 2A/433 > 2A/180 — OK!

#216A/B — STEEL BEAM HIGH:

NOT SUPPORTING BR6. LOAD
1', USE W12×35 - TO MATCH #215;

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PROJECT: KONERU RES.
REVD: 7/5/22
DATE: 11/6/21
PROJECT NO: 0426-2021-03
DESIGN: JCM
SHEET: V-3

ROOF FRMG. \ CONT.:

✓ # 217A/B – RIM/BEAM O/ BDRMS 01 & 02 EAST WALL:

W = (15+30) 22/2 = 495#/'
ℓMAX. = 15
R = 3.71
M = 13.92
fv = 78
fb = 1.354
ΔTL = 0.427" ~ ℓ/421 – OK! RB3

218 A/B – RB2 FLUSH BM:

W = (15+30) 5/2 = 115 #/'
ℓ = 21
R = 1.20
M = 6.34
fv = 40
fb = 0.925
ΔTL = 0.66" ~ ℓ/379 – OK!

✓ # 219 – RB2 SHADE POCKET BM O/ EXERCISE:

W = (15+30) 21/2 = 475 #/'
ℓ = 10.5
R = 2.5
M = 6.55
fv = 73
fb = 0.955
ΔTL = 0.17" ~ ℓ/734 – OK!

220 – 4×8 HDR @ EXTR.

W = (15+30) 345/2 = 775
ℓ = 4
R = 1.55
M = 1.55
fv = 64
fb = 0.161 – OK!

221 – 4×8 INTR BRG. HDR:

W = (15+30) 41/2 = 925 #/'
ℓ = 5
R = 2.3
M = 2.9
fv = 104
fb = 1.13 < 1.17 * 1.15 – OK!
ΔTL = 0.073" ~ ℓ/820

222 – 11 7/8" TJI-240 @ 24" OC RAFTERS:

DL = 15 PSF ; SNOW = 30 PSF
↳ SEE FORTE-WEB OUTPUT

223 – STEEL BM. – FLUSH RF. BM. O/ BEDRM 01:

W's = (15+30) 4/2 + 30 = 955 #/' ; (C-3)
ℓ = 20 ; A = 1.5 ; P = 0

W10×30:
d = 10 1/2" ; Ix = 170 ; tw = 5/16" (~0.3")
bf = 5 3/4" ; Sx = 32.4 ; tf = 1/2"

ΔTL @ B. SPAN = 0.687" ~ ℓ/349

R1 = 9.15 ; R2 = 11.0
M- = -1.07
M+ = 47.2 * 12 = 566.40 K-"
Sx REQD = M / (Fb/Ωb) ; Ωb = 1.67
= 18.92 IN³ << 32.4 – OK!

✓ # 224A – RB1 BEAMS for SHADE POCKET O/ BDRM 04:

W's = (15+30) 15/2 = 340 #/' ; ℓ = 6 (C-1)
R = 1.02 ; fv = 44 ; ΔTL = 0.03 ~ ℓ/2748
M = 1.53 ; fb = 0.45

✓ #224B – (C-2) : ℓ1 = 1 ; ℓ2 = 14 ; P = 1.02
W's = (15+30) 2/2 = 0.045 K/'
R1 = 1.3 ; R2 = 0.40 ; M = 1.83
fv = 90 ; fb = 0.533
ΔTL = 0.12" ~ ℓ/918

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KONERU RES.
PROJECT

REVD: 1/16/23
7/5/22
DATE

D426-2021-03
PROJECT NO

JCM
DESIGN

V-4A
SHEET

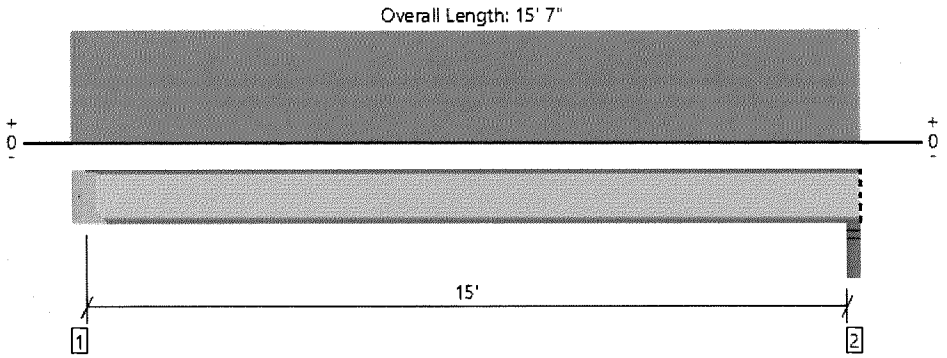
FORTE WEB

MEMBER REPORT

PASSED

Roof, #222 - Roof Rafters

1 piece(s) 11 7/8" TJI® 210 @ 24" 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)	679 @ 3 1/2"	1156 (1.75")	Passed (59%)	1.15	1.0 D + 1.0 S (All Spans)
Shear (lbs)	679 @ 3 1/2"	1903	Passed (36%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	2559 @ 7' 10"	4364	Passed (59%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.252 @ 7' 10"	0.754	Passed (L/717)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.379 @ 7' 10"	1.006	Passed (L/478)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Hanger on 11 7/8" LSL beam	3.50"	Hanger[1]	1.75" / - [2]	235	470	705	See note [1]
2 - Stud wall - DF	3.50"	3.50"	1.75"	233	465	698	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- 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' 7" o/c	
Bottom Edge (Lu)	15' 4" 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 - Face Mount Hanger	IUS2.06/11.88	2.00"	N/A	10-10dx1.5	2-Strong-Grip	

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

Vertical Load	Location	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 15' 7"	24"	15.0	30.0	Default Load

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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Joseph Marquez Malsam-Tsang Engineering (206) 602-5122 JosephM@malsam-tsang.com	

Weyerhaeuser

7/1/2022 9:08:05 PM UTC
ForteWEB v3.2, Engine: V8.2.0.17, Data: V8.1.0.16
File Name: Koneru Res

@ UPPER FLOOR FRMG. ; #100's (A6) ;

→ 24" PRE-MFD FLOOR TRUSSES @ 16" OC ;

DL = 30 PSF ; LL = 40 PSF

✓ #101 - RB1 RIM ;

W = (30+25+5)~1' = 60

ℓ_{MAX1} = 21

R = 0.63

M = 3.30

fv = 41

fb = 0.96

Δ_{TL} = 0.69" ~ ℓ/363 - OK?

✓ #102 - GAR. HDR. ; - RB3

W = (30+25+5) 8/2 = 0.24

ℓ = 18.5

R = 2.22

M = 10.30

fv = 46

fb = 0.95

Δ_{TL} = 0.45" ~ ℓ/485 - OK? RB3

✓ #103A - GAR. HDR. ; RB2

W = 0.24

ℓ = 9.5

R = 1.14

M = 2.70

fv = 33

fb = 0.4

Δ_{TL} = 0.058" ~ ℓ/1982 - OK?

✓ #103B - 4x8 HDRS

W = 0.24 ; ℓ_{MAX} = 4'

R = 0.48

M = 0.48

fv = 20

fb = 0.19 - OK?

✓ #104 - BM. SUPP. NO. SW ABV. (TOP FLUSH W/ JOIST BOTTOM) O/ GAR. MANDOOR

ℓ_1 = 8.5 ; ℓ_2 = 10 (C-2)

W_1 = (20+30) ~1 + 15 * 10' + (30+40) ~1 = 270

W_2 = (30+30) 2.5/2 = 75 #/'

P = UWOR SELS = 8.25 ; UW = 3.20

Ω FACTOR PER ASCE 2.4.5 EQ:-9

U_{SELS} = 4.5 * 0.525 * 1.4 * 2.5 = 8.25 - 90 CMS?

R_1 = 6.43

R_2 = 4.86

M = 44.90 PER ASCE 2.4.5

fv = 111 < 290 * 1.2

fb = 3.27 < 2.9 * 1.2 = 3.48 - OK? RB4

✓ RECHK BM. REACTIONS W/O UPLIFT for #106 ;

P = 0 ; W_1 = 270 #/' ; W_2 = 75 #/'

R_1 = 1.97 ; R_2 = 1.07

→ P_1 TO #105 BM DEFL. CHK.

✓✓ #105 - FLR. BM. ADJ. TO GAR. DOORS ; (C-4)

ℓ_1 = 1 ; ℓ_2 = 22.5 ; ℓ_3 = 7.5 ; R = 0 ; P_1 = R_1 #105 = 6.43 ; WITH UPLIFT

W_1 = (30+30) 2.5/2 = 750 #/' P_1 = 1.97 ; W/O UPLIFT

W_2 = $W_{\#104}$ + 15x10 + (30+30) 6/2 + (30+40) 22/2

= 540 + 150 + 180 + 770 = 1640 #/'

W_3 = 540 + 150 + 180 + (30+40) 14/2 = 1360 #/'

✓✓ BM. DESIGN CONSIDERING UPLIFT ;

R_1 = 30.50 ; R_2 = 23.80

M = 196.20

fv = 212 < 265 * CD

fb = 2.32 < 2.4 * CV * CD = 2.8185 - OK? (CV 0.1851/1.38)

Δ_{TL} = 1.24 ~ ℓ/300 (INCL. RF. SNOW + UPLIFT)

FOR GLB 6 3/4 x 30 24F-V4

CV = 0.851 ASCE 2.4.5

CD = 1.2 * 1.15 SNOW = 1.38

✓✓ RECHK DEFL. W/O UPLIFT ; P_1 = 1.97K ; P_2 = 0

$\Delta_{TL\ (INCL.\ SNOW)}$ = 1.22" ~ ℓ/304 > ℓ/240 - OK?

GLB 6 3/4 x 30 33 24F-V4 - OK?

REVD: 2/27/23
REVD: 8/10/22
11/9/21

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KONERU RES.
PROJECT

DATE

D426-2021-03
PROJECT NO

JCM
DESIGN

V-5
SHEET

UPPER FLOOR FRMG. \ CONT. :

✓✓ #106 - GL 6 3/4 X 24 O/ SERVICE & POWDER RMS. :

W = $W_{2\ \#105}$ = 1.640 K/'

ℓ = 16' MAX. SPAN

R = 13.12

M = 52.5

fv = 91

fb = 0.97

Δ_{TL} = 0.173" ~ ℓ/1111] — OK! GL 6 3/4 X 24 24F-V4 FLUSH W/ FLR. TRUSSES

✓ #~~107~~ - MECH. 01 HEADER ; (C-2) :

ℓ_1 = 4.25 ; ℓ_2 = 1.25 ; W_S ≅ 0

NOT APPLIC.

ASCE 2.4.5 DUE TO Ω_0 FACTOR

= 432 — OK!

fb = 1.14

PSL 5 1/4 X 18 HDR

#108 - RB3 DROPPED BEAM (O/ FREEZER) :

W = $W_{\#221}$ + 10 X 10' + (30+40) 31/2
= 925 + 100 + 1085 = 2.11

ℓ = 7.5

R = 7.9

M = 14.84

fv = 134

fb = 1138

Δ_{TL} = 0.108" ~ ℓ/828] — OK!

#109 - BEAM/RIM O/ DIN. EAST S.G.D. ; (C-4) :

ℓ_1 = 1.5 ; ℓ_2 = 19.5 ; ℓ_3 = 2.5

W_1 = (30+40) 19/2 + 15 X 10 + 465 $W_{\#202}$ = 1280 #/'

W_2 = (30+40) 19/2 + 15 X 10 = 815 #/'

W_3 = (30+40) 10/2 + 150 + $W_{\#202}$ 465 = 965

W/O UPLIFT :

P_1 = 4.62 ; P_2 = R_{ABU} $R_{\#202}$ + R_{GT} = 4.62 + 3.13 = 7.75

UPLIFT : U_{WIND} = 1.0
U_{SEIS} = 4.0 × 0.525 × 2.5 × 1.4 = 7.35

P_1 = 4.62 ; ∴ P_2 = 7.75 + 7.35 = 15.1 (↓) — GOVERNS for UPLIFT

P_2 = 7.75 − 7.35 = 0.4 (↑)

#109 \ CONT. : (C-4)

CHK. BM. W/O UPLIFT & DL+LL ONLY for DEFL

WHERE : W_1 = 1280 ; W_2 = 815 ; W_3 = 965 ; P = 7.75

$\Delta_{TL\ INCL\ SNOW}$ = 0.212" ~ ℓ/1329 — OK!

CHK W18 X 71 ; Fy = 50 ; Ω_b = 1.67

d = 18 1/2" ; bf = 7-5/8"

tw = 1/2" ; tf = 13/16

Ix = 1170 ; Sx = 127

✓ RECHK. BM. W/ UPLIFT for CAPACITY :

P_1 = 4.62

$P_{2\ TOT}$ = 7.75 + U_{SEIS} ~~W/ Ω_0~~ 7.35 = 15.1

R_1 = 16.2

R_2 = 23.74 ← UPLIFT DOWNWARD ; UPLIFT UPWARD R_2 = 10.6 K ✓

M = 80.15 K-' × 12 = 962.0 K-"

Sx REQD = 32 IN³ << Sx PROV. = 127 IN³ — OK!

#110 - BEAM O/ KITC. S.G.D. ; (C-4) :

ℓ_1 = 7.0 ; ℓ_2 = 12.0 ; ℓ_3 = 9.5

W_1 = $W_{\#202}$ + 15 X 10' + (30+30) 13/2 =
= 465 + 150 + 390 = 1005 #/'

W_2 = 150 + 390 + (30+40) 19/2 = 1205 #/'

W_3 = 150 + 390 + (30+40) 9/2 = 855 #/'

W/O UPLIFT :

P_1 = $R_{ABU\ \#205}$ + R_{GT} = 2.9 + 3.10 = 6.0 ; P_2 = R_{GT} + 0.465 × 21.5/2 = 3.1 + 5.0 = 8.10

W/ UPLIFT :

SIM. TO #109

U_W = 1.0 OR

U_{SEIS} = 4.0 × 0.525 × 2.5 × 1.4
= 7.35

∴ $P_{1\ TOT}$ = 6 + 7.35 = 13.35

CHK W 18 X 106 ; Fy = 50 ; Ω_b = 1.67

d = 18-3/4" ; b = 11 1/4" ; tw = 9/16" ; tf = 15/16"

Ix = 1910 Sx = 204

$\Delta_{TL\ INCL.\ SNOW}$ = 0.45" ~ ℓ/748 — OK!

CHK BM. CAP. W/ UPLIFT : $P_{1\ TOT}$ = 13.35 K

R_1 = 28.2 ; R_2 = 22.9 ; M = 197.6 × 12 = 2371 K-"

Sx REQD = 79.2 IN³ << Sx PROVIDED = 204 — OK!

$P_{MAX\ for\ POST}$ = $R_{2\ \#109}$ (UPLIFT UPWARD) + $R_{1\ \#110}$ = 10.6 + 28.2 = 39.0 K

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SHEET: V-6A

#107A – LVL 1 3/4 x 7 1/4 @ 16" o.c. RAFTERS:

$W = (30+25+5)\ 16''/12 = 80\#/'$

$\ell = 13'$

$R = 0.52$

$M = 1.69$

$f_v = 56$

$f_b = 1.32$

$\Delta_{TL} = 0.462'' \sim \ell/337$ — OK!

#107B – GLB 5 1/2 x 12 24F-V4 HDR:

$W = (30+25+5)\ 20/2 = 600\#/'$

$\ell_{MAX.} = 11.5'$

$R = 3.45$ < HUCQ610-SDS CAP. = 5.185^k — OK!

$M = 9.92$

$f_v = 65$

$f_b = 0.90$

$\Delta_{TL} = 0.165'' \sim \ell/833$ — OK!

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UPPER FLOOR FRMG \ CONT.:

#111 - BEAM/RIM @ LIVING DOOR+WDW:

W = 15 PSF × 10' = 150 #/' ; ℓ = 28'

TRY (2) HSS 7X5X1/2 WELDED TOGETHER

$I_{x\,EACH} = 60.6\ IN^4$; $S_x = 17.3\ IN^3$

Wt = 35.11 #/'

$\Delta_{TL} = 0.159'' \sim \ell/564$ - OK! (BM INT. N/INCL. PER IBC TAB. 1604.3, FOOTNOTE 9)

$R_{MAX} = 3.1$

$M_{MAX} = 21.6^{K-'}$; $S_{x\,REQD} = 8.3\ IN^3$ - N/CRIT. (@ Fy = 46 KSI - CONS.)

#112 - HSS 6X3X1/4 BRIDGE JSTS @ 36" OC:

W = (40+30) 3' = 0.127 ; ℓ = 5'

M = 0.1844 × 12 = 10.13 K-'

HSS 6X3X1/4:

Ix = 17 ; Sx = 5.66

Fy = 50 ; Zb = 1.67

$S_{x\,REQD} = 0.34$ - OK! N/CRIT.

#113A/B - STEEL BM for BRIDGE

W = (40+30) 5/2 + 45 + 50 = 270 #/' (175; RAIL; BM WT.)

ℓ = 28' ; R = 3.8 K

CHK HSS 12X3 1/2X3/8:

Ix = 156 ; Sx = 26

$\Delta_{TL} = 0.176'' \sim \ell/440 >> \ell/240$ - OK! (DL+LL)

$M_{MAX} = 26.5 \frac{1}{2} \cdot 12 = 318^{K-'}$

$S_{x\,REQD} = 11.55 < S_{x\,PROV.} = 26$ - OK!

#114 - STEEL RIM/BM @ STAIRWELL WEST WALL:

$W_{BEAM} = 150$ #/' ; $W_{DECK} = 200$ #/' (INCL. BM WT.) ; $\ell_{MAX} = 11.5'$

FLAT HSS 7X4X1/2 ; Iy = 20.7 ; Sy = 10.4

$\Delta_{TL} = 0.131'' \sim \ell/1053 >> \ell/360$ - OK!

R = 1.15 ; P_{MAX} =

$M_{MAX} = 3.31 * 12 =$ (@ Fy = 46 KSI - CONS.)

$S_{y\,REQD} = 1.44 << S_{y\,PROV.} = 10.4$ - OK!

→ SEE NEXT SHT. (V-7B) for OUT-OF-PLANE LOAD CHECK.

#115 - RIM/BM @ OFFICE EAST WALL: (C-4)

$\ell_1 = 7.5$; $\ell_2 = 6.5$; $\ell_3 = 2.5$

$W_1 = W_2 = 150 + (30+40) \sim 20/2 = 850$

$W_3 = W_{\#117A} + 15 \times 10' + (30+40) \sim 20/2 =$

$= 495 + 150 + 700 = 1,345$ #/'

W/O UPLIFT:

$R_1 = 495^{\#/'} \times \frac{2.5}{2} = 5.7$

$R_2 = 495 \times 7/2 = 1.73$

W/ UPLIFT:

SIM. TO #110

$P_2 = 1.73 + 7.35$ (USE W/ DL)

$P_2 = 9.10$ K

CHK BM. for DEFL. W/O UPLIFT: (C-4)

$P_1 = 5.7$; $P_2 = 1.73$

$\Delta_{TL} = 0.326'' \sim \ell/606$

CHK BM. for CAP. WITH UPLIFT: (C-4)

$P_1 = 5.7$; $P_2 = 9.1$

$R_1 = 11.60$

$R_2 = 18.5$

M = 63.0

fv = 209

fb = 1.87 — OK! GL 5 1/2 × 21, 24F-V4

BRG CAP. of 2X BOT SUPP. 6X6:

$BRG.\ CAP. = 0.625 \times 5.5^2$

$= 18.9^{K}$ - OK!

#116 - RM/BM @ BDRM. 03 EAST WALL:

W = 150 + (30+40) 21/2 + (20+25) ~ 1 = 930

ℓ = 15.5

R = 7.2 ; $\Delta_{TL} = 0.158'' \sim \ell/1177$

M = 27.93

fv = .72

fb = 0.83

OK! GL 5 1/2 × 21, 24F-V4

#117 - INTR. BRG HDR @ OFFICE DOOR:

W = (30+40) 21/2 + 120 = 855 ; ℓ = 3.5'

R = 1.5

M = 1.3

fv = 68

fb = 0.6 — OK! (2) 2X8 OR 4X8

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DESIGN: JCM

SHEET: V-7A

CHK W8×21 COL. SUPPORTING BEAMS #110, #111, #128 AND GL RM/BM ;

$P_{TOT.} = 17.93 + 22 + 2.11 + 0.015 \times 12 \times 17/2$
$= 43.56 \approx 44.0^K$

FOR W8×21 ; $d = 8\frac{1}{4}"$; $t_f = 5\frac{1}{4}"$
$t_w = 1/4"$; $t_f = 3/8"$

$A = 6.16\square"$ — $E = 29{,}000\ KSI$
$I_x = 75.3\ IN^4$ — $F_y = 50\ KSI$
$r_x = 3.49\ IN$ — $\Omega_c = 1.67$
$I_y = 9.77\ IN^4$ — $K = 0.80$
$r_y = 1.26\ IN$ ← GOVERNS

$P_n/\Omega_c = \frac{F_{cr} * A_g}{\Omega_c}$ WHERE ;

$KL/r = \frac{0.80(12' \times 12")}{1.26\ IN} = 91.42$

IF; $\frac{KL}{r} \leq 4.71\sqrt{\frac{E}{F_y}} =$
$91.42 \leq 113.43$

THEN; $F_{cr} = [0.658^{F_y/F_e}]F_y$; (F_y = 1.46)

$F_{cr} = 27.14\ KSI$

WHERE ;
$F_e = \frac{\pi^2 E}{(KL/r)^2}$
$= 34.24$

$\phi \frac{P_n}{\Omega_c} = \frac{F_{cr} * A_g}{\Omega_c}$
$= 100\ KIPS \gg 44.0^{KIPS}$ — OK ; W8×21

CONT\ #114 - HSS 7×4×1/2 (LAID FLAT) BEAM BET. WINDOWS NEXT TO STAIR ;

FOR OUT-OF-PLANE LOADING
DEFLECTION LIMIT PER 1604.3.7; 1) & 2)
→ ZONE 5 = -22.0 PSF
ZONE 4 = -17.9 ≈ 18 PSF ← FOR DES.

HSS 7×4×1/2 ; $I_x = 50.7$; $S_x = 14.5$

$W_S = 18^{PSF} * 24/2 * 0.7$ (IBC TAB. 1604.3; FOOTNOTE ; f)
$= 264^{\#/'}$; $= 264 * 0.7 = 185^{\#/'}$
↳ FOR CAP, CHK, & CONN. ↳ FOR DEFL. CHK.

$L = 28'$

CHK. DEFLECTION — 1604.3.7 ; 2) ;

$\Delta_{TL\ MAX.} = L/240 + 1/4"$; $L = 28'$
$= 1.4" + 1/4" = 1.65"_{MAX.}$
FOR HSS 7×4×1/2 ; $I_x = 50.7\ IN^4$;

$\Delta_{WIND} = 1.74" \sim L/193$ — NOT GOOD!

TRY HSS 8×4×5/8 ; $I_x = 82$; $S_x = 20.5$;

$\Delta_{WIND} = 1.076" \sim L/312 < L/240 + 1/4$
OK!

CHK. R & M ; $W = 264^{\#/'}$; $L = 28'$;

$R = 3.7$
$M = 25.9 \times 12" = 311^{K-"}$
$S_{X\ REQD} = 11.3$ (@ $F_y = 46\ KSI$ — CONS.)
↳ N/CRIT.!

STAIR FRAMING CHK ;

MC 12×31 STRINGERS ; $L \approx 15'_{MAX.}$
$W_{TOT.} = (40+20)4/2 + 45 = 165^{\#/'} + 31 = 196^{\#/'}$
$R = 1.46$
$M = 5.5^{K}$ 6 ; $\phi_b = 1.67$
$S_{X\ REQD}$ $^{IN^3}$ — OK!
$\Delta_{TL} =$,

PRE-MFD STAIR SYSTEM (DES. BY OTHERS)

4×12 D

DL = 10 ; L LBS ; DL = 10

R = 0.06
M = 0.0765
$f_v = 2.6$
$F_b = 0.04$
$\Delta_{TL} = 0.0025" \sim L/1706$
OK!

M = 0.278
$F_v = 6.3$
$F_b = 0.145$
$\Delta_{TL} = 0.0077 \sim L/543$
OK!

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DATE: 11/22/21
PROJECT NO: 0426-2021-03
DESIGN: JCM
SHEET: V-7B

UPPER FLOOR FRMG \ CONT.:

#118 - DROPPED BM @/HALLWAY ADJ. OFF.:

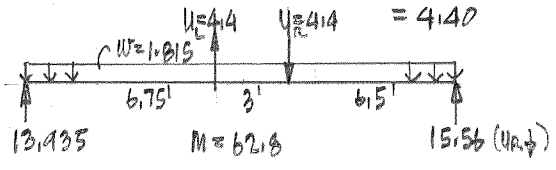
$W's = W_{\#121}^{925} + 120 + (30+40)\frac{22}{2} = 1,815$

CHK. BM. W/O UPLIFT: $\ell = 16.25'$

$R = 14.75$
$M = 59.9$
$fv = 165$
$fb = 2.4$
$\Delta_{TL} = 0.154" \sim \ell/360$ — OK? PSL 7X16 2.2E

RECHK. BM W/ UPLIFT:

$U_{SBS} = 2.4 \times 0.525 \times 2.5 \times 1.4$ (Ω_0)
$= 4.40$



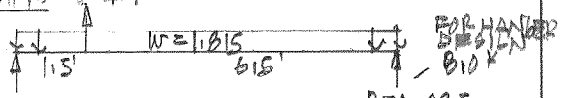
$fv = 176$
$fb = 2,523$ — OK?

#119-A - PSL 7X16 CONT. DROPPED BM.:

$W = 1.815$; $\ell = 8$

$R = 7.26$; $fv = 65$
$M = 14.52$; $fb = 0.583$ — OK?

W/UPLIFT: $U = 4.4$



10.8 (UP) — 3.8 (UP)

DES. for #120 → R=6.435
(W/ UPLIFT ALSO for #119-B)

#119-B - GT. REAC. For DES. of #120:

$\ell_1 = 4$; $\ell_2 = 12$; $P = 4.4$ (C-2)

$W's = W_{\#24}^{925} + 120 + (30+40)4\frac{1}{2} = 2.48$

$R_1 = 23.0$; $R_2 = 21.0$! $R = 19.84$ (NO UPLIFT)

#120 - DROPPED BM./HDR.: (C-2)

$\ell_1 = 2.5$; $\ell_2 = 2.0$; $W's \simeq 0$

$P_{MAX} = 7.26 + 19.84 = 27.1^k$ — W/O UPLIFT
OR
$= 6.435 + 23 = 29.435^k$ — W/ UPLIFT
↳ GOVERNS?

$R_1 = 13$; $R_2 = 16.35$
$M = 32.70$
$fv = 292 < 290 * 1.2 * 1.15$ — OK?
$fb = 1.75 < 2.190 * 1.2 * 1.15$ — OK?

PSL 5 1/4 X16

✓ #121 - GL 5 1/2 X 21 RIM/BM @ SD. WALL: (C-2)

$\ell_1 = 2.75$; $\ell_2 = 7.25$; $W's = 165$

$P = 19.84$; R#119 - NO UPLIFT

FOR SBS: UPLIFT: (Ω_0)
$U_{SBS} = 5.8 \times 0.525 \times 2.5 \times 1.4$
$= 10.65$

$\therefore P_{TOT} = 19.84 + 10.65 = 30.5$

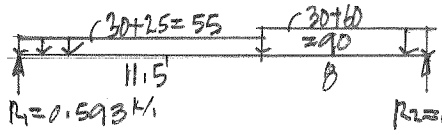
$\Delta_{TL} = 0.074" \sim \ell/1617$ — OK?

RECHK. BM CAP. — W/ UPLIFT:

$P = 30.5^k$
$R_1 = 22.94$
$R_2 = 9.2$
$M = 62.45$
$fv = 294 < 265 * C_D$ (1.6) $= 424$
$fb = 1.854 < 2.40 * C_D$

OK!

#122 - 11 7/8" TJI-360 @ 16"OC DECK+RAFTERS:



SEE FORTE-WEB OUTPUT

#123 - E/W BEAM @/ ACTIVITY ROOM: (C-2):

$\ell_1 = 5$; $\ell_2 = 15$

$W_1 = 0$; $W_2 = 150$ ($1225^{\#/'}$)

$P = [(30+25)5/2 + 150 + (30+25)15/2 + (30+40)15/2]\,11.5/2 = 11.95$

$R_1 = 9.80$
$R_2 = 4.40$
$M = 49.0$
$fv = 131$
$fb = 1.97$
$\Delta_{TL} = 0.159" \sim \ell/405$ — OK? PSL 7X16
OR
W10X30:
$\Delta_{TL} = 0.57" \sim \ell/418$

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KONERU RES.
PROJECT

REVD: 4/27/22
11/10/21
DATE

0426-2021-03
PROJECT NO

JCM
DESIGN

V-8A
SHEET

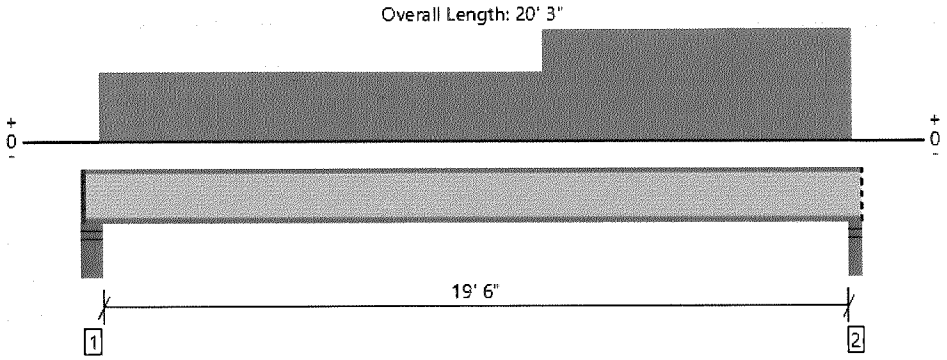
FORTE WEB

MEMBER REPORT

PASSED

Roof, #122 - Deck+Roof Rafters

1 piece(s) 11 7/8" TJI® 360 @ 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)	713 @ 20' 1/2"	1505 (3.50")	Passed (47%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	706 @ 19' 11 1/2"	1705	Passed (41%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3306 @ 10' 5 9/16"	7107	Passed (47%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.286 @ 10' 5 1/4"	0.983	Passed (L/825)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.610 @ 10' 3 1/8"	1.311	Passed (L/387)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Stud wall - DF	5.50"	4.25"	1.75"	372	99	269	740	1 1/4" Rim Board
2 - Stud wall - DF	3.50"	3.50"	1.75"	329	384	115	828	Blocking

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	5' 2" o/c	
Bottom Edge (Lu)	20' 2" o/c	

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

Vertical Loads	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
1 - Uniform (PSF)	6" to 12'	16"	30.0	-	25.0	Default Load
2 - Uniform (PLF)	12' to 20'	N/A	30.0	60.0	-	

Weyerhaeuser Notes

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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Joseph Marquez Malsam-Tsang Engineering (206) 602-5122 JosephM@malsam-tsang.com	

Weyerhaeuser

11/11/2021 12:51:53 AM UTC
ForteWEB v3.2, Engine: V8.2.0.17, Data: V8.1.0.16
File Name: Koneru Res

V-B B

UPPER FLOOR FRMG. \ CONT.:

#124 - N/S DROPPED BM. O/ ACTIVITY NOOK:

$W = (20+25)\,35/2 + 120 + (30+40)\,35/2 = 2130$

$L = 16$

$R = 17$

$M = 68$

$f_V = 165$

$f_b = 2.16$

$\Delta_{TL} = 0.14$

NOT APPLIC. - SEE NEXT SHT.

#125 - N/S DROPPED BM D/ BILLIARD TABLE:

$L_1 = 5$; $L_2 = 11$; $L_3 = 2.5$ (C-4)

$W_1 \simeq W_2 = (20+25)\,11 + 150 + 760 + (30+40)\,20/2$

$= 495 + 150 + 760 + 700 = 2100$

$W_2 = W_{FRM} = 2130$

$P_1 = 0$

$R_1 = 20$

$R_2 = 23$

$M = 95$

$f_V = 23$

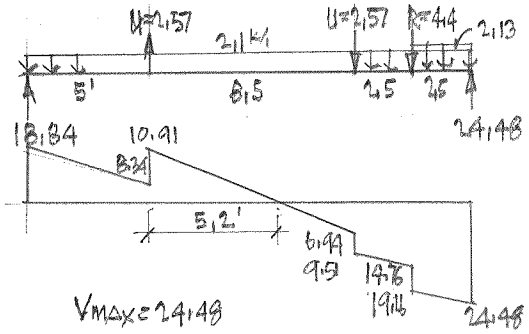
$f_b = 3.2$ [illegible] OK?

$\Delta_{TL} = 0.87" \sim L/254 > L/240$ — OK?

W/ SNOW 20E ↑ PSL 7X18

RECHK BM: W/ UPLIFT:

$USE_{LS} = 1.4 \times 0.1525 \times 2.5 \times 11.4 = 2.57$



$V_{MAX} = 24.48$

$M_{MAX} = 96.32$ — OK? N/CRIT.

#126 — OUTDOOR RF. RIM/BM:

$W = (30+25)\,5.5/2 = 150\ \#/'$

$L = 27$

$R = 2.0$

$M = 13.67$

TRY W12X26:

$d = 12\frac{1}{4}"$; $I_X = 204$

$b_f = 6\frac{1}{2}"$; $S_X = 33.4$

$\Delta_{TL} = 0.3" \sim L/1069$

$S_{X\,REQD} = M/F_y/D_b = 5.5$ OK?

#127 - OUTDOOR RF CANT. RIM @ NORTH SIDE:

$L = 12.5$; $A = 5.5$; $P = 2.4$ (C-3)

$W's \simeq 0.05$

$R_1 = -0.805$

$R_2 = 4.10$

$M- = -13.96 \times 12 = 168^{K-"}$

TRY 12X35:

$d = 12\frac{1}{2}"$; $I_X = 285$

$b_f = 6\frac{1}{2}"$; $S_X = 45.6$

$\Delta_{TL@B.S.} = -0.026" \sim L/5762$

$\Delta_{TL@END} = 0.09" \sim 2A/1447$

$S_{X\,REQD} = 5.6$ — N/CRIT.

#128 - OUTDOOR RF. CANT. MIDDLE RF. BM.:

$L = 12.5$; $A = 5.5$ (C-3)

$W's \simeq 0.05$

$P = 2.0 + 0.05 \times 28/2 = 2.7$; USE 5.0^K

$R_1 = -1.195$

$R_2 = 7.85$

$M- = -28.25 \times 12 = 339^{K-"}$

TRY 12X35: WHERE: $P \simeq 5.0$

$\Delta_{TL@END} = 0.189" \sim \frac{2A}{595}$ - OK?

$S_{X\,REQD} = 11.32\,IN^3$ — OK?

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KONERU RES.
PROJECT

REVD: 7/6/22
11/10/21
DATE

0426-2021-03
PROJECT NO

JCM
DESIGN

V-9A
SHEET

UPPER FLOOR FRMG. \ CONT. ;

#124 – N/S STEEL BM. O/ ACTIVITY ROOM ; (G-2)

ℓ_1 (N&S) = 13.5 ; ℓ_2 (E&W) = 19.5 ; P = R_2 #123 = 4.40^K

$W_1 = R_2$ #122 (DECK & BSMT) $(12/16) + (30+40)$ (FLOOR) $22/2 + 15 \times 10'$ (WALL) $+ (15+30\times0.075)$ (RF LOAD) 11

$W_1 = 620 + 770 + 150 + 415 = 1955\ ^{\#}/_{'}$

$W_2 = (30+40)\frac{35}{2} + 15\times10' + (15+30\times0.075)\frac{35}{2}$

$= 1225 + 150 + 655 = 2030\ ^{\#}/_{'}$

$R_{1\,(N\&S)} = 35.30$; $M = 303.24 \times 12 = 3639\ ^{K}\text{-}^{'}$

$R_{2\,(E\&W)} = 35.10$

S_x REQD $= \frac{M}{F_y/\Omega_b} = 121.5\ IN^3 < 131\ IN^3$ – OK!

W 24 x 76 ; $I_x = 2100\ IN^4$; $S_x = 176\ IN^3$

$d = 23\ 7/8"$; $b_f = 9"$

USE W24x84 (FOR DEFL. CONTROL) $t_w = 7/16"$ (0.43) ; $t_f = 11/16"$

CHK DEFL. ;

Δ_{TL} INCL. SNOW (W24x76) $= 0.966" \sim \frac{\ell}{410}$ – OK!

W24x84 ; $0.856" \sim \frac{\ell}{462}$ – FOR STIFFER FLR. SYS.

#125 – E/W DROPPED STEEL BM O/ SHELVES ;

$\ell_1 = 6.15' = \ell_2$ (C-2)

W_1's $= \sim 75\ ^{\#}/_{'}$; P = R_1 #124 = 35.20^K

$R_1 = R_2 = 18.10$

$M = 116.10\ ^{K}\text{-}^{'} \times 12 = 1392\ ^{K}\text{-}^{"}$

S_x REQD $= 46.5\ IN^3 < 64.2\ IN^3$ – OK!

W12x50 ; $I_x = 391$; $S_x = 64.2$

$\Delta_{TL} = 0.28" \sim \ell/556$ – OK!

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PROJECT: KONERU RESIDENCE

DATE: REVD; 1/15/23

PROJECT NO: 0426-2021-03

DESIGN: JCM

SHEET: V-9B

WELDING CONNECTIONS AND SHEAR PL CAPACITY CHECKS:

"W" - FILLET WELD ; $V_{CAP.}$:

$F_{EXX} = 70$ KSI

$\Omega = 2.0$

$W = 3/16"$; $W = 1/4"$

$$V_{CAP.} = \frac{0.6\, F_{EXX} * 0.707}{\Omega} * W$$

$V_{CAP.\ W=3/16"} = 2.734 \frac{K}{IN}$; $V_{CAP.\ W=1/4"} = 3.712 \frac{K}{IN}$

"t" PL SHEAR YIELDING ; $V_{CAP.}$:

$$V_{CAP.} = \frac{0.60\, F_y}{\Omega} * t \quad ; \quad F_y = 36\ KSI,\ \Omega = 1.5$$

$t\ 3/16" = 2.70 \frac{K}{IN}$; $t\ 1/4" = 3.60 \frac{K}{IN}$

"t" PL SHEAR RUPTURE ; $V_{CAP.}$:

$$V_{CAP.} = \frac{0.60\, F_u}{\Omega} * t \quad F_u = 58\ KSI,\ \Omega = 1.5$$

$t\ 3/16" = 4.35\ K/IN$; $t\ 1/4" = 5.80\ K/IN$

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PROJECT KONERU RES.

DATE 11/11/24

PROJECT NO 0426-2024-03

DESIGN JCM

SHEET V-10A

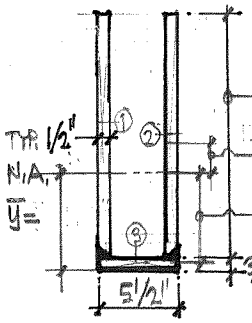
UPPER FLOOR FRMG. \ CONT.:

#129 - BUILT-UP STL. FR. BM. @ VALLEY:

$W = (30+30)19/2 = 570^{\#}/' + 35 = 605^{\#}/'$

$L = 27'$

$R = 0.16$; $M = 55.0 \times 12'' = 660^{K-'}$



$A_1 = 7.750''$

$A_2 = 7.750\ \square''$

$A_3 = 4.125\ \square''$

$A_T = 19.625''$

$\bar{y} = \frac{2[7.75 \times (15.5/2 + 3/4)] + 4.125 \times \frac{0.175}{2}}{A_T} = 6.8''$

$I_{N.A.} = \left[\frac{15.5 \times 0.175^3}{12} + 4.125 * d_1^2\right] + 2\left[\frac{0.5 \times 15.5^3}{12} + 7.75 * d_2^2\right]$

$= 170.5 + 3243$

$= 414.788\ IN^4$

WHERE: $F_y = 36$, $\Omega_b = 1.67$

$S_{X\,REQD} = \frac{M}{F_y/\Omega_b} = 30.62\ IN^3$ — N/CRIT.

$S_X = I_{NA}/\bar{y} = 72.76\ IN^3$

$\Delta_{TL} = \frac{5\,W\,L^4}{384\,EI}$; $EI = 14.348852 \times 10^9$

$= 0.504 \sim L/642.6 > L/180$ — OK!

#130 - STEEL ROOF PAN DECK W/ 2" MAX. GRAVEL BALLAST TOPPING:

SUPERIMPOSED LOAD TOT. = ~20psf + 30

= 50 PSF — OK @ N/CRIT.

SEE NEXT SHTS.

USING ASC STEEL DECK - GAGE 16 2WHF-36 OR D62WHF PANEL

HSS 5x5x1/4 ALLOW. AXIAL LOAD CAP.:

@ $KL \sim 13'$; $P_n/\Omega_c = 76.4$ KIPS

① STRUCT. SLAB/FDN./PINPILES:

STRUCTURAL SLAB-ON-GRADE:

MIN. SLAB THICKNESS; ACI TAB. 9.3.1.1

- ONE END CONT. = $L/24$
  - MAX. CLR. SPAN; $L_n = 12'-0''$
- BOTH ENDS CONT. = $L/28$
  - MAX. CLR SPAN; $L_n = 14'-0''$

6" THK. SLAB

APPROX. DESIGN MOMENTS; TAB. 6.5.2:

MORE THAN (2) SPANS

$(+)M_{u\,MAX.} = \frac{W_u L_n^2}{11}$

$(-)M_{u\,MAX.} = \frac{W_u L_n^2}{10}$

HOUSE SLAB; $L_n = 14'$ MAX.

$W_{u\,TOT.} = [150\,PCF\,(6/12) + 15\,PSF]\,12 + 40 * 1.6$

$= 108 + 64 = 172\ PSF \times 1' \sim 175^{\#}/'$

$M_{u(+)\,MAX} = 175(14)^2/11 = 3120^{\#-'}$

$M_{u(-)\,MAX} = 175(14)^2/10 = 3430^{\#-'}$ — GOVERNS!

$M_u = \phi \rho f_y b d^2 \left[1 - \frac{\rho f_y}{1.7 f'_c}\right]$

$\frac{f_y}{1.7 f'_c}\rho^2 - \rho + \frac{M_u}{\phi f_y b d^2} = 0$

WHERE: $f_y = 60000\ psi$; $f'_c = 2500\ PSI$

$\phi = 0.9$; $b = 1'$ STRIP

MAIN REINF. @ CENTERED ~6" SLAB ; $d = 3.25''$

$14.12\rho^2 - \rho + \frac{3430^{\#-'}}{0.9(60000)(12/12)(3.25)^2} = 0$ — 0.006

BY Q.F.; $\rho = 0.0066$

$A_{S\,REQD} = \rho b d = 0.1257\ \square''$ — GOVERNS!

$A_{S\,MIN.} = \frac{200}{f_y} b_w d = 0.16\ \square''$

T&S REINF. $= 0.0018\,bh = 0.13\ \square''$

USE #4 @ 9" OC MAIN REINF. AND #4 @ 18" OC T&S — BARS CENTERED ON 6" SLAB

USE #4 @ 12" OC FOR CLR SPAN; $L_n = 9'$ MAX.

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PROJECT: KONERU RES.

REVS.: 7/1/22, 11/11/21

DATE

0426-2021-03

PROJECT NO

JCM

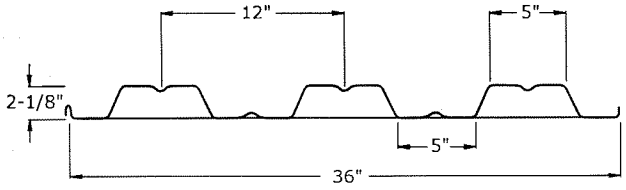
DESIGN

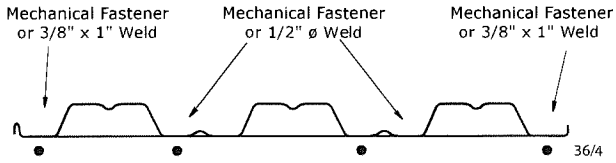
V-10B

SHEET

ASC STEEL DECK

DG2WHF-36 & 2WHF-36 4.2





Note: Weld sizes are effective not visible. Refer to AISI S100-2007 or AWS D1.3 for additional welding requirements.

Panel Properties

Gage	Weight	Base Metal Thickness	Yield Strength	Tensile Strength	Gross Section Properties: Area	Moment of Inertia	Distance to N.A. from Bottom	Section Modulus	Radius of Gyration
	w psf	t in	F_y ksi	F_u ksi	A_g in²/ft	I_g in⁴/ft	y_b in	S_g in³/ft	r in
20/20	3.54	0.035 / 0.036	50	65	1.008	0.770	0.65	0.496	0.874
20/18	4.01	0.035 / 0.047	50	65	1.147	0.820	0.58	0.504	0.845
20/16	4.53	0.035 / 0.059	50	65	1.299	0.864	0.53	0.510	0.815
18/20	4.13	0.047 / 0.036	50	65	1.187	0.961	0.72	0.648	0.900
18/18	4.61	0.047 / 0.047	50	65	1.326	1.025	0.66	0.658	0.879
18/16	5.12	0.047 / 0.059	50	65	1.477	1.083	0.61	0.667	0.856
16/20	4.78	0.059 / 0.036	50	65	1.381	1.159	0.79	0.809	0.916
16/18	5.25	0.059 / 0.047	50	65	1.520	1.235	0.73	0.822	0.901
16/16	5.77	0.059 / 0.059	50	65	1.671	1.306	0.68	0.833	0.884

Gage	Effective Section Modulus for Bending at F_y: Area	Section Modulus	Distance to N.A. from Bottom	Section Modulus	Distance to N.A. from Bottom	Effective Moment of Inertia for Deflection at Service Load: Moment of Inertia	Moment of Inertia	Uniform Load Only $I_d = (2I_e+I_g)/3$	
	A_e+ in²/ft	S_e+ in³/ft	y_b in	S_e- in³/ft	y_b in	I_e+ in⁴/ft	I_e- in⁴/ft	I+ in⁴/ft	I- in⁴/ft
20/20	0.510	0.391	0.56	0.457	1.00	0.732	0.603	0.745	0.659
20/18	0.591	0.401	0.50	0.476	0.87	0.776	0.690	0.791	0.733
20/16	0.692	0.406	0.46	0.492	0.73	0.816	0.771	0.832	0.802
18/20	0.715	0.590	0.69	0.593	1.07	0.959	0.749	0.960	0.820
18/18	0.796	0.599	0.63	0.616	0.95	1.023	0.849	1.024	0.908
18/16	0.897	0.607	0.57	0.639	0.83	1.081	0.948	1.082	0.993
16/20	0.939	0.779	0.77	0.740	1.10	1.156	0.905	1.157	0.990
16/18	1.020	0.792	0.71	0.766	1.01	1.232	1.017	1.233	1.090
16/16	1.121	0.803	0.66	0.792	0.91	1.303	1.132	1.304	1.190

Reactions at Supports (plf) Based on Web Crippling

Gage	Condition	Bearing Length of Webs: Allowable (R_n/Ω) 1"	2"	4"	6"	Factored (ΦR_n) 1"	2"	4"	6"
22	End	316	393	503	588	483	602	770	899
	Interior	528	638	792	911	786	948	1178	1355
21	End	403	499	636	741	616	764	973	1133
	Interior	675	810	1001	1148	1004	1205	1489	1708
20	End	450	556	707	822	688	851	1081	1258
	Interior	755	903	1114	1275	1123	1344	1657	1897
19	End	633	777	980	1137	968	1188	1500	1739
	Interior	1066	1266	1549	1766	1585	1883	2304	2627
18	End	781	954	1199	1387	1195	1460	1835	2122
	Interior	1319	1559	1898	2158	1961	2318	2823	3211
16	End	1194	1445	1800	2072	1827	2211	2754	3170
		2027	2373	2862	3237	3015	3530	4257	4815

Web Crippling Constraints h=2.16" r=0.125" θ=64°

V-10C

4.2 DG2WHF-36 & 2WHF-36

ASC STEEL DECK

Inward Allowable (f_b/Ω) and Factored (Φf_b) Distributed Load (lbs/ft²)

Gage	Span	Limit Condition	Panel Span (Support Spacing) 4'-0"	6'-0"	8'-0"	10'-0"	12'-0"	14'-0"	16'-0"	18'-0"	20'-0"
16/20	SS	f_b/Ω	972	432	243	155	108	79	61	48	39
		Φf_b	1542	685	385	247	171	126	96	76	62
		L/360	790	234	99	51	29	18	12	9	6
		L/240	-	351	148	76	44	28	19	13	9
		L/180	-	-	198	101	59	37	25	17	13
		L/120	-	-	-	152	88	55	37	26	19
	DS	f_b/Ω	923	410	231	148	103	75	58	46	37
		Φf_b	1465	651	366	234	163	120	92	72	59
		L/360	-	-	203	104	60	38	25	18	13
		L/240	-	-	-	-	90	57	38	27	20
		L/180	-	-	-	-	-	-	51	36	26
		L/120	-	-	-	-	-	-	-	-	-
	TS	f_b/Ω	1154	513	288	185	128	94	72	57	46
		Φf_b	1831	814	458	293	203	149	114	90	73
		L/360	-	442	186	95	55	35	Exceeds Maximum Product Length		
		L/240	-	-	280	143	83	52			
		L/180	-	-	-	-	110	70			
		L/120	-	-	-	-	-	-			
16/18	SS	f_b/Ω	988	439	247	158	110	81	62	49	40
		Φf_b	1568	697	392	251	174	128	98	77	63
		L/360	842	249	105	54	31	20	13	9	7
		L/240	-	374	158	81	47	29	20	14	10
		L/180	-	-	210	108	62	39	26	18	13
		L/120	-	-	-	-	94	59	39	28	20
	DS	f_b/Ω	956	425	239	153	106	78	60	47	38
		Φf_b	1516	674	379	243	168	124	95	75	61
		L/360	-	-	224	115	66	42	28	20	14
		L/240	-	-	-	-	100	63	42	30	22
		L/180	-	-	-	-	-	-	56	39	29
		L/120	-	-	-	-	-	-	-	-	-
	TS	f_b/Ω	1194	531	299	191	133	98	75	59	48
		Φf_b	1895	842	474	303	211	155	118	94	76
		L/360	-	487	205	105	61	38	Exceeds Maximum Product Length		
		L/240	-	-	-	158	91	57			
		L/180	-	-	-	-	122	77			
		L/120	-	-	-	-	-	-			
16/16	SS	f_b/Ω	1002	445	250	160	111	82	63	49	40
		Φf_b	1589	706	397	254	177	130	99	78	64
		L/360	890	264	111	57	33	21	14	10	7
		L/240	-	396	167	85	49	31	21	15	11
		L/180	-	-	223	114	66	42	28	20	14
		L/120	-	-	-	-	99	62	42	29	21
	DS	f_b/Ω	988	439	247	158	110	81	62	49	40
		Φf_b	1568	697	392	251	174	128	98	77	63
		L/360	-	-	245	125	72	46	31	21	16
		L/240	-	-	-	-	109	68	46	32	23
		L/180	-	-	-	-	-	-	61	43	31
		L/120	-	-	-	-	-	-	-	-	-
	TS	f_b/Ω	1235	549	309	198	137	101	77	61	49
		Φf_b	1959	871	490	314	218	160	122	97	78
		L/360	-	531	224	115	66	42	Exceeds Maximum Product Length		
		L/240	-	-	-	172	100	63			
		L/180	-	-	-	-	133	84			
		L/120	-	-	-	-	-	-			

V-10D

HOUSE SLAB DESIGN \ CONT'D

$V_u = 1.15\, W_u \times l_n/2$
$= 1.15(175)(14/2) = 1408\#$

SHEAR CAP. CHK.:

$V_{u\,CAP} = \phi\, 2\sqrt{f'c}\, b_w d$
$= 0.75 * 2 * \sqrt{2500}\,(12)(4)$
$= 3.6 \gg 2V_u = 2.8\,^{plf}$ — OKAY

GAR. STRUCT. SLAB-ON-GRADE DES.:

PER IRC LOADING:
LL = 50 PSF OR (1) 2000 lbs WHEEL LOAD 5' APART OR 9' APART

☐ AT DISCONT. END; $l_n = 12'$; LL UNIF. = 50 PSF

$W_u = 1.2(150 \times 6/12) + 1.6 \times 50$
$= 90 + 80 = 170\#/'$

$(-) M_{u\,MAX} = \frac{170(12)^2}{10} = 2450\#\text{-}'$

$(+) M_{u\,MAX} = \frac{170(12)^2}{11} = 2225\#\text{-}'$

LL = 2000 lb FT. LOAD AT MIDSPAN $l_n = 12'$:

$W_{u\,DL} = 90$; $P_u = 2000 \times 1.6 = 3200\#$

$M_{u\,TOT} = \frac{90(12)^2}{10} + \frac{3200 \times 12}{8}$
$= 1215 + 4800 = 6015\#\text{-}'$

☐ AT INTERIOR SPAN; $l_n = 13'$:

$W_{DL} = 90$; $P_u = 2000 \times 1.6 = 3200\#$

$M_{u\,TOT} = \frac{90(13)^2}{11} + \frac{3200 \times 13}{8}$
$= 1380 + 5200 = 6580\#\text{-}'$

0.0115 ← FOR DESIGN

$14.12\rho^2 - \rho + \frac{6580\#\text{-}'}{0.9(60000)(12/12)(3.25)^2}$

BY Q.F.; $\rho = 0.0144$

$A_{S\,REQD} = \rho b d = 0.56\ \square''$ — GOVERNS

$A_{S\,MIN} = \frac{200}{f_y} b_w d = 0.130''$

USE #5 AT 8"OC MAIN REINF AND #4 AT 18"OC T&S REINF. - CENTER REBARS ON 6" SLAB.

☑ SPA STRUCT. SLAB-ON-GRADE DES.:

$l_{n\,MAX} = 5.0'$; SLAB THICKNESS = 5"; $d = 2.5''$

$W_u = (62.4\,PCF \times 3.5/12 \times 1.6)\# + (150\,PCF \times 10/12 \times 1/2)$
$= 350 + 150 = 500\#/'$

$M_u = W_u l_n^2/8 = 1565\#\text{-}'$

$14.12\rho^2 - \rho + \frac{M_u\ \#\text{-}'}{0.9(60000)(1')(2.5)^2} = 0$ ← 0.0046

BY Q.F.; $\rho = 0.0049$

$A_{S\,REQD} = \rho b d = 0.147\ \square''$ — GOVERNS

$A_{S\,MIN} = \frac{200}{f_y} b_w d = 0.100''$

USE #4 AT 12"OC MAIN REINF. AND #4 AT 18"OC T&S REINF. CENTER REBARS ON 5" SLAB

☑ OUTDOOR PATIO AND TERRACE AREAS SLAB-ON-GRADE DESIGN:

$l_{n\,MAX} = 8.0'$; SLAB THICKNESS = $\frac{8.0' \times 12}{24} = 4.0''$ USE 5" THK

$d = 2.5''$

$W_u = 1.6(60) + 1.2\left[\frac{(5+3)}{12} \times 0.15\right] \approx 225\#/'$

NEG. M_u (2-SPANS):

$-M_u = W_u l_n^2/8 = 1800\#\text{-}'$

$14.12\rho^2 - \rho + \frac{1800\#\text{-}'}{0.9(60000)(12/12)(2.5)^2} = 0$ ← 0.0053

BY Q.F.; $\rho = 0.0057$

$A_{S\,MIN.} = \rho b d = 0.16\ \square''$ — GOVERNS

$A_{S\,MIN} = 0.10\ \square''$

USE #4 AT 12"OC MAIN REINF. AND #4 AT 18"OC T&S REINF. - CENTER REBARS ON 5" SLAB.

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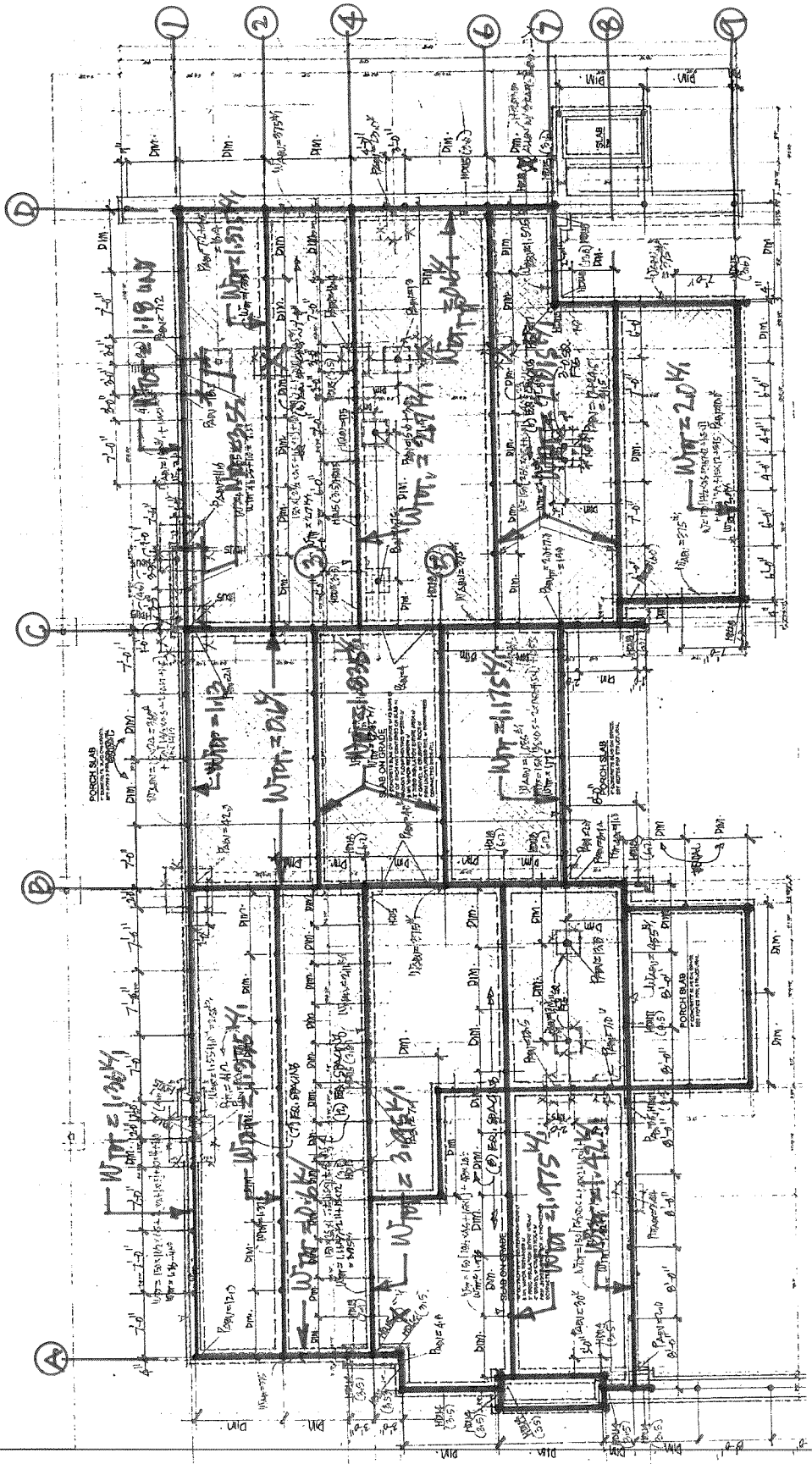
KONERU RES. — PROJECT

REVIS.: 1/16/23
11/11/21 — DATE

0426-2021-03 — PROJECT NO

JCM — DESIGN

V-11 — SHEET



KEY PLAN (for PILE DES. - 92.8M. LOADING)
NTS

N

4"Ø PIPE PILE ALLOWABLE AXIAL CAPACITY = 10TONS (20 KIPS)

KONERU RES.
PROJECT

11/23/21
DATE

0426-2021-03
PROJECT NO

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DESIGN

V-12
SHEET

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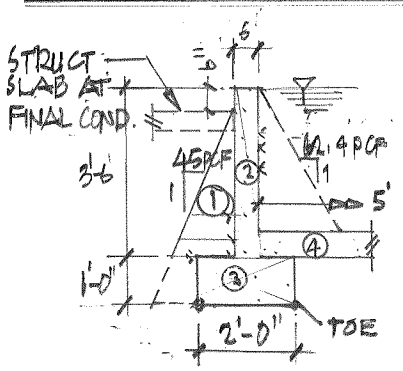
CHK SPA WALL SYSTEM;



	WT. (LBS)	LEVER ARM, $\bar{X}$ (FT)	RESTD. MOM.; R.M. (FT-LB)
①	60	1.75	105
②	260	1.0	260
③	300	1.0	300
④	155	0.25	40
	$\Sigma R_V = 775^{\#}$		$\Sigma R.M. = 705^{\#-1}$

OVERTURNING MOMENT (@ TOE); O.M.;

AT EX.CAV. & BACKFILLING CONDITION

$O.M. = 1/2(45 * 2.5 * 2.5) \times (\frac{2.5}{3} + 1.416)$

$= .316^{\#-1}$

$F.S.O.T. = \frac{R.M.}{O.M.} = 2.120 > 1.5$ OK!

SLIDING - BY INSPN NOT CRIT.?

CHK 6" THK WALL REINF. - #4 VERT CENTERED;

SAY PATIO STRUCT. SLAB NOT YET POURED

$M_u = 1.6 [1/2(62.4 * 3)(3)(1.4167] = 636^{\#-1}$

WHERE; $f'c = 2500$ psi; $f_y = 60$ ksi; $d = 3"$

$14.11 \rho^2 - \rho + \frac{636}{0.9(60000)(12/12)(3)^2} = 0$; 0.0093

BY Q.F.; $\rho = 0.0013$

A_S REQD $= \rho b d = 0.05\square"$

A_S MIN. $= \frac{200}{f_y} b_w d = 0.120"$

!! USE #4 @ 18" OC VERT. AND #4 @ 16" OC HORIZ - CENTERED IN WALL - AND (4)# CONT. IN FTG.

CHK. SPA WOOD DECK FRMG;

PT (2) 2x4 DECK JSTS. @ 12" OC; $\ell_{MAX} = 9'$;

$W = (10+60) 12/12 = 70^{\#}/_{l}$; $\ell = 9'$

$R = 0.315$

$M = 0.708$

$f_V = 42$

$f_b = 1.138 < 1.1 * 1.4 * 0.80 * 1.15$ (HF#1 / C_F / C_i / C_r)

$= 1.417$ — OK!

PT (2) 2x4 HF#1 @ 12" OC SPA DECK JOISTS

REV'D: 2/28/23
REV'D: 1/30/23

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PROJECT: KONERU RES.
SPA RETAINING WALL

DATE: 0426-2021-03

PROJECT NO: JCM

DESIGN: V-13

SHEET

② CHK GLOBAL CAPACITY OF PIN PILES:

FOR LATERAL SPREADING DURING MCE

$V_{Sx\ ALLOW.} = 47.5$ KIPS

USING 6" Ø X-STRONG (SC, 80) A53 GRADE-B:

$F_y = 35$ KSI ; $E = 29{,}000{,}000$ PSI

$I = 38.3\ IN^4$; $K = 1.0$; TAB. C-C2.2, (C) (AISC 13TH ED)

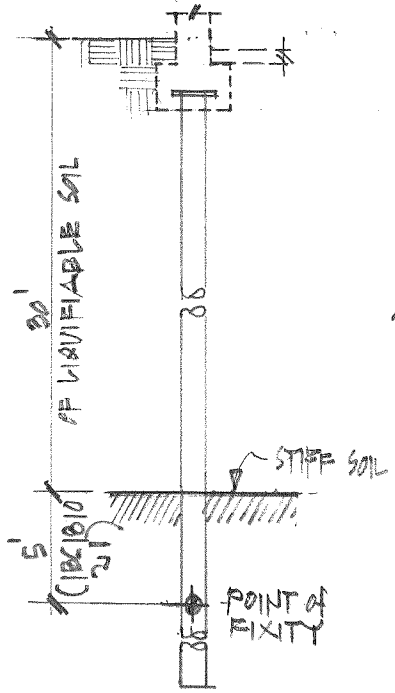
$S = 11.6\ IN^3$

$r = 2.12$

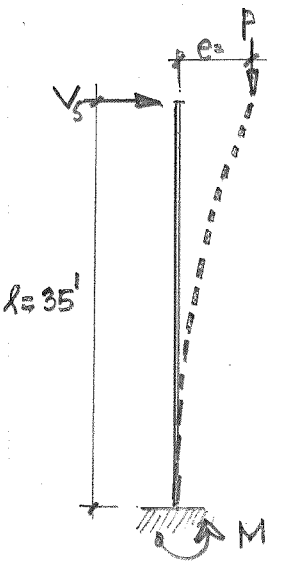
$\frac{Kl}{r} = \frac{1.0(35\times12)}{2.12} \leq 200$

$= 191 \leq 200$ — OK!

NO. OF PILES = 173 PILES (SUPPORTING HOUSE ONLY)



PILE SECTION



PILE LOADING

WHERE: (AT ALLOWABLE LEVEL)

$V_{Sz} = \frac{47.5k}{173\ PILES} = 275^{\#}/PILE$

P = VERTICAL LOAD OF PILE (WORST CASE)

$= 3.95^{K}/_{1} \times 4.5'_{\alpha}$

$= \sim 18.0$ KIPS

$e = \frac{V_S \times l^3}{3EI} = \frac{275(35\times12)^3}{3\times29\times10^6\times38.3}$

$= 6.11''$

① DESIGN MOMENT, $M = V_S \times l + P \times e$

$M = 0.275^{K}(35'\times12) + 18.0^{K}\times6.11\ IN$

$= 115.5 + 110$

$= 225\ K\text{-}IN$

DEMAND $S_x = \frac{M}{F_y/\Omega_b}$; $\Omega_b = 1.67$, $F_y = 35$ KSI

$= \frac{225\ K\text{-}IN}{35/1.67}$

$= 10.75\ IN^3 < S_{x\ PROVIDED} = 11.6\ IN^3$

OK!

PER AISC TAB. 4-6 (13TH ED):

$\frac{Kl}{r}(FT) = \frac{1.0\times35}{2.12} = 16'$

$\frac{P_n}{\Omega_c} = 112.0$ KIPS $>>$ 18.0 KIPS — OK!

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PROJECT: KONERU RES.

DATE: REV.: 10/31/22

PROJECT NO: 0426-2021-03

DESIGN: JCM

SHEET: V-14