STRUCTURAL CALCULATIONS

FOR

Residential Deck Addition

255 McChristian
Salmon Creek, CA

Toledano-Gantert

BY:
ROY ANDERSON PE
2337 WYATT COURT
SANTA ROSA, CA 95403
707.322.8403

7/28/2021

PROJECT NUMBER

21 S 01

7/8/2021

CONSULTING ENGINEER	Residential Deck Addition		PROJECT NO.21 S 01
	255 McChristian		DATE: Jul-08-2021
	BY: RA	CHK BY: RA	SHT NO 1 OF 12

DESIGN CRITERIA

2019 California Building Code

Occupancy II

Main Wind-Force Resisting System

Exposure C

Basic Wind Speed, Vasd => 85 mph

Envelope Procedure

Enclosed

Seismic Force-Resisting System

G. Cantilevered Column

7. Timber frames

Site Class =>	D
Seismic Design Catagegory, SDC =>	D
Response Coeff, R =>	1.5
Overstrength Factor, Ω =>	1.5
Seismic Importance Factor, Is =>	1.0
Height Limits, =>	35.0

2019 California Building Code Chapter 18

Foundation design is based on minimum footing dimensions as set forth in Table 1804 in the CBC
Class 5 soil is assumed with allowable soil bearing pressures of 1500 PSF

Materials (unless noted otherwise)

Concrete:	f'c = 2,500 psi @ 28 days *No special inspection	
Masonry:	ASTM C90, f'm=1,500 psi @ 28 days	
Reinf. Steel:	ASTM A615, Grade 60	
Lumber:	West Coast Douglas Fir. Grades as follows:	
	Studs:	Stud
	Joists & Plates	No. 2
	Post, Beams, & Headers:	No. 1
	Plywood:	PS1-95
	Glue Laminated Lumber	24F V4 simple span beams
		24F V8 cantilever, multi-span beam, & columns
	Manufactured PSL by TJI	E = 2.0 E7, F_b = 2,900 psi, F_v = 290 psi
	Manufactured LVL by TJI	E = 1.9 E7, F_b = 2,600 psi, F_v = 285 psi

Structural Steel:

In accordance with AISC Manual of Steel Construction, Latest Edition.

Shapes & Plates:	ASTM A-36
Hollow Steel Sections	ASTM A-500 Grade B
Anchor Bolts:	ASTM A-36 or A307

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VERTICAL LOADING

Deck

	Dead Load	Live Load
2x6 Decking	4.40 psf	
Sleepers	0.00 psf	
3/4" Plywood	0.00 psf	
2x10 - Joists @ 16" OC	2.20 psf	
Misc.	1.40 psf	
	8.00 psf	40.00 psf per CBC

Existing Deck

	Dead Load	Live Load
2x6 Decking	4.40 psf	
2x10 - Joists @ 16" OC	2.20 psf	
Mech. & Elec.	1.40 psf	
	8.00 psf	40.00 psf per CBC

CONSULTING ENGINEER	Residential Deck Addition		PROJECT NO.21 S 01
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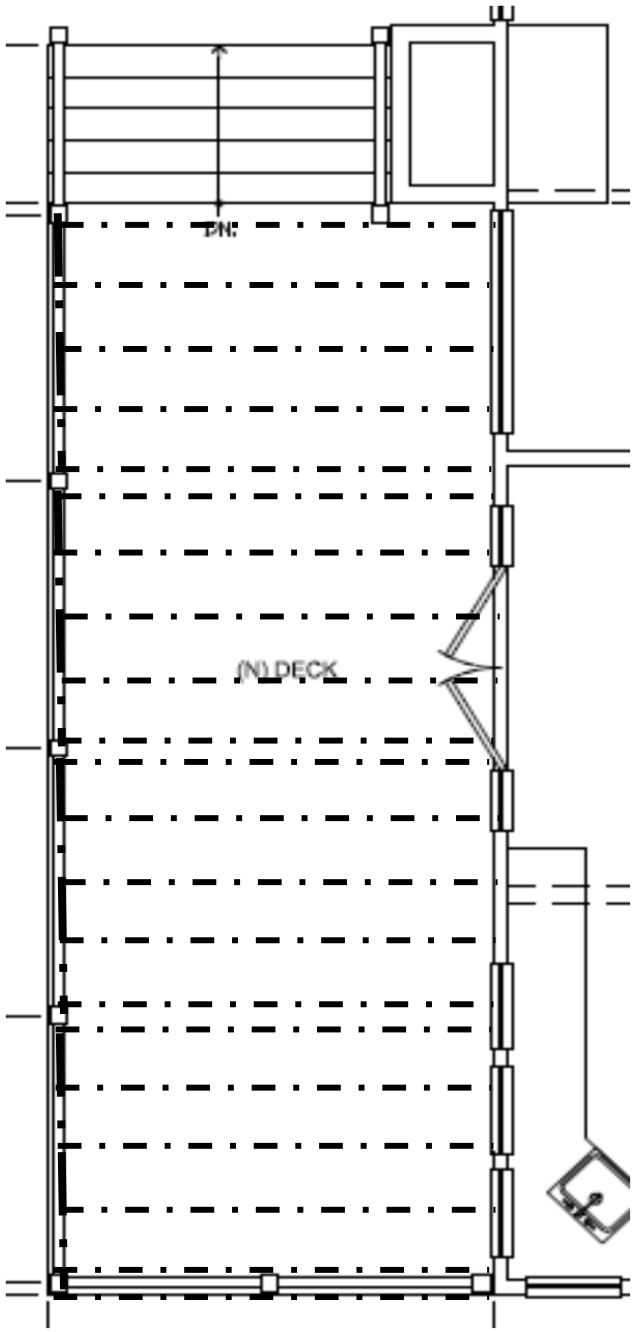
DECK FLOOR FRAMING PLAN

2x10 DFPT @ 24" oc
4x10 DFPT Beam



31'8"

DB1
L=8
T=6

12'

CONSULTING ENGINEER	Residential Deck Addition		PROJECT NO.21 S 01
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DECK FRAMING

Deck Joists 2x10 PTDF # 2 @ 24"o.c.

							Governing	Maximum
b	=	1.50	Joist spacing =	24	in.		*Parameter*	*Span*
d	=	9.50	Uniform dead load =	22.00	plf		SHEAR	19.28
Fv	=	95	Uniform live load =	80.00	plf		MOMENT	12.18
Fb	=	875	Max. TL deflection = L/	240			TL DEF	15.52
E	=	1.6E+06	Max. LL deflection = L/	360			LL DEF	14.70
Cr	=	1.15						
LDF	=	1.00	MAX JOIST SPAN =	12.18	FT			

New Deck Girders DB1 4x10 PTDF # 2

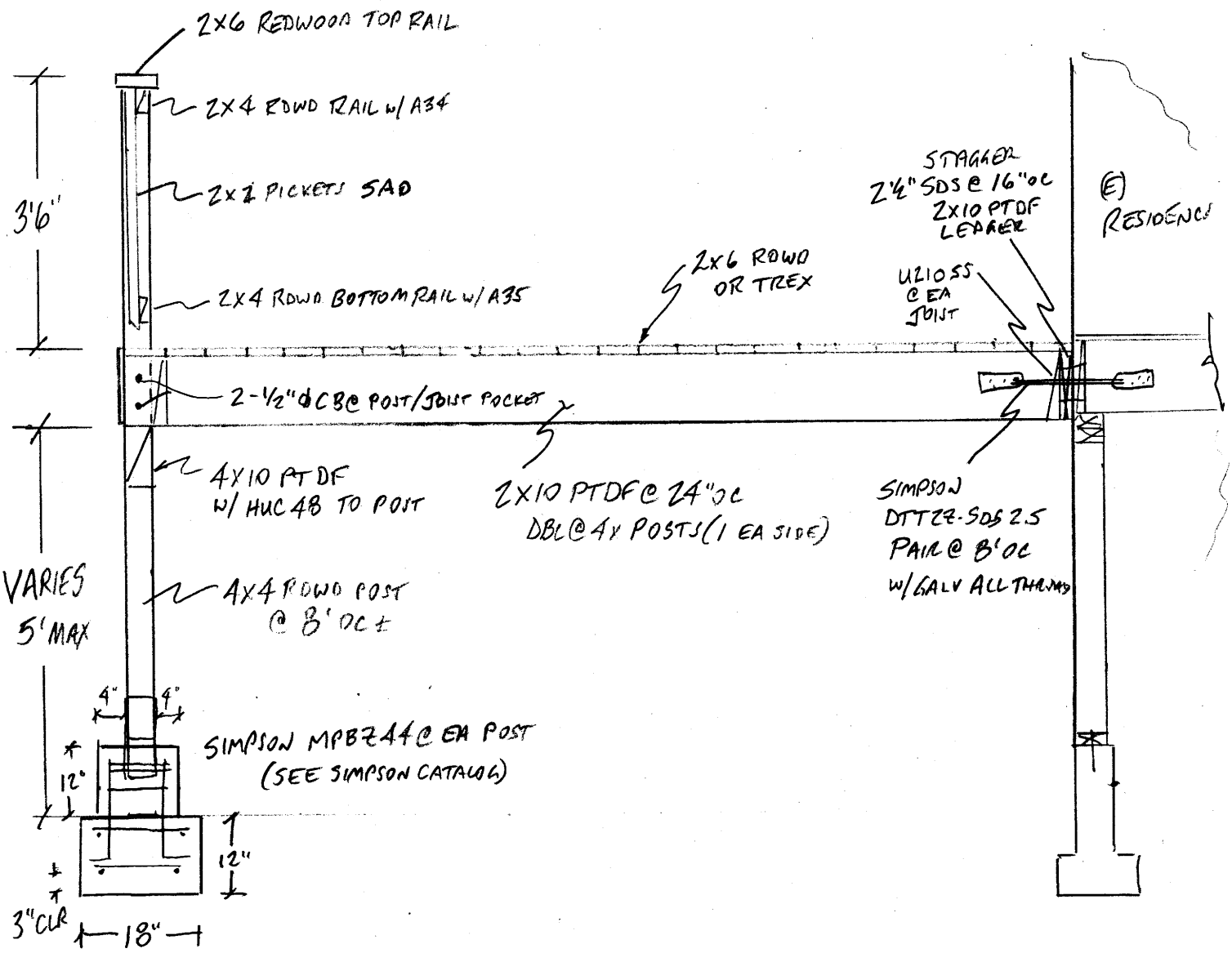
							Governing	Maximum
b	=	3.50	Girder spacing =	72	in.		*Parameter*	*Span*
d	=	9.50	Uniform dead load =	66.00	plf		SHEAR	15.35
Fv	=	95	Uniform live load =	240.00	plf		MOMENT	10.02
Fb	=	875	Max. TL deflection = L/	240			TL DEF	14.27
E	=	1.6E+06	Max. LL deflection = L/	360			LL DEF	13.52
Cr	=	1.00						
LDF	=	1.00	MAX GIRDER SPAN =	10.02	FT			

Deck Top Rail Use 20 plf at 42"

20*8/2 80 lb at rail ends, use Simpson A34 to post

CONSULTING ENGINEER

255 McChristian DECK



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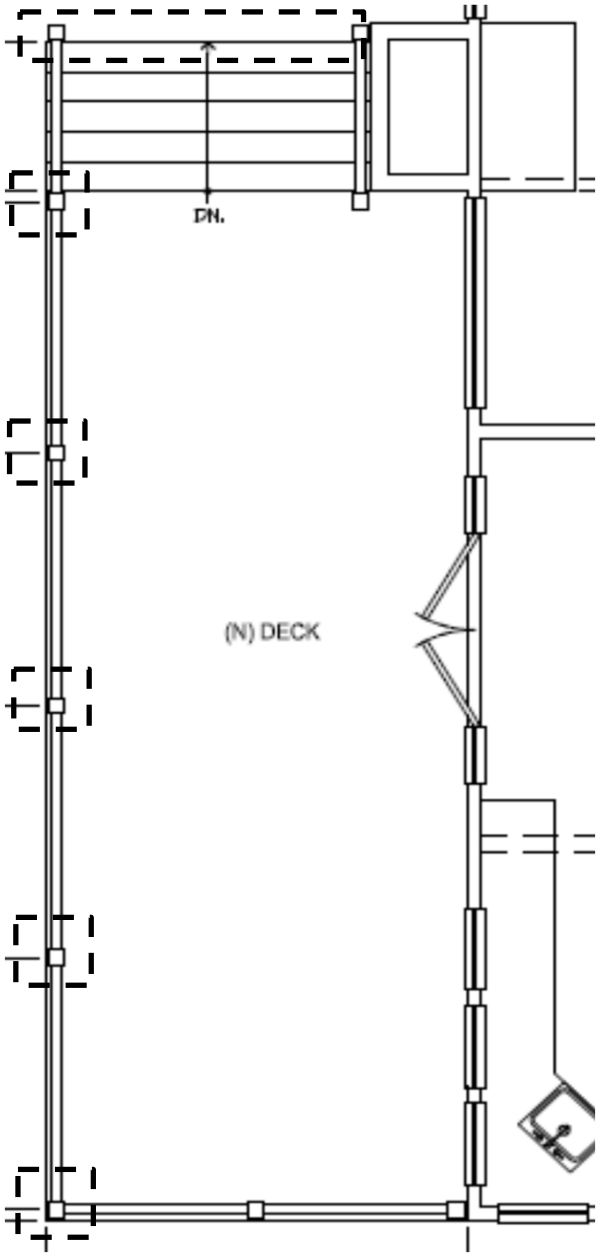
DECK FOUNDATION PLAN



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FOUNDATION DESIGN

Pads @ Deck Support DB1

Dead Load = 0.38 k
Live Load = 1.92 k
2.30 k

$$B = \sqrt{\frac{2.30}{1.50}} = 1.239 \text{ sq ft}$$

Use 1'-6" Square footing

Pads @ Deck Stairs

Dead Load = 0.256 k
Live Load = 1.92 k
2.176 k

$$B = \sqrt{\frac{2.18}{1.50}} = 1.204 \text{ sq ft}$$

Use 1'-0" footing x width of stairs

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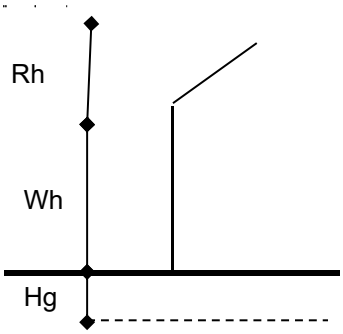
WIND DISTRIBUTION - 1 Story



Deck Height, Rh =	1 ft
Wall Height, Wh =	5 ft
Height above Grade, Hg =	1 ft
Roof Mean Height, RMH =>	7 ft

Wind Loading at DeckRoof

Wind Pressure		* Trib			
12.7	X	3.50	=	44	plf

w_R =	44	plf	Basic Wind Speed, Vasd =>

CONSULTING ENGINEER	Residential Deck Addition		PROJECT NO.21 S 01
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SEISMIC LOADING

Approximate Fundamental Period *Eq 12.8-7*

All Other structural systems

C_t = 0.020 To = 0.115 sec

H_n = 6.50 Ts = 0.577 sec

$T_a = C_t h_n^x$ = 0.081 sec x = 0.750 T_L = 8.000 sec

Acceleration Paramenters

1.2

S_S = 2.546 F_a = 1.000 $S_{MS} = F_a S_s$ => 2.546 $S_{DS} = {}^2/_3 S_{MS}$ => 1.697

S_1 = 0.98 F_v = 1.500 $S_{M1} = F_v S_1$ => 1.470 $S_{D1} = {}^2/_3 S_{M1}$ => 0.980

Base Shear

$V = C_S W$ *Eq 12.8-1*

where

$C_S = S_{DS} / R * I$

C_S = 1.132

Not to exceed

$$C_S = \frac{SD1}{Ta\ (R/I)}$$ *Eq 12.8-3*

C_S = 8.025

Not to Less

C_S = 0.010 *Eq 12.8-5*

C_S = 0.327 Eq12.8-6

Use 1.132 * W

CONSULTING RAA ENGINEER	Residential Deck Addition		PROJECT NO.21 S 01
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SEISMIC DISTRIBUTION - 1 Story

Deck

W_{R1} =	14	psf	*	12	*	32					Deck Addition
	1	psf	* (	12	)+(2 *	32	) * (	5	/2)		Ext. Walls (Roof to Floor)
+	0	psf	*	12	) + (	32	) * (	5	/2)	*Assumed*	Int. Walls (Roof to Floor)

W_{R1} = 5,596 psf

Roof

W_{R2} =	14	psf	*	12	*	32					Deck at House
	15	psf	* (	12	)+(2 *	32	) * (	5	/2)		Ext. Walls (Roof to Floor)
+	0	psf	*	12	) + (	32	) * (	5	/2)	*Assumed*	Int. Walls (Roof to Floor)

W_{R2} = 8,676 psf

Roof

W_{R3} =	14	psf	*	1	*	1					Not Used
	15	psf	* (	1	)+(2 *	1	) * (	5	/2)		Ext. Walls (Roof to Lower Floor)
+	0	psf	*	1	) + (	1	) * (	5	/2)	*Assumed*	Int. Walls (Roof to Lower Floor)

W_{R3} = 164 psf

Average Mudsill to Center Ht. = 5 '

Total Base Shear:

V_1 = 1.132 * W_{total}/1.4 = 4,523 lbs

V_2 = 7,012 lbs

V_3 = 133 lbs

A_1 = 384 ft^2

A_2 = 384 ft^2

A_3 = 1 ft^2

CONSULTING RAA ENGINEER	Residential Deck Addition		PROJECT NO.21 S 01
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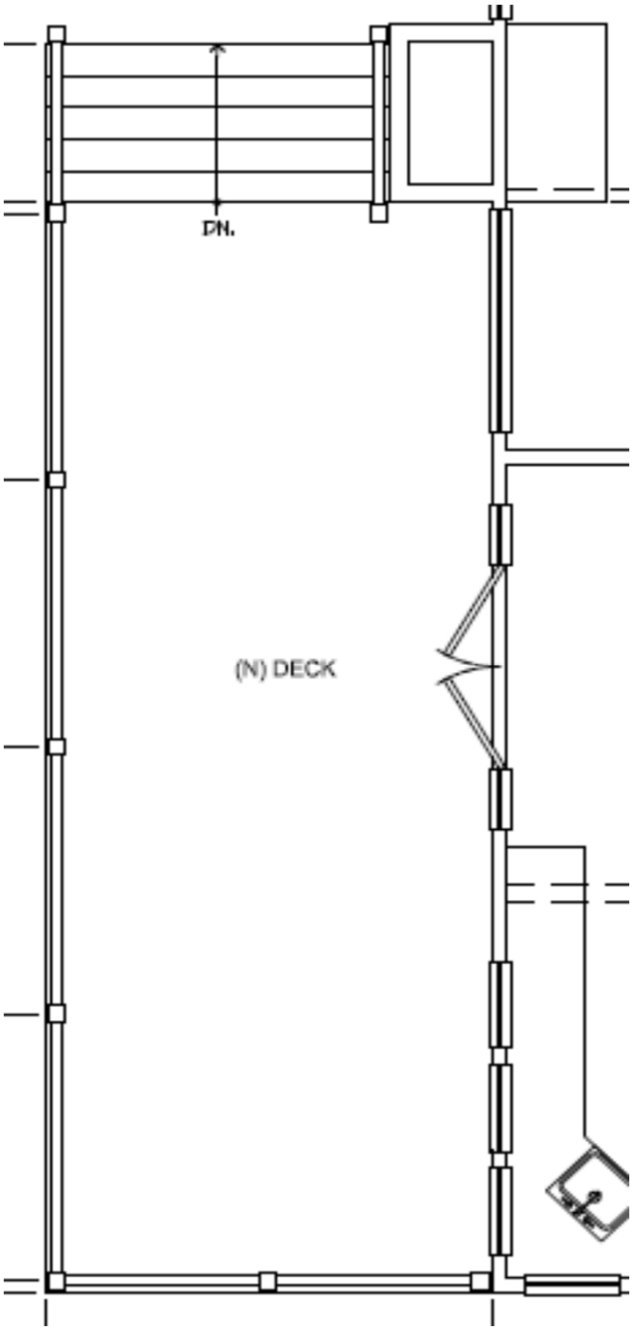
LATERAL DESIGN

1
5 Posts



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SHEAR RESISTANCE

Line 1 w_L Trib

V = 44 * 12 /2 = 267 lbs b = 5 b = 5.0 ft

V_1 = 4,523 * 384.0 / A_1 = 4,523 lbs *v* = 905 plf

Seismic Governs USE 5 each Simpson MPZ44

T=C = h * *v* = 4 X 905 = 3,618 lbs -

MPZ44 Anchors

lbs

L