B-21-0712
CITY OF PUALLUP

THOMPSON
ENGINEERING

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City of Puyallup
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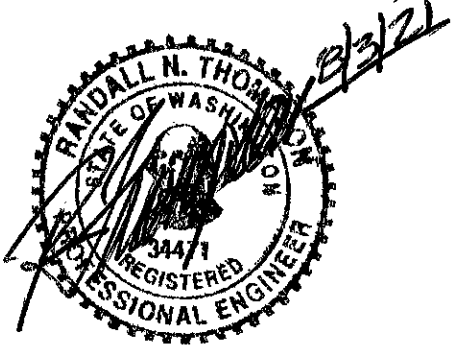
STRUCTURAL CALCULATIONS
DETACH LOFT/GARAGE/RV BUILDING
FOR
JEFF STROBL

PROJECT #21-107

SITE LOCATED AT
1922 5TH AVE SW
PUYALLUP, WA 98371

BY
RANDALL N. THOMPSON, P.E.



THE APPROVED CONSTRUCTION PLANS, DOCUMENTS AND ALL ENGINEERING MUST BE POSTED ON THE JOB AT ALL INSPECTIONS IN A VISIBLE AND READILY ACCESSIBLE LOCATION.

FULL SIZED LEDGIBLE COLOR PLANS ARE REQUIRED TO BE PROVIDED BY THE PERMITEE ON SITE FOR INSPECTION

#21-107

OSHPD

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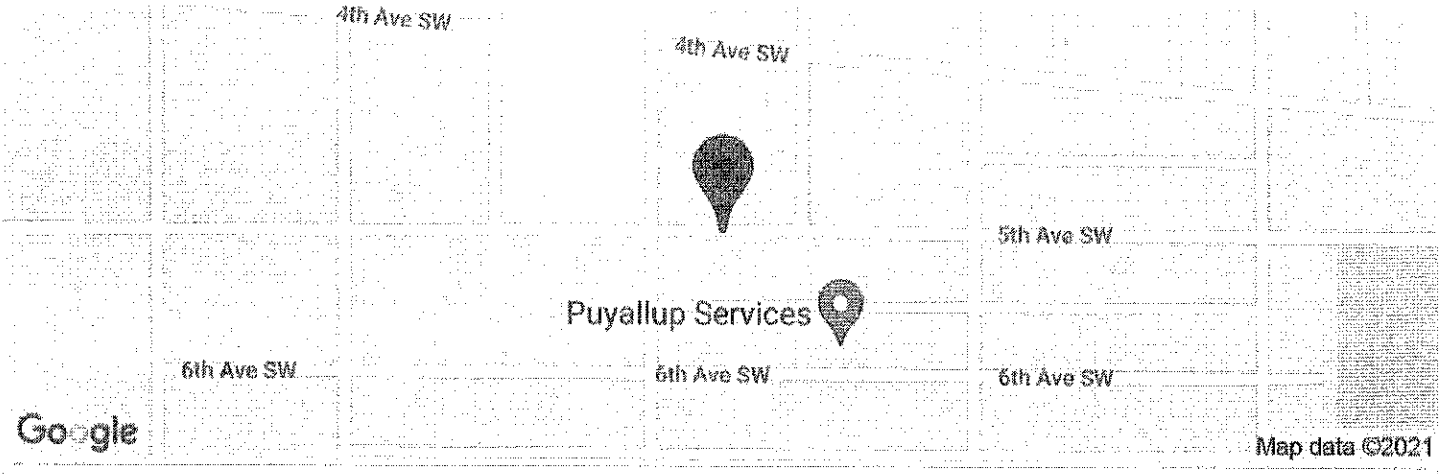
STROBL

Latitude, Longitude: 47.1881866, -122.3078308



Date	8/3/2021, 11:09:34 AM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	D - Default (See Section 11.4.3)

SEE R322 & ASCE 24
SEE R322.3.4
PER ENGINEERING EMAIL
LOCATED IN 500 - FLOOD ZONE AND FLOOD PROOFING NOT REQUIRD.

Type	Value	Description
S_S	1.277	MCE_R ground motion. (for 0.2 second period)
S_1	0.44	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.532	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	1.021	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	1.2	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.5	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	0.6	Site modified peak ground acceleration
T_L	6	Long-period transition period in seconds
SsRT	1.277	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.397	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)
S1RT	0.44	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.489	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.6	Factored deterministic acceleration value. (1.0 second)
PGAd	0.5	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.914	Mapped value of the risk coefficient at short periods
C_{R1}	0.898	Mapped value of the risk coefficient at a period of 1 s

#21-107 STROBL 3/8

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SCOPE OF WORK:

Provide vertical & lateral design (per 2018 I.B.C.) for new garage/RV building per client's request.

PROJECT DESCRIPTION:

Two story wood framed garage and RV building. WITH LOFT

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DESIGN PARAMETERS:

GRAVITY LOADS:

Roofs: Trusses & comp.	=	15 psf dead
	=	25 psf snow
	=	40 psf total
Floors: Conventional	=	12 psf dead
	=	10 psf (partition)
	=	40 psf live
	=	62 psf total
Walls: Conventional	=	10 psf dead

SITE SOILS DATA:

Assumed allowable soil bearing pressure = 1500 psf

LOCATED IN SFHA (500-year zone).

SUBJECT TO FIELD INSPECTION IF ADDITIONAL SOIL EVALUATION IS REQUIRED.

PER APPLICANT NO SOIL WILL BE BROUGHT IN TO RAISE ELEVATION.

LATERAL LOADS:

Wind:
Basic wind speed = 110 MPH
V-asd = 85 MPH
Exposure category "B"

Seismic:
Design category "D"
Resonant response factor R = 6.5
Ss = 1.277g S1 = 0.44g Sds = 1.021g Sd1 = null

VERTICAL DESIGN

ROOF → TRUSSES BY OTHERS

UP. STORY HDRS

W = 40PSF (28/2+2) = 640PLF

SPAN = 4.25'
LDF = 1.15
S = 4/240
BY PROGRAM → S = 13 (#2 DF)
T = 14
A = 15
R = 1.3k
USE 3x 5.1 → (2) 2x6 HDRS

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UP. FLR JOISTS

W = 62PSF (1.33) = 83PLF
40PSF (") = 53PLF (LIVE ONLY)

SPAN = 24' → 11 7/8" LPI 52+ = 89/53PLF

FLR BM/HDR

W = 62 (28/2) = 868PLF

SPAN = 11' → (24F) 5.5 x 9.8 → 5 1/2" x 9" GLBS
LDF = 1.10
S = 4/360
R = 4.7k → USE HHUS5.52/10

SPAN = 3.25' → (#2DF) 3.5 x 4.9 → 4x6 HDR

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GAR. O.H.D. HDR

$W = 40(\frac{28}{2}+2) + 62(\frac{24}{2}) + 10(8) = 1461$ PLF

SPAN = 16.5' → (24F) 5.5 x 6.5 → 5½" x 16½" GLB
LDF = 1.15 R = 12078#
δ = 1/360
(3) 2x6 TP. MC.

$W_2 = 40(\frac{24}{2}+2) = 520$ PLF

SPAN = 7.25' → (#1 DF) 5.5 x 7.1 → 6x8 HDR
LDF = 1.15 R = 2590#
δ = 1/240

REWALL/FLR BM BTWN GAR/RM

$P_{SNOW} = 4774^{\#}$

EQ WT = $\frac{8(4774^{\#})(4.5)(8)}{12.5^3}$ = 704 PLF

$W_2 = 40(3) + 10(12) + 62(\frac{1.33}{2}) = 281$ PLF
985 PLF

(LSL) SPAN = 12.5' → 5.25 x 12.2 → 5¼" x 11⅞" LSL

W_2 = 281 PLF

SPAN = 2' → CTR FTG → $\sqrt{\frac{2404}{1500}} = 1.5'$ → 18" x 18" x 12"

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FLY RAFTERS

W = 40(1.33/2) = 29 plf

SPAN = 14' → 1.5x5.5 (#2DF) → 2x6's OK
LDF = 1.15 R = 189#
δ = l/240

M = 189#(1.33) = 251'#

S REQ'D = 251#(12) / 1140 psi (1.15) = 2.3 IN³

S 2x4 = 3.06 ≥ 2.3 IN³ ∴ OK

FTG @ STAIRS

P = 477#

√(477# / 1500 psf) = 1.8' → 24" SQ. FTG

P REAR WALL = 481# → FOUND. WALL OK

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LATERAL DESIGN

*BY INSP., WIND CONTROLS OVER SEISMIC!

$P_{WIND} = 17$ PSF

W_{FRONT}: RF = 17(5.5+8/2) = 162 PLF

FLR = 17(8/2+1+9/2) = 162 PLF

RJ = 17(4.5+12/2) = 179 PLF

W_{SIDES}: RF = 17(5 5/2+8/2) = 115 PLF

FLR = 17(9.5) = 162 PLF

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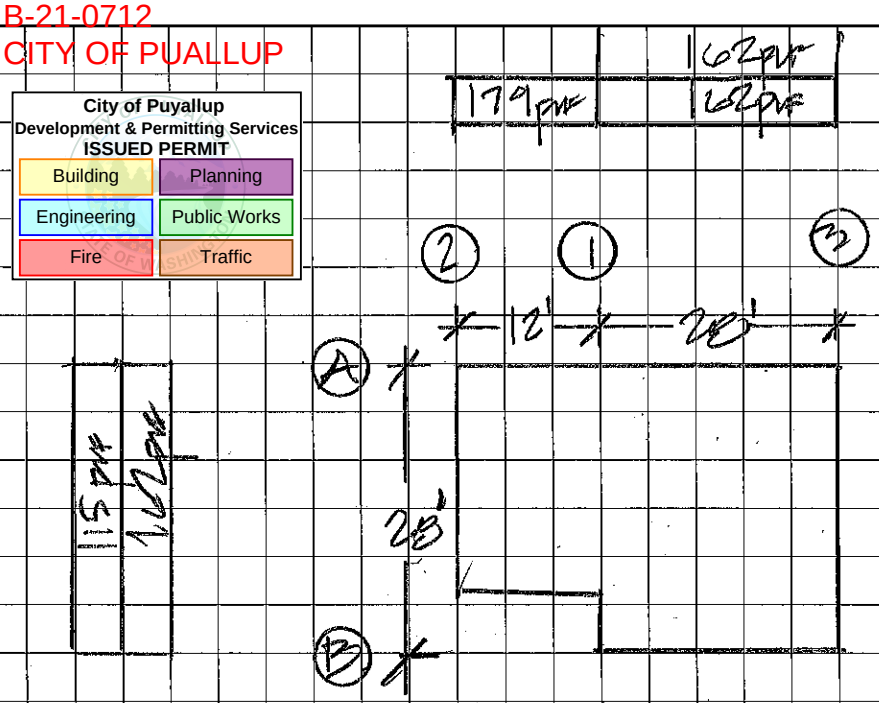

SHEAR PATH PLAN

LOADS TO WALL LINES

① ; ③ RF = 162 (28/2 + 1) = 2430#
FLR = 162 (28/2) = 2268# > 2430#

② RF = 179 (13) = 2327#

Ⓐ ; Ⓑ RF = 15 (28/2) = 1610#
FLR = 162 (11) = 2268# > 3878#

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SHEARWALL DESIGN CHART

WALL LINE	STORY LEVEL	SHEAR FORCE (lbs)	AVAILABLE SHEARWALL (S.W.)	TOTAL S.W.	SHEAR (plf)	S.W. TYPE	ANCHOR BOLTS (n) / dia. (s)	UPLIFT (lbs)	S.W. SECTION	DEAD LOAD (plf)	NET UPLIFT (lbs)	TOTAL UPLIFT (lbs)	HOLDOWN OPTIONS
1	RF	2430#	11'+14'	25'		1							
	FLR	4698# − 3302# = 1396#	4'	4	349	2	(2)½"=48"	3141#	4+12'	142	2005#		LSTHD8/HTT4
			4 TO (2)										
2	RF	5629#	24'	24'	235	1	(7)½"=48"	2015#	24'	195	475#		LSTHD8/LTT20B
3	RF	2430#	9.5'(2)	19'	128	1		1025#	28' (AR 4)	175	—#		N/A
	FLR	4698#	12'+5'+~~4~~	17'	276	2	(6)½"=72"	2457#	21'	182	1416#		LSTHD8/LTT20B
A	RF	1610#	28' WALL BELOW WINDOWS	28'	58	1							
			1610#/10 KINGS = 161# PER ea	M = 161#(4') = 644'#, SREQ'D = 644(12)/1140(1.33) = 5.1 IN³					(2) 2x6's = 8.25 IN³				(10) DBL 2x6 KINGS CS16 STRAPPING ABOVE & BELOW WINDOWS
	FLR	3878#	40'	40'	97	1	(5)½"=72"	1308#	40'	260	—#		N/A
B	RF	1610#	4.5'(2)	9'	179	1		1431#	4.5+4'	240	411#		MSTA 36 STRAPS
	FLR	3878#	5.875'(2)	11.75'	330	2	(5)½"=(3) PER	2970#	6+4'	150	1320#	1731#	LSTHD8/HTT4