ENW STRUCTURAL ENGINEERS
Engineers Northwest Inc., P.S.

PRCTI20241512

COSTCO WHOLESALE

Puyallup, WA

STRUCTURAL CALCULATIONS FOR FLEET RESTROOM ADDITION

City of Puyallup
Development & Permitting Services
ISSUED PERMIT
Building | Planning
Engineering | Public Works
Fire | Traffic

City of Puyallup
Building
REVIEWED
FOR
COMPLIANCE
SKinnear
11/13/2024
11:30:55 AM
CITY OF PUYALLUP
STATE OF WASHINGTON

2021 IBC
September 20, 2024
ENW #99090017

Calculations required to be provided by the Permittee on site for all Inspections

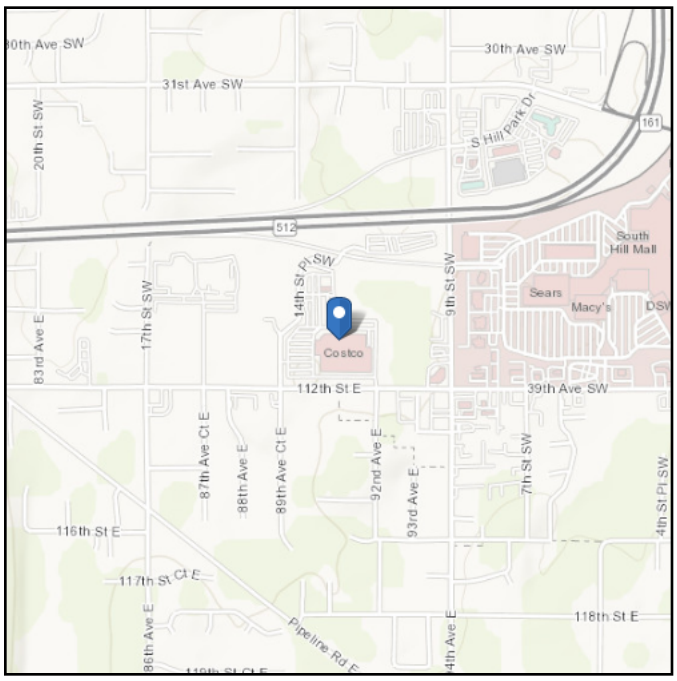
19020 33rd Ave W #530 • Lynnwood, WA 98036
206.525.7560 • fax 206.522.6698
www.engineersnw.com

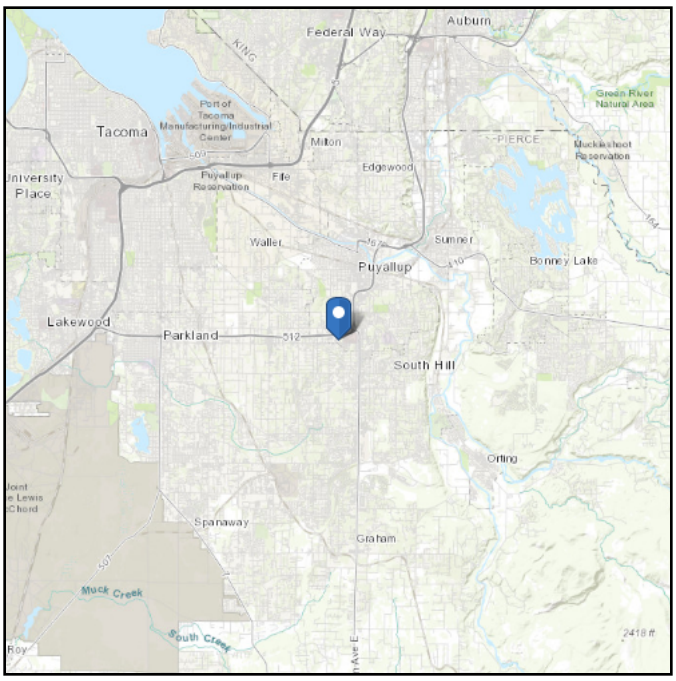
ASCE Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: D - Stiff Soil

Latitude: 47.156
Longitude: -122.308
Elevation: 380.8878222015333 ft (NAVD 88)





Wind

Results:

Wind Speed	97 Vmph
10-year MRI	67 Vmph
25-year MRI	73 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, and Section 26.5.2
Date Accessed: Wed Sep 04 2024

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.

Seismic

Site Soil Class: D - Stiff Soil

Results:

S_S :	1.268	S_{D1} :	N/A
S_1 :	0.438	T_L :	6
F_a :	1	PGA :	0.5
F_v :	N/A	PGA_M :	0.55
S_{MS} :	1.268	F_{PGA} :	1.1
S_{M1} :	N/A	I_e :	1
S_{DS} :	0.845	C_v :	1.354

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

Data Accessed: Wed Sep 04 2024

Date Source: USGS Seismic Design Maps

The ASCE Hazard Tool is provided for your convenience, for informational purposes only, and is provided “as is” and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

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(4) IBC Section 1612.3, regarding the establishment of flood hazard areas, is amended to read as follows:

Section 1612.3. To establish flood hazard areas, the City Council hereby adopts the flood hazard map and supporting data identified by the Federal Emergency Management Agency in an engineering report entitled "The Flood Insurance Study for the City of Puyallup," initially adopted in PMC 21.07.040, as it currently exists or may be subsequently amended.

(Ord. 3043 § 5, 2013; Ord. 2962 § 6, 2010).

17.04.050 Local amendments of International Residential Code.

The International Residential Code adopted in this chapter is hereby amended as follows.

(1) Section R104, entitled "Duties and Powers of Building Official," is hereby amended to add subsection R104.12:

Section R104.12 Lot lines and setback lines. Notwithstanding the authority of the building official to administer and enforce the building code, the building official shall have no duty to verify or establish lot lines or setback lines. No such duty is created by this code, and none shall be implied.

(2) Section R105.2, entitled "Work exempt from permit," subsection 10, entitled "Building," is amended to read as follows:

Decks that are not more than 30 inches above adjacent grade at any point and are not over any basement or story.

(3) Section R110.1, entitled "Use and Occupancy," subsection entitled "Exception," is amended to read as follows:

Certificates of occupancy are not required for Group R, Division 3 occupancies and for work exempt from permits under Section R105.2.

(4) The following subsections are deleted from Section R112, "Board of Appeals": Subsection R112.3, "Qualifications."

(5) Table R301.2(1), Climatic and Geographical Design Criteria, is amended to read as follows:

Table R301.2(1)
Climatic and Geographical Design Criteria

Ground Snow Load	Wind Design		Seismic Design Category[f]	Subject to Damage from			Winter Design Temp[e]	Ice Shield Underlay[h]	Flood Hazards[g]	Air Freeze Index[i]	Mean Annual Temp[j]
	Speed[d] (mph)	Topographical effects[k]		Weath-ering[a]	Frost Line Depth[b]	Termites[c]					
20 lbs/ft	85	No	D-1	Moderate	12 inches	Slight to Moderate	22°	No	Puyallup Municipal Code 21.07	160	51°

(Ord. 3043 § 6, 2013; Ord. 2962 § 6, 2010).

17.04.060 Conflicts between codes.

In case of conflict among the provisions of the State Building Code, i.e., the International Building Code, the International Residential Code, the International Mechanical Code, the International Fire Code, the Uniform Plumbing Code and Uniform Plumbing Code Standards, and the rules adopted by the Washington State Building Code Council establishing standards for making buildings and facilities accessible to and usable by the physically disabled or elderly persons, the first named code in this section shall govern over those that follow. In case of conflicts between other codes and provisions adopted by this chapter, the code or provision that is most restrictive, as determined by the city's building official, shall apply. (Ord. 2962 § 6, 2010).

17.04.070 Definitions.

(1) Unless the context requires otherwise, any reference to "jurisdiction," "department of building safety," "department of mechanical inspection," "department of inspection," "department of prevention," or "department of property maintenance inspection" shall be construed to mean the city of Puyallup.

(2) Unless the context requires otherwise, any reference to "building official" or "code official" shall be construed to mean the city's building code official in the absence of any specific written designation from the city manager.

(3) Unless the context requires otherwise, any reference to "fire code official" shall be construed to mean the city's fire code official in the absence of any specific written designation.

(4) Unless the context requires otherwise, any reference to "board of appeals" shall be construed to mean the hearing examiner. All appeals authorized by the codes adopted in the chapter shall be to the city's hearing examiner.

(5) Unless the context requires otherwise, any reference to "International Electric Code" shall be construed to mean the National Electric Code. (Ord. 2962 § 6, 2010).

17.04.080 Fees.

(1) Establishment. All fees and charges for permits, approvals, inspections or other services or items related to this title shall be established and amended from time to time by executive order of the city manager.

(2) Waiver of Fees. Building permit fees for the construction, alteration, and repairs of single-family or duplex dwellings may be waived when all of the following conditions apply:

(a) The residential structure is intended for low-income families.

(b) The construction of the structure involves some volunteer labor.

(c) The structure is being constructed by an organization classified as a 501(c) nonprofit organization by the Internal Revenue Service.

(3) Fee Refund. The building official may authorize a fee refund in the following amounts:

(a) One hundred percent of any fee erroneously paid or collected;

(b) Up to 80 percent of the permit fee paid when no work had been performed under a permit or approval issued in accordance with this code;

(c) Up to 80 percent of the plan review fee paid when an application for a permit or approval for which a plan review fee has been paid is withdrawn or cancelled before any plan review has been performed. The building official shall not authorize refunding of any fee paid except on written application filed by the original applicant not later than 180 days after the date of fee payment.

(4) Special Investigation Fee. Whenever any work for which a permit or approval is required by applicable law has commenced without a permit or approval, the city may perform a special investigation before issuance of a permit or approval. The building official is authorized to impose an investigation fee in an amount that compensates the city for performing the investigation. The subject of investigation shall pay

THICKNESS OF STEEL COMPONENTS [1]

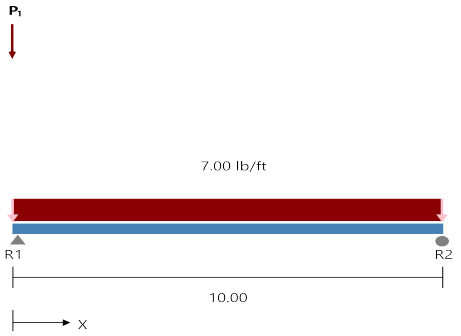
GAGE	DESIGN THICKNESS	MINIMUM THICKNESS [2]
22	.0283	.0269
20	.0346	.0329
18	.0451	.0428
16	.0566	.0538
14	.0713	.0677
12	.1017	.0966
10	.1240	.1265

NOTES:
1.) UNCOATED STEEL THICKNESS. THICKNESS IS FOR CARBON SHEET STEEL.
2.) MINIMUM THICKNESS REPRESENTS 95% OF DESIGN THICKNESS AND IS THE MINIMUM ACCEPTABLE THICKNESS DELIVERED TO THE JOB SITE BASED ON SECTION A2.4 OF THE 2007 A.I.S.I. CODE.

JOIST BRACING SCHEDULE

	JOIST SPAN	TOP AND BOTTOM FLANGE BRACING
(1)	UP TO AND INCLUDING 10'	NONE
(2)	10' UP TO AND INCLUDING 14'	ONE ROW AT MID-SPAN
(3)	14' UP TO AND INCLUDING 18'	TWO ROWS AT THIRD SPANS
(4)	18' UP TO AND INCLUDING 21'	THREE ROWS AT QUARTERS SPANS

NOTES:
1.) USE 1 1/2" x 16GA. FLAT STRAP ON TOP & BOT. OF JOIST. OMIT TOP STRAP IF DECK OCCURS. OR 1 1/2" CRC ON TOP OF JOIST. FASTEN TO EA. JOIST w/2 SCREWS.
2.) SPACE BRACING AS NOTED ABOVE EXCEPT WHEN NOTED OTHERWISE ON PLANS.
3.) SEE SECT. 1/S2.2 FOR DETAILS AND EXCEPTIONS.



Section: 800S162-54 (50 ksi) Single C Stud (punched)
Maxo = 3065.9 ft-lb **Va =** 2091.3 lb **I =** 5.60 in^4

Loads have not been modified for strength checks
Loads have not been modified for deflection calculations

Bridging Connectors - Design Method =AISI S100

Span	Axial KyLy, KtLt	Flexual, Distortional	Connector	Stress Ratio
Span	NA	None, 120.0"	N/A	-

Web Crippling

Support	Load (lb)	Bearing (in)	Pa (lb)	M (ft-lbs)	Max Int.	Stiffener?
R1	335.00	1.00	409.4	0.0	0.43	NO
R2	35.00	1.00	574.6	0.0	0.03	NO
P1	300.00	1.50	440.3	0.0	0.35	NO

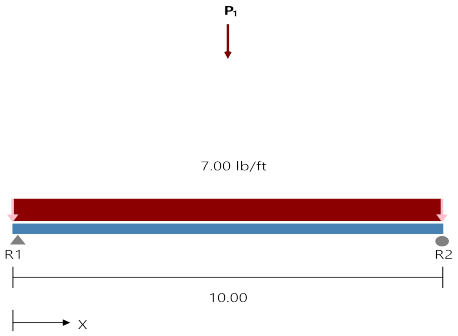
"*" after support means punched near support

Point Loads	**P1**
Load(lb)	300.00
X-Dist.(ft)	0.00

	Code Check	Required	Allowed	Interaction	Notes
Span	Max. Axial, lbs	0.0(t)	-	0%	KΦ=0.00 lb-in/in Max KL/r = N/A
	Max. Shear, lbs	35.0	2091.3	2%	Shear (Punched)
	Max. Moment (MaFy, Ma-dist), ft-lbs	87.5	2734.3	3%	Ma-dist (control),KΦ=0.00 lb-in/in
	Moment Stability, ft-lbs	87.5	866.5	10%	
	Shear/Moment	0.03	1.00	3%	Shear 0.0, Moment 87.5
	Axial/Moment	0.10	1.00	10%	Axial 0.0(c), Moment 87.5
	Deflection Span, in	0.010	--meets L/12586--		

Support	Rx(lb)	Ry(lb)	Simpson Strong-Tie Connector	Connector Interaction	Anchor Interaction
R1	0.0	335.0	By Others & Anchorage Designed by Engineer	NA	NA
R2	0.0	35.0	By Others & Anchorage Designed by Engineer	NA	NA

* Reference catalog for connector and anchor requirement notes as well as screw placement requirements



Section: 800S162-54 (50 ksi) Single C Stud (punched)
Maxo = 3065.9 ft-lb **Va =** 2091.3 lb **I =** 5.60 in^4

Loads have not been modified for strength checks
Loads have not been modified for deflection calculations

Bridging Connectors - Design Method =AISI S100

Span	Axial KyLy, KtLt	Flexual, Distortional	Connector	Stress Ratio
Span	NA	None, 120.0"	N/A	-

Web Crippling

Support	Load (lb)	Bearing (in)	Pa (lb)	M (ft-lbs)	Max Int.	Stiffener?
R1*	185.00	1.00	544.0	0.0	0.18	NO
R2*	185.00	1.00	544.0	0.0	0.18	NO
P1	300.00	1.50	1377.7	837.5	0.28	NO

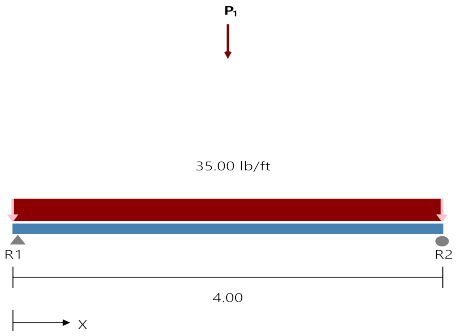
"*" after support means punched near support

Point Loads	**P1**
Load(lb)	300.00
X-Dist.(ft)	5.00

	Code Check	Required	Allowed	Interaction	Notes
Span	Max. Axial, lbs	0.0(t)	-	0%	KΦ=0.00 lb-in/in Max KL/r = N/A
	Max. Shear, lbs	185.0	2091.3	9%	Shear (Punched)
	Max. Moment (MaFy, Ma-dist), ft-lbs	837.5	2734.3	31%	Ma-dist (control),KΦ=0.00 lb-in/in
	Moment Stability, ft-lbs	837.5	987.1	85%	
	Shear/Moment	0.28	1.00	28%	Shear 150.0, Moment 837.5
	Axial/Moment	0.85	1.00	85%	Axial 0.0(c), Moment 837.5
	Deflection Span, in	0.075	--meets L/1602--		

Support	Rx(lb)	Ry(lb)	Simpson Strong-Tie Connector	Connector Interaction	Anchor Interaction
R1	0.0	185.0	By Others & Anchorage Designed by Engineer	NA	NA
R2	0.0	185.0	By Others & Anchorage Designed by Engineer	NA	NA

* Reference catalog for connector and anchor requirement notes as well as screw placement requirements



Section: (2) 800S162-54 (50 ksi) Boxed C Stud (punched)
Maxo = 6131.8 ft-lb **Va =** 4182.6 lb **I =** 11.20 in^4

Loads have not been modified for strength checks
Loads have not been modified for deflection calculations

Bridging Connectors - Design Method =AISI S100

Span	Axial KyLy, KtLt	Flexual, Distortional	Connector	Stress Ratio
Span	NA	None, N/A	N/A	-

Web Crippling

Support	Load (lb)	Bearing (in)	Pa (lb)	M (ft-lbs)	Max Int.	Stiffener?
R1*	220.00	1.00	1088.0	0.0	0.11	NO
R2*	220.00	1.00	1088.0	0.0	0.11	NO
P1	300.00	1.50	2755.4	370.0	0.10	NO

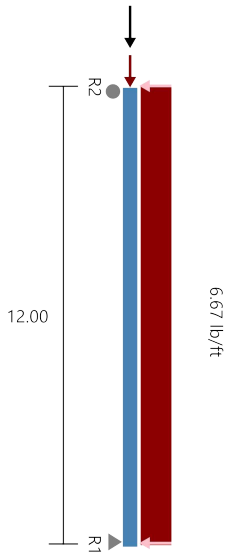
"*" after support means punched near support

Point Loads	**P1**
Load(lb)	300.00
X-Dist.(ft)	2.00

	Code Check	Required	Allowed	Interaction	Notes
Span	Max. Axial, lbs	0.0(t)	-	0%	KΦ=0.00 lb-in/in Max KL/r = N/A
	Max. Shear, lbs	220.0	4182.6	5%	Shear (Punched)
	Max. Moment (MaFy, Ma-dist), ft-lbs	370.0	6131.8	6%	
	Moment Stability, ft-lbs	370.0	6131.8	6%	
	Shear/Moment	0.07	1.00	7%	Shear 150.0, Moment 370.0
	Axial/Moment	0.06	1.00	6%	Axial 0.0(c), Moment 370.0
	Deflection Span, in	0.003	--meets L/17763--		

Support	Rx(lb)	Ry(lb)	Simpson Strong-Tie Connector	Connector Interaction	Anchor Interaction
R1	0.0	220.0	By Others & Anchorage Designed by Engineer	NA	NA
R2	0.0	220.0	By Others & Anchorage Designed by Engineer	NA	NA

* Reference catalog for connector and anchor requirement notes as well as screw placement requirements



Section : 362S162-33 (33 ksi) @ 16" o.c. Single C Stud (punched)
Maxo = 440.9 ft-lb **Va =** 1023.6 lb **I =** 0.55 in^4

Loads have not been modified for strength checks
Loads have not been modified for deflection calculations

Bridging Connectors - Design Method =AISI S100

Span	Axial KyLy, KtLt	Flexual, Distortional	Connector	Stress Ratio
Span	48.0", 48.0"	48.0", 144.0"	LSUBH3.25 (Min)	0.18

Web Crippling

Support	Load (lb)	Bearing (in)	Pa (lb)	M (ft-lbs)	Max Int.	Stiffener?
R2	40.00	1.00	165.2	0.0	0.13	NO
R1	40.00	1.00	165.2	0.0	0.13	NO

"*" after support means punched near support

Gravity Load

Type	Load (lb)
Uniform	9.33plf
P1y	335.00lb @ 12.00ft

	Code Check	Required	Allowed	Interaction	Notes
Span	Max. Axial, lbs	447.0(c)	1758.7(c)	25%	KΦ=0.00 lb-in/in Max KL/r = 99
	Max. Shear, lbs	40.0	521.2	8%	Shear (Punched)
	Max. Moment (MaFy, Ma-dist), ft-lbs	120.0	440.9	27%	MaFy (control),KΦ=0.00 lb-in/in
	Moment Stability, ft-lbs	120.0	432.1	28%	
	Shear/Moment	0.27	1.00	27%	Shear 0.0, Moment 120.0
	Axial/Moment	0.53	1.00	53%	Axial 394.4(c), Moment 119.6
	Deflection Span, in	0.191	--meets L/753--		

Support	Rx(lb)	Ry(lb)	Simpson Strong-Tie Connector	Connector Interaction	Anchor Interaction
R2	40.0	0.0	By Others & Anchorage Designed by Engineer	NA	NA
R1	40.0	447.0	By Others & Anchorage Designed by Engineer	NA	NA

* Reference catalog for connector and anchor requirement notes as well as screw placement requirements

ENGINEERS-NORTHWEST,INC.P.S.
9725 THIRD AVE. N.E. (SUITE 207)
SEATTLE, WA. 98115

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ASCE 7-16

Seismic Loads per ASCE 7-16- Chapter 12 Seismic Design Requirements for Building Structures

Input Cells =	
Project Number:	99090017
Project Name:	Fleet Restroom
Location:	C. Puyallup, WA
Design By:	J.S.

2018 IBC Section 1613 / ASCE 7-16 Section 12.8 Equivalent Lateral Force Procedure

All references below are to ASCE 7-16 (U.N.O.)

Input

Basic Seismic Force Resisting System =	A17. Light-frame walls with shear panels of all other materials	
Basic Seismic Force Resisting System =	BWS	= Bearing Wall Systems
Is diaphragm considered flexible? =	YES	
Structural height, h_n =	12	ft
S_s =	1.268	spectral response acceleration at a period of 0.2s for Site Class B
S_1 =	0.438	spectral response acceleration at a period of 1.0s for Site Class B
T_L =	6	Long-period transition period
Site Class (soil) =	D	
Risk Category =	II	Table 1.5-1
Top of wall elevation (parapet) =	12	ft
Elev. of top of wall lateral support (max.) =	12	ft (roof high point- minimum parapet)
Elev. of top of wall lateral support (min.) =	12	ft (roof low point- maximum parapet)
Regular structure ≤ 5 stories ? =	YES	Section 12.8.1.3
ρ =	1.0	Section 12.3.4.2

Output

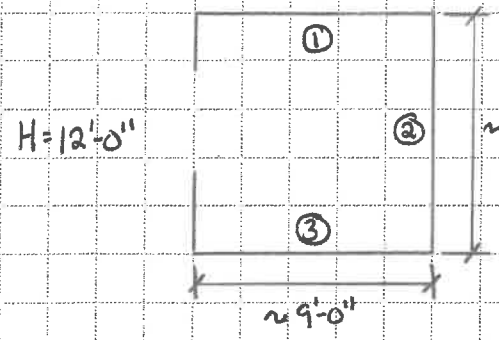
Site Coefficient, F_a =	1	Table 11-4.1
Site Coefficient, F_v =	1.862	Table 11-4.2
S_{MS} =	1.268	Eqn 11.4-1
S_{M1} =	0.816	Eqn 11.4-2
S_{DS} =	0.845	Eqn. 11.4-3
S_{D1} =	0.544	Eqn. 11.4-3
Seismic Design Category (SDC) =	D	Section 11.6 & Tables 11.6-1 & 11.6-2
T_0 =	0.129	Section 11.4.5, 0.2Sd1/Sds
T_s =	0.644	Section 11.4.5, Sd1/Sds
C_t =	0.02	Table 12.8-2
Period, T =	0.129	sec, Section 12.8.2.1 (Eqn 12.8-7)
S_a =	0.845	Section 11.4.5 (Eqns 11.4-5, 11.4-6, 11.4-7)
Response Modification Coefficient, R =	2	Table 12.2-1
System Overstrength Factor, Ω_o =	2	Table 12.2-1
Deflection Amplification Factor, C_d =	2	Table 12.2-1
Importance Factor, I_e =	1	Table 1.5-2, by Risk Category
Detailing Reference Section =	14.1 and 14.5	
$C_{s\ calc}$ =	0.423	Section 12.8.1.1, Eqn 12.8-2
$C_{s\ max}$ =	2.109	Section 12.8.1.1, Eqns 12.8-3 & 12.8-4
$C_{s\ min}$ =	0.037	Section 12.8.1.1, Eqns 12.8-5 & 12.8-6
$C_{s\ use}$ =	0.423	Section 12.8.1.1, Eqns 12.8-2 - 12.8-6
V_u =	**0.423**	*** W (LRFD)** Section 12.8.1, Eqn 12.8-1
V =	**0.296**	*** W (ASD)**
E_v =	**0.169**	*** D = +/- S_{DS} D (Eqn 12.4-4) - May be zero for proportioning foundations.**

STRUCTURAL CALCULATIONS

PROJECT # _____ PROJECT C. Fleet Restroom DATE _____

SUBJECT Lateral Check (Use $C_s = 0.500$) SHEET _____ OF _____

BY _____



Typical Layout

DL:

Ceiling	= 2.8	psf
Joists @ 16" oc	= 1.8	psf
Misc.	= 0.4	psf
	5.0	psf

5/8" GWB EA Side	= 5.6	psf
Studs @ 16" oc	= 0.7	psf
Misc.	= 0.7	psf
	7.0	psf

$V_{x/y} = 0.5(5_{psf} \times 9\,ft + 7_{psf} \times 12\,ft \times 2) = 106.5\,plf$

$V_{1/3} = 106.5\,plf \times 9\,ft \div 2 = 479.3\,\#$

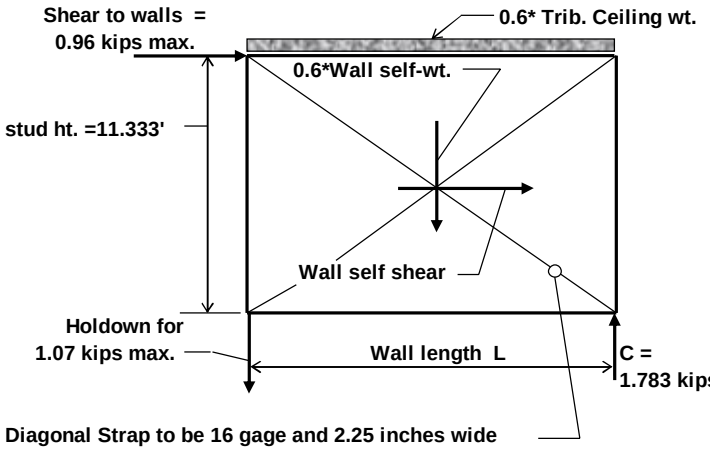
$V_2 = 106.5\,plf \times 9\,ft = 958.5\,\#$

ENGINEERS-NORTHWEST,INC.P.S.
9725 THIRD AVE. N.E. (SUITE 207)
SEATTLE, WA. 98115

COSTCO - X-braced walls

Cs (USD) = 0.714
Cs (ASD) = 0.500

High Seismic Cs = 0.5
V = 0.5 W (ASD)
IBC Section 2211 $\Omega 0 = 2.0$
Seismic Design Category= D



Diagonal Strap to be 16 gage and 2.25 inches wide

Joist DL	w/ Ceiling	
	8 in. Joists @ 16 in.o/c	= 1.8 psf
	Ceiling	= 2.8 psf
	Misc.	= 0.4 psf
	Total	= 5.0 psf
Wall DL	w/ sheathing each side	
	5/8" GWB each side of wall	= 5.6 psf
	3-5/8" Studs @ 16" o/c	= 0.7 psf
	Misc.	= 0.7 psf
	Total	= 7.0 psf
Wall DL	w/ sheathing one side	
	5/8" GWB one side of wall	= 2.8 psf
	3-5/8" Studs @ 16" o/c	= 0.7 psf
	Misc.	= 0.5 psf
	Total	= 4.0 psf

v = 1060 lb / 9 ft = 117.8 plf < 290 plf O.K. *Use 5/8" G.W.B.

Wall	L	V top	Wall self-wt.	V wall wt.	Σ V	Diagonal Strap Tension	# screws	Gross up
1	9.00 ft.	0.48 k	0.41 k	0.20 k	0.58 k	0.94 kips	6	0.732 k
2	9.00 ft.	0.96 k	0.41 k	0.20 k	1.06 k	1.71 kips	10	1.337 k
3	9.00 ft.	0.48 k	0.41 k	0.20 k	0.58 k	0.94 kips	6	0.732 k
4	0.00 ft.	0.00 k	0.00 k	0.0 k	0.00 k	0.00 kips	0	0.000 k
5	0.00 ft.	0.00 k	0.00 k	0.0 k	0.00 k	0.00 kips	0	0.000 k
6	0.00 ft.	0.00 k	0.00 k	0.0 k	0.00 k	0.000001	1	0.000 k

#8 screws

	controlling gage	screw values
Required # of screws @ 16ga. Diagonal strap to 16ga. Plate = 10	16 ga	0.268 k
Required # of screws @ 16ga. Plate to 20ga. end studs = 13	20 ga	0.164 k
Required # of screws @ 16ga. Plate to 16ga. Top Track = 6	16 ga	0.268 k
Required # of screws @ 16ga. Plate to 16ga. Bot.Track = 6	16 ga	0.268 k

Wall	GWB E.S. Wall ?	Wall Self DL x 0.3	Trib. Ceiling to wall	Trib. Ceiling DL x 0.3	Perp. Wall length	GWB E.S. Wall ?	Perp.Wall DL x 0.6	Sum Walls DL x 0.6	Net uplift	Compression load C
1	One Side	0.11 kips	4.50 ft.	0.06 kips	2.00 ft.	One Side	0.05 kips	0.21 kips	0.52 kips	1.09 kips
2	One Side	0.11 kips	9.00 ft.	0.11 kips	2.00 ft.	One Side	0.05 kips	0.27 kips	1.07 kips	1.78 kips
3	One Side	0.11 kips	4.50 ft.	0.06 kips	2.00 ft.	One Side	0.05 kips	0.21 kips	0.52 kips	1.09 kips
4	One Side	0.00 kips	0.00 ft.	0.00 kips	0.00 ft.	One Side	0.00 kips	0.00 kips	0.00 kips	0.00 kips
5	One Side	0.00 kips	0.00 ft.	0.00 kips	0.00 ft.	One Side	0.00 kips	0.00 kips	0.00 kips	0.00 kips
6	One Side	0.00 kips	0.00 ft.	0.00 kips	0.00 ft.	One Side	0.00 kips	0.00 kips	0.00 kips	0.00 kips
									Max.	1.78 kips

Max. uplift = 1.069 kips
Max. compression = 1.783 kips

Area of 6 in.slab to resist the net uplift @ holdowns = (1.07/(0.6*0.075))^0.5= 4.88 ft. square - O.K.by inspection w/ slab reinf.
slab Mu = 1.4*0.075*(2.44)^2/2 = 0.313 k-ft/ft. b = 12in., t = 6in. fb = 0.313*6/(6)2 = 0.053 ksi
@ 2.5 ksi concrete fr = (5*.55* (2500)1/2)/1000 = 0.138 ksi 0.138 > 0.053 O.K.

For Holdown use (Simpson S/LTT20 w/ 1.45 kip capacity) > 1.069 k O.K.
Uplift w/Ω = 1069 lb x 2 = 2138 lb < 2650 lb O.K. *See Simpson Anchor printout

Table B5.2.2.3-3
Unit Nominal Shear Strength [Resistance] (v_n) [1, 2]
For Shear Walls with Gypsum Board Panel Sheathing on One Side of Wall

United States and Mexico (Pounds Per Foot)						
Sheathing	Maximum Aspect Ratio (h/w)	Fastener Spacing at Panel Edges/Field (Inches)				Designation Thickness of Stud, Track and Blocking (mils)
		8/12	4/12	7/7	4/4	
½" gypsum board	2:1	230	295	290	425	33 (min)
Canada (kN/m)						
Sheathing	Maximum Aspect Ratio (h/w)	Fastener Spacing at Panel Edges/Field (mm)				Designation Thickness of Stud, Track and Blocking (mils)
		200/300	150/300	100/300		
12.5 mm gypsum board	2:1	2.7	3.1	3.4		33 (min)

1. For SI: 1" = 25.4 mm, 1 foot = 0.305 m, 1 lb = 4.45 N.
2. See Section B5.2.2.3.6 for requirements for sheathing applied to both sides of wall.

Table B5.2.2.3-4
Unit Nominal Shear Strength [Resistance] (v_n) [1, 2]
For Shear Walls with Fiberboard Panel Sheathing on One Side of Wall

United States and Mexico (Pounds Per Foot)					
Sheathing	Maximum Aspect Ratio (h/w)	Fastener Spacing at Panel Edges/Field (Inches)			Designation Thickness of Stud, Track and Blocking (mils)
		4/6	3/6	2/6	
½" fiberboard	1:1	425	615	670	33 (min)
Canada (kN/m)					
Sheathing	Maximum Aspect Ratio (h/w)	Fastener Spacing at Panel Edges/Field (mm)			Designation Thickness of Stud, Track and Blocking (mils)
		100/150	75/150	50/150	
12.5 mm fiberboard	1:1	5.0	7.2	7.8	33 (min)

1. For SI: 1" = 25.4 mm, 1 foot = 0.305 m, 1 lb = 4.45 N.
2. See Section B5.2.2.3.6 for requirements for sheathing applied to both sides of wall.

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Company:		Date:	2/17/2023
Engineer:		Page:	1/4
Project:			
Address:			
Phone:			
E-mail:			

1.Project information

Project description:
Location:
Fastening description:

Comment:

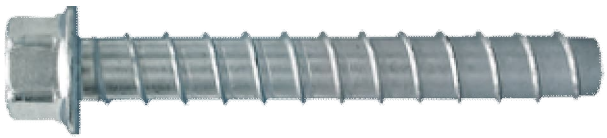
2. Input Data & Anchor Parameters

General
Design method:ACI 318-19
Units: Imperial units

Anchor Information:
Anchor type: Concrete screw
Material: Carbon Steel
Diameter (inch): 0.500
Nominal Embedment depth (inch): 3.250
Effective Embedment depth, h_{ef} (inch): 2.350
Code report: ICC-ES ESR-2713
Anchor category: 1
Anchor ductility: No
h_{min} (inch): 5.00
c_{ac} (inch): 3.56
C_{min} (inch): 1.75
S_{min} (inch): 3.00

Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 6.00
State: Uncracked
Compressive strength, f'_c (psi): 4000
Reinforcement condition: Supplementary reinforcement not present
Supplemental edge reinforcement: No
Reinforcement provided at corners: No
Ignore concrete breakout in tension: No
Ignore concrete breakout in shear: No
Ignore 6do requirement: Not applicable
Build-up grout pad: No

Recommended Anchor
Anchor Name: Titen HD® - 1/2"Ø THD, hnom:3.25" (83mm)
Code Report: ICC-ES ESR-2713

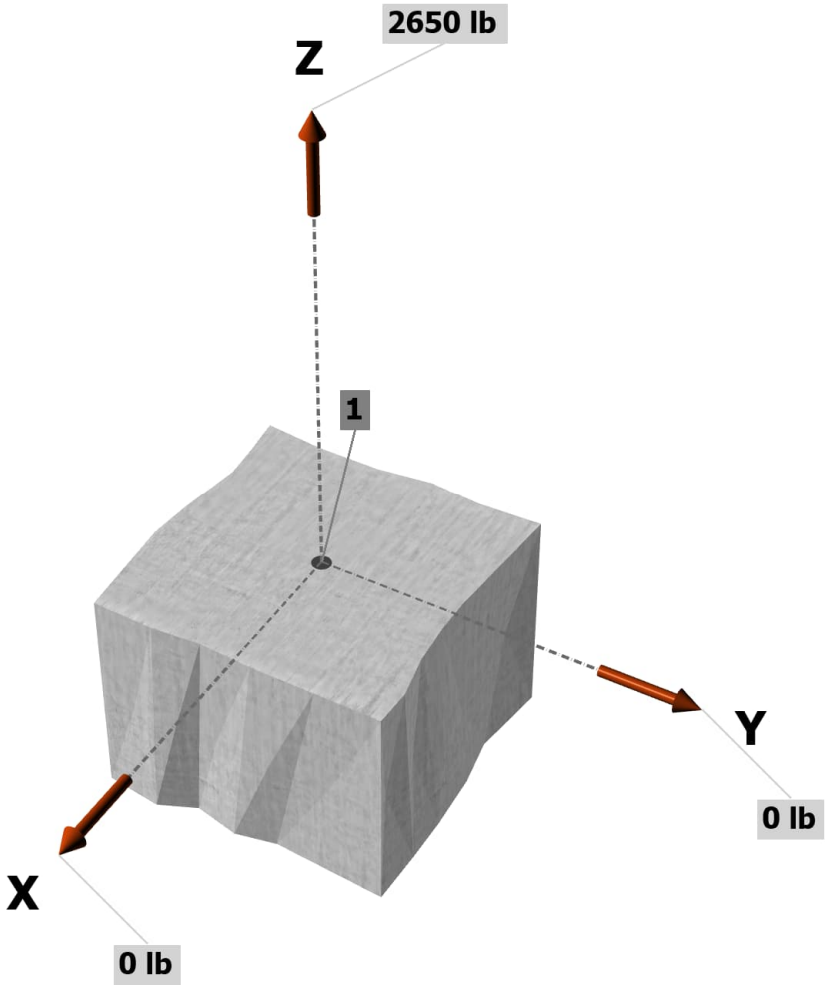


Load and Geometry
Load factor source: ACI 318 Section 5.3
Load combination: not set
Seismic design: Yes
Anchors subjected to sustained tension: Not applicable
Ductility section for tension: 17.10.5.3 (d) is satisfied
Ductility section for shear: 17.10.6.3 (c) is satisfied
Ω_0 factor: not set
Apply entire shear load at front row: Yes
Anchors only resisting wind and/or seismic loads: No

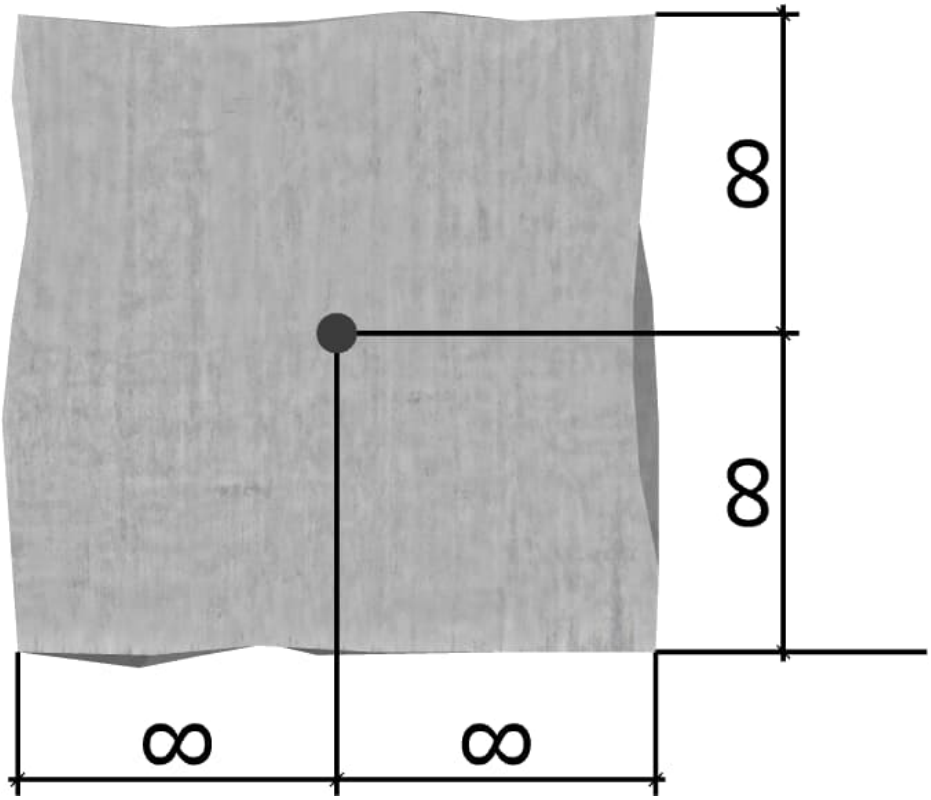
Strength level loads:

N_{ua} [lb]: 2650
V_{uax} [lb]: 0
V_{uay} [lb]: 0

<Figure 1>



<Figure 2>



3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	2650.0	0.0	0.0	0.0
Sum	2650.0	0.0	0.0	0.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 2650
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00

4. Steel Strength of Anchor in Tension (Sec. 17.6.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
20130	0.65	13085

5. Concrete Breakout Strength of Anchor in Tension (Sec. 17.6.2)

$N_b = k_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5}$ (Eq. 17.6.2.2.1)

k_c	λ_a	f'_c (psi)	h_{ef} (in)	N_b (lb)
24.0	1.00	4000	2.350	5468

$0.75\phi N_{cb} = 0.75\phi \, (A_{Nc} / A_{Nco}) \, \Psi_{ed,N} \Psi_{c,N} \Psi_{cp,N} N_b$ (Sec. 17.5.1.2 & Eq. 17.6.2.1a)

A_{Nc} (in^2)	A_{Nco} (in^2)	$c_{a,min}$ (in)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	$0.75\phi N_{cb}$ (lb)
49.70	49.70	-	1.000	1.00	1.000	5468	0.65	2666

11. Results

Interaction of Tensile and Shear Forces (Sec. 17.8)

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
Steel	2650	13085	0.20	Pass
Concrete breakout	**2650**	**2666**	**0.99**	**Pass (Governs)**

1/2"Ø THD, hnom:3.25" (83mm) meets the selected design criteria.

12. Warnings

- Per designer input, ductility requirements for tension have been determined to be satisfied – designer to verify.

- Per designer input, ductility requirements for shear have been determined to be satisfied – designer to verify.

- Designer must exercise own judgement to determine if this design is suitable.

- Refer to manufacturer's product literature for hole cleaning and installation instructions.