

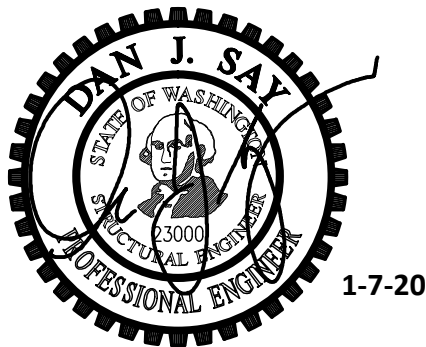


Structural Calculations For:

Fukano Residence

Supplemental Structural Calculations

6600 82nd Ave SE
Mercer Island, WA



Prepared for: Suyama Peterson Deguchi

Job #: 00043-2018-09

Date: January 7, 2021



SEATTLE
TACOMA

2124 Third Ave, Suite 100, Seattle, WA 98121
934 Broadway, Suite 100, Tacoma, WA 98402

○ 206.443.6212
○ 253.284.9470

⊕ ssfengineers.com



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Address:			
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1. Project information

Customer company:
 Customer contact name:
 Customer e-mail:
 Comment:

Project description:
 Location:
 Fastening description:

2. Input Data & Anchor Parameters

General

Design method: ACI 318-14
 Units: Imperial units

Anchor Information:

Anchor type: Bonded anchor
 Material: F1554 Grade 36
 Diameter (inch): 0.625
 Effective Embedment depth, h_{ef} (inch): 8.000
 Code report: IAPMO UES ER-263
 Anchor category: -
 Anchor ductility: Yes
 h_{min} (inch): 9.25
 c_{ac} (inch): 19.18
 C_{min} (inch): 1.75
 S_{min} (inch): 3.00

Base Material

Concrete: Normal-weight
 Concrete thickness, h (inch): 12.00
 State: Cracked
 Compressive strength, f'_c (psi): 3000
 $\Psi_{c,v}$: 1.0
 Reinforcement condition: B tension, B shear
 Supplemental reinforcement: Not applicable
 Reinforcement provided at corners: No
 Ignore concrete breakout in tension: No
 Ignore concrete breakout in shear: No
 Hole condition: Dry concrete
 Inspection: Continuous
 Temperature range, Short/Long: 150/110°F
 Ignore 6do requirement: Not applicable
 Build-up grout pad: No

Recommended Anchor

Anchor Name: AT-XP® - AT-XP w/ 5/8"Ø F1554 Gr. 36
 Code Report: IAPMO UES ER-263





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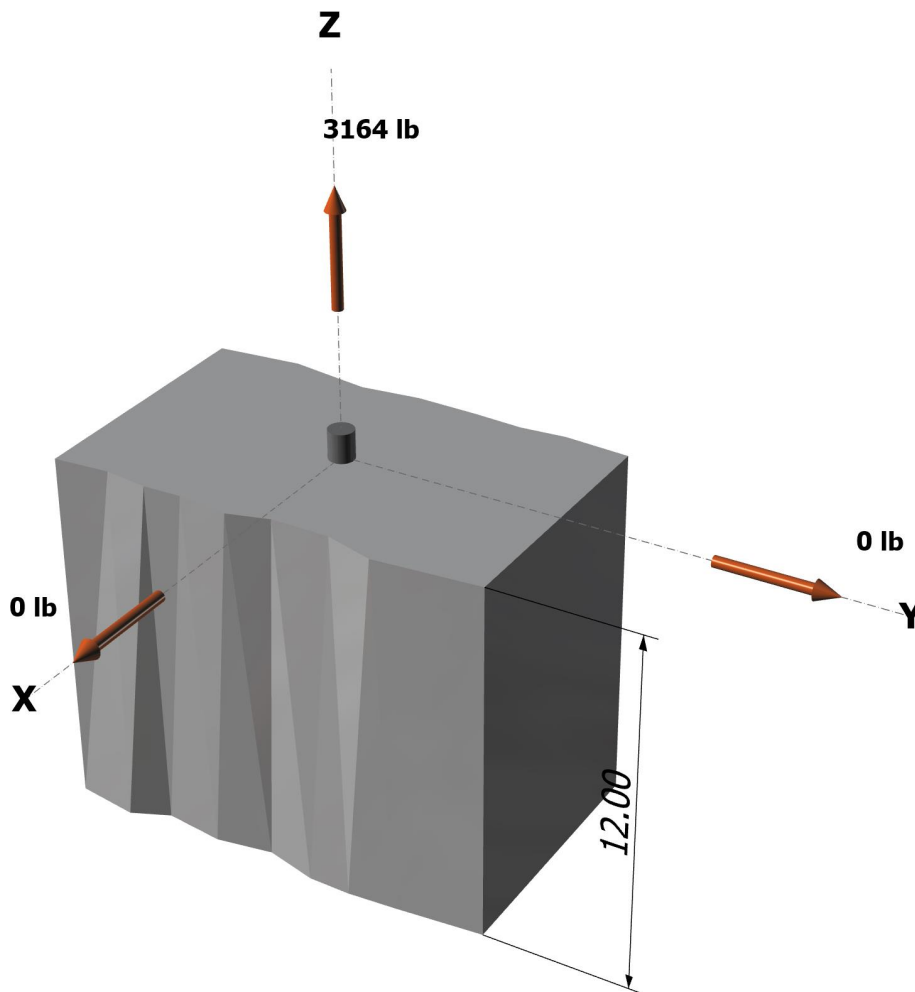
Load and Geometry

Load factor source: ACI 318 Section 5.3
Load combination: not set
Seismic design: Yes
Anchors subjected to sustained tension: No
Ductility section for tension: 17.2.3.4.3 (c) is satisfied
Ductility section for shear: 17.2.3.5.2 not applicable
 Ω_0 factor: not set
Apply entire shear load at front row: No
Anchors only resisting wind and/or seismic loads: Yes

Strength level loads:

N_{ua} [lb]: 3164
 V_{uax} [lb]: 0
 V_{uay} [lb]: 0

<Figure 1>

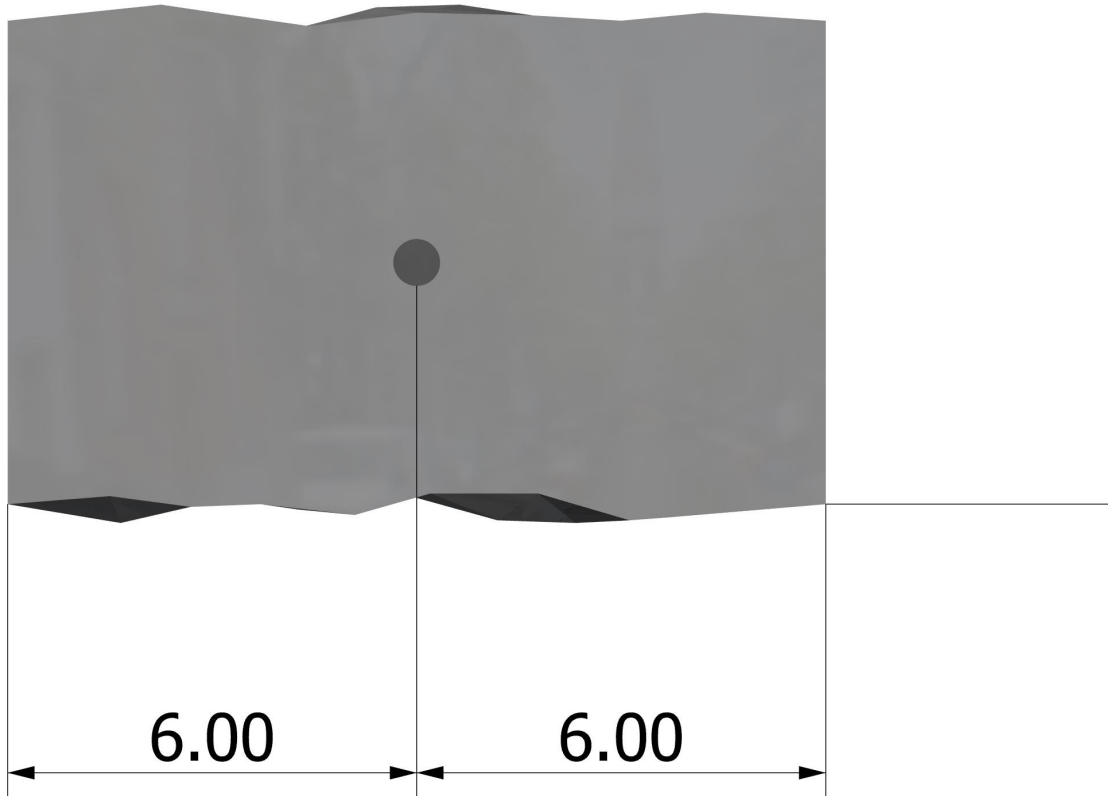


Input data and results must be checked for agreement with the existing circumstances, the standards and guidelines must be checked for plausibility.

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<Figure 2>



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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	3164.0	0.0	0.0	0.0
Sum	3164.0	0.0	0.0	0.0

Maximum concrete compression strain (%): 0.00
 Maximum concrete compression stress (psi): 0
 Resultant tension force (lb): 3164
 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. 17.4.1)

N _{sa} (lb)	φ	φN _{sa} (lb)
13110	0.75	9833

5. Concrete Breakout Strength of Anchor in Tension (Sec. 17.4.2)

$N_b = k_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5}$ (Eq. 17.4.2.2a)

k _c	λ _a	f' _c (psi)	h _{ef} (in)	N _b (lb)
17.0	1.00	3000	8.000	21069

$0.75 \phi N_{cb} = 0.75 \phi (A_{Nc} / A_{Nco}) \Psi_{ed,N} \Psi_{c,N} \Psi_{cp,N} N_b$ (Sec. 17.3.1 & Eq. 17.4.2.1a)

A _{Nc} (in ²)	A _{Nco} (in ²)	c _{a,min} (in)	Ψ _{ed,N}	Ψ _{c,N}	Ψ _{cp,N}	N _b (lb)	φ	0.75 φN _{cb} (lb)
288.00	576.00	6.00	0.850	1.00	1.000	21069	0.65	4365

6. Adhesive Strength of Anchor in Tension (Sec. 17.4.5)

$\tau_{k,cr} = \tau_{k,cr} f_{short-term} K_{sat} \alpha_{N,seis}$

τ _{k,cr} (psi)	f _{short-term}	K _{sat}	α _{N,seis}	τ _{k,cr} (psi)
980	1.00	1.00	0.85	833

$N_{ba} = \lambda_a \tau_{cr} \pi d_a h_{ef}$ (Eq. 17.4.5.2)

λ _a	τ _{cr} (psi)	d _a (in)	h _{ef} (in)	N _{ba} (lb)
1.00	833	0.63	8.000	13085

$0.75 \phi N_a = 0.75 \phi (A_{Na} / A_{Na0}) \Psi_{ed,Na} \Psi_{cp,Na} N_{ba}$ (Sec. 17.3.1 & Eq. 17.4.5.1a)

A _{Na} (in ²)	A _{Na0} (in ²)	c _{Na} (in)	c _{a,min} (in)	Ψ _{ed,Na}	Ψ _{cp,Na}	N _{a0} (lb)	φ	0.75 φN _a (lb)
187.30	243.61	7.80	6.00	0.931	1.000	13085	0.65	4564

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Anchor Designer™
Software
Version 2.9.7376.0

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11. Results

11. Interaction of Tensile and Shear Forces (Sec. D.7)?

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
Steel	3164	9833	0.32	Pass
Concrete breakout	3164	4365	0.72	Pass (Governs)
Adhesive	3164	4564	0.69	Pass

AT-XP w/ 5/8"Ø F1554 Gr. 36 with hef = 8.000 inch meets the selected design criteria.

12. Warnings

- Minimum spacing and edge distance requirement of $6d_a$ per ACI 318 Sections 17.7.1 and 17.7.2 for torqued cast-in-place anchor is waived per designer option.
- Per designer input, ductility requirements for tension have been determined to be satisfied – designer to verify.
- Per designer input, the shear component of the strength-level earthquake force applied to anchors does not exceed 20 percent of the total factored anchor shear force associated with the same load combination. Therefore the ductility requirements of ACI 318 17.2.3.5.2 for shear need not 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.

Input data and results must be checked for agreement with the existing circumstances, the standards and guidelines must be checked for plausibility.

Simpson Strong-Tie Company Inc. 5956 W. Las Positas Boulevard Pleasanton, CA 94588 Phone: 925.560.9000 Fax: 925.847.3871 www.strongtie.com