

Richard D. Burris, SE
Larry H. Dunn, SE
Brian D. Hartley, SE

PROJECT NUMBER
19-003.03

**SUPPLEMENTAL
STRUCTURAL CALCULATIONS
FOR PLAN CHECK DATED 10/16/19**

**Manzana Facility Improvements
CIP Slab
9141 Green Valley Road
Sebastopol, CA 95472**

November 2019



A handwritten signature in black ink, appearing to read "RDB", located to the right of the professional seal.

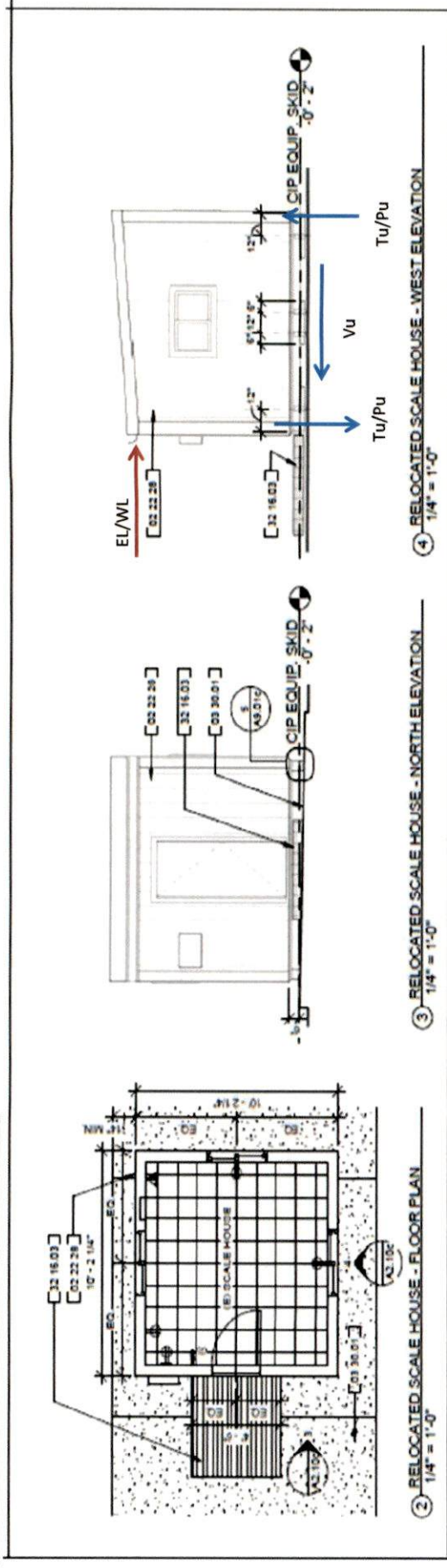
RDC Architecture

STRUCTURAL CALCULATIONS

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
I. Scale House Anchorage to CIP slab (COMMENT#3)	1 to 6

Relocated Scale House Anchorage Calculations



No analysis is done on the scale house structure itself. Analysis is for anchorage of unit to concrete to resist sliding and overturning effects

Seismic is per chapter 15 of ASCE-7-10 (Non-building structures similar to structures)

Wind Loads per Directional Procedure per ASCE-7-10 (Section 27.6-1)

Self Weight of Scale House Structure

DL= 15 psf
Walls= 10 psf

Mean Height= 9.0 ft ...measured from top of slab

Seismic
Sds= 1.0
S1= 0.6
Ip= 1.0
R= 1.25
Cs= 0.8 *Wp
Cs_min= 0.044 *Wp
Cs_min= 0.24 *Wp
Cs_govern= 0.8 *Wp

Seismic Mass

DL_roof= 15 psf
Roof Flat Area= 104 ft^2
Slope amp 1.00

Roof Mass= 1571 lbs

Wall Mass
Linear Length= 40.8 ft
Height= 4.5 ft
Wall Mass 1838 lbs

Total Seismic Mass= 3408 lbs
Cs= 0.8 *Wp

EL= 2727 lbs ...acting at roof level H (ft)
above slab

Governing Load Acting at H(ft) above slab

EL 2727 lbs
H= 9.0 ft

Overturning

Mot= 24540.82 lb-ft ...Mot= EL *H
D= 10.21 ft ...shortest side

Tu= 2404 lbs ...Net Tension = M_ot/D

of anchors 2 ... (neglect 2 anchors close neutral axis)

Tu/anchor= 1202 lbs/anchor

Shear

of anchors 8 ... 4 anchors per side of unit

EL/#anchors= 341 lbs/anchor

Tu= 1202 lbs/anchor
Vu= 341 lbs/anchor

Use 5/8" Simpson Strongbolt-2 stainless steel with 4-1/2" embedment into concrete

Wind

L= 10.21 ft
B= 10.21 ft
L/B 1.0 ft
V= 110 mph
Exp= C

Wall Pressures

Pnet= 25.2 psf
Roof Pressure= N/A
Wall+Roof Height= 4.5 ft
Length= 10.21 ft

WL= 1158 lbs ...Seismic Governs



Anchor Designer™ Software

Version 2.5.6582.10

Company:	Structural Design Group	Date:	10/25/2019
Engineer:	AP	Page:	1/4
Project:	Manzana Skidd		
Address:	2455 Bennett Valley Rd		
Phone:	707-384-3641		
E-mail:	s-d-g.net		

1. Project information

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

Project description: Skid Anchorag (See detail 5/A9.012c)

Location:
Fastening description:

2. Input Data & Anchor Parameters

General

Design method: ACI 318-14
Units: Imperial units

Anchor Information:

Anchor type: Torque controlled expansion anchor
Material: Stainless Steel
Diameter (inch): 0.625
Nominal Embedment depth (inch): 5.125
Effective Embedment depth, h_{ef} (inch): 4.500
Code report: ICC-ES ESR-3037
Anchor category: 1
Anchor ductility: Yes
 h_{min} (inch): 7.88
 C_{ac} (inch): 9.00
 C_{min} (inch): 4.00
 S_{min} (inch): 6.25

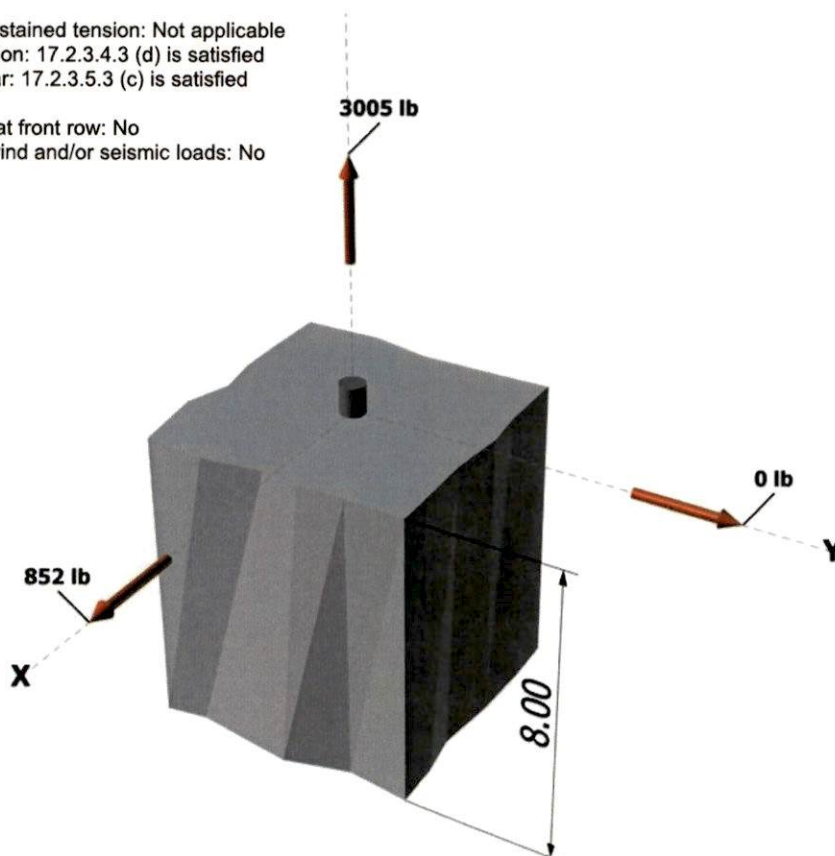
Base Material

Concrete: Normal-weight
Concrete thickness, h (inch): 8.00
State: Cracked
Compressive strength, f_c (psi): 2500
 $\Psi_{c,v}$: 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
Ignore 6do requirement: Not applicable
Build-up grout pad: No

Load and Geometry

Load factor source: ACI 318 Section 5.3
Load combination: $U = 0.9D + 1.0E$
Seismic design: Yes
Anchors subjected to sustained tension: Not applicable
Ductility section for tension: 17.2.3.4.3 (d) is satisfied
Ductility section for shear: 17.2.3.5.3 (c) is satisfied
 Ω_o factor: 2.5
Apply entire shear load at front row: No
Anchors only resisting wind and/or seismic loads: No

<Figure 1>



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

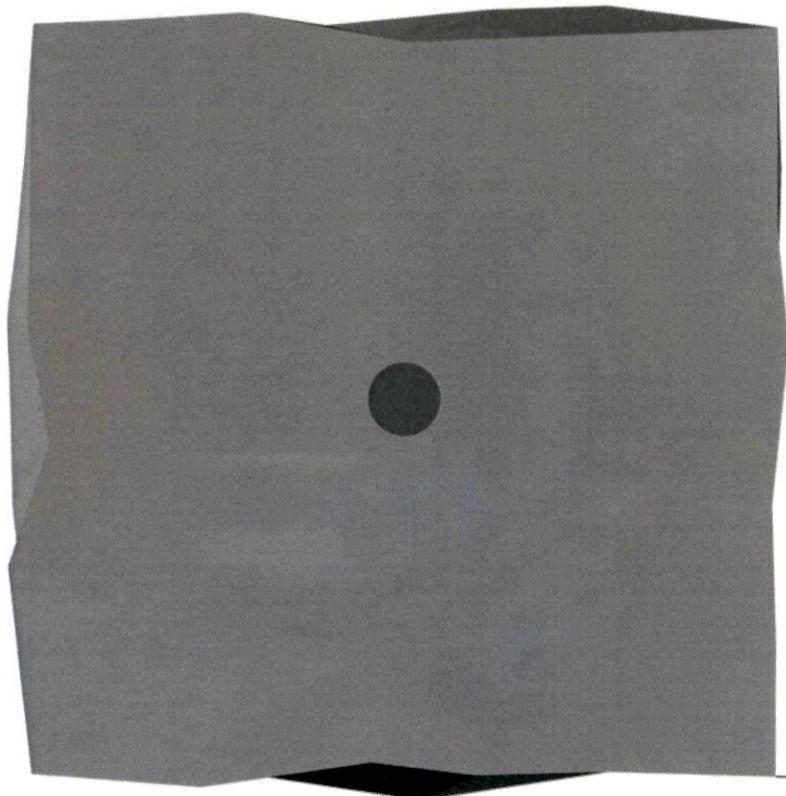
Simpson Strong-Tie Company Inc. 5956 W. Las Positas Boulevard Pleasanton, CA 94588 Phone: 925.560.9000 Fax: 925.847.3871 www.strongtie.com



Anchor Designer™
Software
Version 2.5.6582.10

Company:	Structural Design Group	Date:	10/25/2019
Engineer:	AP	Page:	2/4
Project:	Manzana Skidd		
Address:	2455 Bennett Valley Rd		
Phone:	707-384-3641		
E-mail:	s-d-g.net		

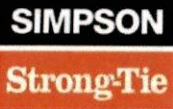
<Figure 2>



Recommended Anchor

Anchor Name: Strong-Bolt® 2 Stainless Steel - 5/8"Ø SS Strong-Bolt 2, hnom:5.125" (130mm)
Code Report: ICC-ES ESR-3037





Anchor Designer™
Software
Version 2.5.6582.10

Company:	Structural Design Group	Date:	10/25/2019
Engineer:	AP	Page:	3/4
Project:	Manzana Skidd		
Address:	2455 Bennett Valley Rd		
Phone:	707-384-3641		
E-mail:	s-d-g.net		

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	3005.0	852.0	0.0	852.0
Sum	3005.0	852.0	0.0	852.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 3005
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
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

4. Steel Strength of Anchor in Tension (Sec. 17.4.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
17930	0.75	13448

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

$$N_b = k_c \lambda_a \sqrt{f_c} h_{ef}^{1.5} \text{ (Eq. 17.4.2.2a)}$$

k_c	λ_a	f_c (psi)	h_{ef} (in)	N_b (lb)
17.0	1.00	2500	4.500	8114

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

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)
182.25	182.25	-	1.000	1.00	1.000	8114	0.65	3956

6. Pullout Strength of Anchor in Tension (Sec. 17.4.3)

$$0.75\phi N_{pn} = 0.75\phi \Psi_{c,P} \lambda_a N_p (f_c / 2,500)^n \text{ (Sec. 17.3.1, Eq. 17.4.3.1 & Code Report)}$$

$\Psi_{c,P}$	λ_a	N_p (lb)	f_c (psi)	n	ϕ	$0.75\phi N_{pn}$ (lb)
1.0	1.00	6545	2500	0.40	0.65	3191

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



Anchor Designer™
Software
 Version 2.5.6582.10

Company:	Structural Design Group	Date:	10/25/2019
Engineer:	AP	Page:	4/4
Project:	Manzana Skidd		
Address:	2455 Bennett Valley Rd		
Phone:	707-384-3641		
E-mail:	s-d-g.net		

8. Steel Strength of Anchor in Shear (Sec. 17.5.1)

V_{sa} (lb)	ϕ_{grout}	ϕ	$\phi_{grout}\phi V_{sa}$ (lb)
10760	1.0	0.65	6994

10. Concrete Pryout Strength of Anchor in Shear (Sec. 17.5.3)

$\phi V_{cp} = \phi k_{cp} N_{cb} = \phi k_{cp} (A_{Nc} / A_{Nco}) \Psi_{ed,N} \Psi_{c,N} \Psi_{cp,N} N_b$ (Sec. 17.3.1 & Eq. 17.5.3.1a)

k_{cp}	A_{Nc} (in ²)	A_{Nco} (in ²)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕV_{cp} (lb)
2.0	182.25	182.25	1.000	1.000	1.000	8114	0.70	11360

11. Results

Interaction of Tensile and Shear Forces (Sec. 17.6.)

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status	
Steel	3005	13448	0.22	Pass	
Concrete breakout	3005	3956	0.76	Pass	
Pullout	3005	3191	0.94	Pass (Governs)	
Shear	Factored Load, V_{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status	
Steel	852	6994	0.12	Pass (Governs)	
Pryout	852	11360	0.08	Pass	
Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. 17.6..1	0.94	0.00	94.2%	1.0	Pass

5/8"Ø SS Strong-Bolt 2, hnom:5.125" (130mm) 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.