ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

Seismic

Site Soil Class: D - Default (see Section 11.4.3)

Results:

S_S :	1.563	S_{D1} :	N/A
S_1 :	0.6	T_L :	12
F_a :	1.2	PGA :	0.634
F_v :	N/A	PGA_M :	0.761
S_{MS} :	1.875	F_{PGA} :	1.2
S_{M1} :	N/A	I_e :	1
S_{DS} :	1.25	C_v :	1.413

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

Data Accessed: Wed May 19 2021

Date Source: USGS Seismic Design Maps

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INNOVATIVE
STRUCTURAL ENGINEERING

EQUIPMENT ANCHORAGE

SEISMIC DESIGN LOAD - EQUIVALENT LATERAL FORCE PROCEDURE

Structure: 3,000 Gallon, Metal Storage Tank (Non-Buiding Structure)

Structure Seismic Design Criteria

(ASCE - Chapter 11)

Risk Category of Structure:	II		*Table 1.5-1*
Short-Period Spectral Response Acceleration, S_s:	1.563		*Per ASCE 7 Hazard Tool*
Long-Period Spectral Response Acceleration, S_1:	0.600		*Per ASCE 7 Hazard Tool*
Structural height, h_n :	6.33	ft	
Seismically isolated or dampened structure?	*No*		*11.4.8 Item 1*
Site-specific ground motion analysis provided?	*No*		*11.4.8*
Analytical procedure (Limit per Table 12.6-1)	*ELF*	*Equivalent Lateral Force*	*12.8*
Structural irregularities per 12.3.2?	*No*		*12.8.1.3 - Item 1*
Exceed 5 story above base/grade including mezzanines?	*No*		*12.8.1.3 - Item 2*

Site Class

11.4.3 & 11.4.4

Soil Site Class: D - Default — *No Geotech Report, Fa = 1.2 Min, per 11.4.4*

Site Coefficients & Spectral Response Acceleration Parameters

11.4.4

	Table 11.4-1 & 11.4-2	11.4.8 Exceptions	Site-specific analysis per Geotech Report
Site Coefficient, *Fa:*	1.20	N/A	*0.00*
Site Coefficient, *Fv:*	N/A	1.70	*0.00*

$S_{MS} = F_a{*}S_s$:	1.876	*Equation 11.4-1*
$S_{M1} = F_v{*}S_1$:	1.020	*Equation 11.4-2*
$S_{DS} = 2/3{*}S_{MS}$:	1.250	*Equation 11.4-3*
S_{DS} for calculation of C_s & E_v only (Max 1.0 or 70% S_{DS})	1.250	*12.8.1.3*
$S_{D1} = 2/3{*}S_{M1}$:	0.680	*Equation 11.4-4*
$Ts = S_{D1} / S_{DS}$	0.544	*11.4.6*
Seismic Design Category (SDC):	D	*11.6 & Table 11.6-1 & 2*

Seismic Equivalent Lateral Force Procedure

Section 12.8

Impotance Factor, I_e:	1.00		*Table 1.5-2*
Response Modification Factor, *R: Table 15.4-2*	3.00	Horizontal, Saddle-Supported Welded Steel Vessels	
Overstrength Amplification factor, Ω_o :	2.0		*Table 15.4-2*
Approximate Period Values: Table 12.8-2: C_t:	0.02	All other systems	
x:	0.75		
Approximate Fundamental Period, $Ta = C_t (h_n)^x$:	0.08	s	*Equation 12.8-7*
Long Period Transition Period , T_L:	12		*Figure 22 (14-17)*

Seismic Response Coefficient, Cs:

$C_s = S_{DS} / (R / I_e)$:	0.417		*Equation 12.8-2*
Maximum C_s:	MAX		
$C_s = S_{D1} / T_a (R / I_e)$: $T \leq T_L$	2.839		*Equation 12.8-3*
$C_s = S_{D1} T_L / T_a^2 (R / I_e$ $T > T_L$	426.639		*Equation 12.8-4*
Minimum C_s:	MIN		
$C_s = 0.044 S_{DS} I_e$: ≥ 0.03	0.055		*Equation 15.4-1*
$C_s = 0.8 S_1 / (R / I_e)$: for $S_1 \geq 0.6$	0.160		*Equation 15.4-2*
Seismic Base Shear, $V = C_s W$:	0.417	W	*Equation 12.8-1*

Structure - Horizontal Seismic Load Effect, Eh

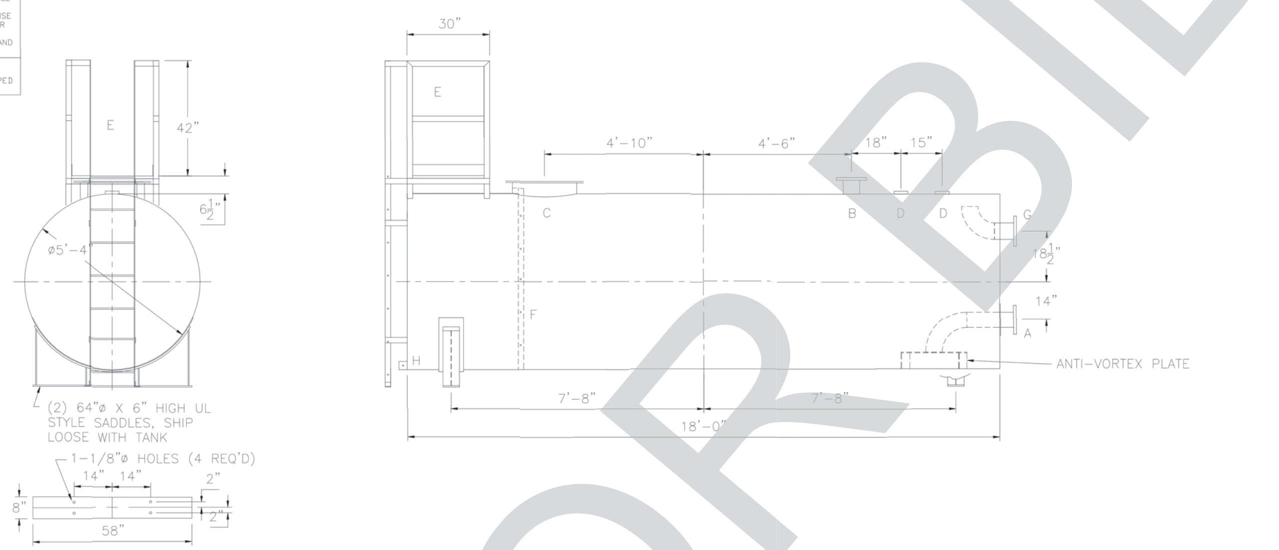
Redundancy Factor, ρ:	1.00		*Section 12.3.4.2*
(Strength Level) $1.0E_h$ = ρQe :	0.417	W	*Equation 12.4-3*
(ASD Level) $0.7E_h$ = ρQe :	0.292	W	*Equation 12.4-3*

Vertical Distribution of Seismic Forces

$F_x = C_{vx} V$	Lateral seismic force at any level		*Equation 12.8-11*
$C_{vx} = w_x h_x^k / \Sigma w_i h_i^k$	Vertical distribution factor		*Equation 12.8-12*
Structural period Factor, k :		1.00	

TOUCH UP OF FINISHED PAINT IS REQUIRED BY INSTALLATION CONTRACTOR. TOUCH UP PAINT SHIPPED WITH TANK.

SHIPPING LUGS AS NEEDED



DESIGN DATA
CAPACITY – 3,000 GALLONS
TYPE – FIRE PROTECTION TANK (FPT)
NO. REQ. – –
OPERATING PRESSURE – ATMOSPHERIC
SPECIFIC GRAVITY = 1.0
TANK MATERIAL – MILD CARBON STEEL
THICKNESS – HEADS: 7 GA
THICKNESS – SHELL: 7 GA
CONSTRUCTION – LAP WELD INSIDE AND OUTSIDE
TANK TEST – 5 PSIG
INT. FINISH – SSPC SP10 BLAST, HighDRO®-LINER PLUS FOR NFPA 22 APPLICATIONS
EXT. FINISH – SSPC SP6 BLAST, WHITE URETHANE PAINT
LABEL – NONE

	LEGEND
A	FLANGE WITH INTERNAL ANTI-VORTEX PLATE PER NFPA 22
B	FLANGE – VENT
C	24" X 1/4" PLATE TIGHT BOLT MANWAY WITH 1/8" THICK NEO-CORK GASKET
D	4" FNPT CONNECTION
E	STD HTM EXTERNAL LADDER & PLATFORM ASSEMBLY – PAINTED SAFETY YELLOW AND SHIPPED LOOSE FOR INSTALLATION ON SITE BY CONTRACTOR
F	HTM STD INTERNAL LADDER
G	FLANGE WITH INTERNAL 90° ELBOW SHOWN – OVERFLOW
H	FB-3"x 1/4"x3" WITH 5/8"Ø HOLE ON CL (GROUNDING LUG)

<u>NOTES</u>: THIS IS A PRELIMINARY SHOP DRAWINGS AND DOES NOT SHOW ALL COMPONENTS. CONTRACTOR IS TO COORDINATE FINAL DESIGN WITH COMPLETE SYSTEM ALONG WITH SUMP PUMP SYSTEM. REQUIRED TANK FEATURES:

1. (1) DRAIN OUTLET.
2. SADDLES, 6" HIGH MIN.
3. SADDLES WELDED TO TANK AND PAINT FINISH TO MATCH TANK.
4. TANK INSULATION.
5. FLOAT SENSOR WITH CONTROL PANELS.
6. LEAK SENSOR WITH CONTROL PANELS.
7. INLET PIPE (FROM SUMP PUMP).
8. OUTLET PIPE (FOR PUMPING OUT).

Highland Tank
UNLESS NOTED, TOLERANCES ARE +/- 1"
HighDRO® WATER STORAGE TANK
3000 GAL 64"Ø SINGLE-WALL ABOVEGROUND HORIZONTAL FOR FIRE PROTECTION WITH BOTTOM DRAIN
CUSTOMER:
PROJECT:
QUOTE NO: CHK'D BY:
SCALE: 3/8" = 1'2" DATE: XX/XX/XX DWG. BY: XXX DWG. NO.: 03000AHSWHDFPTBD64

Storage Tank Cut Sheet per Detail 12/A1.4 per the Architectural Plans

STORAGE TANK:

– SEISMIC LOADS:

$T_a = 0.08$ sec.

$V_1 = 0.3\, S_{DS}\, W I_E = 10{,}856$ # (Min) EQ. 15.4-5

– $S_{DS} = 1.25$,

– $W_1 = 3{,}900$ # (TANK)

– $W_2 = (3{,}000\text{ gal})(8.35\ \#/1\text{ gal}) = 25{,}050$ # (FLUID WEIGHT)

– $I_E = 1.0$

$V_2 = C_S W_T = 12{,}072$ # (CONTROLS) **OK**

$C_S = 0.417$ (Per EXCEL)

$W_T = 28{,}950$ #

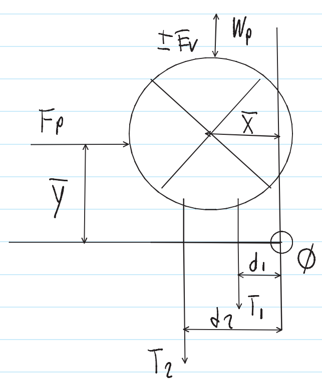
$F_p = 12{,}072\ \#\ (1.0E)$

– WIND LOADS
CH. 29, OTHER STRUCTURES

$F = q_z G C_F A_f$ = **2510 #** (SEISMIC CONTROLS)

$q_z = 0.00256\, K_z K_{zt} K_d K_e V^2 = 19.64$ psf
$K_z = 0.85$, EXPOSURE C, RISK CATEGORY II, h<15'
$K_{zt} = 1.0$,
$K_d = 1.0$, ROUND, CHIMNEYS, TANKS, AND SIMILAR STRUCTURES
$K_e = 1.0$
$V = 95$ mph
$G = 0.85$,
$C_F = 1.32$, $h = 6.33'$, $D = 5.33'$, $h/D = 1.19$
$A_f = L \times H = 18' \times 6.33' = 113.9$ ft^2

– GLOBAL LOAD ANALYSIS:



$M_{e\phi} = M_o - M_r = 0$
$M_{o1} = F_p * \bar{y} =$
$M_{o2} = E_V * \bar{x} = 0.2 S_{DS} W_p d/2$
$M_{r1} = T_1 * d_1 = 0.350\, T_2 d_1$
$M_{r2} = T_2 * d_2 =$
$M_{r3} = W_p * \bar{x} = W_p d/2$

$\bar{x} = d/2$, $E_V = 0.2 S_{DS} W_p$, $W_p = 28{,}950\#$, $\bar{y} = 38''$,

$T_1/d_1 = T_2/d_2$, $T_1 = d_1 T_2/d_2$, $d_1 = 15''$, $d_2 = 43''$, $\bar{x} = 29''$

ISOLATE FOR T2 $S_{DS} = 1.25$

$$F_p \bar{y} + 0.2 S_{DS} W_p d/2 - \underbrace{0.350 T_2 d_1 - T_2 d_2}_{-T_2(0.350 d_1 + d_2)} - W_p d/2 = 0$$

$m = T/d$
$m_1 = T_1/d_1$
$m = T_2/d_2$

$m_1 = m_2$

$\frac{T_1}{d_1} = \frac{T_2}{d_2}$

$$T_2 = \frac{F_p \bar{y} + \frac{0.2 S_{DS} W_p d}{2} - \frac{W_p d}{2}}{(0.350 d_1 + d_2)} = \frac{F_p \bar{y} + 0.2 S_{DS} W_p \bar{x} - W_p \bar{x}}{48.25} = -3{,}542\ \#, \text{ no uplift}$$

LOAD COMBOS: TENSION $F_p \bar{y}$ = 458,742 #-in (1.0E), $0.2 S_{DS} W_p \bar{x}$ = 209,888 #-in (1.0E), $W_p \bar{x}$ = 839,550 #-in (1.0D)

1) 0.6D + 0.7 E_H + 0.7 E_V: T_2 = −740 #, T_1 = −259 #, no uplift, n=2, T_{anchor} = 0
2) 0.9D + E_H + E_V: T_2 = −1,802 #, T_1 = −631 #, no uplift, n=2, T_{anchor} = 0
3) 0.6D + 0.7 ΩE_H + 0.7 E_V: T_2 = 5,916 #, T_1 = 2,070 #, uplift, n=2, T_{anchor} = 2,958 #
4) 0.9D + ΩE_H + E_V: T_2 = 7,705 #, T_1 = 2,697 #, uplift, n=2, T_{anchor} = 3,853 #

LOAD COMBOS: SHEAR

1) 0.6D + 0.7 E_H + 0.7 E_V: V = 8,450 #, n = 4 anchors, V_{anchor} = 2,113 #/anchor,
2) 0.9D + E_H + E_V: V = 12,072 #, n = 4, V_{anchor} = 3,018 #/anchor,
3) 0.6D + 0.7 ΩE_H + 0.7 E_V: V = 16,901 #, n = 4, V_{anchor} = 4,225 # / anchor,
4) 0.9D + ΩE_H + E_V: V = 24,144 #, n = 4, V_{anchor} = 6,036 # / anchor,

ANCHORAGE DESIGN:
- USE OVERSTRENGTH REACTIONS FOR DESIGN.

V_{anchor} = 6,036 #/anchor (ΩE)
T_{anchor} = 3,853 #/anchor (ΩE)

1.Project information

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

Project description: Equipment Anchorage & Handrail Connections
Location: Storage Tank Containment
Fastening description: CIP Concrete Anchor

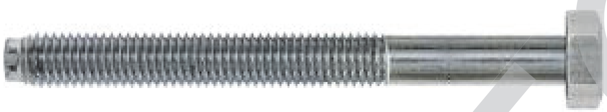
2. Input Data & Anchor Parameters

General
Design method:ACI 318-14
Units: Imperial units

Anchor Information:
Anchor type: Cast-in-place
Material: F1554 Grade 36
Diameter (inch): 1.000
Effective Embedment depth, h_{ef} (inch): 6.000
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 7.75
C_{min} (inch): 6.00
S_{min} (inch): 6.00

Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 20.00
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: No
Build-up grout pad: No

Recommended Anchor
Anchor Name: Heavy Hex Bolt - 1"Ø Heavy Hex Bolt, F1554 Gr. 36

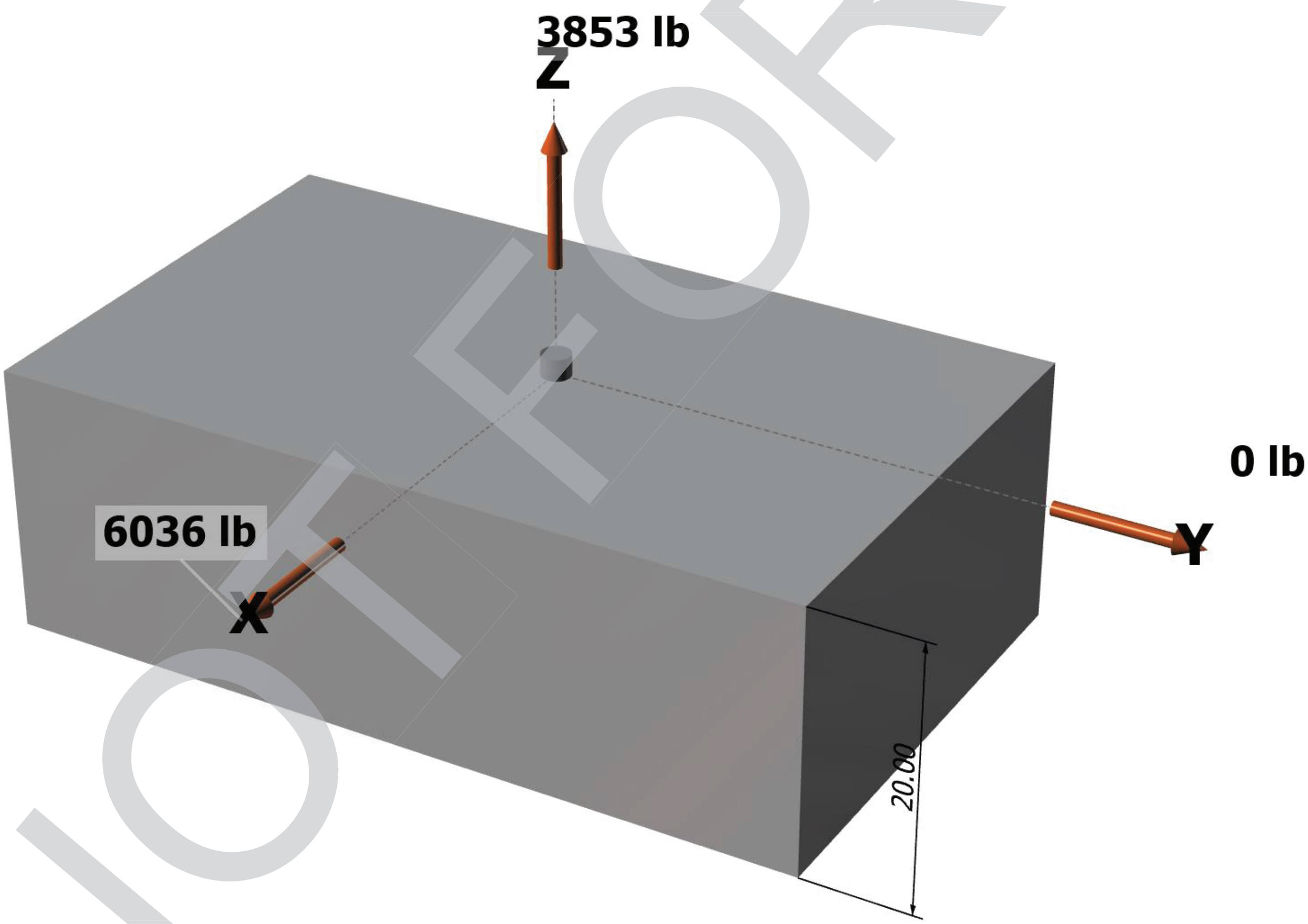


Load and Geometry
Load factor source: ACI 318 Section 5.3
Load combination: not set
Seismic design: Yes
Anchors subjected to sustained tension: Not applicable
Ductility section for tension: 17.2.3.4.3 (d) is satisfied
Ductility section for shear: 17.2.3.5.3 (c) is satisfied
Ω_0 factor: not set
Apply entire shear load at front row: No
Anchors only resisting wind and/or seismic loads: Yes

Strength level loads:

N_{ua} [lb]: 3853
V_{uax} [lb]: 6036
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	3853.0	6036.0	0.0	6036.0
Sum	3853.0	6036.0	0.0	6036.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 3853
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)
35150	0.75	26363

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)
24.0	1.00	2500	6.000	17636

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

A_{Nc} (in^2)	A_{Nco} (in^2	$c_{a,min}$ (in)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	$0.75\phi N_{cb}$ (lb)
324.00	324.00	9.00	1.000	1.00	1.000	17636	0.70	9259

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

$0.75\phi N_{pn} = 0.75\phi\Psi_{c,P}N_p = 0.75\phi\Psi_{c,P}8A_{brg}f'_c$ (Sec. 17.3.1, Eq. 17.4.3.1 & 17.4.3.4)

$\Psi_{c,P}$	A_{brg} (in^2)	f'_c (psi)	ϕ	$0.75\phi N_{pn}$ (lb)
1.0	1.50	2500	0.70	15761

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

V_{sa} (lb)	ϕ_{grout}	ϕ	$\phi_{grout}\phi V_{sa}$ (lb)
21090	1.0	0.65	13709

9. Concrete Breakout Strength of Anchor in Shear (Sec. 17.5.2)

Shear perpendicular to edge in x-direction:

$V_{bx} = \min|7(l_e / d_a)^{0.2}\sqrt{d_a}\lambda_a\sqrt{f'_c}c_{a1}^{1.5};\ 9\lambda_a\sqrt{f'_c}c_{a1}^{1.5}|$ (Eq. 17.5.2.2a & Eq. 17.5.2.2b)

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{bx} (lb)
6.00	1.000	1.00	2500	9.00	12150

$\phi V_{cbx} = \phi\ (A_{Vc} / A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{bx}$ (Sec. 17.3.1 & Eq. 17.5.2.1a)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbx} (lb)
364.50	364.50	1.000	1.000	1.000	12150	0.70	8505

Shear parallel to edge in x-direction:

$V_{by} = \min|7(l_e / d_a)^{0.2}\sqrt{d_a}\lambda_a\sqrt{f'_c}c_{a1}^{1.5};\ 9\lambda_a\sqrt{f'_c}c_{a1}^{1.5}|$ (Eq. 17.5.2.2a & Eq. 17.5.2.2b)

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
6.00	1.000	1.00	2500	13.33	21909

$\phi V_{cbx} = \phi\ (2)(A_{Vc} / A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (Sec. 17.3.1, 17.5.2.1(c) & Eq. 17.5.2.1a)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cbx} (lb)
360.00	800.00	1.000	1.000	1.000	21909	0.70	13803

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	324.00	324.00	1.000	1.000	1.000	17636	0.70	24691

11. Results

Interaction of Tensile and Shear Forces (Sec. R17.6)

Tension	Factored Load, N_{ua} (lb)	Design Strength, $øN_n$ (lb)	Ratio	Status
Steel	3853	26363	0.15	Pass
Concrete breakout	**3853**	**9259**	**0.42**	**Pass (Governs)**
Pullout	3853	15761	0.24	Pass

Shear	Factored Load, V_{ua} (lb)	Design Strength, $øV_n$ (lb)	Ratio	Status
Steel	6036	13709	0.44	Pass
T Concrete breakout x+	**6036**	**8505**	**0.71**	**Pass (Governs)**
|| Concrete breakout y-	**6036**	**13803**	**0.44**	**Pass (Governs)**
Pryout	6036	24691	0.24	Pass

Interaction check	$(N_{ua}/\phi N_{ua})^{5/3}$	$(V_{ua}/\phi V_{ua})^{5/3}$	Combined Ratio	Permissible	Status
Sec. R17.6	0.23	0.56	79.7%	1.0	Pass

1"Ø Heavy Hex Bolt, F1554 Gr. 36 with hef = 6.000 inch meets the selected design criteria.

12. Warnings

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

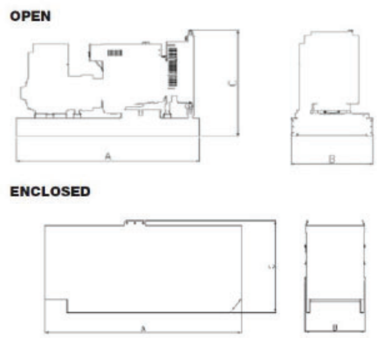
- Per designer input, ductility requirements for shear have been determined to be satisfied – designer to verify.

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

Sheet:	E-Mech Anchorage
Date:	5/25/2021
#	21-7178
Version	2019 CBC

INNOVATIVE STRUCTURAL ENGINEERING

ASCE CHAPTER 13.3 SEISMIC DESIGN REQUIREMENTS FOR NONSTRUCTURLAL COMPONENTS



Weights and dimensions

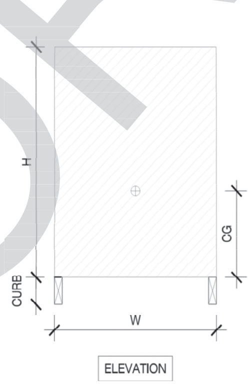
Model	Open Dim "A" mm (in.)	Open Dim "B" mm (in.)	Open Dim "C" mm (in.)	Open Dry wt.* kg (lbs)	Enclosed Dim "A" mm (in.)	Enclosed Dim "B" mm (in.)	Enclosed Dim "C" mm (in.)	Enclosed Dry wt.* kg (lbs)
C90 D5	2268 (90)	1094 (44)	1576 (63)	1244 (2737)	3151 (125)	1142 (45)	1714 (68)	1944 (4277)
C110 D5	2268 (90)	1094 (44)	1576 (63)	1244 (2737)	3151 (125)	1142 (45)	1714 (68)	1944 (4277)
C150 D5	2537 (99.9)	1090 (42.9)	1846 (72.7)	1635 (3604.6)	3460 (136.2)	1090 (42.9)	2387 (94)	2390 (5269)
C170 D5	2537 (99.9)	1090 (42.9)	1846 (72.7)	1635 (3604.6)	3460 (136.2)	1090 (42.9)	2387 (94)	2390 (5269)
C80 D6	2268 (90)	1094 (44)	1576 (63)	1244 (2737)	3151 (125)	1142 (45)	1714 (68)	1944 (4277)
C100 D6	2268 (90)	1094 (44)	1576 (63)	1244 (2737)	3151 (125)	1142 (45)	1714 (68)	1944 (4277)
C135 D6	2537 (99.9)	1090 (42.9)	1846 (72.7)	1635 (3604.6)	3460 (136.2)	1090 (42.9)	2387 (94)	2390 (5269)

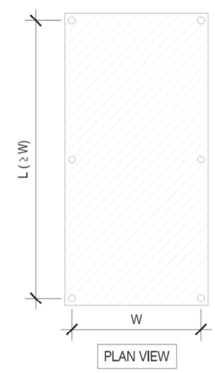
* **Note:** Weights represent a set with standard features. See outline drawings for weights of other configurations.

6BTA C100 D6 Diesel Generator manufactured by Cummins

Unit Properties

Total Component operating weight	W_p	=	4277	lbs
Dimensions				
Unit Length (Depth) ≥ b	**L**	=	125	in.
Unit Width	**W**	=	45	in.
Unit Height	**H**	=	68	in.
Unit Center of Gravity	h_{cg}	=	34	in.
Curb Height	C_h	=	0	in.
Eccentricity Along L	Ecc_L	=	0	in.
Eccentricity Along W	Ecc_W	=	0	in.





Anchor Layout

# of anchors along Width	$N_{anchors, w}$	=	2	minimum
# of anchors along Length	$N_{anchors, l}$	=	2	minimum
Shared Corner Anchors?		=	Yes	*Add Orthogonal Effect Increase of 30% per ASCE 7-16 Section 12.5.3.1*
Total # of anchors	$N_{anchors, Total}$	=	4	

Seismic Criteria

Short Period Spectral Response Acceleration	S_{DS}	=	1.250		**Geotech Report**
Redundancy Factor	ρ	=	1.0	**nonstructural component**	**ASCE 7-16 Section 13.3.1.1**
Component Importance Factor	I_p	=	1		**ASCE 7-16 Section 13.1.3**
Component Amplification Factor	a_p	=	1		**ASCE 7-16 Table 13.5-1 or 13.6-1**
Response Modification Factor	R_p	=	2.5		**ASCE 7-16 Table 13.5-1 or 13.6-1**
Height to point of attachment with respect to the ba	**z**	=	0	ft.	
Average roof height of structure with respect to the	**h**	=	5.67	ft.	
Component/Roof Height Ratio	**z/h**	=	0	*(z/h) = 1.0 for rooftop equipment*	
Component Mounted on Vibration Isolator?			No		**ASCE Table 13.5-1 or 13.6-1**
Apply Omega Strength Factor?			Yes		
Omega Over Strength Factor	Ω_o	=	2		**ASCE Table 13.5-1 or 13.6-1**
Effect of horizontal seismic forces, w/overstrength	E_{mh}	=	Ω	Q_E not required for $F_{p(v)}$	**ASCE 7-16 Section 12.4.3**