

## PATTERSON-KELLEY CO.

### SC-3000/SC-4000 P-K SONIC BOILER

DES. **J. ROBERSON**

JOB NO. **11-1424**

DATE **4/10/14**

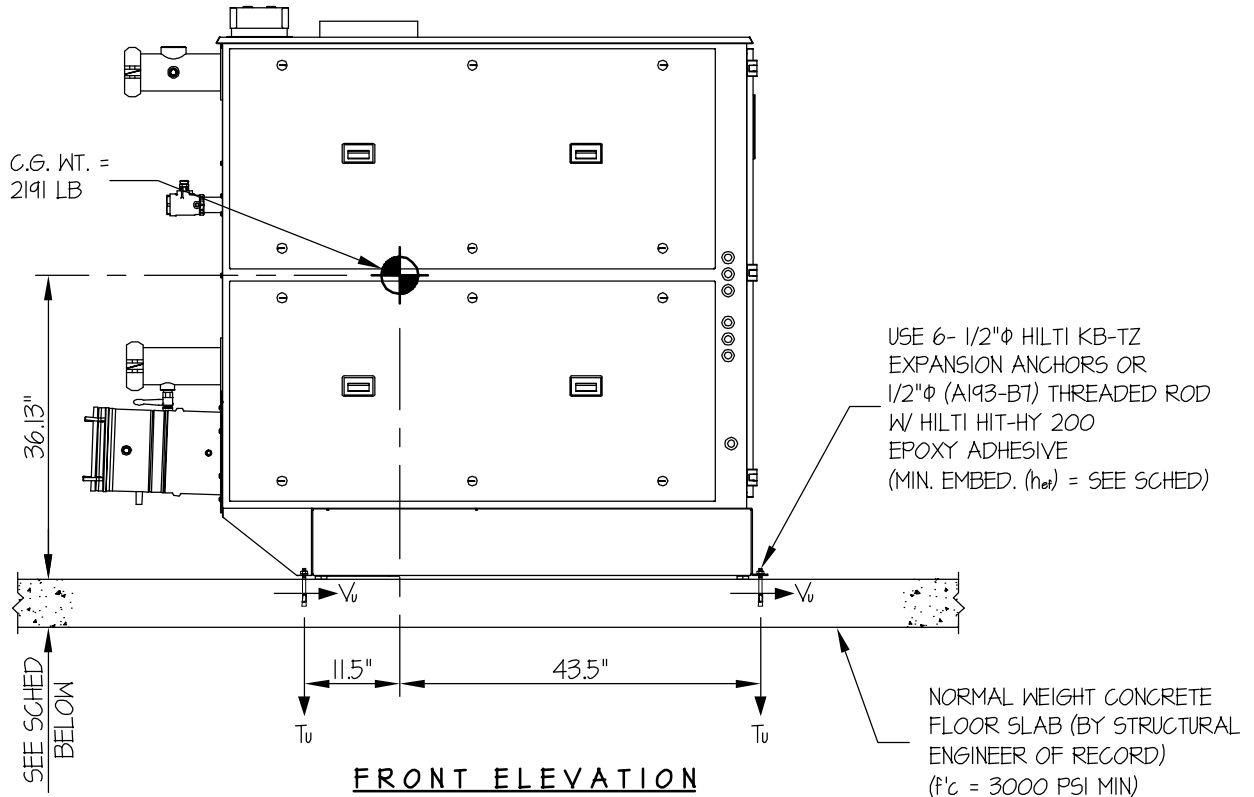
SHEET

**1**

OF **4** SHEETS

SEISMIC ANCHORAGE

SLAB ON GRADE



FRONT ELEVATION

ANCHORS							
MAX Sds	TYPE	DIAM	EFF EMBED	QTY	T <sub>SLAB</sub>	T <sub>u</sub>	V <sub>u</sub>
10	HILTI KB-TZ	1/2"	3.25"	6	6"	2324#	653#
15	HILTI HIT-HY	1/2"	6"	6	8"	3692#	976#
22	HILTI HIT-HY	1/2"	10"	6	12"	5622#	1433#

**NOTES:**

- FORCES ARE DETERMINED PER 2013 CALIFORNIA BUILDING CODE AND ASCE 7-10 STRENGTH DESIGN IS USED. ( $\alpha_p = 10$ ,  $l_p = 15$ ,  $R_p = 2.5$ ,  $\Omega_o = 2.5$ ,  $z/h = 0$ )
- CENTER OF GRAVITY (C.G.) AND WEIGHT ARE THE GOVERNING PARAMETERS FOR DESIGN. THIS PREAPPROVAL ENCOMPASSES ALL WEIGHTS UP TO THE MAXIMUM WEIGHT SHOWN.
- STRUCTURAL ENGINEER OF RECORD FOR THE BUILDING SHALL PROVIDE SUPPORT STRUCTURE DESIGNED TO SUPPORT WEIGHTS AND FORCES SHOWN IN COMBINATION WITH ALL OTHER LOADS THAT MAY BE PRESENT.



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SHEET

**2**

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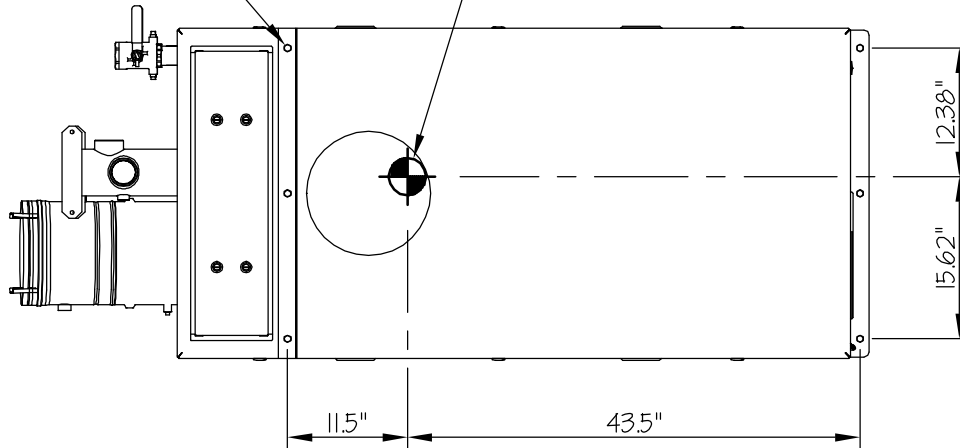
OF **4** SHEETS

SEISMIC ANCHORAGE

SLAB ON GRADE

USE 6- 1/2"  $\phi$  HILTI KB-TZ  
EXPANSION ANCHORS  
(MIN. EMBED. ( $h_{ef}$ ) = 3.25")

C.G. WT. =  
2191 LB  
( $\bar{Y}$  = 36.13")



FRONT ELEVATION

LOADS: PER 2013 CALIFORNIA BUILDING CODE AND ASCE 7-10.

(STRENGTH DESIGN IS USED) ( $S_{Ds} = 100$ ,  $a_p = 10$ ,  $I_p = 15$ ,  $R_p = 2.5$ ,  $\Omega_o = 2.5$ ,  $z/h = 0$ )

WEIGHT = 2191 LB

HORIZONTAL FORCE ( $E_{mh}$ ) = 1.13  $W_p$  = 2476 LB

VERTICAL FORCE ( $E_v$ ) = 0.20  $W_p$  = 438 LB

BOLT SPECS: 1/2"  $\phi$  HILTI KB-TZ

$\phi T = 0.75 \phi N_h = 2625$  LB/BOLT (TENSION)

$\phi V = \phi V_n = 3572$  LB/BOLT (SHEAR)

BOLT FORCES:

TENSION (T)

$$T_{u \text{ MAXIMUM}} = \left[ \frac{2476\#(36.13'')(15.62'')}{2 \text{ BOLTS } (55'')(28'')} \times (0.3) \right] + \frac{2476\#(36.13'')(43.5'')}{1 \text{ BOLT } (28'')(55'')} - \frac{(2191\#(0.9) - 438\#)(43.50'')(15.62'')}{2 \text{ BOLTS } (55'')(28'')} = 2324 \text{ LB/BOLT (MAX)}$$

( HORIZ - SIDE TO SIDE )                      ( HORIZ - FRONT TO BACK )                      ( WEIGHT (0.9) -  $E_v$  )

SHEAR (V)

$$V_{u \text{ MAXIMUM}} = \frac{2476\#(43.5'')}{3 \text{ BOLTS } (55'')} = 653 \text{ LB/BOLT (MAX)}$$

UNITY CHECK:

$$\left( \frac{T_u}{\phi T} \right) + \left( \frac{V_u}{\phi V} \right) \leq 1.2 \quad \left( \frac{2324}{2625} \right) + \left( \frac{653}{3572} \right) = 1.07 \leq 1.2 \therefore \underline{\text{O.K.}}$$

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SHEET

**3**

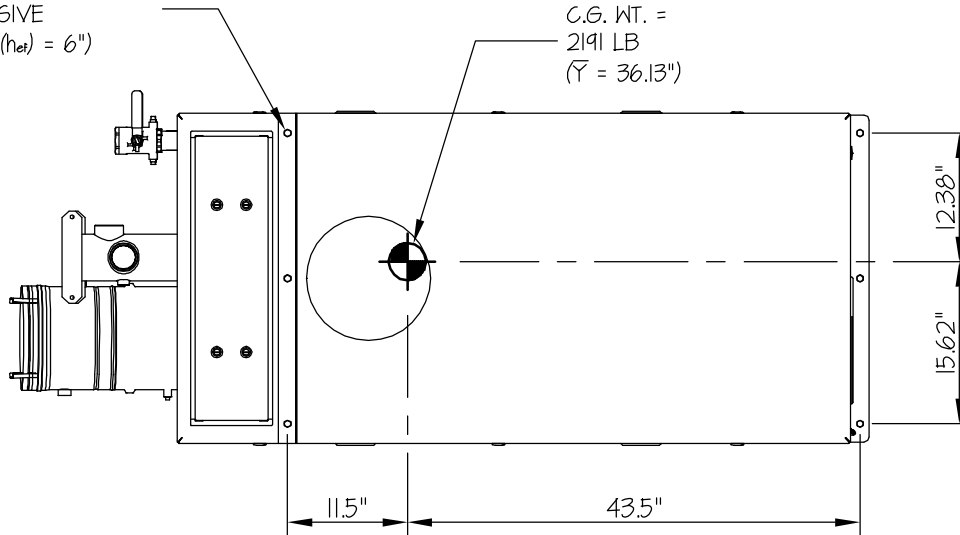
OF **4** SHEETS

SEISMIC ANCHORAGE

SLAB ON GRADE

USE 4- 5/8"φ (A193-B7) THREADED  
ROD W/ HILTI HIT-HY 200  
EPOXY ADHESIVE  
(MIN. EMBED. (h<sub>ef</sub>) = 6")

C.G. WT. =  
2191 LB  
( $\bar{Y}$  = 36.13")



FRONT ELEVATION

LOADS: PER 2013 CALIFORNIA BUILDING CODE AND ASCE 7-10.

(STRENGTH DESIGN IS USED) (S<sub>Ds</sub> = 150, α<sub>p</sub> = 10, I<sub>p</sub> = 15, R<sub>p</sub> = 2.5, Ω<sub>o</sub> = 2.5, z/h = 0)

WEIGHT = 2191 LB

HORIZONTAL FORCE (E<sub>mh</sub>) = 1.69 W<sub>p</sub> = 3703 LB

VERTICAL FORCE (E<sub>v</sub>) = 0.30 W<sub>p</sub> = 657 LB

BOLT FORCES:

BOLT SPECS: 1/2"φ (A193-B7) THREADED ROD  
W/ HILTI HIT-HY 200:

φ<sub>T</sub> = 0.75 φ<sub>N</sub>h = 3864 LB/BOLT (TENSION)

φ<sub>V</sub> = φ<sub>N</sub>h = 4842 LB/BOLT (SHEAR)

TENSION (T)

$$T_{u \text{ MAXIMUM}} = \left[ \frac{3703\#(36.13'')(15.62'')}{2 \text{ BOLTS } (55'')(28'')} \times (0.3) \right] + \frac{3703\#(36.13'')(43.5'')}{1 \text{ BOLT } (28'')(55'')} - \frac{(2191\#(0.9) - 657\#)(43.50'')(15.62'')}{2 \text{ BOLTS } (55'')(28'')} = 3692 \text{ LB/BOLT (MAX)}$$

( HORIZ - SIDE TO SIDE )                      ( HORIZ - FRONT TO BACK )                      ( WEIGHT (0.9) - E<sub>v</sub> )

SHEAR (V)

$$V_{u \text{ MAXIMUM}} = \frac{3703\#(43.5'')}{3 \text{ BOLTS } (55'')} = 976 \text{ LB/BOLT (MAX)}$$

UNITY CHECK:

$$\left( \frac{T_u}{\phi_T} \right) + \left( \frac{V_u}{\phi_V} \right) \leq 1.2 \quad \left( \frac{3692}{3864} \right) + \left( \frac{976}{4842} \right) = 1.16 \leq 1.2 \quad \therefore \text{O.K.}$$

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SHEET

**4**

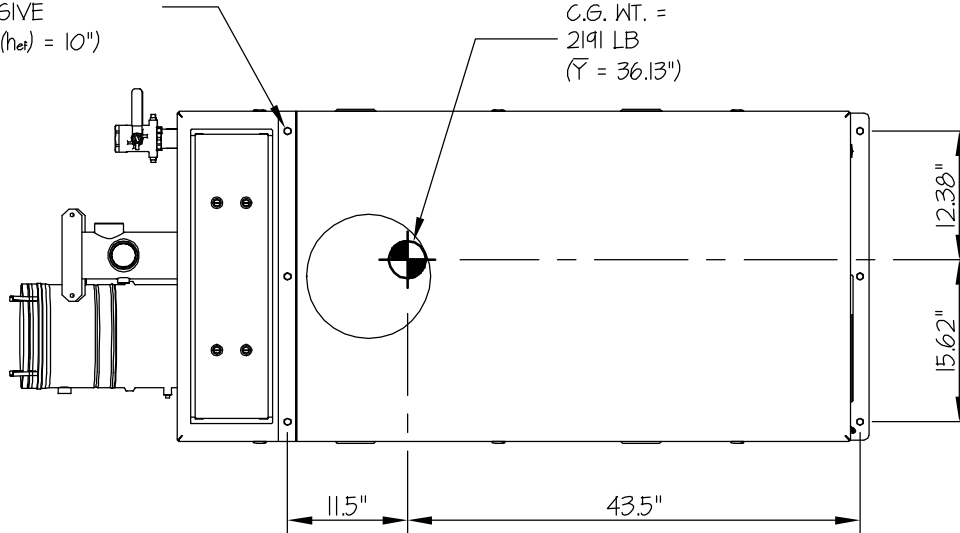
OF **4** SHEETS

SEISMIC ANCHORAGE

SLAB ON GRADE

USE 4- 5/8"φ (A193-B7) THREADED  
ROD W/ HILTI HIT-HY 200  
EPOXY ADHESIVE  
(MIN. EMBED. (h<sub>ef</sub>) = 10")

C.G. WT. =  
2191 LB  
( $\bar{Y}$  = 36.13")



FRONT ELEVATION

LOADS: PER 2013 CALIFORNIA BUILDING CODE AND ASCE 7-10.

(STRENGTH DESIGN IS USED) ( $S_{Ds} = 2.20$ ,  $a_p = 1.0$ ,  $I_p = 1.5$ ,  $R_p = 2.5$ ,  $\Omega_o = 2.5$ ,  $z/h = 0$ )

WEIGHT = 2191 LB

HORIZONTAL FORCE ( $E_{mh}$ ) = 2.48  $W_p$  = 5434 LB

VERTICAL FORCE ( $E_v$ ) = 0.44  $W_p$  = 964 LB

BOLT FORCES:

BOLT SPECS: 1/2"φ (A193-B7) THREADED ROD  
W/ HILTI HIT-HY 200:

$\phi T = 0.75 \phi N_h = 6440$  LB/BOLT (TENSION)

$\phi V = \phi V_n = 4842$  LB/BOLT (SHEAR)

TENSION (T)

$$T_{u \text{ MAXIMUM}} = \left[ \frac{5434\#(36.13'')(15.62'')}{2 \text{ BOLTS } (55'')(28'')} \times (0.3) \right] + \frac{5434\#(36.13'')(43.5'')}{1 \text{ BOLT } (28'')(55'')} - \frac{(2191\#(0.9) - 964\#)(43.50'')(15.62'')}{2 \text{ BOLTS } (55'')(28'')} = 5622 \text{ LB/BOLT (MAX)}$$

( HORIZ - SIDE TO SIDE )                      ( HORIZ - FRONT TO BACK )                      ( WEIGHT (0.9) -  $E_v$  )

SHEAR (V)

$$V_{u \text{ MAXIMUM}} = \frac{5434\#(43.5'')}{3 \text{ BOLTS } (55'')} = 1433 \text{ LB/BOLT (MAX)}$$

UNITY CHECK:

$$\left( \frac{T_u}{\phi T} \right) + \left( \frac{V_u}{\phi V} \right) \leq 1.2 \quad \left( \frac{5622}{6440} \right) + \left( \frac{1433}{4842} \right) = 1.17 \leq 1.2 \quad \therefore \text{OK}$$

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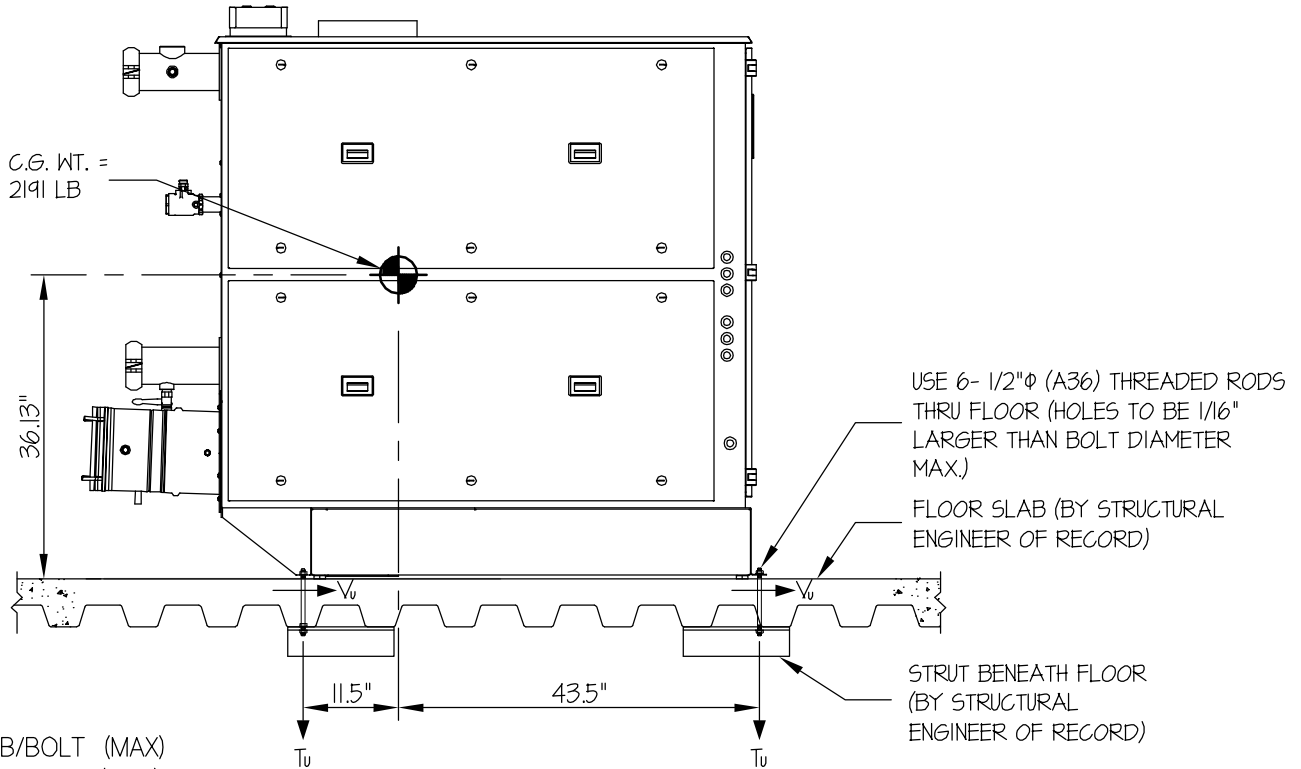
SHEET

**1**

OF **2** SHEETS

SEISMIC ANCHORAGE

UPPER FLOOR



$T_u = 4048 \text{ LB/BOLT (MAX)}$   
 $V_u = 1040 \text{ LB/BOLT (MAX)}$

**FRONT ELEVATION**

**NOTES:**

- FORCES ARE DETERMINED PER 2013 CALIFORNIA BUILDING CODE AND ASCE 7-10. STRENGTH DESIGN IS USED.

HORIZONTAL FORCE ( $E_h$ ) =  $1.80 W_p$  ( $S_{Ds} = 2.5, a_p = 1.0, I_p = 1.5, R_p = 2.5, z/h \leq 1$ )  
VERTICAL FORCE ( $E_v$ ) =  $0.50 W_p$

- CENTER OF GRAVITY (C.G.) AND WEIGHT ARE THE GOVERNING PARAMETERS FOR DESIGN. THESE CALCULATIONS ENCOMPASS ALL WEIGHTS UP TO THE MAXIMUM WEIGHT SHOWN.
- STRUCTURAL ENGINEER OF RECORD FOR THE BUILDING SHALL PROVIDE SUPPORT STRUCTURE DESIGNED TO SUPPORT WEIGHTS AND FORCES SHOWN IN COMBINATION WITH ALL OTHER LOADS THAT MAY BE PRESENT.



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SHEET

**2**

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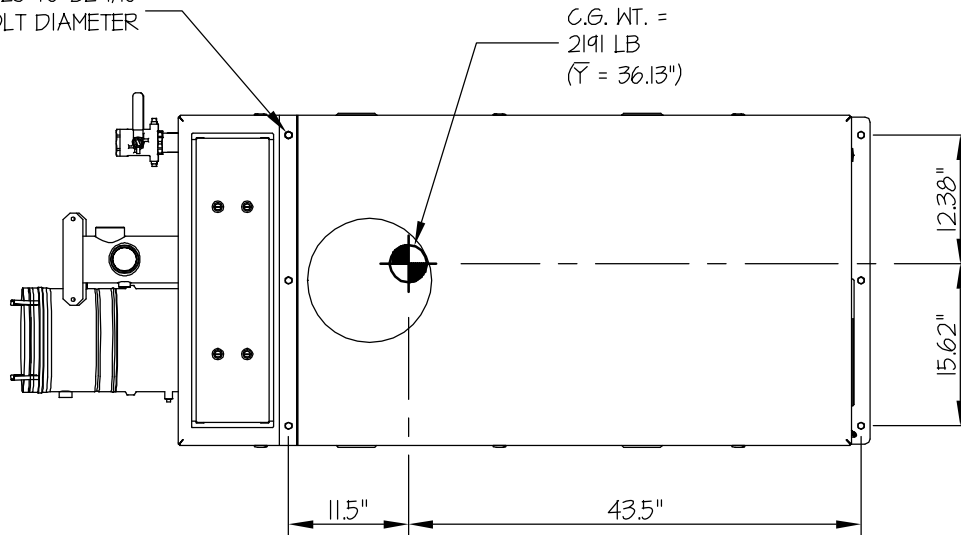
DATE **4/10/14**

OF **2** SHEETS

SEISMIC ANCHORAGE

UPPER FLOOR

USE 6- 1/2"φ (A36) THREADED RODS  
THRU FLOOR (HOLES TO BE 1/16"  
LARGER THAN BOLT DIAMETER  
MAX.)



C.G. WT. =  
2191 LB  
( $\bar{Y}$  = 36.13")

FRONT ELEVATION

LOADS: PER 2013 CALIFORNIA BUILDING CODE AND ASCE 7-10.

(STRENGTH DESIGN IS USED) ( $S_{ds} = 2.5$ ,  $a_p = 10$ ,  $I_p = 15$ ,  $R_p = 2.5$ ,  $z/h \leq 1$ )

WEIGHT = 2191 LB

HORIZONTAL FORCE ( $E_h$ ) = 180  $W_p$  = 3944 LB

VERTICAL FORCE ( $E_v$ ) = 0.50  $W_p$  = 1096 LB

BOLT SPECS: 1/2"φ (A36) THREADED ROD

φT = 6395 LB/BOLT (TENSION)

φV = 3410 LB/BOLT (SHEAR)

BOLT FORCES:

TENSION (T)

$$T_{U \text{ MAXIMUM}} = \left[ \frac{3944\#(36.13'')(15.62'')}{2 \text{ BOLTS } (55'')(28'')} \times (0.3) \right] + \frac{3944\#(36.13'')(43.5'')}{1 \text{ BOLT } (28'')(55'')} - \frac{(2191\#(0.9) - 1096\#)(43.50'')(15.62'')}{2 \text{ BOLTS } (55'')(28'')} = 4048 \text{ LB/BOLT (MAX)}$$

( HORIZ. - SIDE TO SIDE )                      ( HORIZ. - FRONT TO BACK )                      ( WEIGHT (0.9) -  $E_v$  )

SHEAR (V)

$$V_{U \text{ MAXIMUM}} = \frac{3944\#(43.5'')}{3 \text{ BOLTS } (55'')} = 1040 \text{ LB/BOLT (MAX)}$$