EASE

EQUIPMENT **ANCHORAGE** & SEISMIC ENGINEERING
www.EquipmentAnchorage.com

PATTERSON-KELLEY

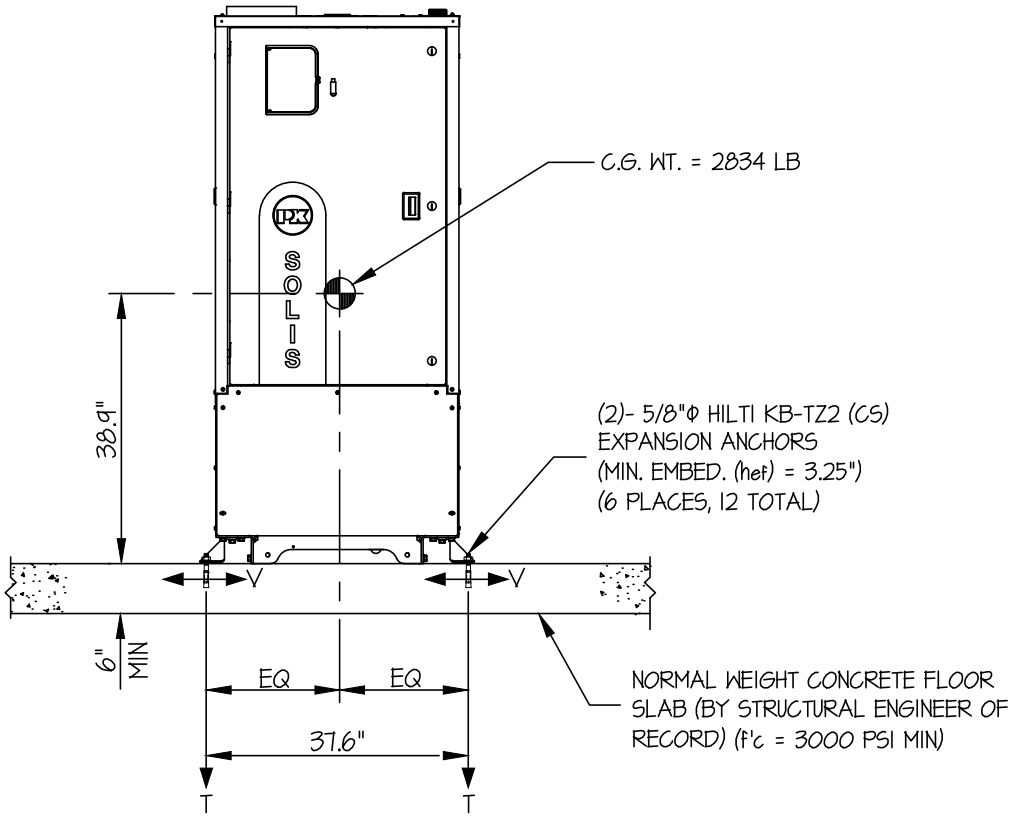
SOLIS 1500-2000 BOILER

DES.	J. ROBERSON
JOB NO.	11-2315
DATE	7/5/23

SHEET 1 OF 2 SHEETS

SEISMIC ANCHORAGE

SLAB ON GRADE



Tu = 1427 LB/BOLT (MAX)
Vu = 605 LB/BOLT (MAX)

FRONT ELEVATION

NOTES:

1. FORCES ARE DETERMINED PER 2022 CALIFORNIA BUILDING CODE AND ASCE 7-16. STRENGTH DESIGN IS USED. (EXAMPLE: S_{DS} = 2.20, a_p = 1.0, I_p = 1.5, R_p = 2.5, Ω_0 = 2.0, z/h = 0)

   HORIZONTAL FORCE (E_h) = 0.99 W_p
   HORIZONTAL FORCE (E_{mh}) = 1.98 W_p (FOR CONCRETE ANCHORAGE)
   VERTICAL FORCE (E_v) = 0.44 W_p

2. THIS CALCULATION ENCOMPASSES WEIGHTS AND VERTICAL C.G. POSITIONS NOT EXCEEDING VALUES SHOWN.

3. THIS CALCULATION WAS PREPARED WITHOUT KNOWLEDGE OF ANY SITE CONDITION. COMPATIBILITY FOR USE WITH A SITE SHALL BE EVALUATED BY THE STRUCTURAL ENGINEER OF RECORD OF THE INSTALLATION (SEOR). USE REQUIRES APPROVAL BY THE SEOR.

4. STRUCTURAL ENGINEER OF RECORD FOR THE INSTALLATION SHALL VERIFY ALL CONDITIONS, EVALUATE INTERACTION WITH ADJACENT EQUIPMENT AND ANCHORS, AND PROVIDE SUPPORT STRUCTURE DESIGNED TO SUPPORT WEIGHTS AND FORCES SHOWN IN COMBINATION WITH ALL OTHER LOADS THAT MAY BE PRESENT.

REGISTERED PROFESSIONAL ENGINEER
JONATHAN ROBERSON
No. 4197
EXP. 6-30-2024
STRUCTURAL
STATE OF CALIFORNIA
7/5/23

NOT STRUCTURALLY ENGINEERED

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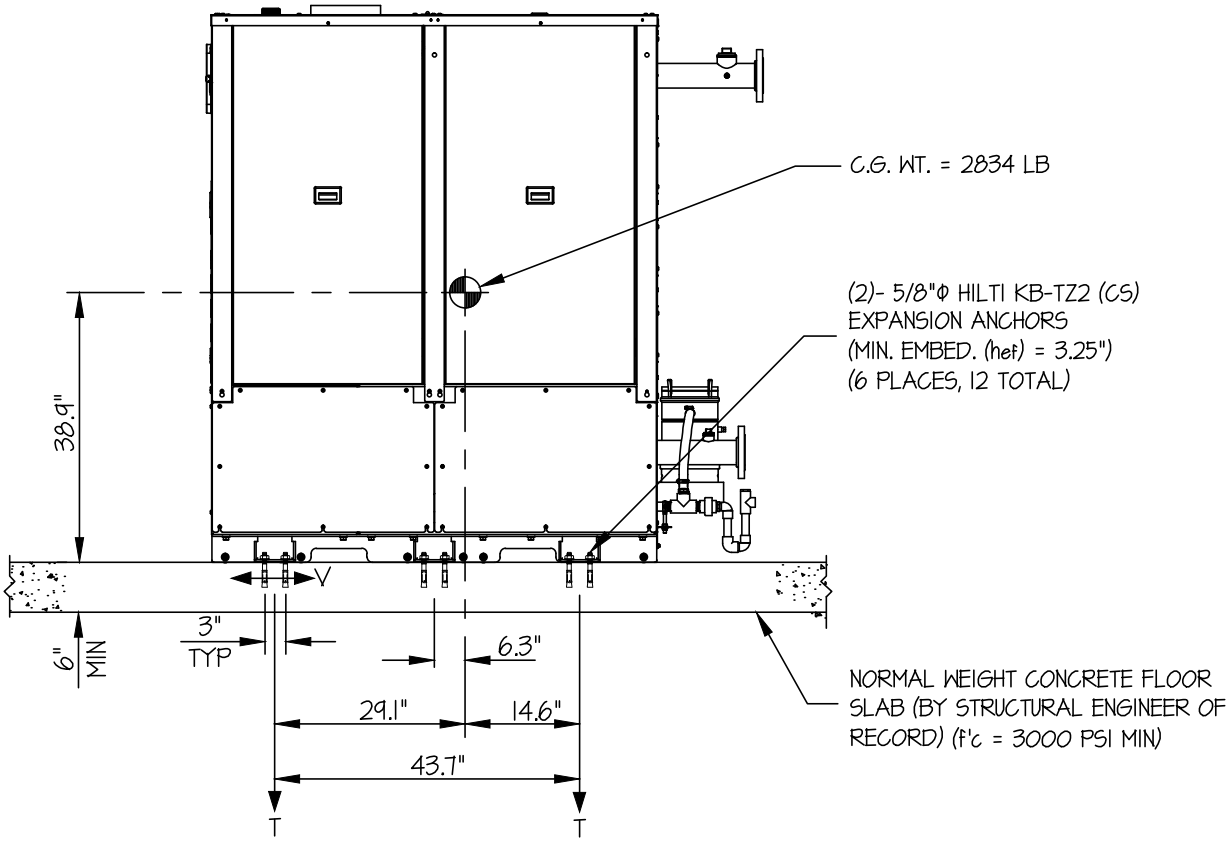
SHEET 2 OF 2 SHEETS

SEISMIC ANCHORAGE

SLAB ON GRADE



SIDE ELEVATION

LOADS:

WEIGHT (W_p) = 2834 LB
HORIZONTAL FORCE (E_{mh}) = 1.98 W_p = 5611 LB
VERTICAL FORCE (E_v) = 0.44 W_p = 1247 LB

ANCHOR SPEC: 5/8"Φ HILTI KB-TZ2 (CS): (h_{ef} = 3.25")
SPACING = 3" MIN
EDGE DISTANCE = 32" MIN:
$\phi T = 0.75\phi N_n$ = 2148 LB/ANCHOR (TENSION)
$\phi V = \phi V_n$ = 6169 LB/ANCHOR (SHEAR)

ANCHOR FORCES:

TENSION (T)

$$T_{U\ MAXIMUM} = \left[\frac{5611\#(38.9'')(29.1'')}{4\ BOLTS\ (37.6'')(43.7'')} \times (0.3) \right] + \frac{5611\#(38.9'')}{4\ BOLTS\ (43.7'')} - \frac{(2834\#(0.9) - 1247\#)(29.1'')}{8\ BOLTS\ (43.7'')} = 1427\ LB/BOLT\ (MAX)$$

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

SHEAR (V)

$$V_{U\ MAXIMUM} = \left[\frac{5611\#}{12\ BOLTS} \times (0.3) \right] + \frac{5611\#(29.1'')}{8\ BOLTS\ (43.7'')} = 605\ LB/BOLT\ (MAX)$$

INTERACTION:

$$\left(\frac{T_u}{\phi T}\right) + \left(\frac{V_u}{\phi V}\right) \leq 1.2 \quad \left(\frac{1427}{2148}\right) + \left(\frac{605}{6169}\right) = 0.76 \leq 1.2 \quad \therefore \text{ O.K.}$$

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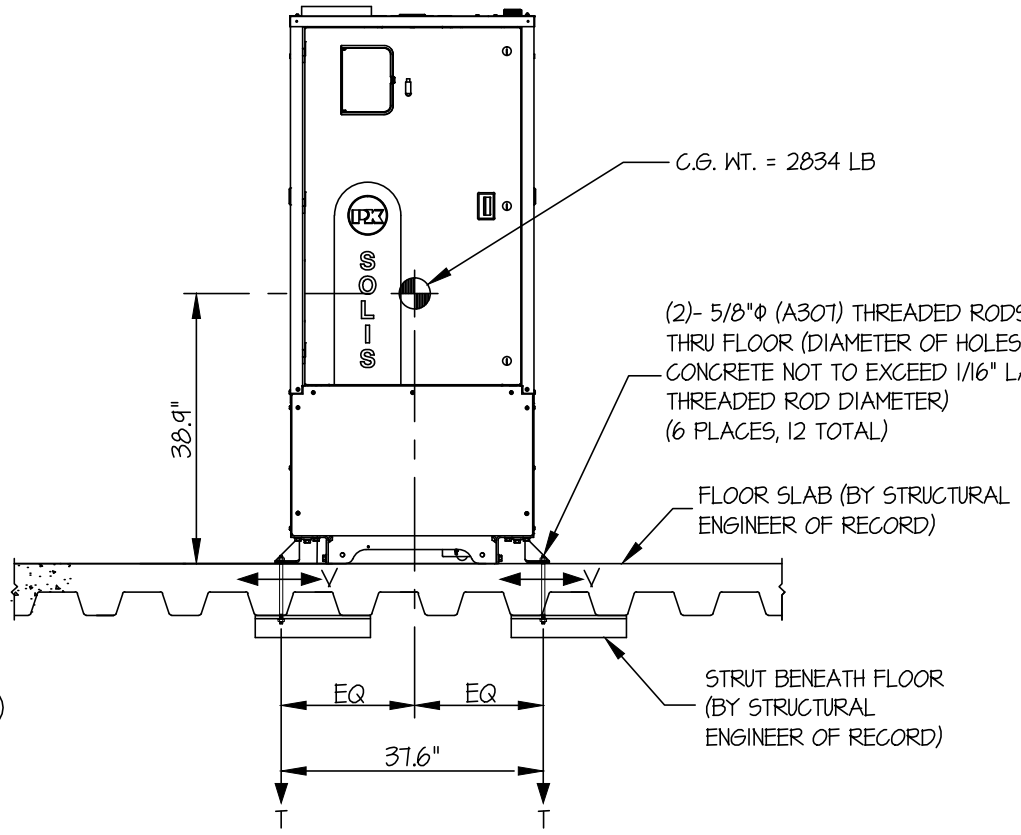
SEISMIC ANCHORAGE

UPPER FLOOR



Tu = 1184 LB/BOLT (MAX)
Vu = 507 LB/BOLT (MAX)

FRONT ELEVATION

NOTES:

1. FORCES ARE DETERMINED PER 2022 CALIFORNIA BUILDING CODE AND ASCE 7-16. STRENGTH DESIGN IS USED. (EXAMPLE: S_{DS} = 2.30, a_p = 1.0, I_p = 1.5, R_p = 2.5, $z/h \leq 1$)

   HORIZONTAL FORCE (E_h) = 1.66 W_p
   VERTICAL FORCE (E_v) = 0.46 W_p

2. THIS CALCULATION ENCOMPASSES WEIGHTS AND VERTICAL C.G. POSITIONS NOT EXCEEDING VALUES SHOWN.

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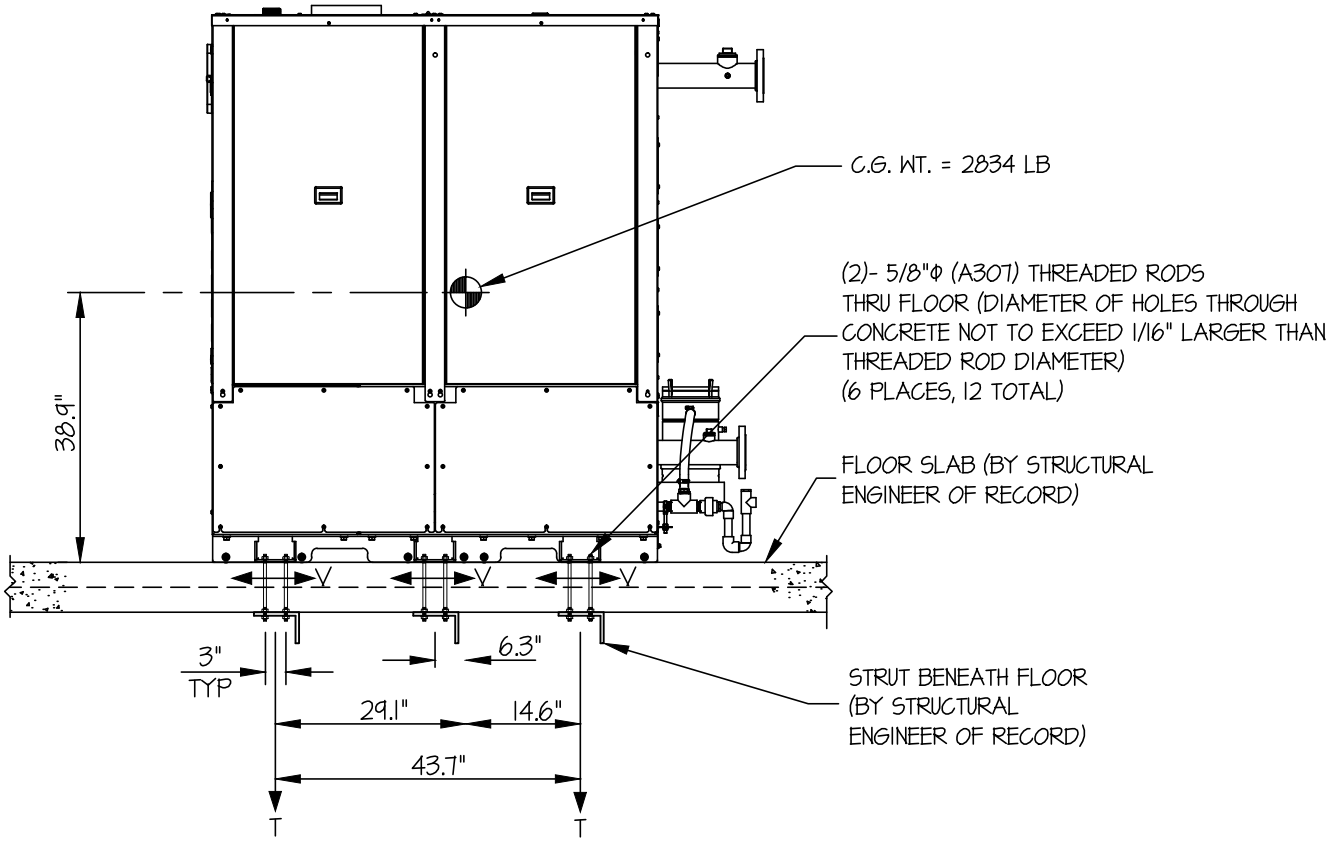

SIDE ELEVATION

LOADS:

WEIGHT (W_p)	= 2834 LB	
HORIZONTAL FORCE (E_h)	= 1.66 W_p	= 4704 LB
VERTICAL FORCE (E_v)	= 0.46 W_p	= 1304 LB

ANCHOR SPECS: 5/8"φ (A307) THREADED ROD
φT= 9870 LB/BOLT (TENSION)
φV= 5890 LB/BOLT (SHEAR)

ANCHOR FORCES:

TENSION (T)

$$T_{U\ MAXIMUM} = \left[\frac{4704\#(38.9'')(29.1'')}{4\ BOLTS\ (37.6'')(43.7'')} \times (0.3) \right] + \frac{4704\#(38.9'')}{4\ BOLTS\ (43.7'')} - \frac{(2834\#(0.9) - 1304\#)(29.1'')}{8\ BOLTS\ (43.7'')} = 1184\ LB/BOLT\ (MAX)$$

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

SHEAR (V)

$$V_{U\ MAXIMUM} = \left[\frac{4704\#}{12\ BOLTS} \times (0.3) \right] + \frac{4704\#(29.1'')}{8\ BOLTS\ (43.7'')} = 507\ LB/BOLT\ (MAX)$$

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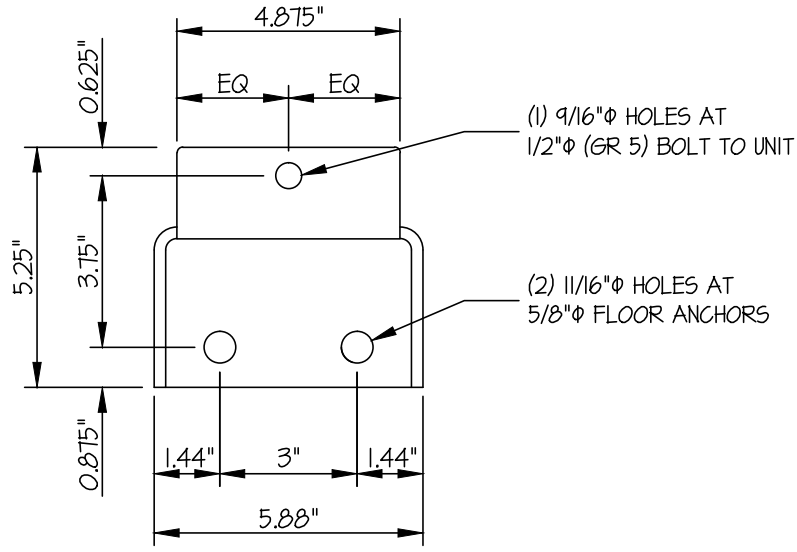
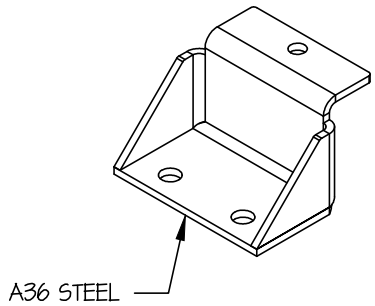
SEISMIC ANCHORAGE

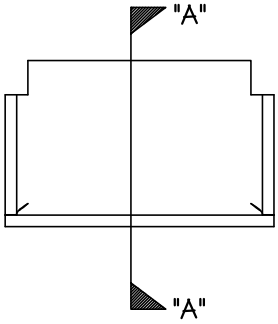
BRACKET DETAILS



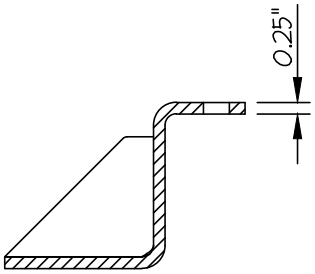
TOP



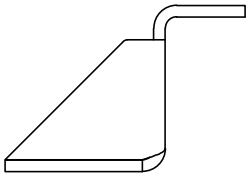
ISOMETRIC



FRONT



SECTION "A"-"A"



RIGHT

FLOOR ANCHOR BRACKET