EASE

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

PATTERSON KELLEY

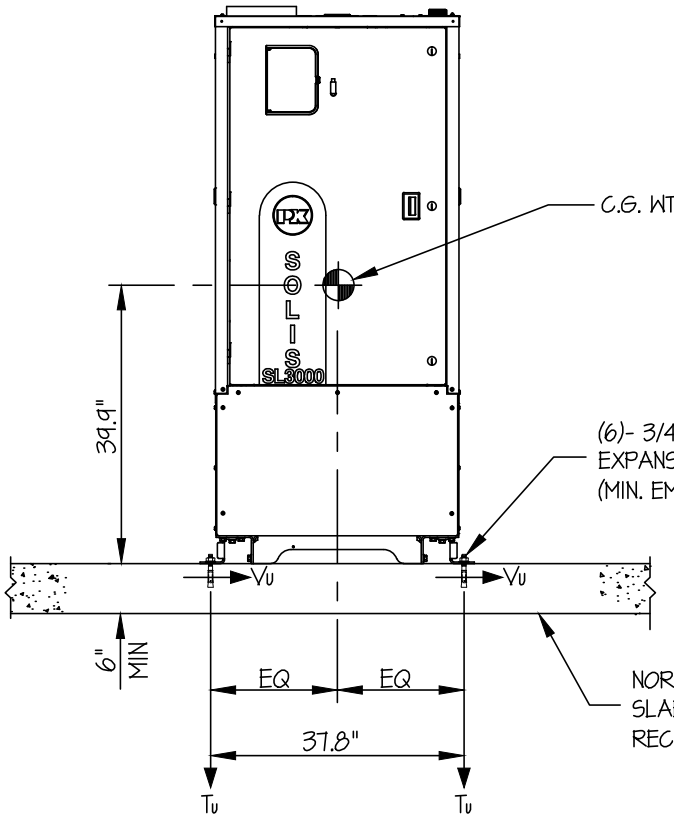
SOLIS 3M CONDENSING BOILER

DES.	J. ROBERSON
JOB NO.	11-2107
DATE	3/17/21

SHEET 1 OF 2 SHEETS

SEISMIC ANCHORAGE

SLAB ON GRADE



Tu = 2958 LB/BOLT (MAX)
Vu = 1521 LB/BOLT (MAX)

FRONT ELEVATION

NOTES:

1. **FORCES ARE DETERMINED PER 2019 CALIFORNIA BUILDING CODE AND ASCE 7-16.**
   STRENGTH DESIGN IS USED. (S_{DS} = 2.20, a_p = 1.0, I_p = 1.5, R_p = 2.5, Ω_o = 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. CENTER OF GRAVITY (C.G.) AND WEIGHT ARE THE GOVERNING PARAMETERS FOR DESIGN. THESE CALCULATIONS ENCOMPASS ALL WEIGHTS UP TO THE MAXIMUM WEIGHT SHOWN.

3. STRUCTURAL ENGINEER OF RECORD FOR THE BUILDING SHALL VERIFY ALL CONDITIONS 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. 6-30-2022
STRUCTURAL
STATE OF CALIFORNIA
3/17/21

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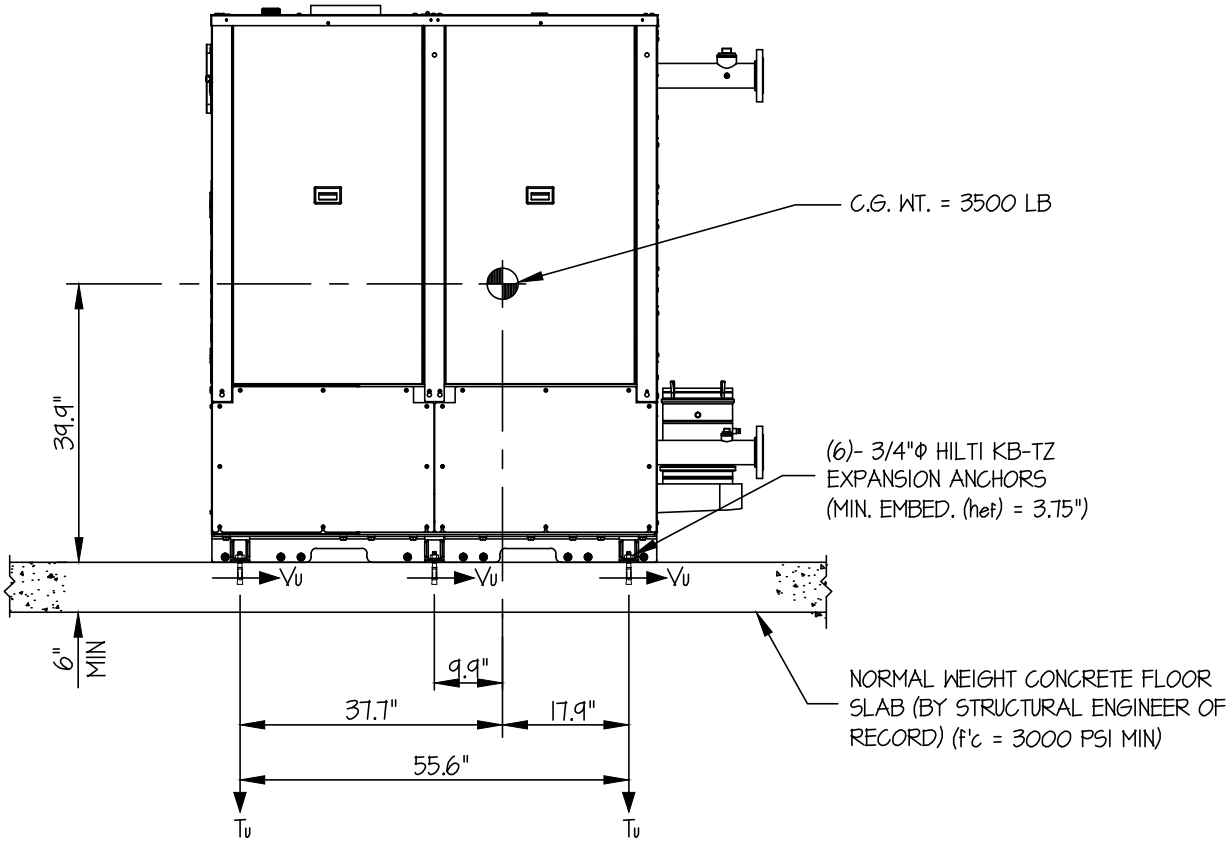
SOLIS 3M CONDENSING BOILER

DES. J. ROBERSON | JOB NO. 11-2107 | DATE 3/17/21 | SHEET 2 OF 2 SHEETS

SEISMIC ANCHORAGE — SLAB ON GRADE



SIDE ELEVATION

LOADS: PER 2019 CALIFORNIA BUILDING CODE AND ASCE 7-16.
STRENGTH DESIGN IS USED (S_{DS} = 2.20, a_p = 1.0, I_p = 1.5, R_p = 2.5, Ω_o = 2.0, z/h = 0)

WEIGHT = 3500 LB

HORIZONTAL FORCE (E_{mh}) = 1.98 W_p = 6930 LB

VERTICAL FORCE (E_v) = 0.44 W_p = 1540 LB

BOLT FORCES:

BOLT SPECS: 3/4"ϕ HILTI KB-TZ (h_{ef} = 3.75")

EDGE DISTANCE = 27" MIN:

ϕT= 0.75ϕNn = 3296 LB/BOLT (TENSION)

ϕV= ϕVn = 7634 LB/BOLT (SHEAR)

TENSION (T)

$$T_{u\ MAXIMUM} = \left[\frac{6930\#(39.9'')(37.7'')}{2\ BOLTS\,(37.8'')(55.6'')} \times (0.3)\right] + \frac{6930\#(39.9'')}{2\ BOLTS\,(55.6'')} - \frac{(3500\#(0.9) - 1540\#)(37.7'')}{4\ BOLTS\,(55.6'')} = 2958\ LB/BOLT\ (MAX)$$

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

SHEAR (V)

$$V_{u\ MAXIMUM} = \left[\frac{6930\#}{6\ BOLTS} \times (0.3)\right] + \frac{6930\#(37.7'')}{4\ BOLTS\,(55.6'')} = 1521\ LB/BOLT\ (MAX)$$

UNITY CHECK:

$$\left(\frac{T_u}{\phi T}\right) + \left(\frac{V_u}{\phi V}\right) \le 1.2 \quad \left(\frac{2958}{3296}\right) + \left(\frac{1521}{7634}\right) = 1.10 \le 1.2 \ \therefore \text{ O.K.}$$

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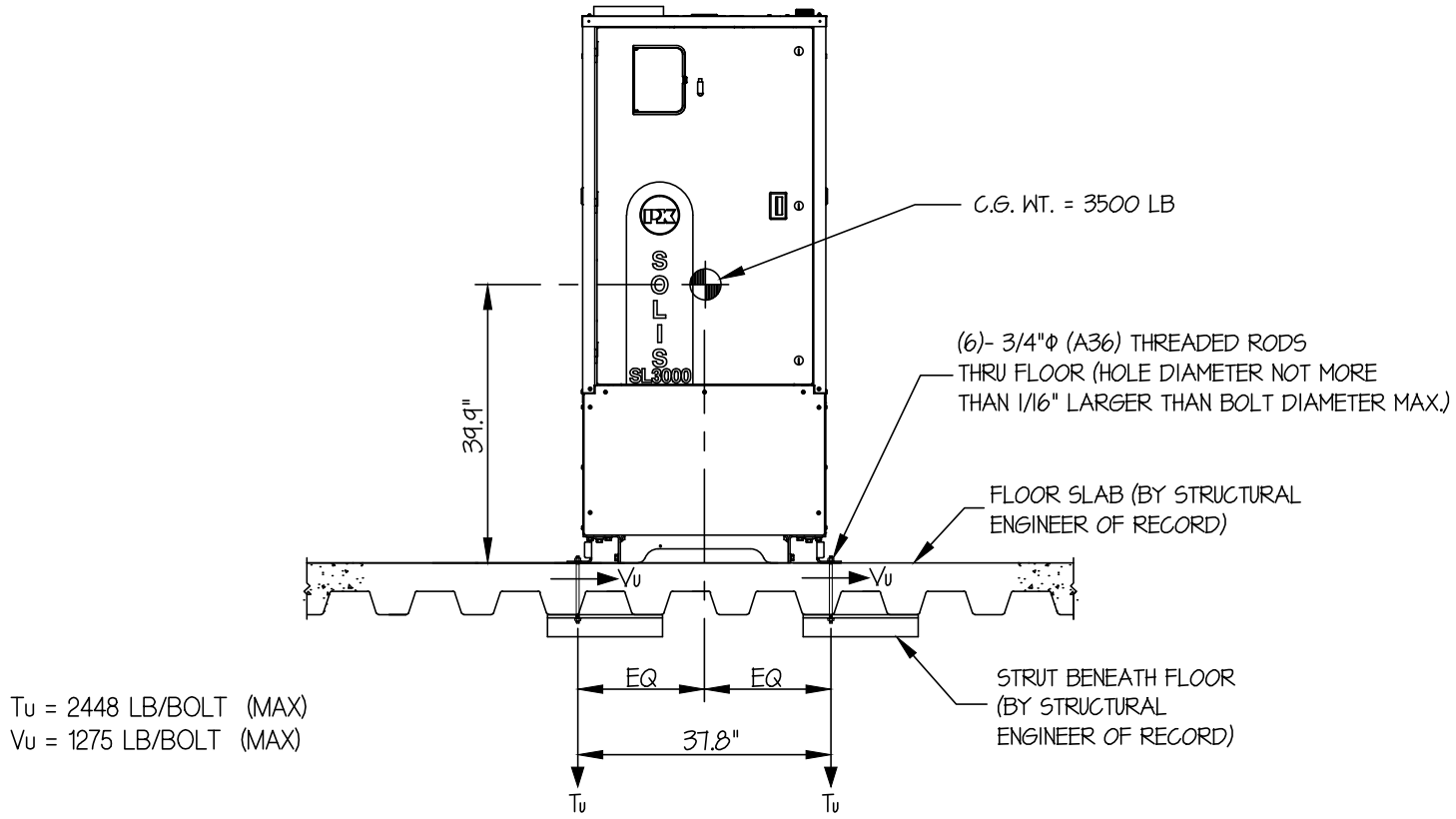
SHEET 1 OF 2 SHEETS

SEISMIC ANCHORAGE

UPPER FLOOR



Tu = 2448 LB/BOLT (MAX)
Vu = 1275 LB/BOLT (MAX)

FRONT ELEVATION

NOTES:

1. **FORCES ARE DETERMINED PER 2019 CALIFORNIA BUILDING CODE AND ASCE 7-16.**
   STRENGTH DESIGN IS USED. (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. CENTER OF GRAVITY (C.G.) AND WEIGHT ARE THE GOVERNING PARAMETERS FOR DESIGN. THESE CALCULATIONS ENCOMPASS ALL WEIGHTS UP TO THE MAXIMUM WEIGHT SHOWN.

3. STRUCTURAL ENGINEER OF RECORD FOR THE BUILDING SHALL VERIFY ALL CONDITIONS AND PROVIDE SUPPORT STRUCTURE DESIGNED TO SUPPORT WEIGHTS AND FORCES SHOWN IN COMBINATION WITH ALL OTHER LOADS THAT MAY BE PRESENT.

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NOT STRUCTURE ENGINEERED

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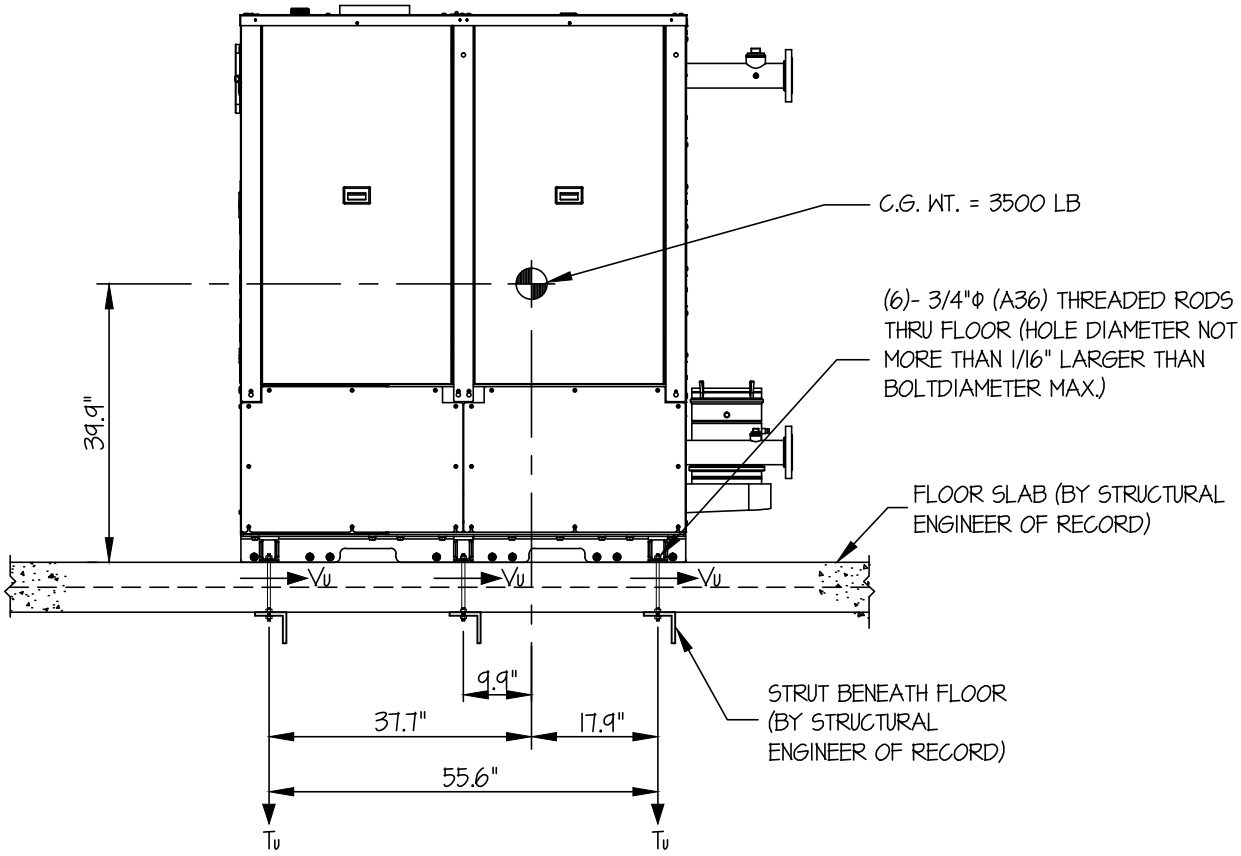
SHEET 2 OF 2 SHEETS

SEISMIC ANCHORAGE — UPPER FLOOR



SIDE ELEVATION

LOADS: PER 2019 CALIFORNIA BUILDING CODE AND ASCE 7-16.
STRENGTH DESIGN IS USED (S_{DS} = 2.30, a_p = 1.0, I_p = 1.5, R_p = 2.5, $z/h \leq 1$)
WEIGHT = 3500 LB
HORIZONTAL FORCE (E_h) = 1.66 W_p = 5810 LB
VERTICAL FORCE (E_v) = 0.46 W_p = 1610 LB

BOLT FORCES:

BOLT SPECS: 3/4"ϕ (A36) THREADED ROD
ϕT= 14,420 LB/BOLT (TENSION)
ϕV= 7691 LB/BOLT (SHEAR)

TENSION (T)

$$T_{u\ MAXIMUM} = \left[\frac{5810\#(39.9'')(37.7'')}{2\ BOLTS\,(37.8'')(55.6'')} \times (0.3)\right] + \frac{5810\#(39.9'')}{2\ BOLTS\,(55.6'')} - \frac{(3500\#(0.9) - 1610\#)(37.7'')}{4\ BOLTS\,(55.6'')} = 2448\ LB/BOLT\ (MAX)$$

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

SHEAR (V)

$$V_{u\ MAXIMUM} = \left[\frac{5810\#}{6\ BOLTS} \times (0.3)\right] + \frac{5810\#(37.7'')}{4\ BOLTS\,(55.6'')} = 1275\ LB/BOLT\ (MAX)$$