PATTERSON-KELLEY CO.

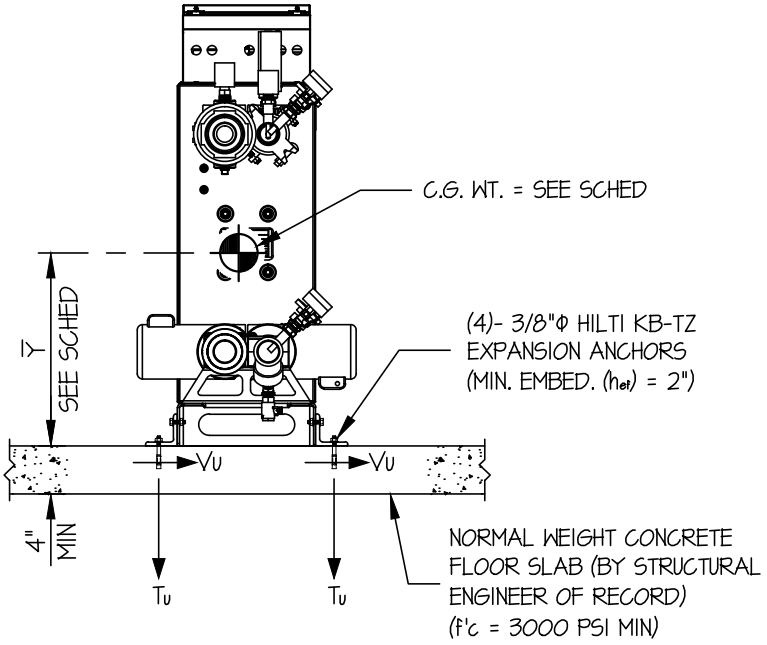
DURATION III® WATER HEATER

DES. J. ROBERSON
JOB NO. 11-1707
DATE 3/21/17

SHEET 1 OF 2 SHEETS

SEISMIC ANCHORAGE

SLAB ON GRADE



FRONT ELEVATION

NOTES:

1. **FORCES ARE DETERMINED PER 2016 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, 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 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. 6-30-2018
STRUCTURAL
STATE OF CALIFORNIA
3/21/17

PATTERSON-KELLEY CO.

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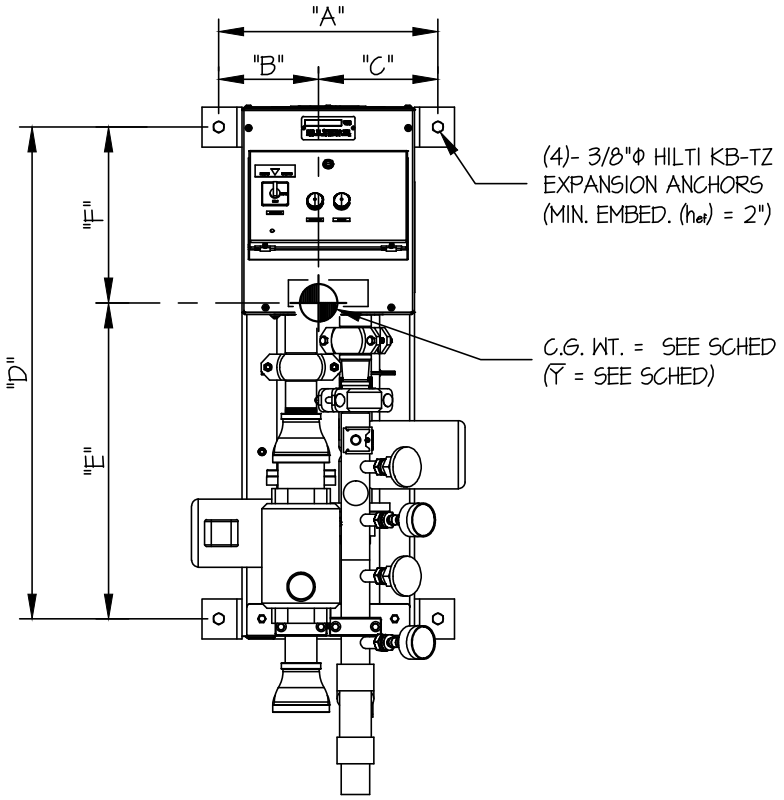

PLAN AT BASE

UNIT	WEIGHT (lb.)	Ȳ (in.)	"A" (in.)	B" (in.)	"C" (in.)	"D" (in.)	"E" (in.)	"F" (in.)	Tu (lb.)	Vu (lb.)
PUMPED	475	18.2	16.5	7.5	9	37	23.8	13.2	666	379
INSTANTANEOUS	500	18.6	16.5	7.6	8.9	37	23.9	13.1	721	400

LOADS: PER 2016 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, Ω_o = 2.0, z/h = 0)
WEIGHT = 500 LB
HORIZONTAL FORCE (E_{mh}) = 1.98 W_p = 990 LB
VERTICAL FORCE (E_v) = 0.44 W_p = 220 LB

BOLT SPECS: 3/8"φ HILTI KB-TZ (h_{ef} = 2")
φT= 0.75φNn = 1212 LB/BOLT (TENSION)
φV= φVn = 1466 LB/BOLT (SHEAR)

BOLT FORCES:

TENSION (T)

$$T_{u\ MAXIMUM} = \left[\frac{990\#(18.6")(7.6")}{1\ BOLT\ (37")(16.5")} \times (0.3)\right] + \frac{990\#(18.6")(23.9")}{1\ BOLT\ (16.5")(37")} - \frac{(500\#(0.9) - 220\#)(7.6")(23.9")}{1\ BOLT\ (16.5")(37")} = 721\ LB/BOLT\ (MAX)$$

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

SHEAR (V)

$$V_{u\ MAXIMUM} = \left(\frac{990\#(8.9")}{2\ BOLTS\ (16.5")} \times (0.3)\right) + \frac{990\#(23.9")}{2\ BOLTS\ (37")} = 400\ LB/BOLT\ (MAX)$$

UNITY CHECK:

$$\left(\frac{T_u}{\phi T}\right) + \left(\frac{V_u}{\phi V}\right) \le 1.2 \quad \left(\frac{721}{1212}\right) + \left(\frac{400}{1466}\right) = 0.87 \le 1.2 \quad \therefore \text{ O.K.}$$

EASE

EQUIPMENT **ANCHORAGE** & SEISMIC ENGINEERING
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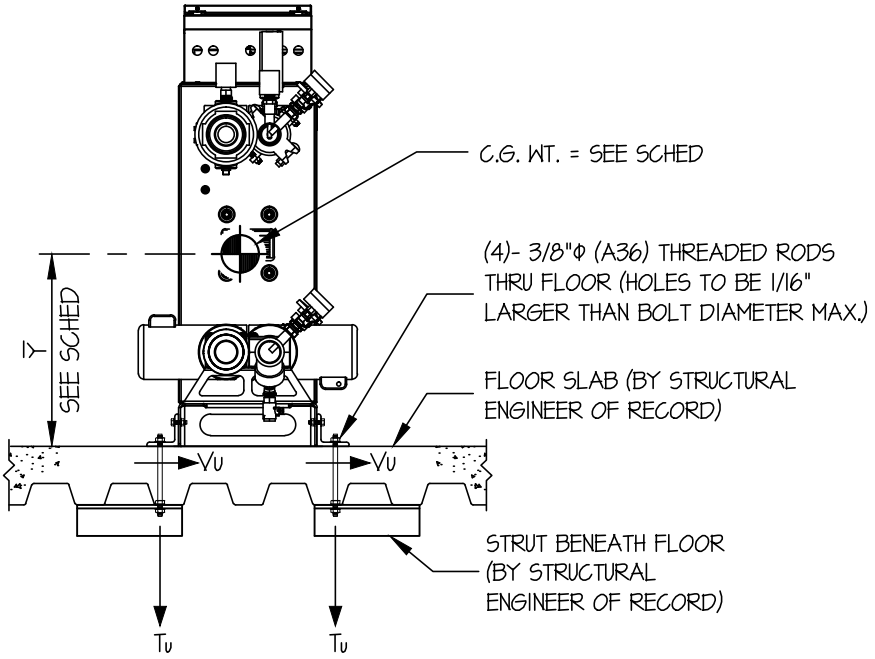
UPPER FLOOR



FRONT ELEVATION

NOTES:

1. **FORCES ARE DETERMINED PER 2016 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, $z/h \leq 1$)

   HORIZONTAL FORCE (E_h) = 1.58 W_p
   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 PROVIDE SUPPORT STRUCTURE DESIGNED TO SUPPORT WEIGHTS AND FORCES SHOWN IN COMBINATION WITH ALL OTHER LOADS THAT MAY BE PRESENT.

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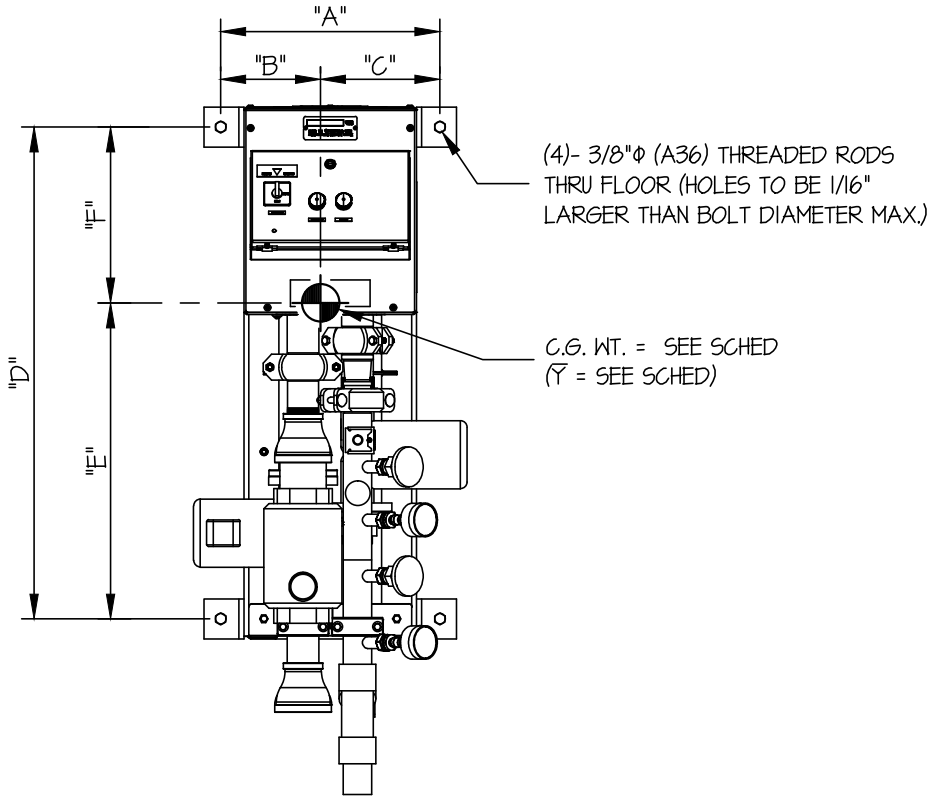

PLAN AT BASE

UNIT	WEIGHT (lb.)	$\bar{Y}$ (in.)	"A" (in.)	B" (in.)	"C" (in.)	"D" (in.)	"E" (in.)	"F" (in.)	Tu (lb.)	Vu (lb.)
PUMPED	475	18.2	16.5	7.5	9	37	23.8	13.2	519	303
INSTANTANEOUS	500	18.6	16.5	7.6	8.9	37	23.9	13.1	562	319

LOADS: PER 2016 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, z/h ≤ 1)
WEIGHT = 500 LB
HORIZONTAL FORCE (E_h) = 1.58 W_p = 790 LB
VERTICAL FORCE (E_v) = 0.44 W_p = 220 LB

BOLT FORCES:

BOLT SPECS: 3/8"ϕ (A36) THREADED ROD
ϕT= 3589 LB/BOLT (TENSION)
ϕV= 1914 LB/BOLT (SHEAR)

TENSION (T)

$$T_{u\ MAXIMUM} = \left[\frac{790\#(18.6'')(7.6'')}{1\ BOLT\ (37'')(16.5'')} \times (0.3)\right] + \frac{790\#(18.6'')(23.9'')}{1\ BOLT\ (16.5'')(37'')} - \frac{(500\#(0.9) - 220\#)(7.6'')(23.9'')}{1\ BOLT\ (16.5'')(37'')} = 562\ LB/BOLT\ (MAX)$$

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

SHEAR (V)

$$V_{u\ MAXIMUM} = \left(\frac{790\#(8.9'')}{2\ BOLTS\ (16.5'')} \times (0.3)\right) + \frac{790\#(23.9'')}{2\ BOLTS\ (37'')} = 319\ LB/BOLT\ (MAX)$$