

## PENTAIR CABINET

DES. **J. ROBERSON**

JOB NO. **11-1461**

DATE **7/7/15**

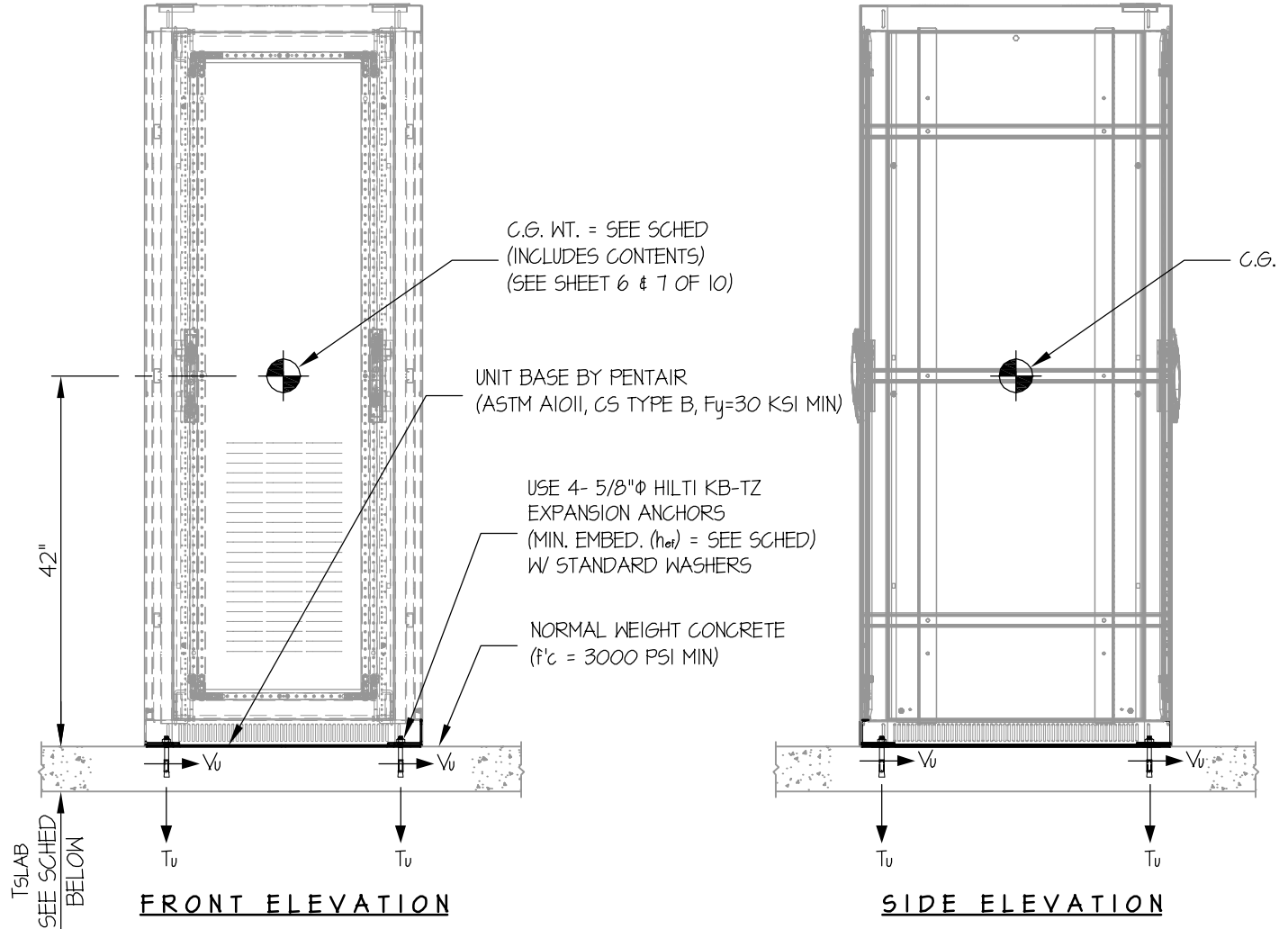
SHEET

# 5

OF **10** SHEETS

SEISMIC SUPPORTS & ATTACHMENTS

CONCRETE SLAB



ANCHORS					
MAX Sds	TYPE	DIAM	EFF EMBED	QTY	T <sub>SLAB</sub>
135	HILTI KB-TZ	5/8"	3.125"	4	5"
190	HILTI KB-TZ	5/8"	4"	4	6"

**NOTES:**

- FORCES ARE DETERMINED PER 2013 CALIFORNIA BUILDING CODE AND ASCE 7-10 STRENGTH DESIGN IS USED. ( $\alpha_p = 2.5$ ,  $I_p = 1.5$ ,  $R_p = 6.0$ ,  $\Omega_0 = 2.5$ ,  $z/h = 0$ )
- 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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# 6

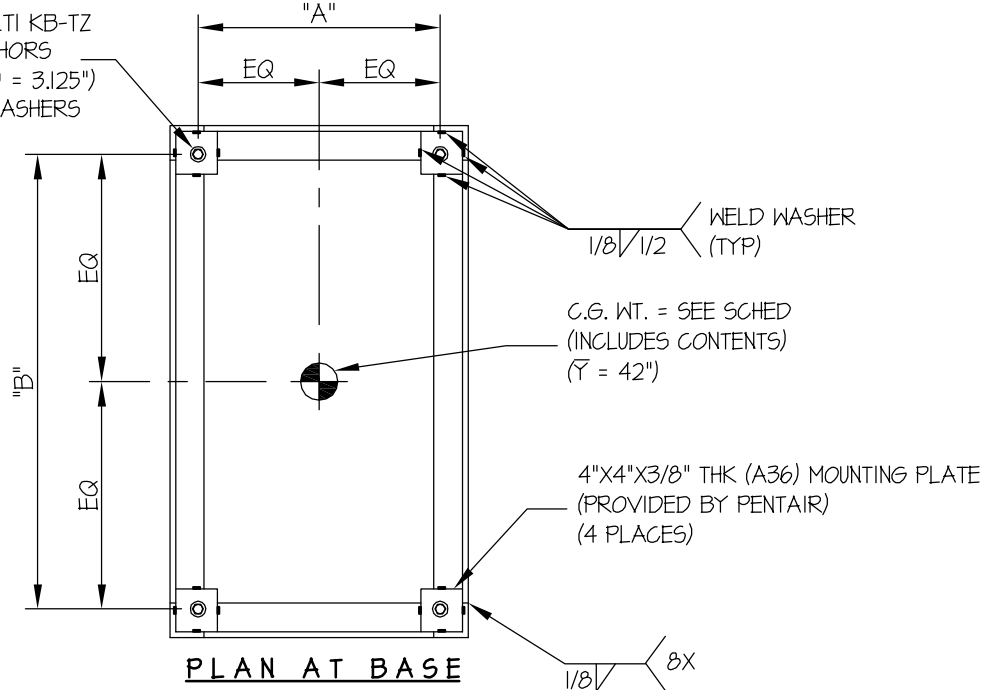
OF **10** SHEETS

SEISMIC SUPPORTS & ATTACHMENTS

MAX  $S_{ps} \leq 1.35$

CONCRETE SLAB

USE 4- 5/8"  $\phi$  HILTI KB-TZ EXPANSION ANCHORS (MIN. EMBED. ( $h_{ef}$ ) = 3.125") W/ STANDARD WASHERS



PLAN AT BASE

MODEL	WEIGHT (lb.)	"A" (in.)	"B" (in.)	** $T_u$ (lb.)	** $V_u$ (lb.)
* ENC2178S	1411	22.52	26.46	2288	536
ENC2189S	1458	26.52	30.38	1985	554
ENC21710S	1455	22.52	34.34	2244	554
ENC21712S	1477	22.52	42.2	2196	561

\* THIS UNIT USED IN THE CALCULATIONS

\*\* VALUES INCLUDE  $\Omega_o$

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

STRENGTH DESIGN IS USED ( $S_{ps} = 1.35$ ,  $a_p = 2.5$ ,  $l_p = 15$ ,  $R_p = 6.0$ ,  $\Omega_o = 2.5$ ,  $z/h = 0$ )

WEIGHT = 1411 LB

HORIZONTAL FORCE ( $E_{mh}$ ) =  $152W_p = 2145$  LB

VERTICAL FORCE ( $E_v$ ) =  $0.27W_p = 381$  LB

BOLT SPECS: 5/8"  $\phi$  HILTI KB-TZ ( $h_{ef} = 3.125"$ )

$\phi T = 0.75 \phi N_n = 2508$  LB/BOLT (TENSION)

$\phi V = \phi V_n = 4940$  LB/BOLT (SHEAR)

BOLT FORCES:

TENSION (T)

$$T_u \text{ MAXIMUM} = \left[ \frac{2145\#(42")}{2 \text{ BOLTS } (26.46") \times (0.3)} \right] + \frac{2145\#(42")}{2 \text{ BOLTS } (22.52")} - \frac{1411\#(0.9) - 381\#}{4 \text{ BOLTS}} = 2288 \text{ LB/BOLT (MAX)}$$

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

SHEAR (V)

$$V_u \text{ MAXIMUM} = \frac{2145\#}{4 \text{ BOLTS}} = 536 \text{ LB/BOLT (MAX)}$$

UNITY CHECK:

$$\left( \frac{T_u}{\phi T} \right) + \left( \frac{V_u}{\phi V} \right) \leq 1.2 \left( \frac{2288}{2508} \right) + \left( \frac{536}{4940} \right) = 1.02 \leq 1.2 \therefore \text{O.K.}$$

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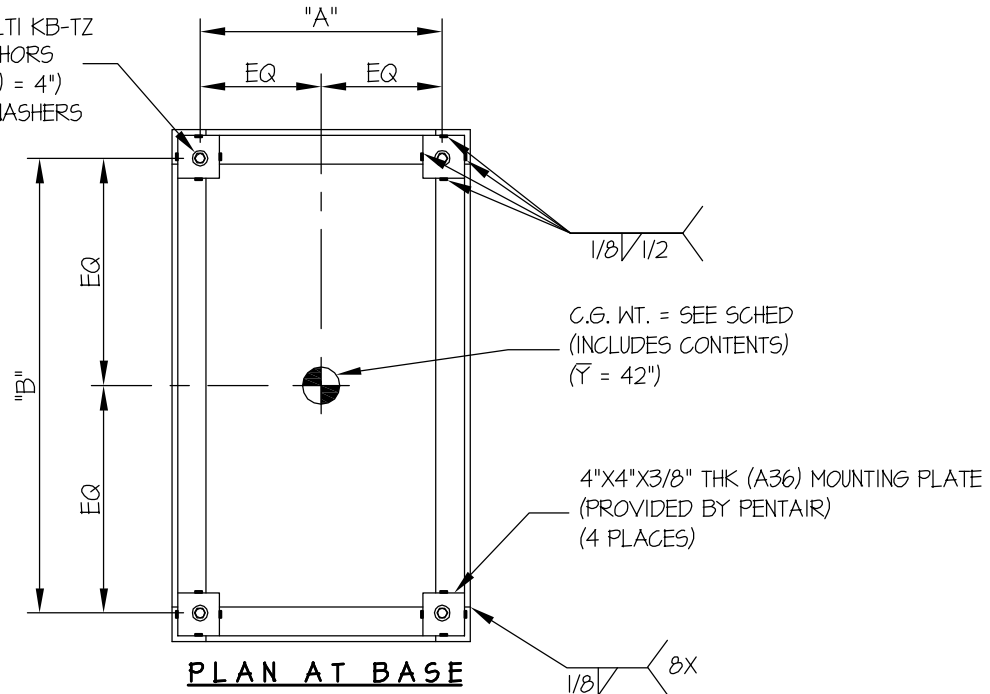
# 7

OF **10** SHEETS

SEISMIC SUPPORTS & ATTACHMENTS

CONCRETE SLAB

USE 4- 5/8"φ HILTI KB-TZ  
EXPANSION ANCHORS  
(MIN. EMBED. (h<sub>ef</sub>) = 4")  
W/ STANDARD WASHERS



**PLAN AT BASE**

MODEL	WEIGHT (lb.)	"A" (in.)	"B" (in.)	** T <sub>u</sub> (lb.)	** V <sub>u</sub> (lb.)
* ENC2178S	1411	22.52	26.46	3350	755
ENC2189S	1458	26.52	30.38	2928	780
ENC21710S	1455	22.52	34.34	3286	778
ENC21712S	1477	22.52	42.2	3227	790

\* THIS UNIT USED IN THE CALCULATIONS

\*\* VALUES INCLUDE Ω.

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

STRENGTH DESIGN IS USED (S<sub>Ds</sub> = 1.90, α<sub>p</sub> = 2.5, I<sub>p</sub> = 1.5, R<sub>p</sub> = 6.0, Ω<sub>o</sub> = 2.5, z/h = 0)

WEIGHT = 1411 LB

HORIZONTAL FORCE (E<sub>mh</sub>) = 2.14W<sub>p</sub> = 3020 LB

VERTICAL FORCE (E<sub>v</sub>) = 0.38W<sub>p</sub> = 536 LB

BOLT FORCES:

TENSION (T)

$$T_u \text{ MAXIMUM} = \left[ \frac{3020\#(42")}{2 \text{ BOLTS } (26.46")} \times (0.3) \right] + \frac{3020\#(42")}{2 \text{ BOLTS } (22.52")} - \frac{1411\#(0.9) - 536\#}{4 \text{ BOLTS}} = 3350 \text{ LB/BOLT (MAX)}$$

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

SHEAR (V)

$$V_u \text{ MAXIMUM} = \frac{3020\#}{4 \text{ BOLTS}} = 755 \text{ LB/BOLT (MAX)}$$

UNITY CHECK:

$$\left( \frac{T_u}{\phi T} \right) + \left( \frac{V_u}{\phi V} \right) \leq 1.2 \left( \frac{3350}{3632} \right) + \left( \frac{755}{4940} \right) = 1.08 \leq 1.2 \therefore \text{O.K.}$$

BOLT SPECS: 5/8"φ HILTI KB-TZ (h<sub>ef</sub> = 4")

φT = 0.75φN<sub>n</sub> = 3632 LB/BOLT (TENSION)

φV = φV<sub>n</sub> = 4940 LB/BOLT (SHEAR)

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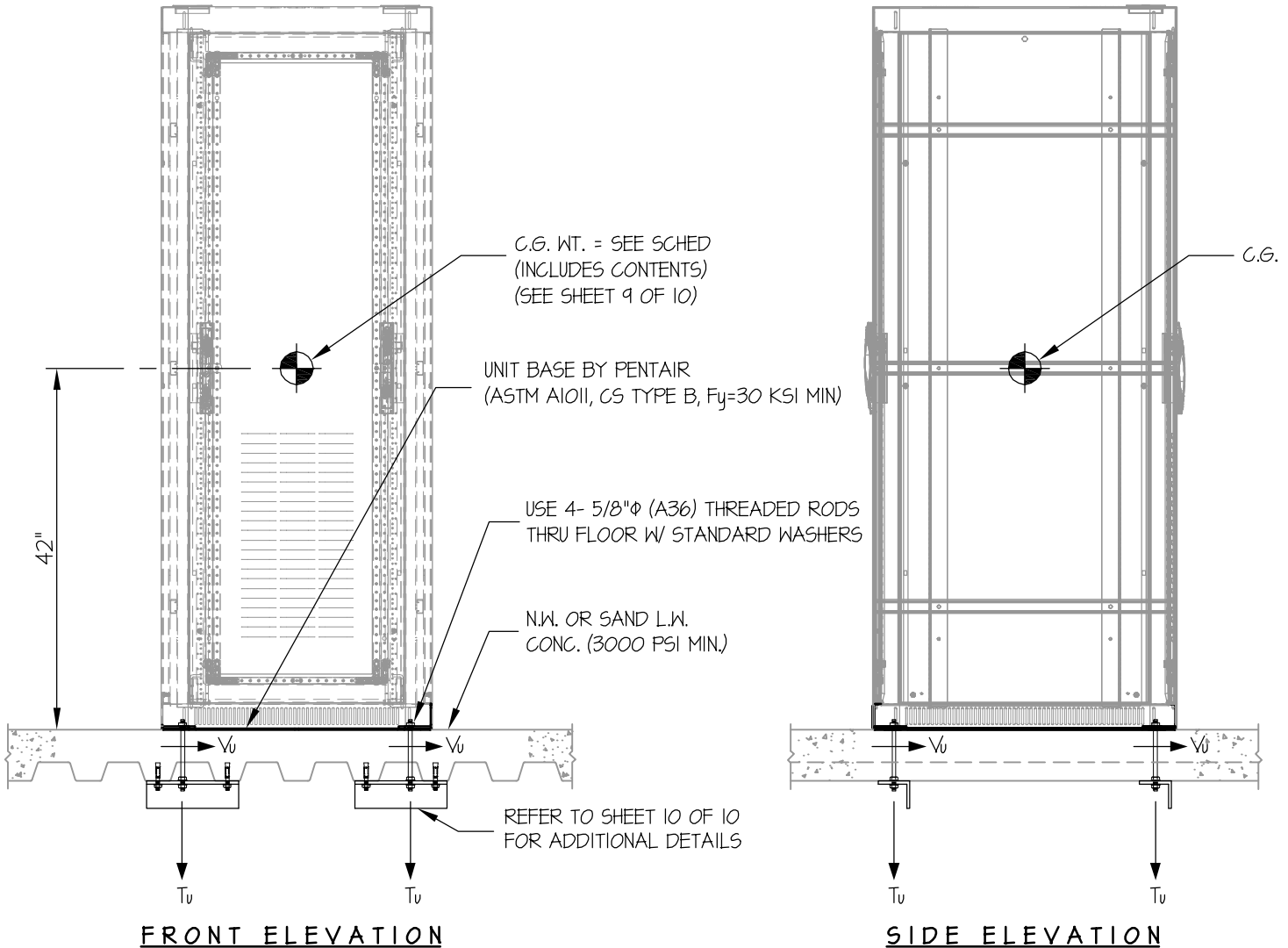
SHEET

**8**

OF **10** SHEETS

SEISMIC SUPPORTS & ATTACHMENTS

CONCRETE SLAB ON METAL DECK



**NOTES:**

- FORCES ARE DETERMINED PER 2013 CALIFORNIA BUILDING CODE AND ASCE 7-10.**

STRENGTH DESIGN IS USED. ( $S_Ds = 2.20$ ,  $a_p = 2.5$ ,  $I_p = 1.5$ ,  $R_p = 6.0$ ,  $\Omega_o = 2.5$ ,  $z/h \leq 1$ )

HORIZONTAL FORCE ( $E_h$ ) =  $1.65 W_p$

HORIZONTAL FORCE ( $E_{mh}$ ) =  $4.13 W_p$  (FOR CONCRETE ANCHORAGE)

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

- 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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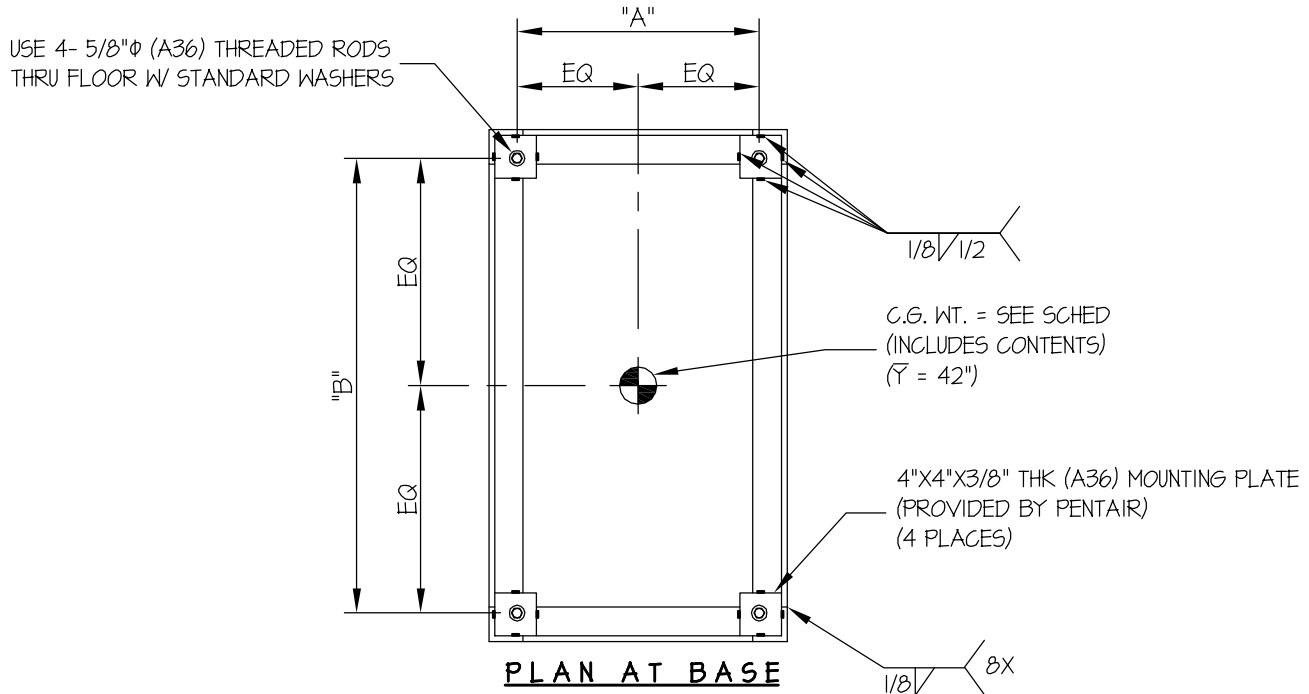
SHEET

**9**

OF **10** SHEETS

SEISMIC SUPPORTS & ATTACHMENTS

CONCRETE SLAB ON METAL DECK



MODEL	WEIGHT (lb.)	"A" (in.)	"B" (in.)	** Tu (lb.)	** Vu (lb.)
* ENC2178S	1411	22.52	26.46	2563	582
ENC2189S	1458	26.52	30.38	2236	601
ENC21710S	1455	22.52	34.34	2512	600
ENC21712S	1477	22.52	42.2	2467	609

\* THIS UNIT USED IN THE CALCULATIONS

\*\* VALUES DO NOT INCLUDE Ω<sub>o</sub>

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

STRENGTH DESIGN IS USED (S<sub>Ds</sub> = 2.20, α<sub>p</sub> = 2.5, I<sub>p</sub> = 1.5, R<sub>p</sub> = 6.0, Ω<sub>o</sub> = 2.5, z/h ≤ 1)

WEIGHT = 1411 LB

HORIZONTAL FORCE (E<sub>h</sub>) = 1.65W<sub>p</sub> = 2328 LB

HORIZONTAL FORCE (E<sub>mh</sub>) = 4.13W<sub>p</sub> = 5827 LB

VERTICAL FORCE (E<sub>v</sub>) = 0.44W<sub>p</sub> = 621 LB

BOLT SPECS: 5/8"φ (A36) THREADED ROD

φ<sub>T</sub> = 10,016 LB/BOLT (TENSION)

φ<sub>V</sub> = 5342 LB/BOLT (SHEAR)

BOLT FORCES:

TENSION (T)

$$T_{u \text{ MAXIMUM}} = \left[ \frac{2328\#(42")}{2 \text{ BOLTS } (26.46")} \times (0.3) \right] + \frac{2328\#(42")}{2 \text{ BOLTS } (22.52")} - \frac{1411\#(0.9) - 621\#}{4 \text{ BOLTS}} = 2563 \text{ LB/BOLT (MAX)}$$

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

SHEAR (V)

$$V_{u \text{ MAXIMUM}} = \frac{2328\#}{4 \text{ BOLTS}} = 582 \text{ LB/BOLT (MAX) (PER AISC J3.7, LESS THAN 20% STRESS)}$$

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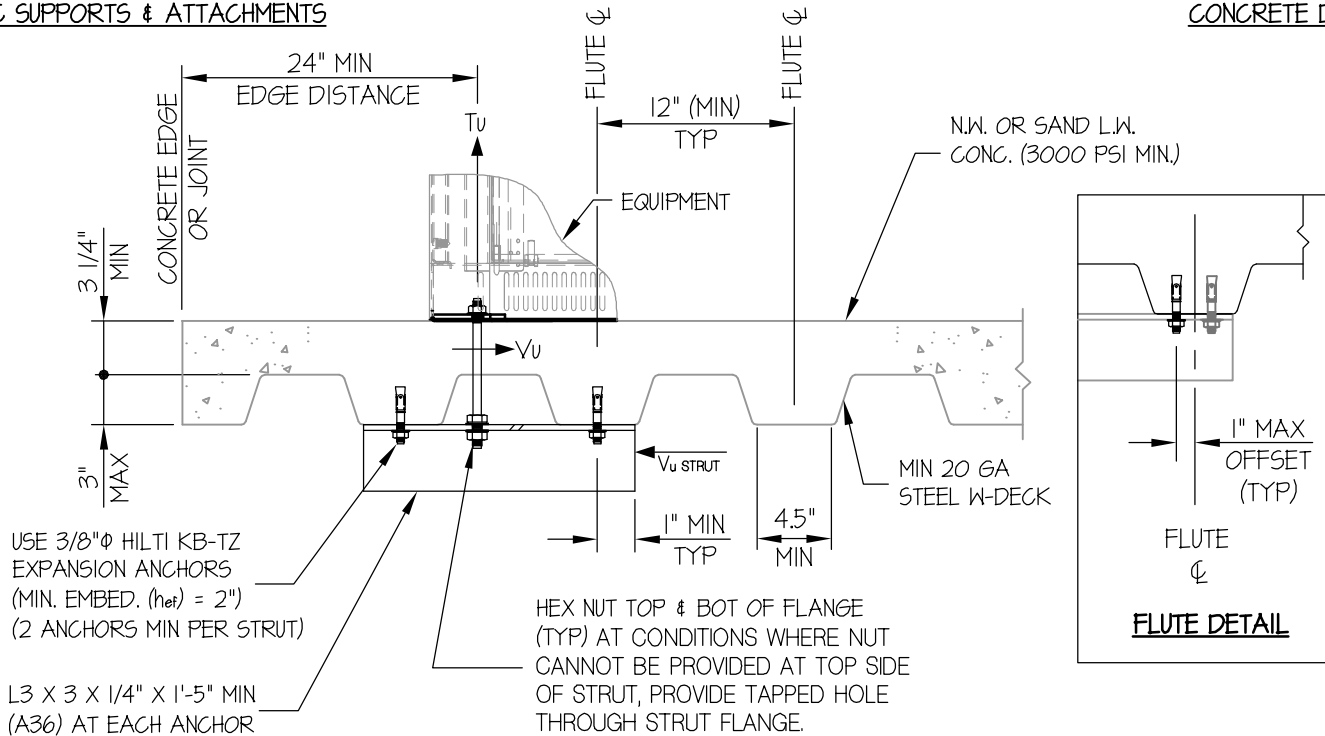
SHEET

# 10

OF **10** SHEETS

**SEISMIC SUPPORTS & ATTACHMENTS**

CONCRETE DETAIL



MIN STEEL DECK REQUIREMENTS AND STRUT DETAIL

DEMANDS: (BASED ON UPPER FLOOR)

$$T_u = 2563 \text{ LB/BOLT}$$

$$V_u = 582 \text{ LB/BOLT}$$

$$V_{u \text{ STRUT}} = 0.7V_u = 0.7(582\#) = 407 \text{ LB/STRUT}$$

CONCRETE ANCHORS AT STRUT

$$V'_u \text{ STRUT} = \Omega_c V_{u \text{ STRUT}} = 2.5(407\#) = 1018 \text{ LB/STRUT}$$

USE 2 BOLTS MIN

$$V'_u \text{ BOLT} = 1018\# / (2 \text{ BOLTS}) = 509 \text{ LB/BOLT}$$

BOLT SPEC: 3/8"  $\phi$  HILTI KB-TZ: ( $h_{ef} = 2"$  MIN)

$$\phi V = 938 \text{ LB/BOLT}$$

STRUT DESIGN (L3 X 3 X 1/4" : S = 0.569 in<sup>3</sup>, A36)

$$M_u \text{ STRUT} = \frac{2563\#(14")}{4} = 8971\#\$$

$$\frac{b}{t} = \frac{3}{0.25} = 12 \leq 0.54 \sqrt{\frac{E}{F_y}} = 0.54 \sqrt{\frac{29000}{36}} = 15.3$$

$$\begin{aligned} \therefore M_n &= 15 F_y S_c \\ &= 15(36000)(0.8 \times 0.569) \\ &= 24580\#\end{aligned}$$

$$\phi M_n = 0.9M_n = 0.9(24580) = 22123\# > 8971\# \therefore \text{OK}$$