PENTAIR

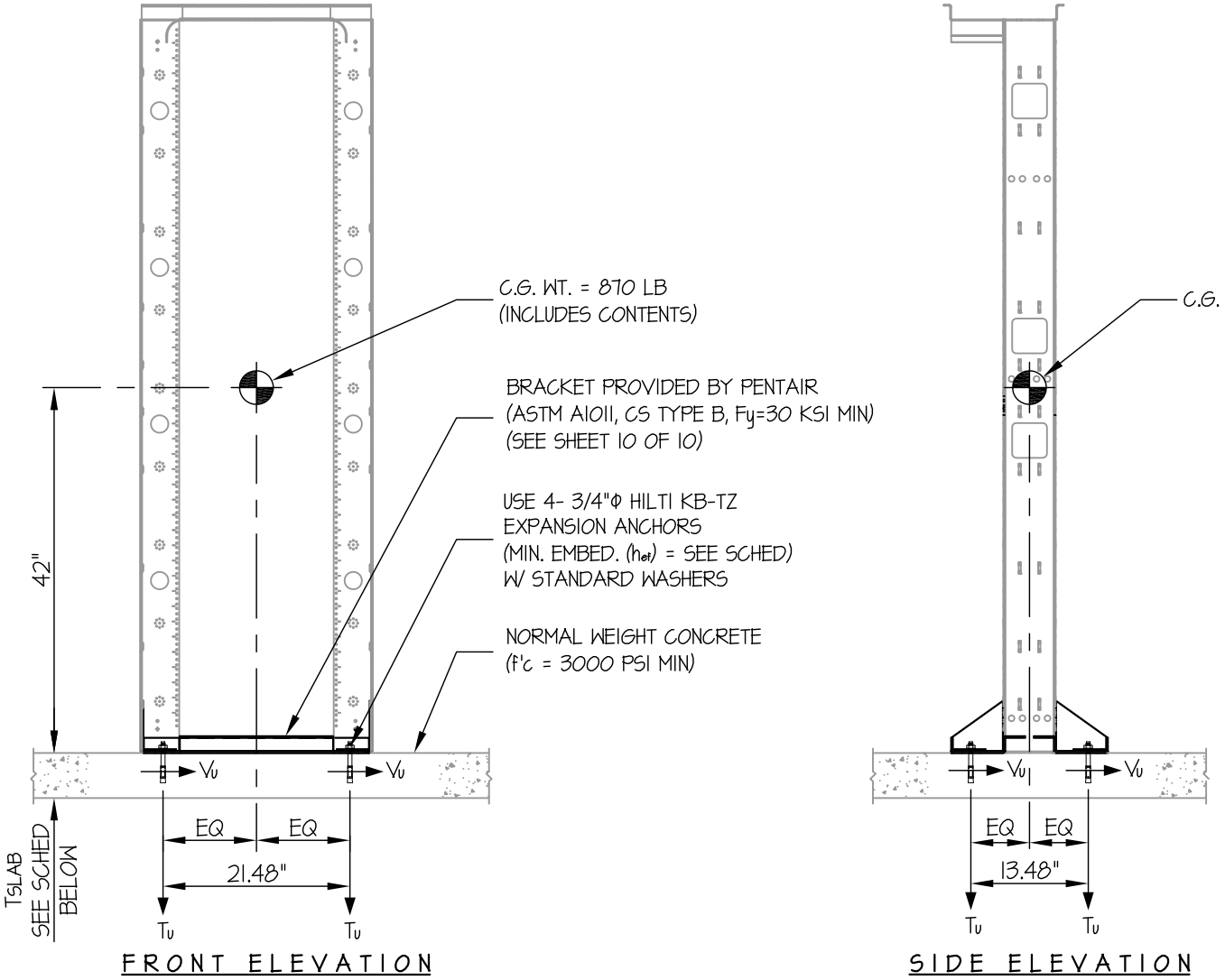
TWO POST RACK

DES. J. ROBERSON
JOB NO. 11-1461
DATE 6/17/15

SHEET 4 OF 10 SHEETS

SEISMIC SUPPORTS & ATTACHMENTS

CONCRETE SLAB



FRONT ELEVATION

SIDE ELEVATION

	ANCHORS						
MAX SDS	TYPE	DIAM	EFF EMBED	QTY	TSLAB	* Tu	* Vu
1.70	HILTI KB-TZ	3/4"	3.75"	4	6"	2954	415
2.20	HILTI KB-TZ	3/4"	4.75"	4	8"	3894	539

* VALUES INCLUDE Ω_0

NOTES:

1. FORCES ARE DETERMINED PER 2013 CALIFORNIA BUILDING CODE AND ASCE 7-10. STRENGTH DESIGN IS USED. (a_p = 2.5, I_p = 1.5, R_p = 6.0, Ω_0 = 2.5, z/h = 0)
2. CENTER OF GRAVITY (C.G.) AND WEIGHT ARE THE GOVERNING PARAMETERS FOR DESIGN. THIS PREAPPROVAL ENCOMPASSES 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. 6-30-2016
6/17/15
STRUCTURAL
STATE OF CALIFORNIA

NOT STRUCTURE ENGINEER ORDERED

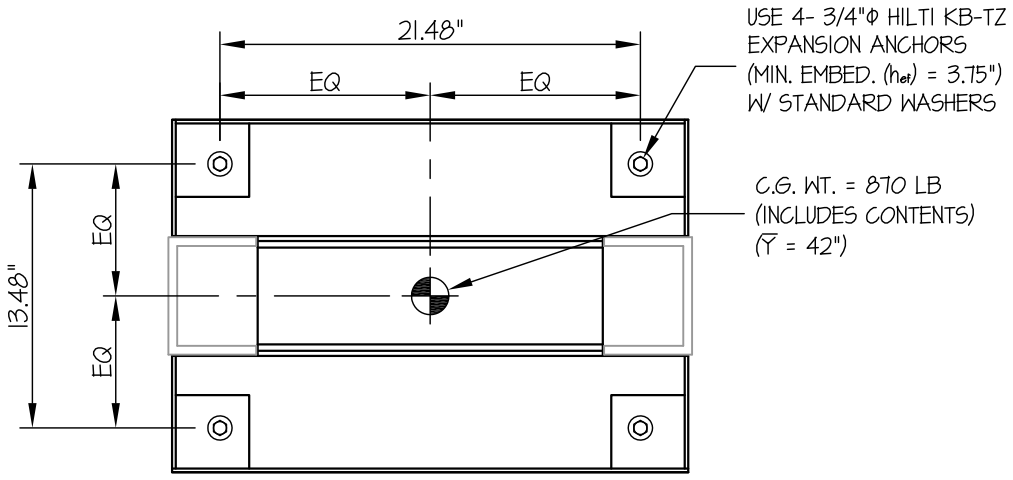
PENTAIR

TWO POST RACK

DES. J. ROBERSON
JOB NO. 11-1461
DATE 6/17/15

SHEET 5 OF 10 SHEETS

SEISMIC SUPPORTS & ATTACHMENTS | MAX $S_{DS} \leq 1.70$ | CONCRETE SLAB



PLAN AT BASE

LOADS: PER 2013 CALIFORNIA BUILDING CODE AND ASCE 7-10.
STRENGTH DESIGN IS USED (S_{DS} = 1.70, a_p = 2.5, I_p = 1.5, R_p = 6.0, Ω_0 = 2.5, z/h = 0)
WEIGHT = 870 LB
HORIZONTAL FORCE (E_{mh}) = $1.91W_p$ = 1662 LB
VERTICAL FORCE (E_v) = $0.34W_p$ = 296 LB

BOLT FORCES:

BOLT SPECS: 3/4"ϕ HILTI KB-TZ (h_{ef} = 3.75")
$\phi T = 0.75\phi N_n$ = 3296 LB/BOLT (TENSION)
$\phi V = \phi V_n$ = 7634 LB/BOLT (SHEAR)

TENSION (T)

$$T_{u\ MAXIMUM} = \left[\frac{1662\#(42")}{2\ BOLTS\ (21.48")} \times (0.3)\right] + \frac{1662\#(42")}{2\ BOLTS\ (13.48")} - \frac{870\#(0.9) - 296\#}{4\ BOLTS} = 2954\ LB/BOLT\ (MAX)$$

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

SHEAR (V)

$$V_{u\ MAXIMUM} = \frac{1662\#}{4\ BOLTS} = 415\ LB/BOLT\ (MAX)$$

UNITY CHECK:

$$\left(\frac{T_u}{\phi T}\right) + \left(\frac{V_u}{\phi V}\right) \leq 1.2 \quad \left(\frac{2954}{3296}\right) + \left(\frac{415}{7634}\right) = 0.95 \leq 1.2 \quad \therefore \text{ O.K.}$$

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JOB NO. 11-1461
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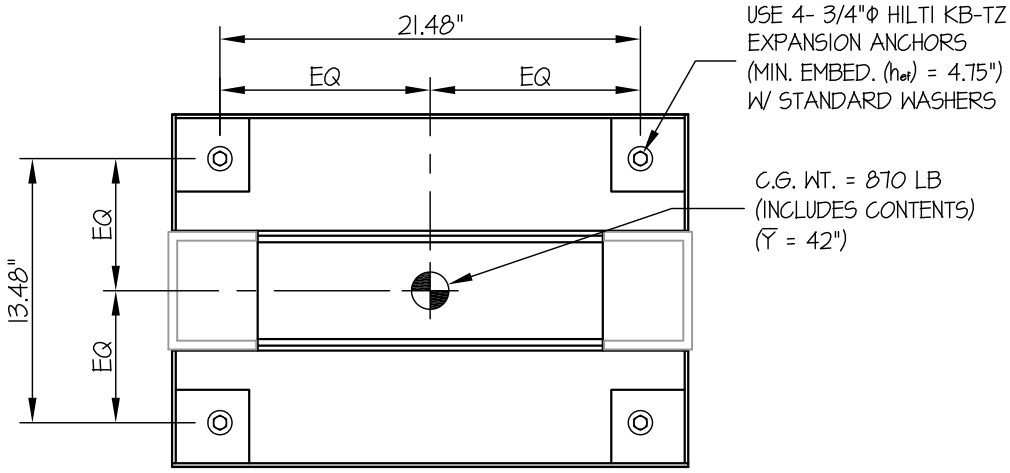
SHEET 6 OF 10 SHEETS

SEISMIC SUPPORTS & ATTACHMENTS | 1.70 < MAX S_{DS} ≤ 2.20 | CONCRETE SLAB



PLAN AT BASE

LOADS: 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, Ω_0 = 2.5, z/h = 0)
WEIGHT = 870 LB
HORIZONTAL FORCE (E_{mh}) = 2.48W_p = 2158 LB
VERTICAL FORCE (E_v) = 0.44W_p = 383 LB

BOLT FORCES:

BOLT SPECS: 3/4"ϕ HILTI KB-TZ (h_{ef} = 4.75")
ϕT= 0.75ϕNn = 4328 LB/BOLT (TENSION)
ϕV= ϕVn = 7634 LB/BOLT (SHEAR)

TENSION (T)

$$T_{u\ MAXIMUM} = \left[\frac{2158\#(42")}{2\ BOLTS\ (21.48")} \times (0.3)\right] + \frac{2158\#(42")}{2\ BOLTS\ (13.48")} - \frac{870\#(0.9) - 383\#}{4\ BOLTS} = 3894\ LB/BOLT\ (MAX)$$

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

SHEAR (V)

$$V_{u\ MAXIMUM} = \frac{2158\#}{4\ BOLTS} = 539\ LB/BOLT\ (MAX)$$

UNITY CHECK:

$$\left(\frac{T_u}{\phi T}\right) + \left(\frac{V_u}{\phi V}\right) \le 1.2 \quad \left(\frac{3894}{4328}\right) + \left(\frac{539}{7634}\right) = 0.97 \le 1.2 \quad \therefore \text{O.K.}$$

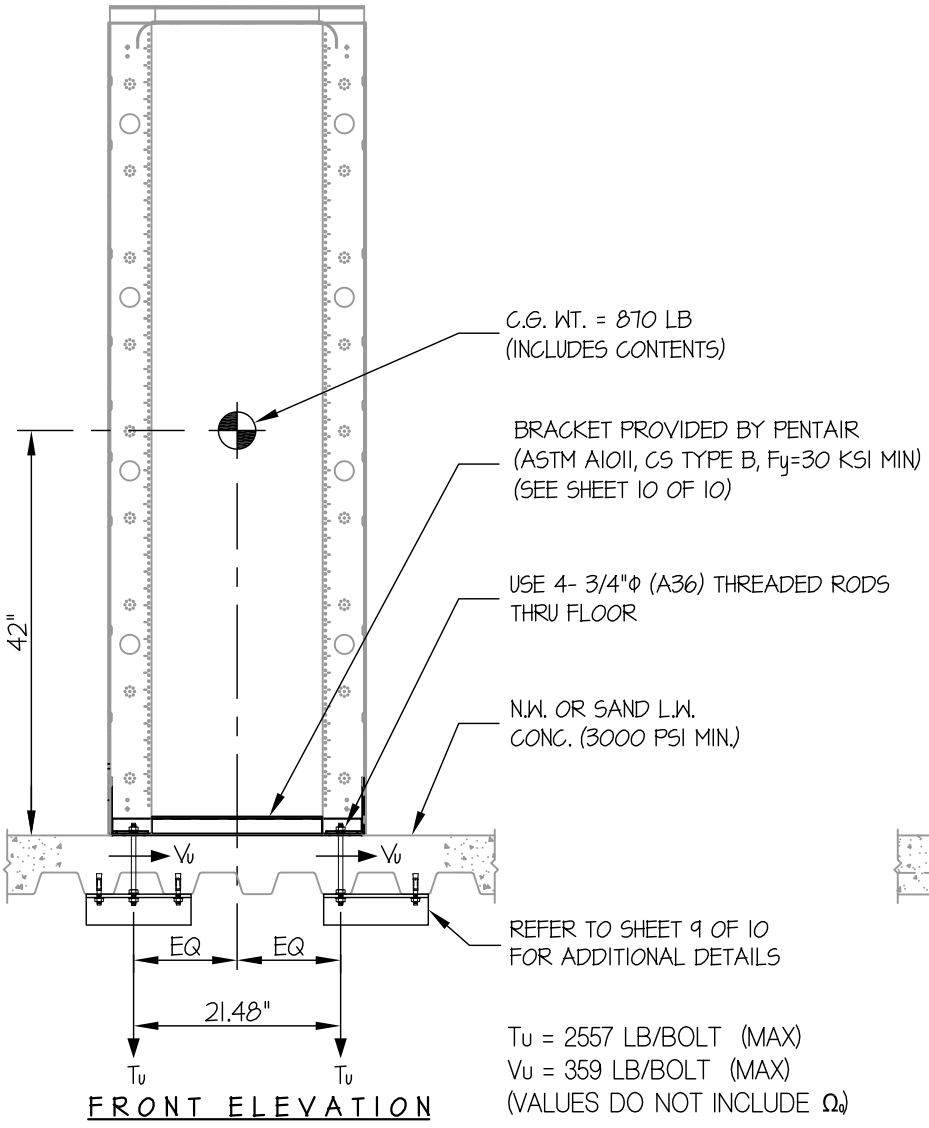
PENTAIR

TWO POST RACK

DES. J. ROBERSON
JOB NO. 11-1461
DATE 6/17/15

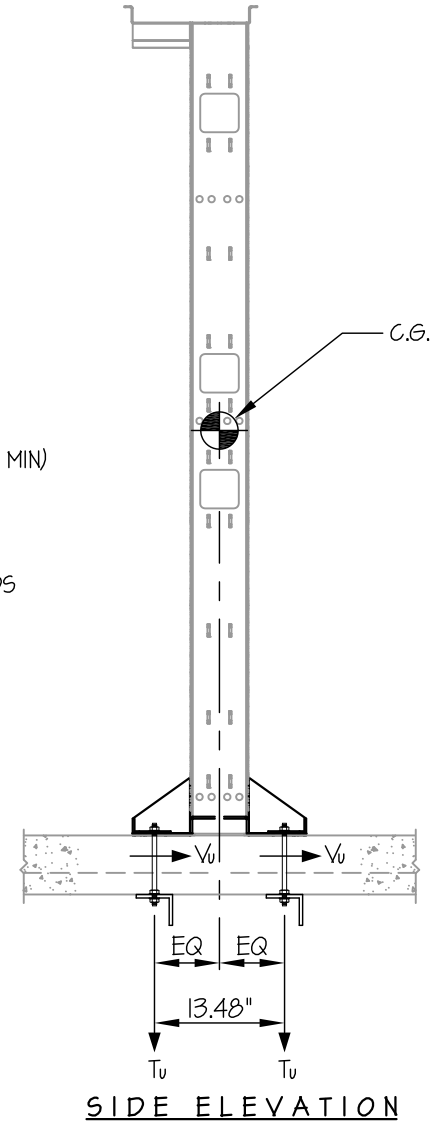
SHEET 7 OF 10 SHEETS

SEISMIC SUPPORTS & ATTACHMENTS



FRONT ELEVATION

CONCRETE SLAB ON METAL DECK



SIDE ELEVATION

NOTES:

1. **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, Ω_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

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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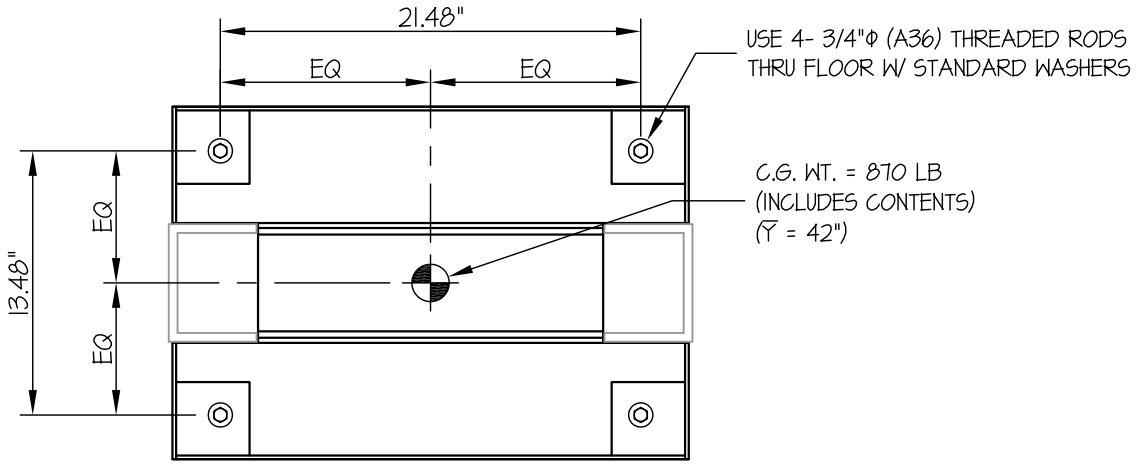
JOB NO. 11-1461
DATE 6/17/15

SHEET 8 OF 10 SHEETS

SEISMIC SUPPORTS & ATTACHMENTS

CONCRETE SLAB ON METAL DECK



PLAN AT BASE

LOADS: 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, Ω_0 = 2.5, $z/h \leq 1$)

WEIGHT = 870 LB
HORIZONTAL FORCE (E_h) = $1.65W_p$ = 1436 LB
HORIZONTAL FORCE (E_{mh}) = $4.13W_p$ = 3593 LB
VERTICAL FORCE (E_v) = $0.44W_p$ = 383 LB

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

BOLT FORCES:

TENSION (T)

$$T_{u\ MAXIMUM} = \left[\frac{1436\#(42'')}{2\ BOLTS\ (21.48'')} \times (0.3)\right] + \frac{1436\#(42'')}{2\ BOLTS\ (13.48'')} - \frac{870\#(0.9) - 383\#}{4\ BOLTS} = 2557\ LB/BOLT\ (MAX)$$

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

SHEAR (V)

$$V_{u\ MAXIMUM} = \frac{1436\#}{4\ BOLTS} = 359\ LB/BOLT\ (MAX)\ \ (PER\ AISC\ J3.7,\ LESS\ THAN\ 20\%\ STRESS)$$

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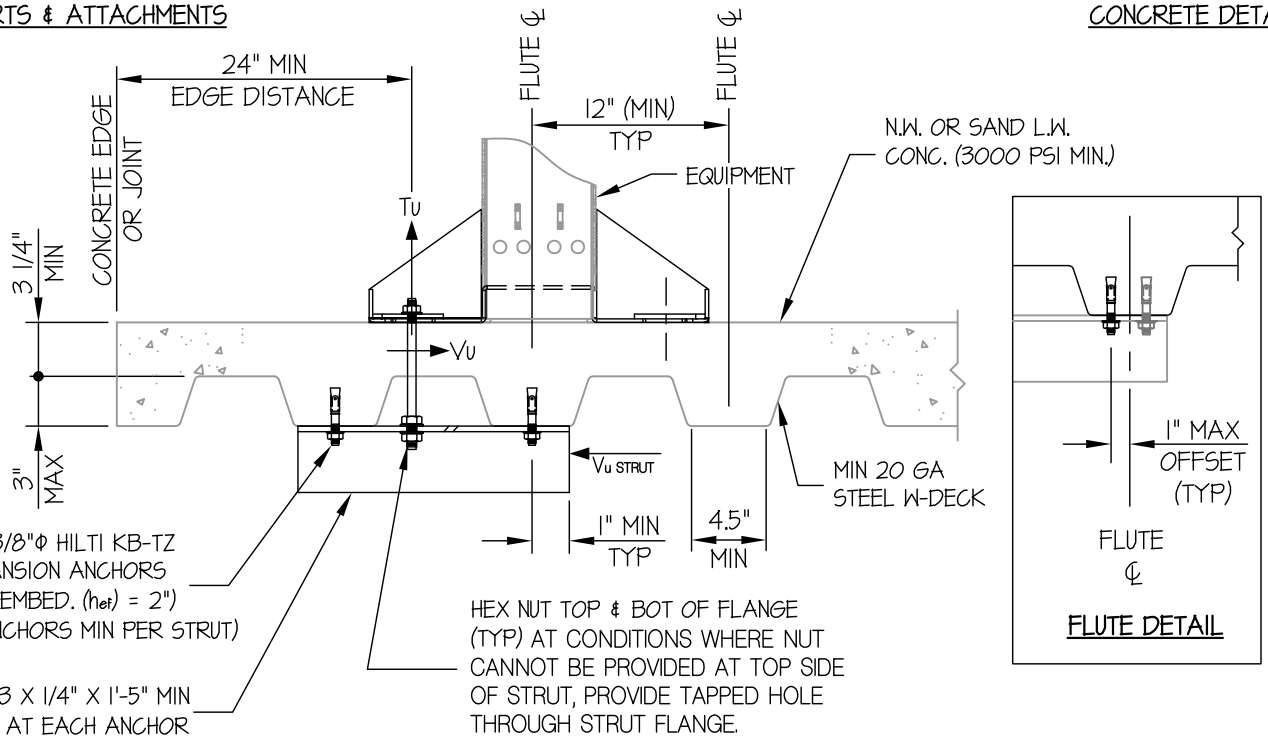
DATE 6/17/15

SHEET 9 OF 10 SHEETS

SEISMIC SUPPORTS & ATTACHMENTS

CONCRETE DETAIL



MIN STEEL DECK REQUIREMENTS AND STRUT DETAIL

DEMANDS: (BASED ON UPPER FLOOR)

Tu = 2557 LB/BOLT

Vu = 359 LB/BOLT

$V_{u\,STRUT}$ = 0.7Vu = 0.7(359#) = 251 LB/STRUT

CONCRETE ANCHORS AT STRUT

$V'_{u\,STRUT} = \Omega_o V_{u\,STRUT}$ = 2.5(251#) = 628 LB/STRUT

USE 2 BOLTS MIN

$V'_{u\,BOLT}$ = 628#/(2 BOLTS) = 314 LB/BOLT

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

ϕV= 938 LB/BOLT

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

$$M_{u\,STRUT} = \frac{2557\#(14")}{4} = 8{,}950"\#$$

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

∴ Mn = 1.5 Fy Sc
= 1.5(36000)(0.8 X 0.569)
= 24580"#

ϕMn = 0.9Mn = 0.9(24580") = 22123"# > 8950"# ∴ OK

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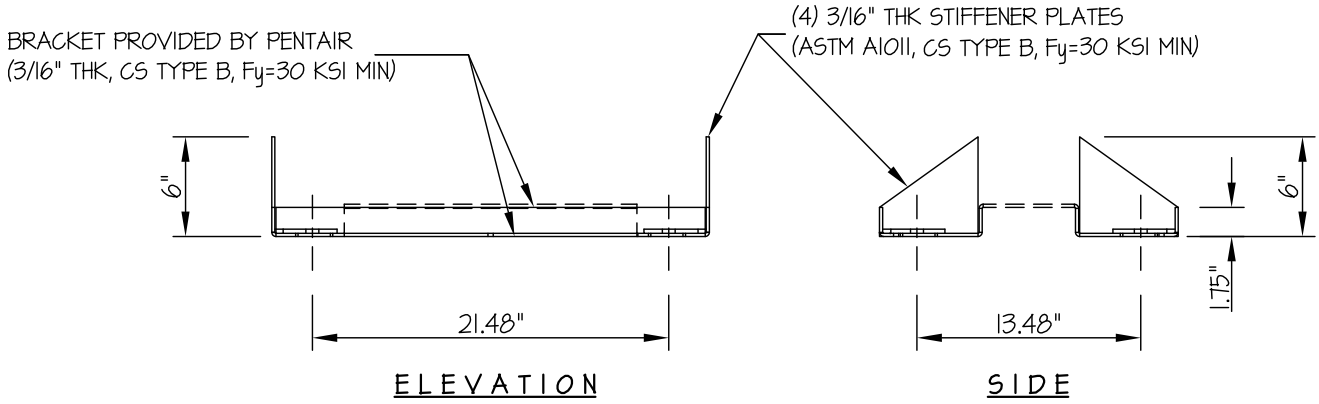
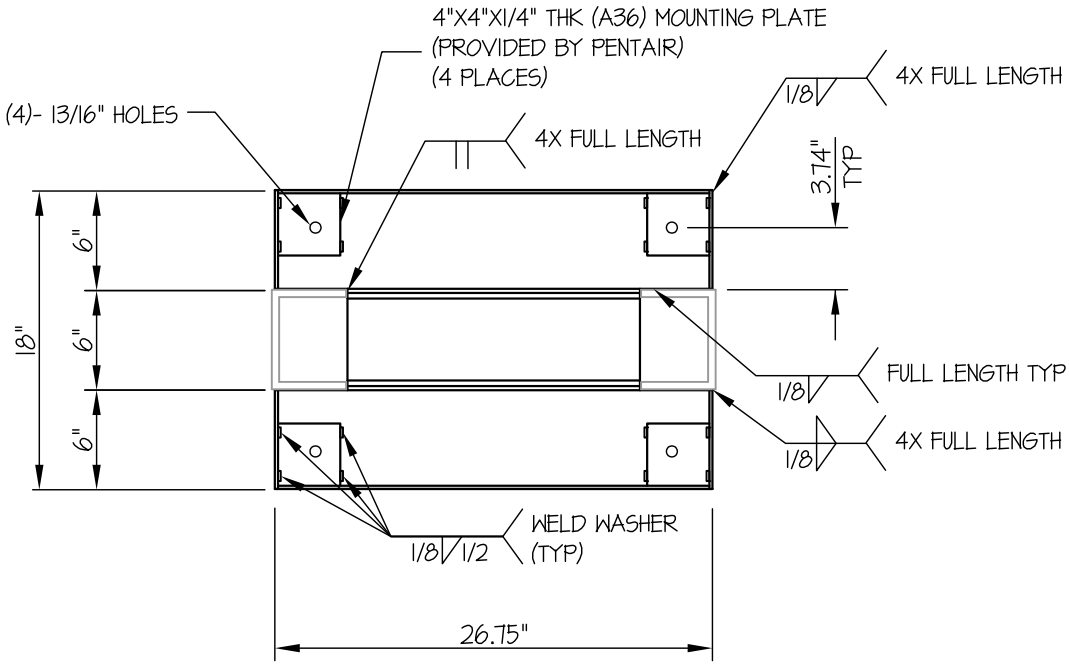
SHEET 10 OF 10 SHEETS

SEISMIC SUPPORTS & ATTACHMENTS

BASE DETAIL



ELEVATION SIDE



PLAN

LOADS TO BASE: (BASED ON UPPER FLOOR DEMANDS)

Tu = 2557 LB/BOLT (NON-PRYING)

Vu = 359 LB/BOLT