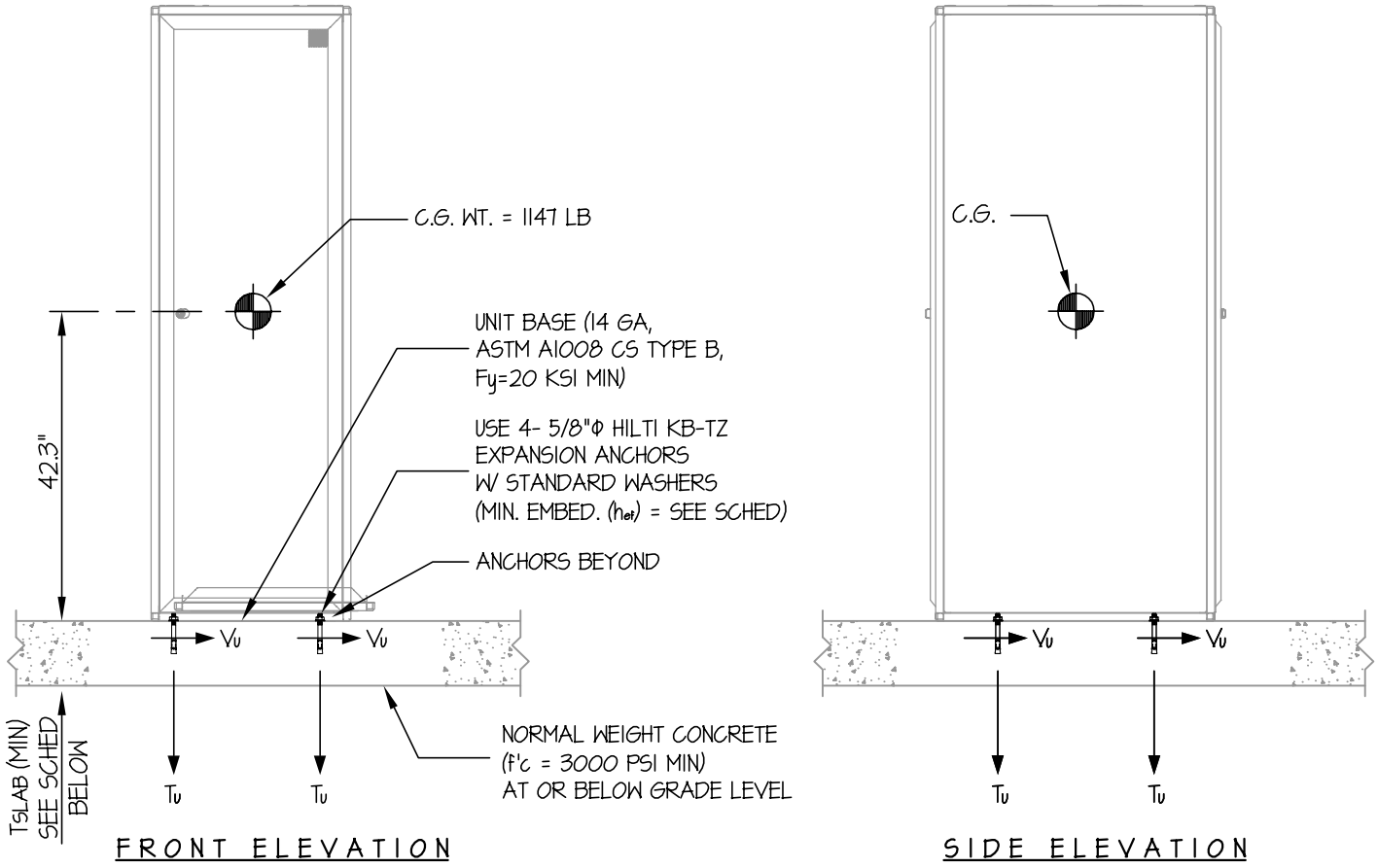
CHATSWORTH PRODUCTS, INC.

SEISMIC FRAME CABINET

DES. J. ROBERSON
JOB NO. 11-1453
DATE 6/16/16
SHEET 1 OF 6 SHEETS

SEISMIC SUPPORTS & ATTACHMENTS — CONCRETE SLAB



FRONT ELEVATION

SIDE ELEVATION

	ANCHORS				
MAX SDS	TYPE	DIAM	MIN. EMBED. (h_{ef})	QTY	TSLAB
1.35	HILTI KB-TZ	5/8"	3.125"	4	5"
1.90	HILTI KB-TZ	5/8"	4"	4	6"

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_o = 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.

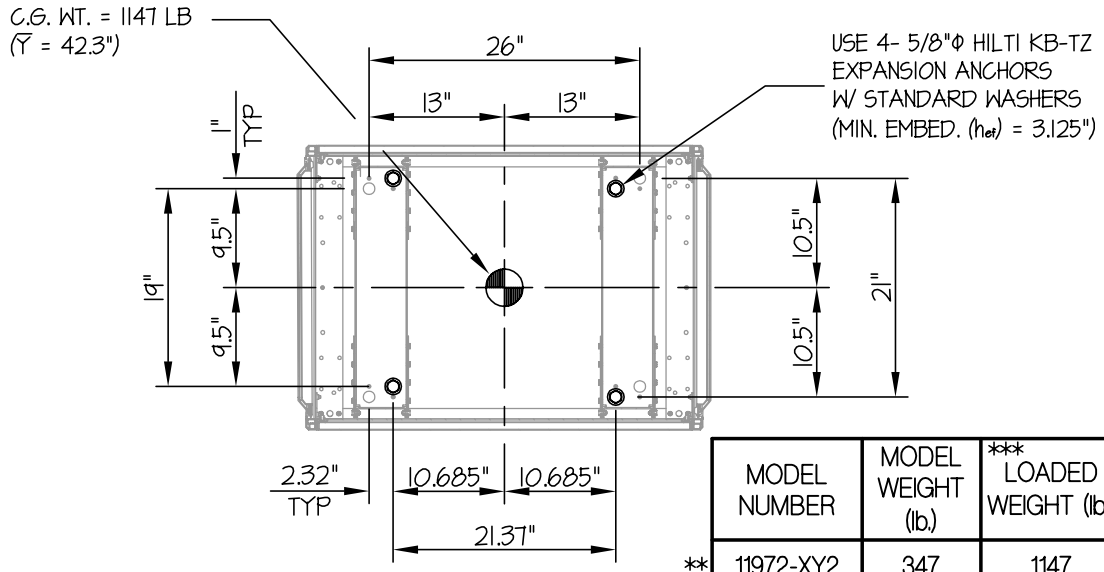
REGISTERED PROFESSIONAL ENGINEER
JONATHAN ROBERSON
No. 4197
EXP. 6-30-2016
6/16/16
STRUCTURAL
STATE OF CALIFORNIA

CHATSWORTH PRODUCTS, INC.

SEISMIC FRAME CABINET

DES. J. ROBERSON
JOB NO. 11-1453
DATE 6/16/16
SHEET 2 OF 6 SHEETS

SEISMIC SUPPORTS & ATTACHMENTS — MAX $S_{DS} \leq 1.35$ — CONCRETE SLAB



PLAN VIEW

	MODEL NUMBER	MODEL WEIGHT (lb.)	*** LOADED WEIGHT (lb.)	* Tu (lb.)	* Vu (lb.)
**	11972-XY2	347	1147	2278	436
	11973-XY2	308	1108	2200	421
	11974-X02	255	1055	2095	401

* VALUES INCLUDE Ω_o
** THIS UNIT USED IN CALCULATION BELOW
*** INCLUDES UNIT + CONTENT WEIGHT

LOADS: PER 2013 CALIFORNIA BUILDING CODE AND ASCE 7-10.
STRENGTH DESIGN IS USED (S_{DS} = 1.35, a_p = 2.5, I_p = 1.5, R_p = 6.0, Ω_o = 2.5, z/h = 0)
WEIGHT = 1147 LB
HORIZONTAL FORCE (E_{mh}) = 1.52 W_p = 1743 LB
VERTICAL FORCE (E_v) = 0.27 W_p = 310 LB

BOLT SPECS: 5/8"ϕ HILTI KB-TZ
$\Phi T = 0.75 = \Phi N_n$ = 2508 LB/BOLT (TENSION)
$\Phi V = \Phi V_n$ = 4940 LB/BOLT (SHEAR)

BOLT FORCES:

TENSION (T)

$$T_{u\ MAXIMUM} = \left[\frac{1743\#(42.3'')}{2\ BOLTS\ (21.37'')} \times (0.3) \right] + \frac{1743\#(42.3'')}{2\ BOLTS\ (19'')} - \frac{(1147\#(0.9) - 310\#)}{4\ BOLTS} = 2278\ LB/BOLT\ (MAX)$$

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

SHEAR (V)

$$V_{u\ MAXIMUM} = \frac{1743\#}{4\ BOLTS} = 436\ LB/BOLT\ (MAX)$$

UNITY CHECK:

$$\left(\frac{T_u}{\Phi T}\right) + \left(\frac{V_u}{\Phi V}\right) \leq 1.2 \qquad \left(\frac{2278}{2508}\right) + \left(\frac{436}{4940}\right) = 1.00 \leq 1.2 \ \therefore \ \text{O.K.}$$

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SEISMIC FRAME CABINET

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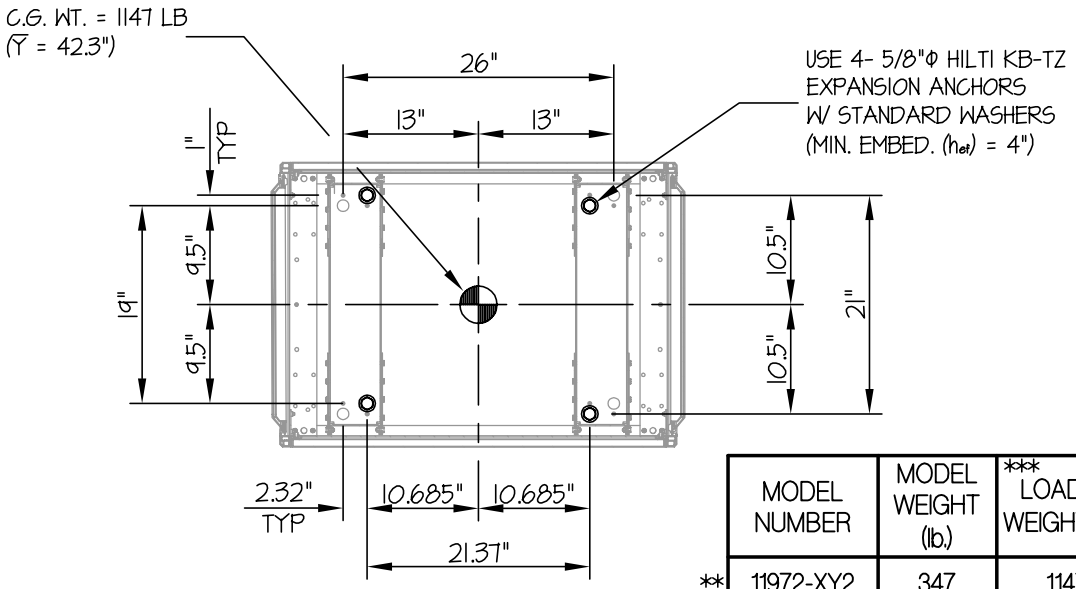
SHEET 3 OF 6 SHEETS

SEISMIC SUPPORTS & ATTACHMENTS | 1.35 < MAX S_{DS} ≤ 1.90 | CONCRETE SLAB



PLAN VIEW

	MODEL NUMBER	MODEL WEIGHT (lb.)	*** LOADED WEIGHT (lb.)	* Tu (lb.)	* Vu (lb.)
**	11972-XY2	347	1147	3312	614
	11973-XY2	308	1108	3199	593
	11974-X02	255	1055	3046	564

* VALUES INCLUDE Ω_o
** THIS UNIT USED IN CALCULATION BELOW
*** INCLUDES UNIT + CONTENT WEIGHT

LOADS: PER 2013 CALIFORNIA BUILDING CODE AND ASCE 7-10.
STRENGTH DESIGN IS USED (S_{DS} = 1.90, a_p = 2.5, I_p = 1.5, R_p = 6.0, Ω_o = 2.5, z/h = 0)
WEIGHT = 1147 LB
HORIZONTAL FORCE (E_{mh}) = 2.14 W_p = 2455 LB
VERTICAL FORCE (E_v) = 0.38 W_p = 436 LB
BOLT FORCES:

BOLT SPECS: 5/8"ø HILTI KB-TZ
ΦT= 0.75=ΦNn = 3632 LB/BOLT (TENSION)
ΦV= ΦVn = 4940 LB/BOLT (SHEAR)

TENSION (T)

$$T_{u\ MAXIMUM} = \left[\frac{2455\#(42.3'')}{2\ BOLTS\ (21.37'')} \times (0.3) \right] + \frac{2455\#(42.3'')}{2\ BOLTS\ (19'')} - \frac{(1147\#(0.9) - 436\#)}{4\ BOLTS} = 3312\ LB/BOLT\ (MAX)$$

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

SHEAR (V)

$$V_{u\ MAXIMUM} = \frac{2455\#}{4\ BOLTS} = 614\ LB/BOLT\ (MAX)$$

UNITY CHECK:

$$\left(\frac{T_u}{\Phi T}\right) + \left(\frac{V_u}{\Phi V}\right) \leq 1.2 \qquad \left(\frac{3312}{3632}\right) + \left(\frac{614}{4940}\right) = 1.04 \leq 1.2 \ \therefore \ \text{O.K.}$$

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SEISMIC FRAME CABINET

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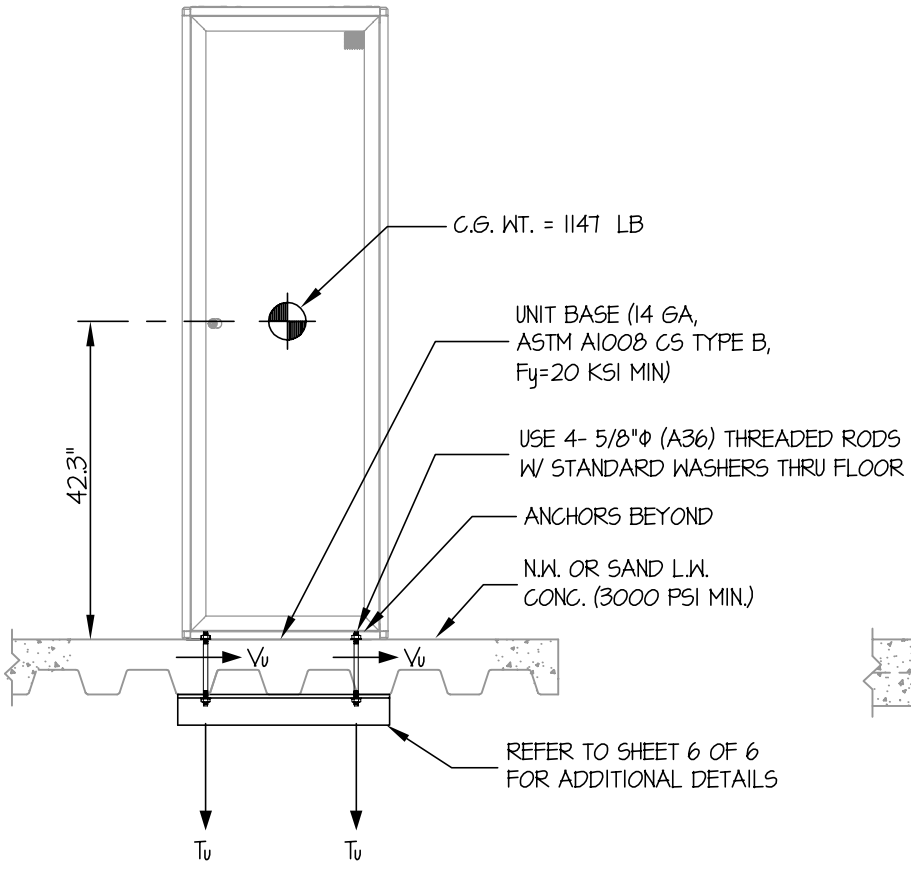
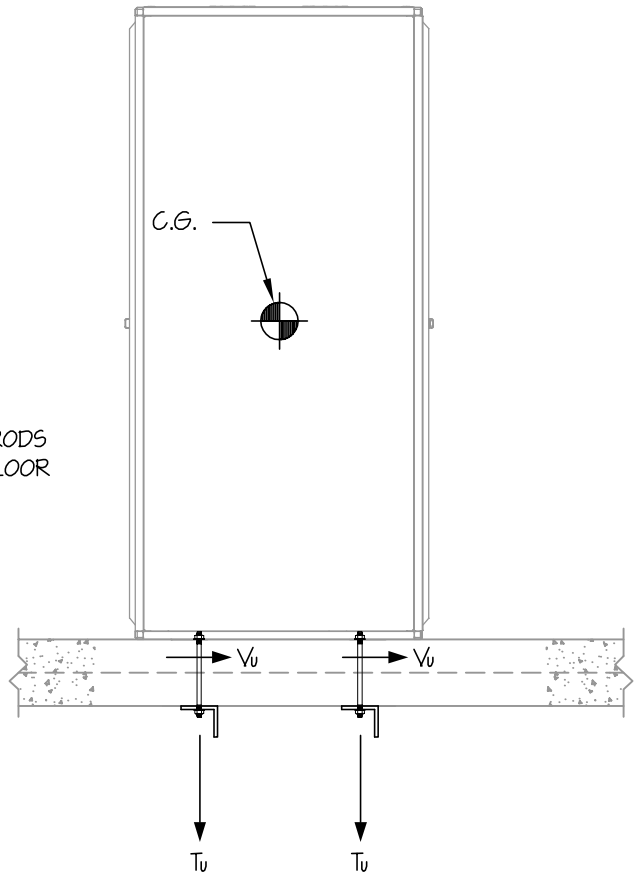
SHEET 4 OF 6 SHEETS

SEISMIC SUPPORTS & ATTACHMENTS

CONCRETE SLAB ON METAL DECK



FRONT ELEVATION



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_0 = 2.5, z/h ≤ 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. 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.

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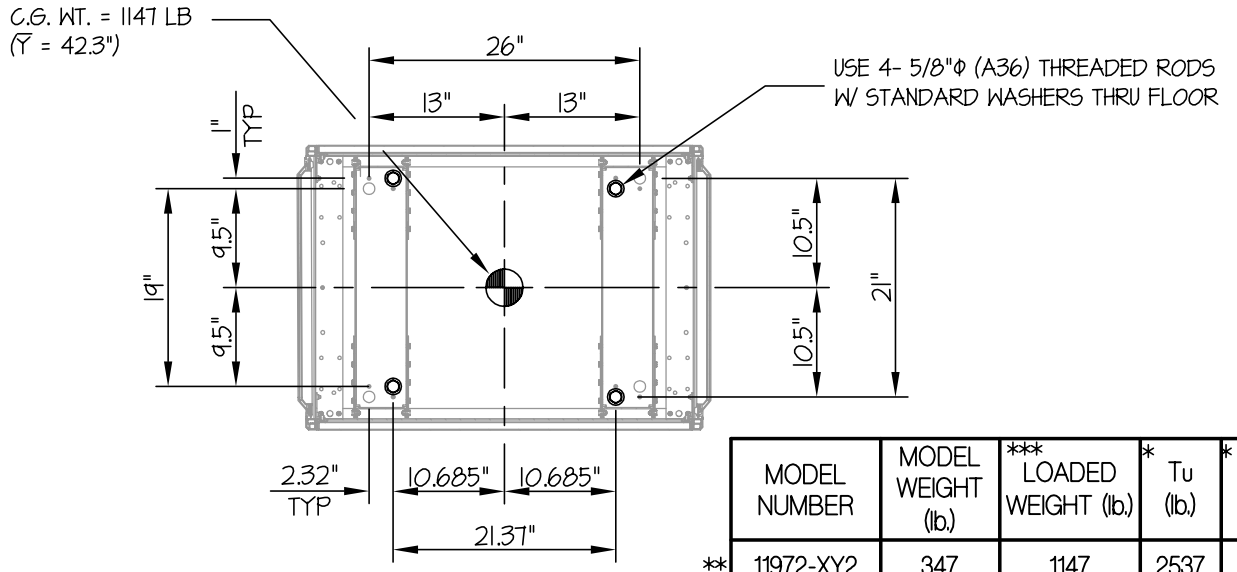
SHEET 5 OF 6 SHEETS

SEISMIC SUPPORTS & ATTACHMENTS

CONCRETE SLAB ON METAL DECK



PLAN VIEW

	MODEL NUMBER	MODEL WEIGHT (lb.)	*** LOADED WEIGHT (lb.)	* Tu (lb.)	* Vu (lb.)
**	11972-XY2	347	1147	2537	473
	11973-XY2	308	1108	2450	452
	11974-X02	255	1055	2333	435

* VALUES DO NOT INCLUDE Ω_o
** THIS UNIT USED IN CALCULATION BELOW
*** INCLUDES UNIT + CONTENT WEIGHT

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_o = 2.5, z/h ≤ 1)
WEIGHT = 1147 LB
HORIZONTAL FORCE (E_h) = $1.65W_p$ = 1893 LB
HORIZONTAL FORCE (E_{mh}) = $4.13W_p$ = 4737 LB
VERTICAL FORCE (E_v) = $0.44W_p$ = 505 LB

BOLT SPECS: 5/8"φ (A36) THREADED ROD
ΦT= 10,016 LB/BOLT (TENSION)
ΦV= 5342 LB/BOLT (SHEAR)

BOLT FORCES:

TENSION (T)

$$T_{U\ MAXIMUM} = \left[\frac{1893\#(42.3'')}{2\ BOLTS\ (21.37'')} \times (0.3)\right] + \frac{1893\#(42.3'')}{2\ BOLTS\ (19'')} - \frac{(1147\#(0.9) - 505\#)}{4\ BOLTS} = 2537\ LB/BOLT\ (MAX)$$

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

SHEAR (V)

$$V_{U\ MAXIMUM} = \frac{1893\#}{4\ BOLTS} = 473\ LB/BOLT\ (MAX)\ (PER\ AISC\ J3.7,\ LESS\ THAN\ 20\%\ STRESS)$$

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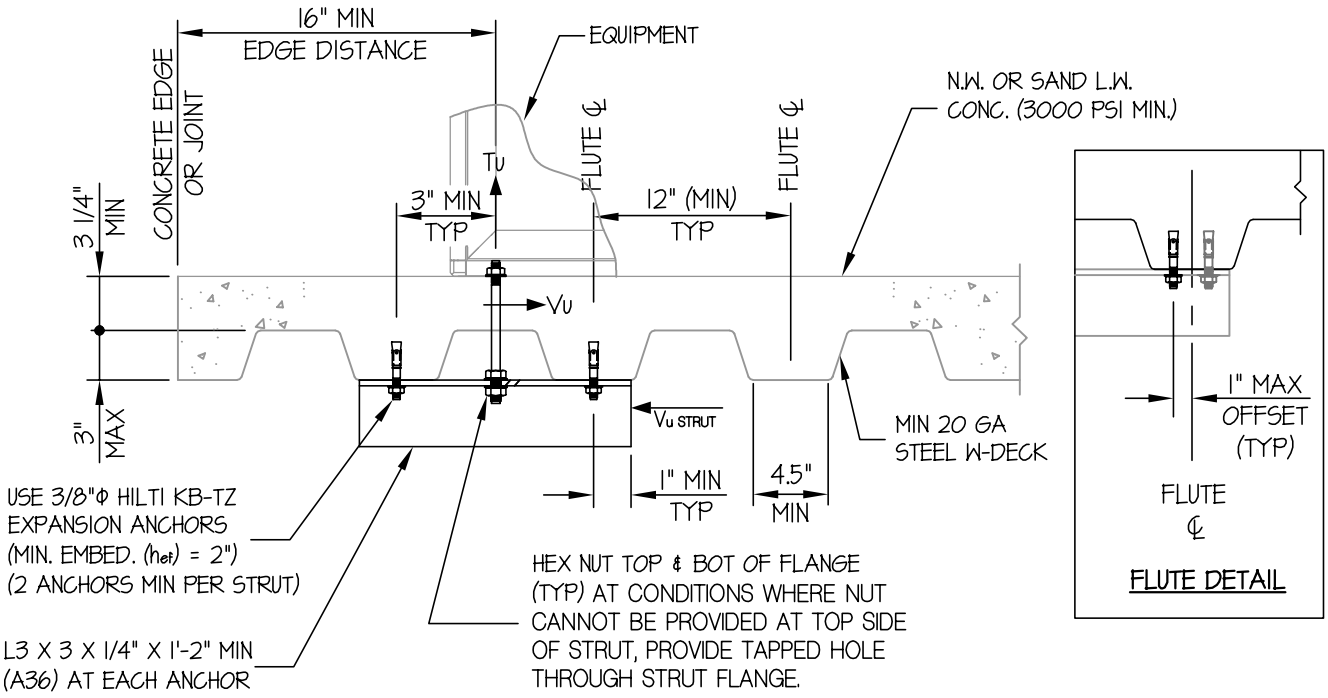
SHEET 6 OF 6 SHEETS

SEISMIC SUPPORTS & ATTACHMENTS

CONCRETE DETAILS



MIN STEEL DECK REQUIREMENTS AND STRUT DETAIL

DEMANDS: (BASED ON UPPER FLOOR)

T_u = 2537 LB/BOLT

V_u = 473 LB/BOLT

$V_{u\,STRUT} = 0.7V_u = 0.7(473\#) = 331$ LB/STRUT

CONCRETE ANCHORS AT STRUT

$V'_{u\,STRUT} = \Omega_o V_{u\,STRUT} = 2.5(331\#) = 828$ LB/STRUT

USE 2 BOLTS MIN

$V'_{u\,BOLT} = 828\#/(2\ BOLTS) = 414$ LB/BOLT

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

ϕV= 871 LB/BOLT

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

$$M_{u\,STRUT} = \frac{2537\#(14'')}{4} = 8880''\text{-}\#$$

$$\frac{b}{t} = \frac{3}{0.25} = 12 \le 0.54\sqrt{\frac{E}{Fy}} = 0.54\sqrt{\frac{29000}{36}} = 15$$

$\therefore M_n = 1.5\ Fy\ Sc$

$= 1.5(36000)(0.8 \times 0.569)$

$= 24581''\text{-}\#$

$\phi M_n = 0.9M_n = 0.9(24581''\text{-}\#) = 22123''\text{-}\# > 8880''\text{-}\#$ $\therefore$ OK