

Robinson
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Principals
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Kurt Ruhland, S.E.

Senior Structural Engineer
Paul L. Juilly, S.E.

Corporate Consultant
L.F. Robinson, S.E.

wright·line

Vantage S2

Structural Calculations
For Seismic Anchorage

Prepared for:

wright·line

November 8, 2004

RMJ Job No. 04204



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w r i g h t • l i n e
Vantage S2

Certificate of Compliance

This project involves structural design of seismic anchorage of Wright-Line Vantage S2 Units in Seismic Zone 4. Anchorage of Vantage S2 units were designed with worst case possible overturning according to UBC 97 Section 1632.2, Zone 4, Type A, near fault (< 2km from fault) conditions ($N_a = 1.5$). Anchorage of units was designed as single units and as “ganged” units on different floor levels and loading conditions. Overturning on units is resisted by Hilti Kwik Bolt-II anchored into existing concrete floor through a raised computer floor system. Calculations are provided to check bending in the *Anchor Plate*, compression on the anchored Kwik Bolt-II and bearing loads on the existing raised computer floor according to UBC 97 Table 16-A-1, computer use.



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Vantage S2 Enclosure
 Wright-Line
 Job No. 04204
 By: AM

Date: 10/26/04
 Page:

Load Case: Single Unit + Utilities (Fully Loaded on 30" Floor), Ground Floor

Unit Dimensions

Length (in) = 24
 Width (in) = 39.12
 Frame Height (in) = 84.79

Center of Gravity Location

Unit	Part	Weight (lbs)	X (in)	Y (in)	Z (in)
VANTAGE S2	Frame	310	12	19.56	42.395
	Max Load	2000	12	19.56	42.395

Seismic Force

(Zone 4, $N_s=1.5$,
 $C_a = 0.66$ <5km Type A)
 $I_p = 1.00$ (Importance)
 $a_p = 1.00$ (Cabinets)
 $R_p = 3.00$ (Cabinets)
 $h_x/h_r = 0.00$ (Ground Floor) ←

$F_p = 0.157$ W
 $F_{p,min} = 0.33$ W
 $F_{p,max} = 1.89$ W

$F_p = 0.33$ W

Longitudinal Anchorage Spacing (in) = 31.19
 Transverse Anchorage Spacing (in) = 16.75

inside mounting

Longitudinal Anchorage Spacing (in) = 46.98
 Transverse Anchorage Spacing (in) = 16.75

outside mounting

Longitudinal Overturning (Y-axis)

Overturning

Moment = $0.33(310\text{lbs}+2000\text{lbs}) \times 72.395" = 32318$ lb-in

Shear = 762.3 lb

0.9xResisting

Moment = $0.9(310\text{lbs}+2000\text{lbs}) \times 39.12"/2 = 40665$ lb-in

Anchorage Force = -267.6 lbs, INSIDE MOUNTED BRACKETS
 -177.7 lbs, OUTSIDE MOUNTED BRACKETS

Design Bolts For 0 lbs, min tension, longitudinal direction, loaded

Transverse Overturning (X-axis)

Overturning

Moment = $0.33(310\text{lbs}+2000\text{lbs}) \times 72.395" = 32318$ lb-in

Shear = 762.3 lb

0.9xResisting

Moment = $0.9(310\text{lbs}+2000\text{lbs}) \times 24"/2 = 24948$ lb-in

Anchorage Force = 440 lbs, INSIDE MOUNTED BRACKETS
 440 lbs, OUTSIDE MOUNTED BRACKETS

Design Bolts For 440 lbs, min tension, transverse direction, loaded



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Load Case: Single Unit + Utilities (Fully Loaded on 30" Floor), Other floor levels

Unit Dimensions

Length (in) = 24
 Width (in) = 39.12
 Frame Height (in) = 84.79

Center of Gravity Location

Unit	Part	Weight (lbs)	X (in)	Y (in)	Z (in)
VANTAGE S2	Frame	310	12	19.56	42.395
	Max Load	2000	12	19.56	42.395

Longitudinal Anchorage Spacing (in) = 31.19
 Transverse Anchorage Spacing (in) = 16.75

inside mounting

Longitudinal Anchorage Spacing (in) = 46.98
 Transverse Anchorage Spacing (in) = 16.75

outside mounting

Seismic Force

(Zone 4, $N_a=1.5$,
 $<5\text{km Type A}$)
 $C_a = 0.66$
 $I_p = 1.00$ (Importance)
 $a_p = 1.00$ (Cabinets)
 $R_p = 3.00$ (Cabinets)
 $h_x/h_r = 0.90$ (90% of total ←
 of total height)
 $F_p = 0.581$ W
 $F_{p,min} = 0.33$ W
 $F_{p,max} = 1.89$ W

$F_p = 0.58$ W

Longitudinal Overturning (Y-axis)

Overturning

Moment = $0.58(310\text{lbs}+2000\text{lbs}) \times 42.395" = 56941$ lb-in

Shear = 1343.1 lb

0.9xResisting

Moment = $0.9(310\text{lbs}+2000\text{lbs}) \times 39.12"/2 = 40665$ lb-in

Anchorage Force = 521.8 lbs, INSIDE MOUNTED BRACKETS
 346.4 lbs, OUTSIDE MOUNTED BRACKETS

Design Bolts For 521.8 lbs, min tension, longitudinal direction, loaded

Transverse Overturning (X-axis)

Overturning

Moment = $0.58(310\text{lbs}+2000\text{lbs}) \times 42.395" = 56941$ lb-in

Shear = 1343.1 lb

0.9xResisting

Moment = $0.9(310\text{lbs}+2000\text{lbs}) \times 24"/2 = 24948$ lb-in

Anchorage Force = 1910 lbs, INSIDE MOUNTED BRACKETS
 1910 lbs, OUTSIDE MOUNTED BRACKETS

Design Bolts For 1910 lbs, min tension, transverse direction, loaded



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 Page:

Load Case: Ganged Unit + Utilities (Fully Loaded on 30" Floor), Ground floor

Ganged Unit Dimensions

Length (in) = 48 = (24" x 2 units)
 Width (in) = 39.12
 Frame Height (in) = 84.79

			Center of Gravity Location		
Unit	Part	Weight (lbs)	X (in)	Y (in)	Z (in)
VANTAGE S2	Frame	620	24	19.56	42.395
(ganged, 2 units or more)					
Max Load		4000	24	19.56	42.395

Longitudinal Anchorage Spacing (in) = 31.19
 Transverse Anchorage Spacing (in) = 40.75

inside mounting

Longitudinal Anchorage Spacing (in) = 46.98
 Transverse Anchorage Spacing (in) = 40.75

outside mounting

Seismic Force

(Zone 4, $N_a=1.5$,
 $<5\text{km Type A}$)
 $C_a = 0.66$
 $I_p = 1.00$ (Importance)
 $a_p = 1.00$ (Cabinets)
 $R_p = 3.00$ (Cabinets)
 $h_x/h_r = 0.00$ Ground Floor ←

$F_p = 0.157$ W
 $F_{p,min} = 0.33$ W
 $F_{p,max} = 1.89$ W

$F_p = 0.33$ W

Longitudinal Overturning (Y-axis)

Overturning Moment = $0.33(620\text{lbs}+4000\text{lbs}) \times 42.395" = 64635$ lb-in
 Shear = 1524.6 lb

0.9xResisting Moment = $0.9(620\text{lbs}+4000\text{lbs}) \times 39.12"/2 = 81330$ lb-in

Anchorage Force = -535.3 lbs, INSIDE MOUNTED BRACKETS
 -355.4 lbs, OUTSIDE MOUNTED BRACKETS

Design Bolts For 0 lbs, min tension, longitudinal direction, loaded

Transverse Overturning (X-axis)

Overturning Moment = $0.33(620\text{lbs}+4000\text{lbs}) \times 42.395" = 64635$ lb-in
 Shear = 1524.6 lb

0.9xResisting Moment = $0.9(620\text{lbs}+4000\text{lbs}) \times 48"/2 = 99792$ lb-in

Anchorage Force = -862.7 lbs, INSIDE MOUNTED BRACKETS
 -862.7 lbs, OUTSIDE MOUNTED BRACKETS

Design Bolts For 0 lbs, min tension, transverse direction, loaded



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Page:

Load Case: Ganged Unit + Utilities (Fully Loaded on 30" Floor), Other floor levels

Ganged Unit Dimensions

Length (in) = 48
 Width (in) = 39.12
 Frame Height (in) = 84.79

Center of Gravity Location

Unit	Part	Weight (lbs)	X (in)	Y (in)	Z (in)
VANTAGE S2	Frame	620	24	19.56	42.395
(ganged, 2 units or more)					
	Max Load	4000	24	19.56	42.395

Seismic Force

(Zone 4, $N_a=1.5$,
 <5km Type A)
 $C_a = 0.66$
 $I_p = 1.00$ (Importance)
 $a_p = 1.00$ (Cabinets)
 $R_p = 3.00$ (Cabinets)
 $h_x/h_r = 0.90$ (90% of total
 of total height) ←
 $F_p = 0.581$ W
 $F_{p,min} = 0.33$ W
 $F_{p,max} = 1.89$ W

$F_p = 0.58$ W

Longitudinal Anchorage Spacing (in) = 31.19
 Transverse Anchorage Spacing (in) = 40.75

inside mounting

Longitudinal Anchorage Spacing (in) = 46.98
 Transverse Anchorage Spacing (in) = 40.75

outside mounting

Longitudinal Overturning (Y-axis)

Overturning

Moment = $0.58(620\text{lbs}+4000\text{lbs}) \times 42.395" = 113881$ lb-in

Shear = 2686.2 lb

0.9xResisting

Moment = $0.9(620\text{lbs}+4000\text{lbs}) \times 39.12"/2 = 81330$ lb-in

Anchorage Force = 1043.6 lbs, INSIDE MOUNTED BRACKETS
 692.9 lbs, OUTSIDE MOUNTED BRACKETS

Design Bolts For 1043.6 lbs, min tension, longitudinal direction, loaded

Transverse Overturning (X-axis)

Overturning

Moment = $0.58(620\text{lbs}+4000\text{lbs}) \times 42.395" = 113881$ lb-in

Shear = 2686.2 lb

0.9xResisting

Moment = $0.9(620\text{lbs}+4000\text{lbs}) \times 48"/2 = 99792$ lb-in

Anchorage Force = 345.8 lbs, INSIDE MOUNTED BRACKETS
 345.8 lbs, OUTSIDE MOUNTED BRACKETS

Design Bolts For 345.8 lbs, min tension, transverse direction, loaded

Load Case: Overturing on Frame (Empty Enclosure on 30" Floor), Ground Floor

Unit Dimensions

Length (in) = 24
 Width (in) = 39.12
 Frame Height (in) = 84.79

Center of Gravity Location

Unit	Part	Weight (lbs)	X (in)	Y (in)	Z (in)
VANTAGE S2	Frame	310	12	19.56	42.395
	Max Load	0			

Seismic Force

(Zone 4, $N_a=1.5$,
 $C_a = 0.66$ <5km Type A)
 $I_p = 1.00$ (Importance)
 $a_p = 1.00$ (Cabinets)
 $R_p = 3.00$ (Cabinets)
 $h_x/h_r = 0.00$ (Ground Floor) ←

$F_p = 0.157$ W
 $F_{p,min} = 0.33$ W
 $F_{p,max} = 1.89$ W

$F_p = 0.33$ W

Longitudinal Anchorage Spacing (in) = 31.19
 Transverse Anchorage Spacing (in) = 16.75

inside mounting

Longitudinal Anchorage Spacing (in) = 46.98
 Transverse Anchorage Spacing (in) = 16.75

outside mounting

Longitudinal Overturing (Y-axis)

Overturing Moment = $0.33(310\text{lbs} \times 42.395") = 4337$ lb-in

0.9xResisting Moment = $0.9(310\text{lbs} \times 39.12"/2) = 5457$ lb-in

Anchorage Force = -35.9 lbs, INSIDE MOUNTED BRACKETS
 -23.8 lbs, OUTSIDE MOUNTED BRACKETS

Design Bolts For 0 lbs, min tension, longitudinal direction, empty

Transverse Overturing (X-axis)

Overturing Moment = $0.33(310\text{lbs} \times 42.395") = 4337$ lb-in

0.9xResisting Moment = $0.9(310\text{lbs} \times 24"/2) = 3348$ lb-in

Anchorage Force = 59 lbs, INSIDE MOUNTED BRACKETS
 59 lbs, OUTSIDE MOUNTED BRACKETS

Design Bolts For 59 lbs, min tension, transverse direction, empty
--

Load Case: Overturing on Frame (Empty Enclosure on 30" Floor), Other floor levels

Unit Dimensions

Length (in) = 24
 Width (in) = 39.12
 Frame Height (in) = 84.79

Center of Gravity Location

Unit	Part	Weight (lbs)	X (in)	Y (in)	Z (in)
VANTAGE S2	Frame	310	12	19.56	42.395
	Max Load	0			

Seismic Force

(Zone 4, $N_s=1.5$)
 $C_a = 0.66$ (<5km Type A)
 $I_p = 1.00$ (Importance)
 $a_p = 1.00$ (Cabinets)
 $R_p = 3.00$ (Cabinets)
 $h_x/h_r = 0.90$ (90% of total height) ←
 $F_p = 0.581$ W
 $F_{p,min} = 0.33$ W
 $F_{p,max} = 1.89$ W

$F_p = 0.58$	W
--------------	---

Longitudinal Anchorage Spacing (in) = 31.19
 Transverse Anchorage Spacing (in) = 16.75

inside mounting

Longitudinal Anchorage Spacing (in) = 46.98
 Transverse Anchorage Spacing (in) = 16.75

outside mounting

Longitudinal Overturing (Y-axis)

Overturing Moment = $0.58(310\text{lbs} \times 42.395") = 7641$ lb-in

0.9xResisting Moment = $0.9(310\text{lbs} \times 39.12"/2) = 5457$ lb-in

Anchorage Force = 70 lbs, INSIDE MOUNTED BRACKETS
 46.5 lbs, OUTSIDE MOUNTED BRACKETS

Design Bolts For 70 lbs, min tension, longitudinal direction, empty

Transverse Overturing (X-axis)

Overturing Moment = $0.58(310\text{lbs} \times 42.395") = 7641$ lb-in

0.9xResisting Moment = $0.9(310\text{lbs} \times 24"/2) = 3348$ lb-in

Anchorage Force = 256.3 lbs, INSIDE MOUNTED BRACKETS
 256.3 lbs, OUTSIDE MOUNTED BRACKETS

Design Bolts For 256.3 lbs, min tension, ltransverse direction, empty

Load Case: Ganged Unit (Empty Enclosure on 30" Floor), Ground Floor

Unit Dimensions

Length (in) = 48 = (24" x 2units)
 Width (in) = 39.12
 Frame Height (in) = 84.79

Center of Gravity Location

Unit	Part	Weight (lbs)	X (in)	Y (in)	Z (in)
VANTAGE S2	Frame	620	24	19.56	42.395
(ganged, 2units or more)					
	Max Load	0			

Seismic Force

(Zone 4, $N_g=1.5$,
 <5km Type A)
 $C_a = 0.66$
 $I_p = 1.00$ (Importance)
 $a_p = 1.00$ (Cabinets)
 $R_p = 3.00$ (Cabinets)
 $h_x/h_f = 0.00$ (Ground Floor) ←
 $F_p = 0.157 W$
 $F_{p,min} = 0.33 W$
 $F_{p,max} = 1.89 W$

$F_p = 0.33 W$

Longitudinal Anchorage Spacing (in) = 31.19
 Transverse Anchorage Spacing (in) = 33.5 inside mounting

Longitudinal Anchorage Spacing (in) = 46.98
 Transverse Anchorage Spacing (in) = 33.5 outside mounting

Longitudinal Overturning (Y-axis)

Overturning Moment = 0.33(620lbs x 69.77") = 8674 lb-in

0.9xResisting Moment = 0.9(620lbs x 39.12"/2) = 10914 lb-in

Anchorage Force = -71.8 lbs, INSIDE MOUNTED BRACKETS
 -47.7 lbs, OUTSIDE MOUNTED BRACKETS

Design Bolts For -47.7 lbs, min tension, longitudinal direction, empty

Transverse Overturning (X-axis)

Overturning Moment = 0.58(620lbs x 69.77") = 8674 lb-in

0.9xResisting Moment = 0.9(620lbs x 48"/2) = 13392 lb-in

Anchorage Force = -140.8 lbs, INSIDE MOUNTED BRACKETS
 -140.8 lbs, OUTSIDE MOUNTED BRACKETS

Design Bolts For -140.8 lbs, min tension, transverse direction, empty

Load Case: Overturing on Frame (Empty Enclosure on 30" Floor), Other floor levels

Unit Dimensions

Length (in) = 48 =(24"x 2 units)
 Width (in) = 39.12
 Frame Height (in) = 84.79

Center of Gravity Location

Unit	Part	Weight (lbs)	X (in)	Y (in)	Z (in)
VANTAGE S2	Frame	620	24	19.56	42.395
(ganged, 2units or more)					
	Max Load	0			

Seismic Force

(Zone 4, $N_s=1.5$,
 <5km Type A)
 $C_a = 0.66$
 $I_p = 1.00$ (Importance)
 $a_p = 1.00$ (Cabinets)
 $R_p = 3.00$ (Cabinets)
 $h_x/h_r = 0.90$ (90% of total height) ←
 $F_p = 0.581$ W
 $F_{p,min} = 0.33$ W
 $F_{p,max} = 1.89$ W

$F_p = 0.58$	W
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Longitudinal Anchorage Spacing (in) = 31.19
 Transverse Anchorage Spacing (in) = 33.5 inside mounting

Longitudinal Anchorage Spacing (in) = 46.98
 Transverse Anchorage Spacing (in) = 33.5 outside mounting

Longitudinal Overturing (Y-axis)

Overturing Moment = $0.58(620\text{lbs} \times 42.395") = 15283$ lb-in

0.9xResisting Moment = $0.9(620\text{lbs} \times 39.12"/2) = 10914$ lb-in

Anchorage Force = 140.1 lbs, INSIDE MOUNTED BRACKETS
 93 lbs, OUTSIDE MOUNTED BRACKETS

Design Bolts For 140.1 lbs, min tension, longitudinal direction, empty

Transverse Overturing (X-axis)

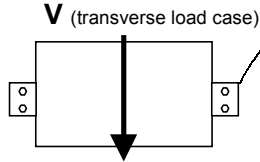
Overturing Moment = $0.58(620\text{lbs} \times 42.395") = 15283$ lb-in

0.9xResisting Moment = $0.9(620\text{lbs} \times 48"/2) = 13392$ lb-in

Anchorage Force = 56.4 lbs, INSIDE MOUNTED BRACKETS
 56.4 lbs, OUTSIDE MOUNTED BRACKETS

Design Bolts For 56.4 lbs, min tension, transverse direction, empty

Case 1 Anchorage: *Single Unit on 30" Floor, Ground Floor, Fully Loaded*



Bolts on this side resist tension

V = 762.3 lb
 T = 440 lb

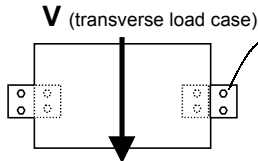
Req'd # bolts in Shear = 1 bolt
 Req'd # bolts in Tension = 1 bolts

(use external brackets)
 (2 brackets/4 bolts total)

2 bolt in tension, good for =	1613 lbs > 440 lbs, therefore ok
2 bolt in shear, good for =	2933 lbs > 762.3 lbs, therefore ok

-Use external brackets at single unit on ground floor

Case 2 Anchorage: *Single Unit on 30" Floor, Other Floors, Fully Loaded*



Bolts on this side resist tension

V = 1343 lb
 T = 1910 lb

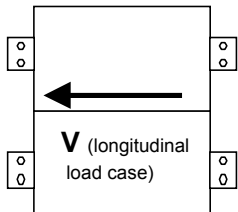
Req'd # bolts in Shear = 1 bolt
 Req'd # bolts in Tension = 3 bolts

(use internal & external brackets)
 (4 brackets/8 bolts total)

4 bolt in tension, good for =	3227 lbs > 1910 lbs, therefore ok
4 bolt in shear, good for =	5867 lbs > 1343 lbs, therefore ok

-Use external & internal brackets at single unit on other floor levels

Case 3 Anchorage: *Ganged Unit (2 units or more) on 30" Floor, Ground*



V = 1524 lb
 T = 0 lb

Req'd # bolts in Shear = 2 bolt
 Req'd # bolts in Tension = 0 bolts

(use external brackets)
 (4 brackets/8 bolts total)

4 bolt in tension, good for =	3227 lbs > 0 lbs, therefore ok
4 bolt in shear, good for =	5867 lbs > 1524 lbs, therefore ok

-Use external brackets at ganged units on ground floor



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Date: 11/8/04
Page:

Case 4 Anchorage: Ganged Unit (2 units or more) on 30" Floor, Other Floors

V = 2686 lb Req'd # bolts in Shear = 2 bolts
T = 1044 lb Req'd # bolts in Tension = 2 bolts

4 bolt in tension, good for =	3227 lbs > 1044 lbs, therefore ok
4 bolt in shear, good for =	5867 lbs > 2686 lbs, therefore ok

-Use external brackets at ganged units on other floor levels

ANCHOR CAPACITIES

3/8"φ: Hilti Kwik Bolt-II (ICBO Report No. 4627 Table 3), Embedded 3" into 3000 psi reg. Wt. Conc., w/o special insp,
Tension: 605lb x 1.33 (seismic increase) = **807 lb/ bolt**
Shear: 1100lb x 1.33 (seismic increase) = **1467 lb/ bolt**

1/4" TEKS screw into 16 GA., Good For 2100lb/5 (F.S.) *4/3 (seismic) = **560lbs/screw**

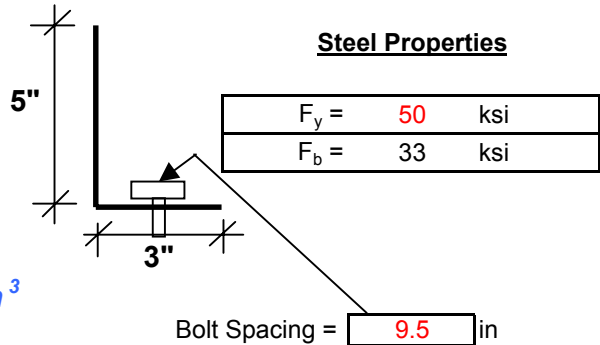
Summary

∴ Use 3/8"φ Hilti Kwik Bolt-II at each bracket, embedded 3" into existing concrete and 2-1/4-3/4" LONG TEKS screws at each bracket to Wright-Line Unit

Bending in Plate

Section Modulus of Anchor Plate

	b (width)	d (in)	S _x (in ³)
Vertical Leg	0.105	3	0.1575
Horizontal Leg	5	0.105	0.0092
SUM =			0.17



Section Modulus of Anchor Plate = **0.17 in³**

Maximum Allowable Tension on Plate

$M_{max} = S_x * F_b * 4/3_{(seismic\ increase)} = 7.33 \text{ k-in}$

$T_{max} = \frac{M_{max}}{\text{moment arm}} = \frac{7.33}{9.5} = 773 \text{ lb}$

Max Allowable Tension per plate = **773 lb**

External Brackets Only

Max Tension per Vantage S2 Unit = **1546 lb (2 anchor plates/unit)**
 Max Tension from Overturning Calculations = **1044 lb (see "Case 4 anchorage")**

Bending Stress Ratio = 67.5

Internal & External Brackets (occurs at Case 2 only)

Max Tension per Vantage S2 Unit = **3092 lb (4 anchor plates/unit)**
 Max Tension from Overturning Calculations = **1910 lb (see "Case 2 anchorage")**

Bending Stress Ratio = 61.8

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Page:

Compression On Bolts (3/8"φ bolts)

Height of Raised Floor = 30 in

Max Compression (P) = 1910lbs/4 bolts + 310lbs/4 bolts = 555 lbs
(single unit on other floors)

P = 555 lbs

$A_g = 0.110 \text{ in}^2$

r = 0.1875 in

$KL/r = 160 > C_c = 126$

$f_a = 5.03 \text{ ksi} < F_a = 9.39 \text{ ksi}$

$f_a = 5.03\text{ksi} < F_a = 9.39\text{ksi}$, therefore 3/8" diameter anchor bolts are ok in compression

Bearing on (E) Raised Floor

Total Load on 2.5 foot sq area = 555lbs x 2 anchors = 1110 lbs < 2000lbs (UBC 97 Table 16-A-1, Computer Use)

Load on 2.5 sq ft area (1110lbs) is less then 2000lbs, therefore (E) Raised floor ok

TABLE 3—CARBON STEEL KWIK BOLT-II ALLOWABLE TENSION AND SHEAR VALUES (in pounds), NORMAL-WEIGHT CONCRETE^{1,2}

ANCHOR DIAMETER (inch)	ANCHOR DEPTH (inches)	$f'_c = 2,000$ psi			$f'_c = 3,000$ psi			$f'_c = 4,000$ psi			$f'_c = 6,000$ psi		
		Tension		Shear	Tension		Shear	Tension		Shear	Tension		Shear
		With Sp. Insp.	Without Sp. Insp.		With Sp. Insp.	Without Sp. Insp.		With Sp. Insp.	Without Sp. Insp.		With Sp. Insp.	Without Sp. Insp.	
1/4	1 1/8 ³	245	120	400	300	150	400	350	175	400	430	215	400
	2	525	265	400	550	280	400	590	295	400	625	315	400
	3 3/4	625	315	400	625	315	400	625	315	400	625	315	400
3/8	1 5/8 ³	500	250	925	605	300	975	710	355	1,025	800	400	1,025
	2 1/2	1,125	565	1,100	1,210	605	1,100	1,290	645	1,100	1,450	725	1,100
	4 1/4	1,190	595	1,100	1,235	615	1,100	1,285	640	1,100	1,450	725	1,100
1/2	2 1/4 ³	860	430	1,810	960	480	1,840	1,065	530	1,840	1,625	815	1,840
	3 1/2	1,750	875	1,840	2,000	1,000	1,840	2,250	1,125	1,840	2,625	1,315	1,840
	6	1,950	975	1,840	2,165	1,080	1,840	2,375	1,190	1,840	2,625	1,315	1,840
5/8	2 3/4 ³	1,425	710	2,875	1,685	845	2,875	1,950	975	2,875	2,500	1,250	2,875
	4	2,180	1,125	3,125	2,670	1,335	3,125	3,090	1,545	3,125	3,925	1,965	3,125
	7	3,000	1,500	3,125	3,250	1,625	3,125	3,500	1,750	3,125	3,925	1,965	3,125
3/4	3 1/4 ³	1,850	925	3,875	2,175	1,090	3,875	2,500	1,250	3,875	3,000	1,500	3,875
	4 3/4	2,750	1,375	4,225	3,625	1,940	4,225	4,500	2,250	4,225	5,060	2,530	4,225
	8	3,750	1,875	4,225	4,625	2,315	4,225	5,500	2,750	4,225	5,925	2,965	4,225
1	4 1/2 ³	2,930	1,465	6,625	3,650	1,825	7,125	4,375	2,190	7,625	4,360	2,180	8,625
	6	3,990	1,995	8,625	5,310	2,655	8,625	6,625	3,315	8,625	7,875	3,940	8,625
	9	6,040	3,020	8,625	7,050	3,525	8,625	8,055	4,025	8,625	10,000	5,000	8,625

For SI: 1 inch = 25.4 mm, 1 psi = 6.9 kPa, 1 lb. = 4.45 N.

¹See Table 2 footnotes.

²Allowable loads may be increased by 33 1/3 percent for short-term loading due to wind or seismic forces.

³Only the long-threaded style KB-II anchor installed at this embedment depth is permitted to be used to resist shear due to wind or seismic forces. Long threaded style KB-II anchors have a thread length greater than three bolt diameters.

TABLE 4—STAINLESS STEEL KWIK BOLT-II ALLOWABLE TENSION AND SHEAR VALUES (in pounds), NORMAL-WEIGHT CONCRETE^{1,2}

ANCHOR DIAMETER (inch)	ANCHOR DEPTH (inches)	$f'_c = 2,000$ psi.			$f'_c = 3,000$ psi			$f'_c = 4,000$ psi			$f'_c = 6,000$ psi		
		Tension		Shear	Tension		Shear	Tension		Shear	Tension		Shear
		With Sp. Insp.	Without Sp. Insp.		With Sp. Insp.	Without Sp. Insp.		With Sp. Insp.	Without Sp. Insp.		With Sp. Insp.	Without Sp. Insp.	
1/4	1 1/8 ³	170	85	525	230	115	540	245	120	550	350	175	550
	2	425	210	550	500	250	550	500	250	550	520	260	550
	3 3/4	520	260	550	520	260	550	520	260	550	520	260	550
3/8	1 5/8 ³	400	200	825	460	230	950	515	260	1,075	625	315	1,150
	2 1/2	875	440	1,250	1,025	515	1,250	1,175	590	1,250	1,350	675	1,250
	4 1/4	1,000	500	1,250	1,145	625	1,250	1,350	675	1,250	1,350	675	1,250
1/2	2 1/4 ³	800	400	1,700	1,000	500	1,740	1,200	600	1,775	1,250	625	2,085
	3 1/2	1,250	625	2,085	1,625	815	2,085	2,000	1,000	2,085	2,250	1,125	2,085
	6	1,375	690	2,085	1,765	880	2,085	2,150	1,075	2,085	2,550	1,275	2,085
5/8	2 3/4 ³	1,020	510	2,625	1,250	625	2,875	1,475	735	3,125	1,800	900	3,125
	4	1,730	865	3,125	2,220	1,110	3,125	2,715	1,355	3,125	3,000	1,500	3,125
	7	2,250	1,125	3,125	2,825	1,415	3,125	3,425	1,715	3,125	3,425	1,715	3,125
3/4	3 1/4 ³	1,450	725	2,700	1,825	915	3,100	2,200	1,100	3,500	2,450	1,225	4,500
	4 3/4	2,350	1,175	4,225	2,990	1,495	4,365	3,625	1,815	4,500	4,375	2,190	4,500
	8	2,750	1,375	4,500	3,500	1,815	4,500	4,250	2,125	4,500	4,800	2,400	4,500
1	4 1/2 ³	2,300	1,150	5,700	2,850	1,425	6,350	3,400	1,700	7,000	4,500	2,250	7,000
	6	3,740	1,870	7,000	4,930	2,465	7,000	6,120	3,060	7,000	6,875	3,440	7,000
	9	5,250	2,625	7,000	7,075	3,540	7,000	8,800	4,400	7,000	8,800	4,400	7,000

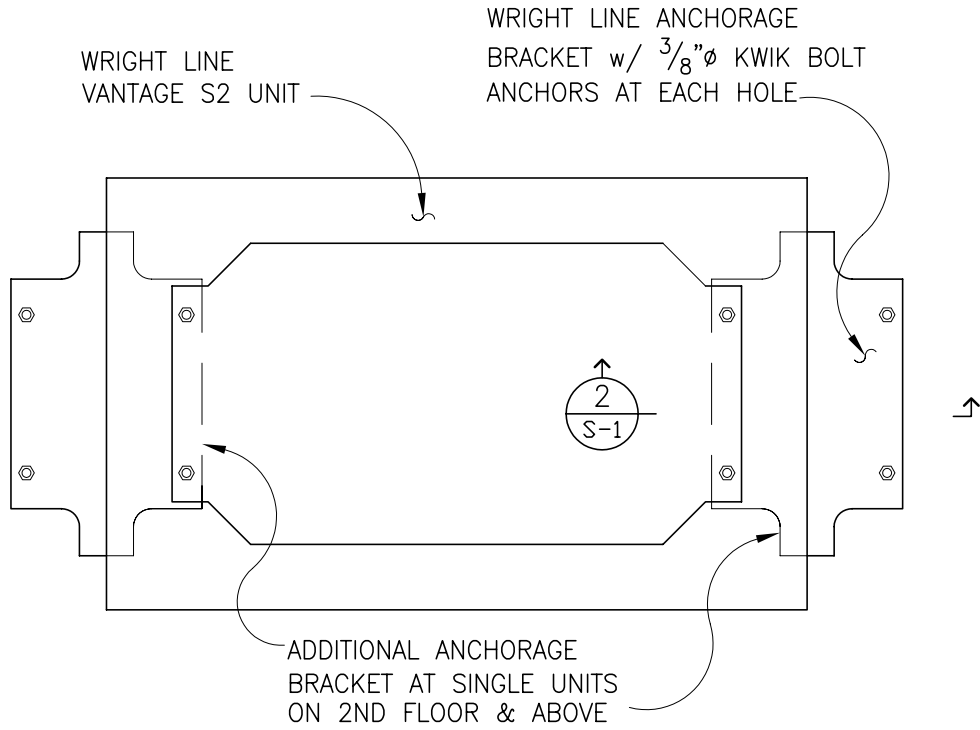
For SI: 1 inch = 25.4 mm, 1 psi = 6.9 kPa, 1 lb. = 4.45 N.

¹See Table 2 footnotes.

²Allowable loads may be increased by 33 1/3 percent for short-term loading due to wind or seismic forces.

³Anchors installed at this embedment depth shall not be used to resist shear due to wind or seismic forces.

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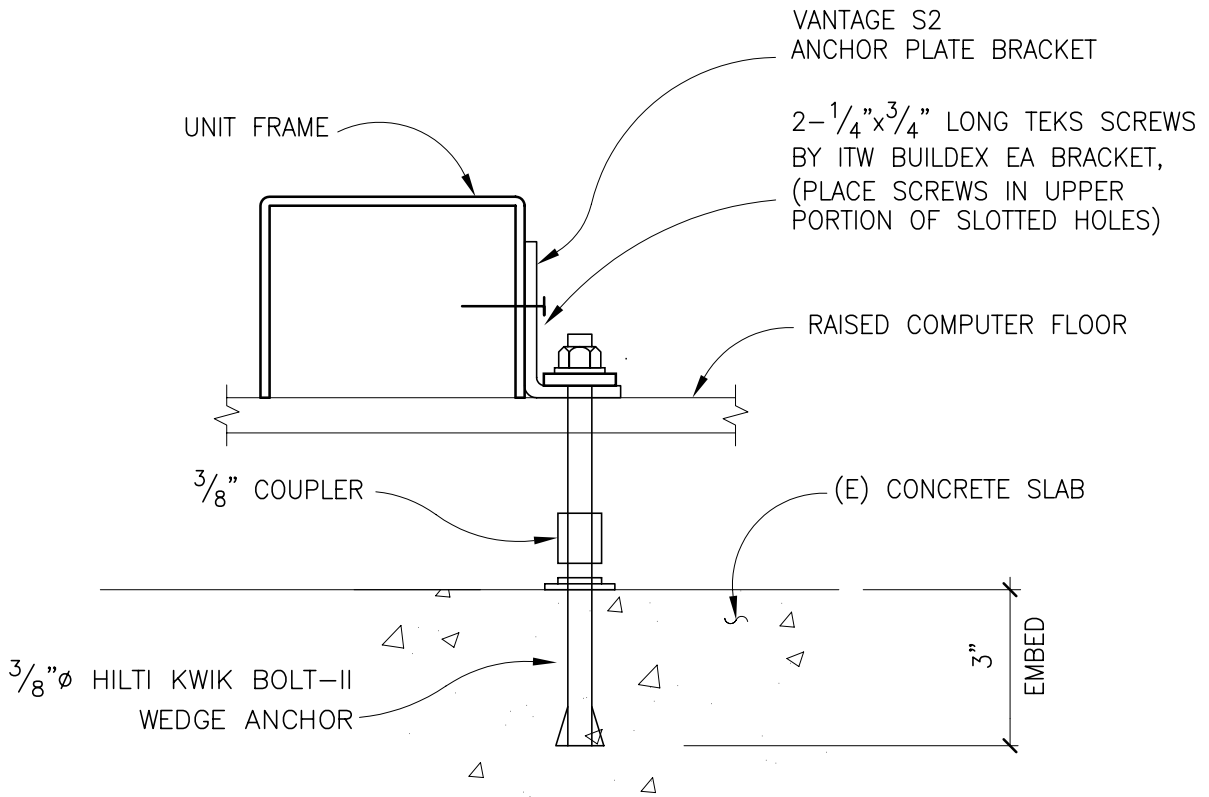
UNIT PLAN VIEW

PLAN

N.T.S.

1
S-1

 <p>Robinson Meier Jullly & Associates Structural Engineers 103 Linden Avenue So. San Francisco, CA 94080 650 871-2282 Fax:871-2459</p>	WRIGHT-LINE		Job No. 04204
	GENERAL OUTLINE OF 85Hx40Wx24D VANTAGE S2		Sheet No. 1
	Signed by AM	Date 11/8/04	OF




BOLT INSTALLATION FOR
VANTAGE S2 UNIT

PLAN

N.T.S.

2
S-1

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 <p>Robinson Meier Jully & Associates</p> <p>Structural Engineers 103 Linden Avenue So. San Francisco, CA 94080 650 871-2282 Fax:871-2459</p>	WRIGHT-LINE		Job No. 04204
	GENERAL OUTLINE OF 85Hx40Wx24D VANTAGE S2		Sheet No. 2
	Signed by AM	Date 11/8/04	OF □