RMJ

Structural Engineers

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Powering Business Worldwide™

Paramount/ S Series Unit

Structural Calculations
Seismic Anchorage

Prepared for:

Eaton
January 16, 2014
RMJ Job No. 14107

241 Joaquin Ave.
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RMJ

Powering Business Worldwide™

Paramount/ S Series Unit

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Eaton Paramount/ S Series Unit Anchorage
Nationwide
RMJ Job# 14107

Project Description:

This project involves providing server anchorage support for units located throughout the United States. Calculations have been assembled according to two distinct seismic regions low & moderate, and high. A map has been created based on Figures 3.3-1 & 3.3-2 of ASCE 7-10 to define the two different seismic regions. Please note our seismic map shows three distinct regions low, moderate, and high, but for simplicity of our calculations low and moderate were combined into one region. The map also shows a solid line near the New Madrid Fault where the value of S_s exceeds 2.75. In this area of extreme seismic potential, all anchorage is site specific. The other seismic regions have been determined according to the table included below;

Seismic Design Data			
Seismic design region	**Short period spectral response acceleration S_s**	**Short-period site coefficient F_a**	**Design spectral response acceleration at short periods S_{DS}**
Low	0.4	1.5	0.4
Moderate	1.5	1.0	1.0
High	2.75	1.0	2.0

4.5" Concrete Slab

For allowable load refer to flow charts. Simpson Strong Bolt 2 expansion anchor bolts shall be used to anchor the Eaton equipment. Specific equipment model numbers are listed on next page. The design approach is conservative by considering that half of the bolts resist shear forces and the other half resist tension forces due to uplift. Calculations are based on the assumptions that anchors are not located within any boundary edges, 4.5" thick concrete minimum thickness, 2.75" minimum embedment, and 3000 psi concrete strength.

Concrete fill over Metal Deck

Units not located on ground level but below 50% of the buildings height has an assumed weight varies of Low and Moderate Seismic Regions and varies in High Seismic Regions. (see flow charts). Units to be raised a maximum height of 24" according to ICC report ESR-3037 the ½" dia. Strong Bolt 2 with an embedded 2.75" requires a minimum concrete thickness of 4.5". We have included a hand calculation for the reported value.

Results

Please see the table below for a quick review of our results.

Bolt Alignment	**Max Tension (lbf.)**	**Max Shear (lbf.)**	**% Capacity**
Ground Level	1,150 (937 actual)	1,250 (585 Actual)	99
50% Bld. Ht.	1,051	949	99

Our results show that units on the ground level the Simpson Strong Bolt 2 (½" Dia. with a 2.75" embedment) resists a max tension force of 1,150#, and max shear force of 1,250#. Anchorage for units located on the upper floor using the Simpson Strong Bolt 2 (½" Dia. with a 1¾" embedment) resists a max tension force of 1,051#, and max shear force of 949#. I have included the Simpson output files along with my hand calculations in the appendix section of this calculation packet. Site specific engineering is required where S_S is greater than 2.75. Design is in accordance with the 2012 International Building Code along with the 2013 California Building Code.

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Eaton –Paramount/ S Series Units
Scope, Assumptions, and Limitations
RMJ Job #14107
January 17, 2014

- Special Inspection shall be provided for expansion bolt installation.
- Existing concrete shall have a minimum compressive strength of 3,000 psi.
- Importance factor is assumed to be 1.5.
- Raised Units not to exceed 24".
- Soil class is assumed to be D.
- Calculations and anchorage are done in accordance with the 2012 IBC, 2013 CBC and ASCE7-10.
- Maximum S_S value is 2.75. Where value of S_S exceeds 2.75, site specific calculations are required for all anchorages. S_S values can exceed 2.75 near the New Madrid faults.
- The minimum slab on grade thickness is assumed to be 4".
- The minimum concrete fill over metal deck thickness is 2½" (with 1½" metal deck).
- Maximum weight of enclosure and contents has been listed in the below:

	High Seismic		*Low and Moderate Seismic*	
	Ground Level	≥50% of Bldg. Ht.	Ground Level	≥50% of Bldg. Ht.
Max Wt. of Enclosure and Contents (lb)	**SEE FLOW CHART**	**SEE FLOW CHART**	**SEE FLOW CHART**	**SEE FLOW CHART**

- Enclosure is assumed to stay rigid during seismic loading (design by others).
- Computer access floor shall have strength to support compression and lateral loads.
- Floor slab and concrete filled metal deck shall have strength to resist uplift caused by overturning moment of cabinets.
- Any installation located in a high seismic region above the upper half of the building is not considered the upper half of the building.
- Ganged Units based on a Minimum of 3 Units.
- Calculations are for Eaton Paramount/ S Series units.

- Calculations are for Eaton Paramount units.

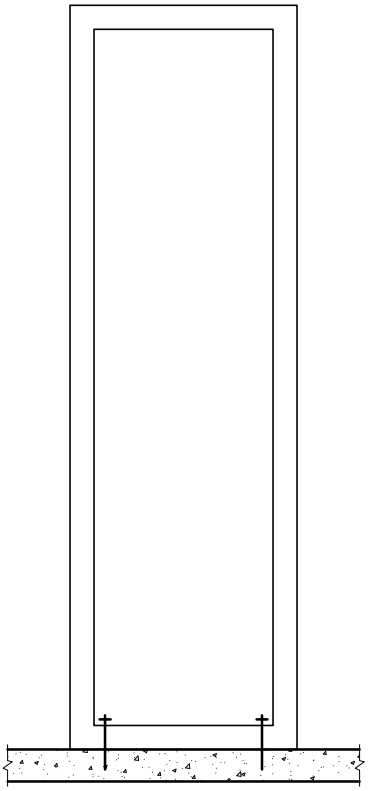
Paramount		Paramount H-Frame	
Item Number	Product Name	Item Number	Product Name
JW772434	•40Ux24”Wx34.5”	PMTFRM422440	•42Ux24”Wx40”D
JW772440	•40Ux24”Wx40”D	PMTFRM422445	•42Ux24”Wx45”D
JW772445	•40U, 24W, 45D	PMTFRM423040	•42Ux30”Wx40”D
JW773034	•40Ux30”Wx34.5”D	PMTFRM423045	•42Ux30”Wx45”D
JW773040	•40Ux30”Wx40”D	PMTFRM442434	•44Ux24”Wx34”D
JW773045	•40U, 30W, 45D	PMTFRM442440	•44Ux24”Wx40”D
JW842434	•84”Hx24”Wx34.5”D	PMTFRM442445	•44Ux24”Wx45”D
JW842440	•84”Hx24”Wx40”D	PMTFRM442834	•44U28”Wx34”D
JW842445	•44U, 24W, 45D	PMTFRM442840	•44Ux28”Wx40”D
JW843032	•84”Hx30”Wx31.5”D	PMTFRM443040	•44Ux30”Wx40”D
JW843034	•84”Hx30”Wx34.5”D	PMTFRM443045	•44Ux30”Wx45”D
JW843040	•84”Hx30”Wx40”D	PMTFRM443645	•44Ux36”Wx45”D
JW843045	•44U, 30W, 45D	PMTFRM482440	•48Ux24”Wx40”D
JW962434	•96”Hx24”Wx34.5”D	PMTFRM482445	•48Ux24”Wx45”D
JW962440	•96”Hx24”Wx40”D	PMTFRM483040	•48Ux30”Wx40”D
JW962445	•51U, 24W, 45D	PMTFRM483045	•48Ux30”Wx45”D
JW963034	•96”Hx30”Wx34.5”D	PMTFRM512440	•51Ux24”Wx40”D
JW963040	•96”Hx30”Wx40”D	PMTFRM512445	•51Ux24”W45”D
JW963045	•51U, 30W, 45D	PMTFRM513040	•51Ux30”Wx40”D
		PMTFRM513045	•51Ux30”Wx45”D

Responsibility of the Structural Engineer of Record

- Verify that the concrete meets the requirements of the applicable ICC ESR.
- Verify that the anchors are at an adequate distance from any slab opening or edges.
- Verify the adequacy of the structure to support the weight and forces shown in this pre-approval in addition to all other weights and forces that are imposed on it.
- Provide any supplementary structure required for strength and stability.
- Verify that the installation is in conformance with the 2010 CBC and with the notes and details shown in this pre-approval. Verify that the equipment’s actual weight, cg location, anchor locations, anchor details and the material and gage of the unit where attachments are made conform with the information shown in this pre-approval.

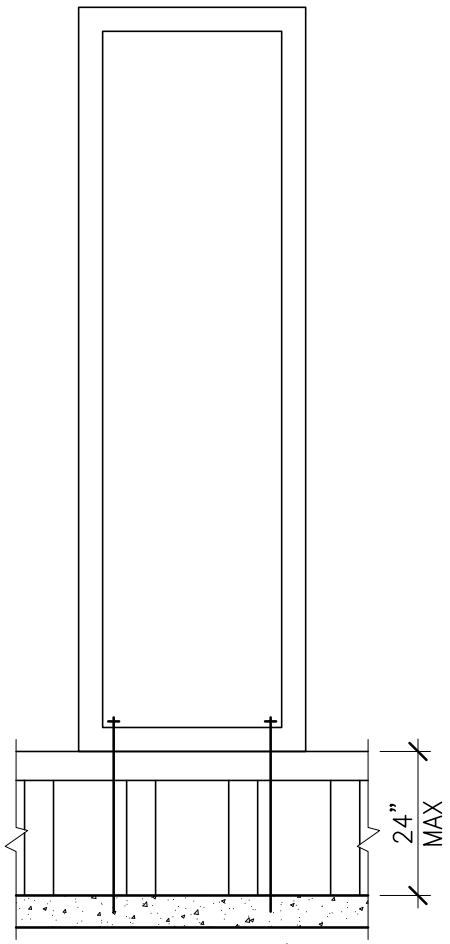
DESIGN SCENARIOS AND CONDITIONS

EATON
ENCLOSURE RACK



CONC. SLAB OR CONC. OVER METAL DECK (DIRECT FRAME TO FLOOR) REFER TO DRAWINGS SK3, SK6, SK7, SK10, SK11

EATON
ENCLOSURE RACK



RAISED COMP. FLOOR (ANCHOR FRAME TO SUB–FLOOR) REFER TO DRAWINGS SK3, SK5, SK7, SK9, SK11

DESIGN CRITERIA
- –PROVIDE SPECIAL INSPECTION FOR EXPANSION ANCHOR
- –(E) CONC. MIN COMPRESSIVE STRENGTH SEE TABLE
- –GROUND FLOOR
- –INSTALLATION AT <50% OF BUILDING HEIGHT
- –SINGLE & GANGED UNITS (GANGED MIN. 3 UNITS)
- –HIGH, MODERATE & LOW SEISMIC REGIONS
- –CALCULATION PER IBC 2012/CBC 2013
- –IMPORTANCE FACTOR 1.5
- –WEIGHT OF ENCLOSURE AND CONTENTS: SEE FLOW CHARTS PROVIDED WITH CALCULATION PACKET

FASTENER SELECTION
HILTI KB–TZ $^1/_2$" ø BOLT

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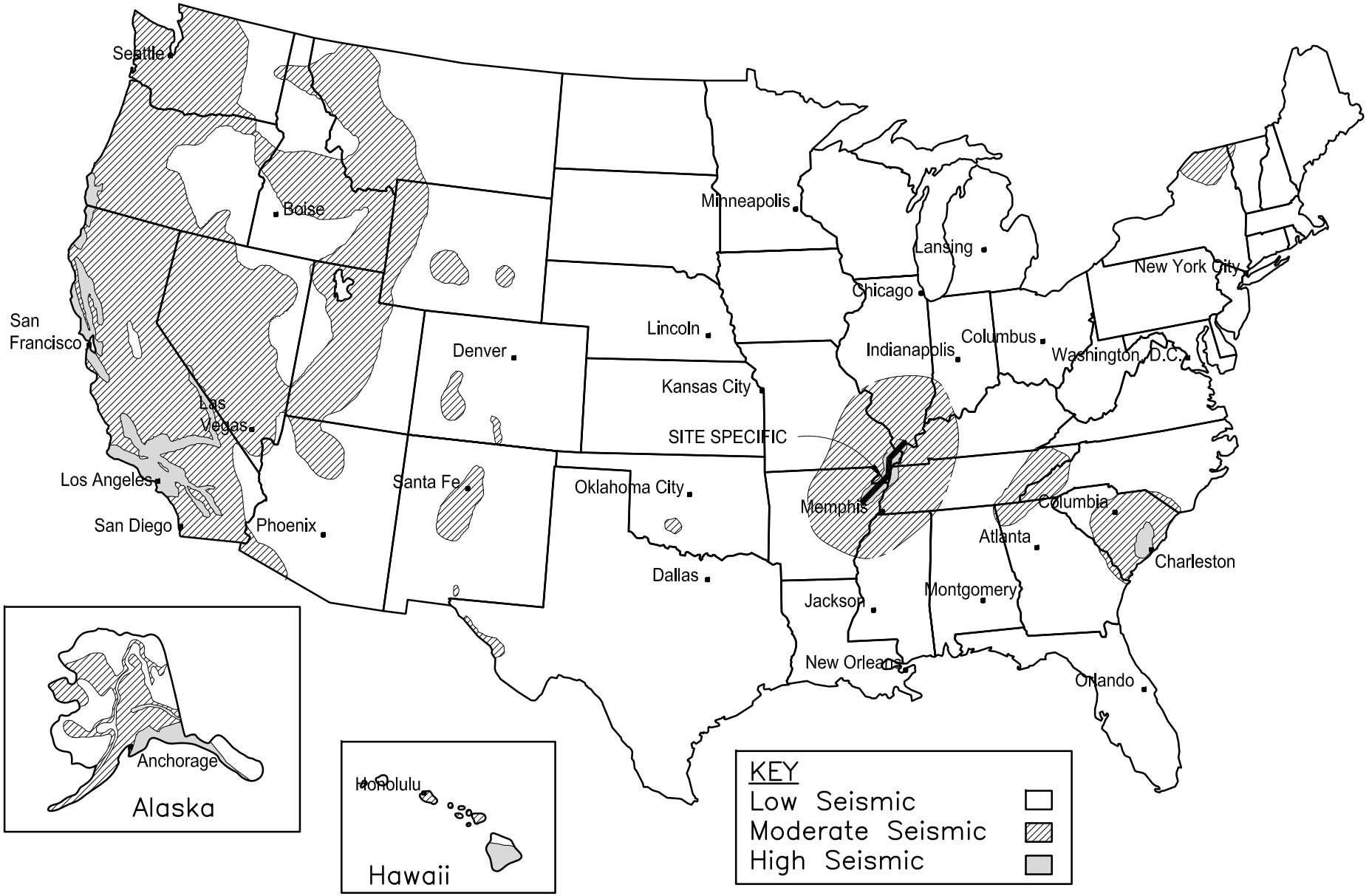
EATON PARAMOUNT/
S SERIES UNIT ANCHORAGE

ALL SEISMIC REGIONS

Signed by MAS Date 01/2014

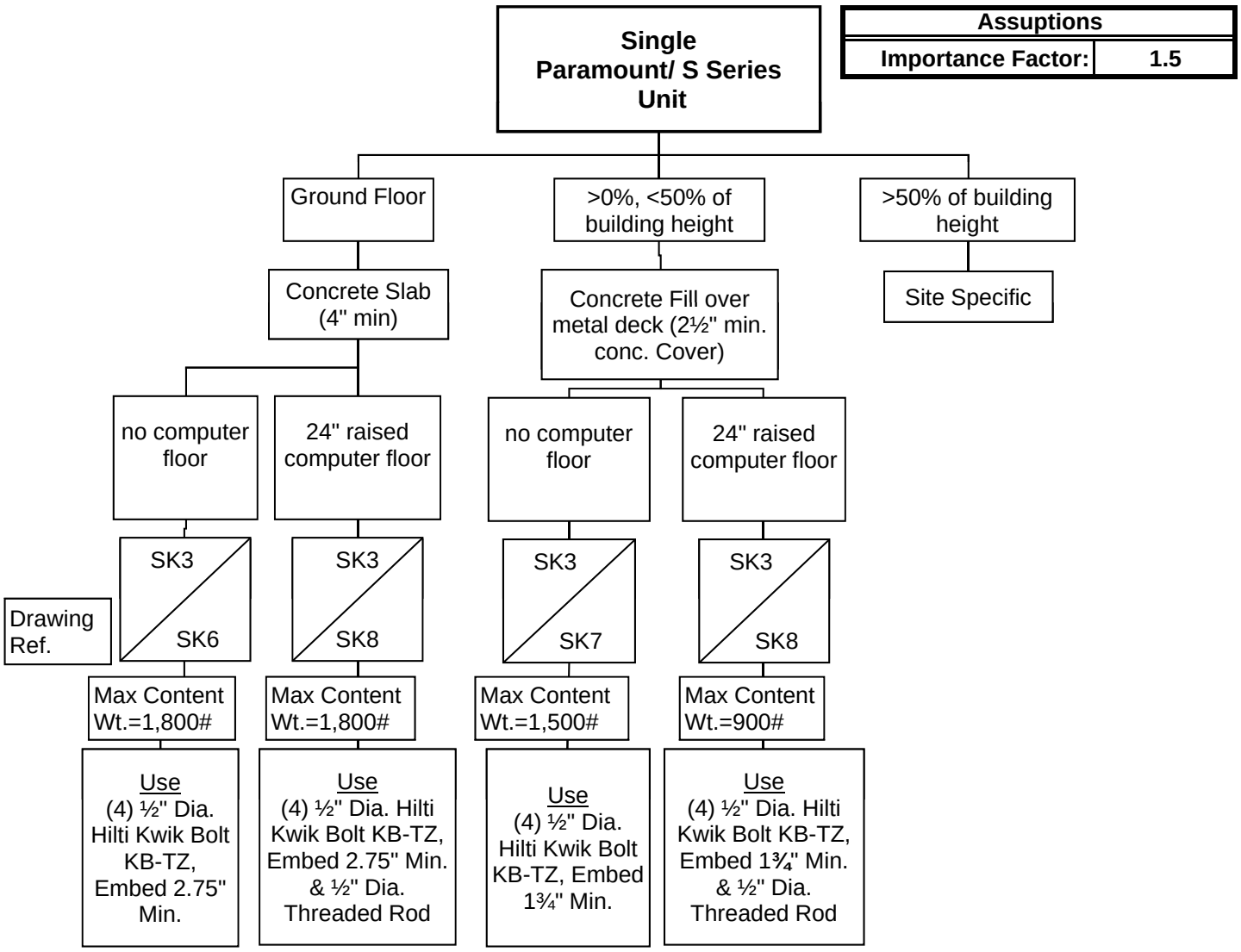
Job No. 14107

Sheet No. SK2

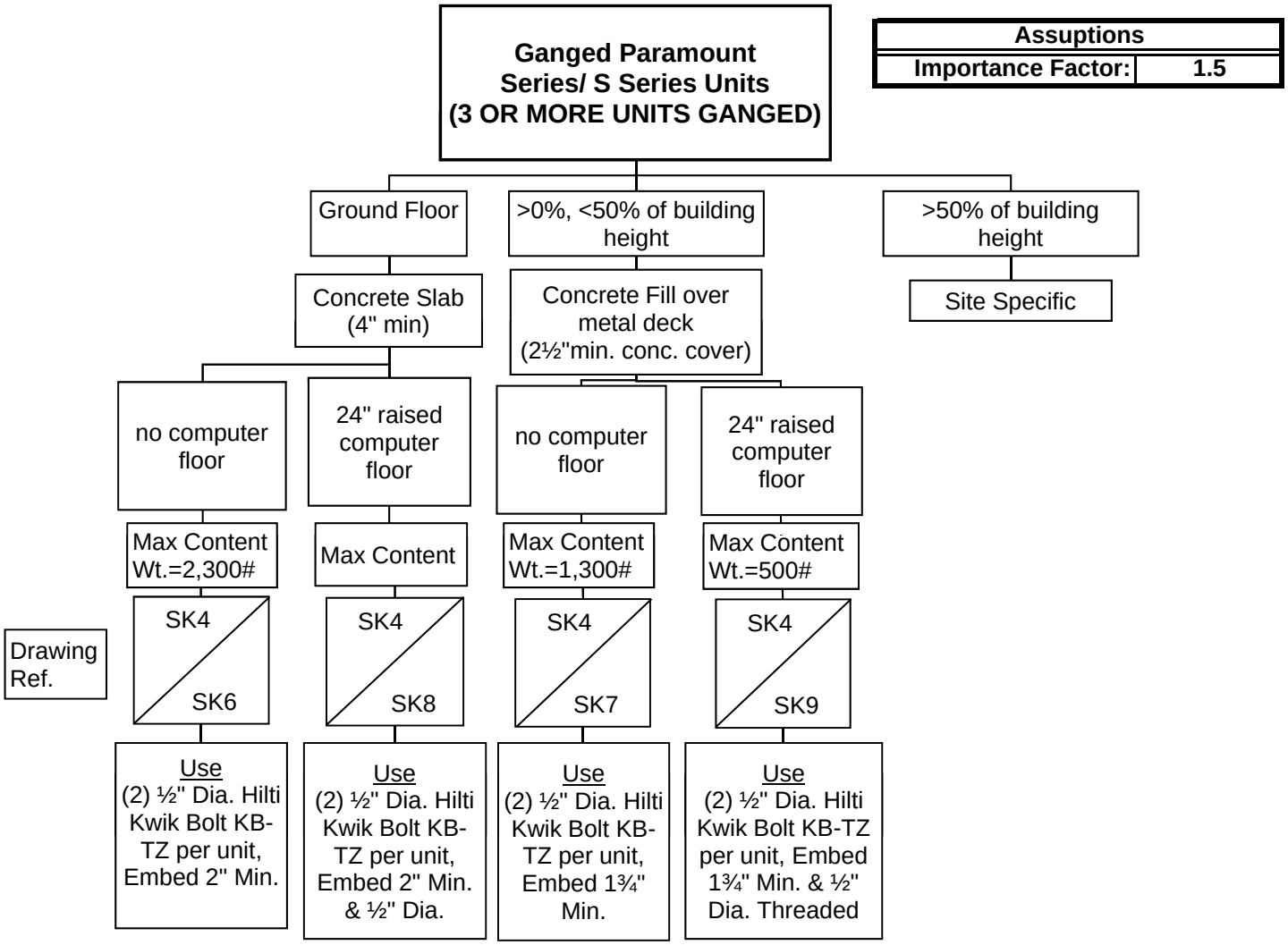


RMJ Robinson Meier Juilly & Associates Structural Engineers 241 Joaquin Ave. San Leandro, CA 94577 510 991·0977	SEISMIC RISK LOCATION MAP EATON Paramount/ S SERIES UNIT USA Date 01–14	Job No. 14107 Sheet No. 1 OF 1

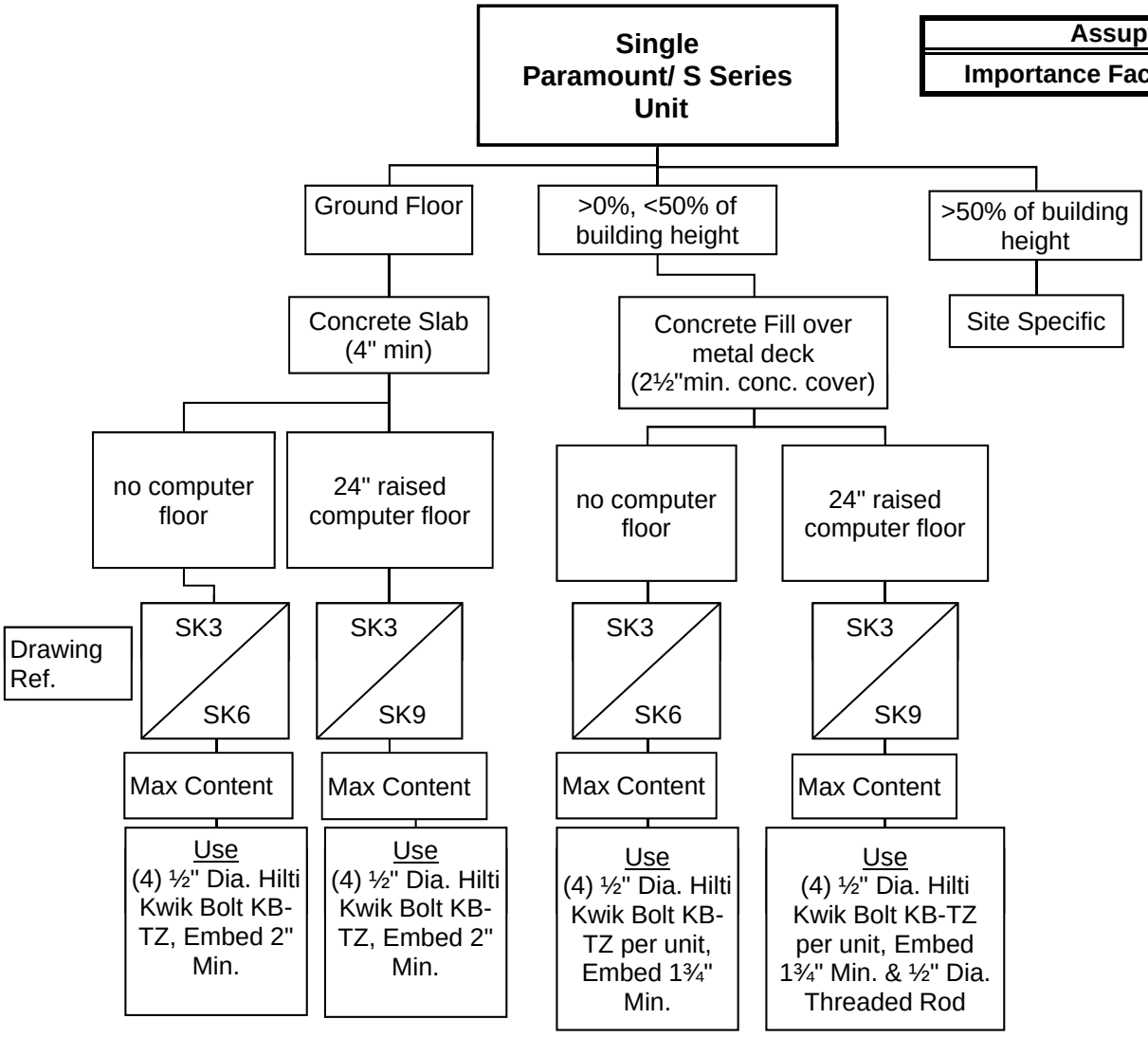
Summary: Paramount - Low & Moderate Seismic



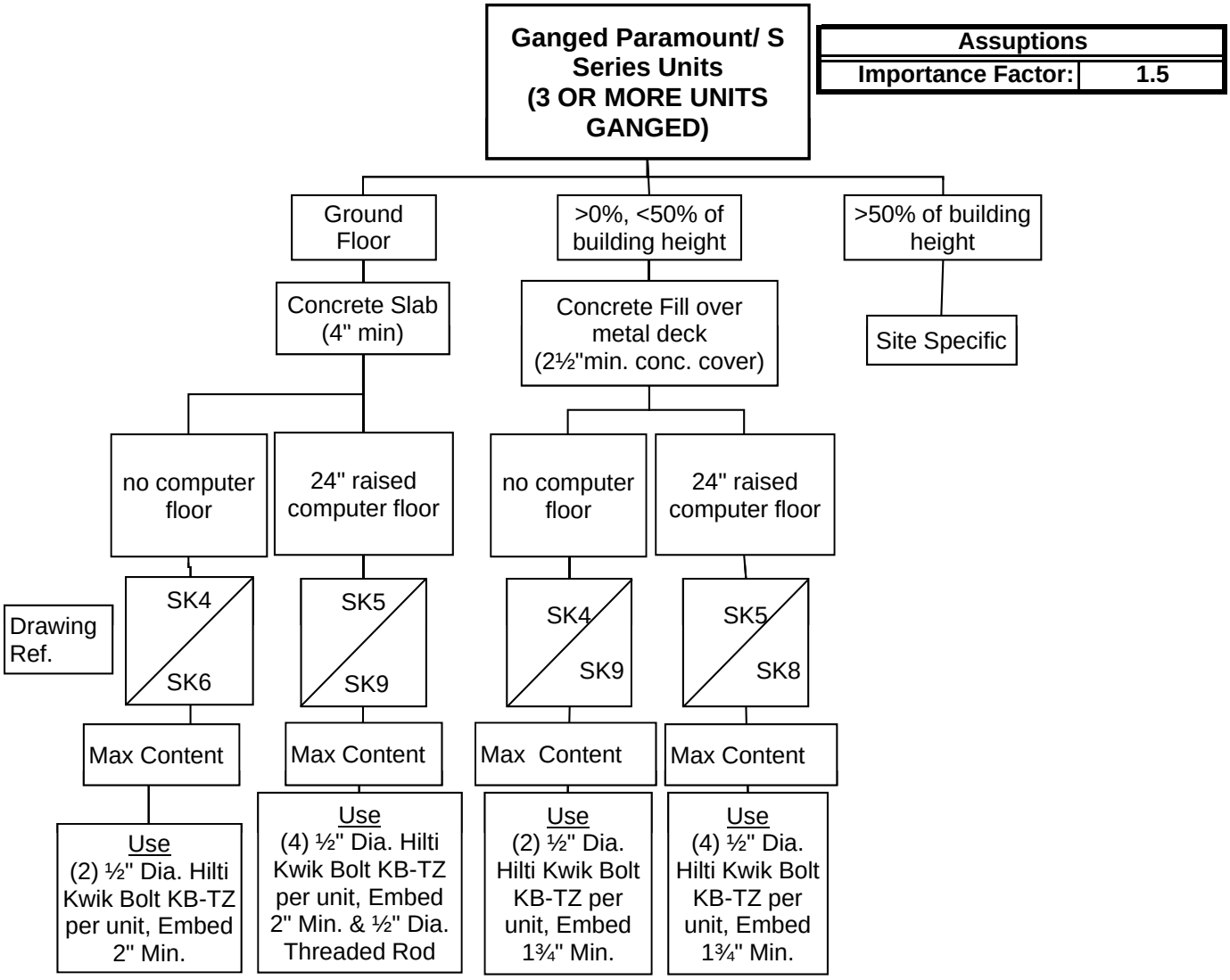
Summary: Paramount - Low & Moderate Seismic



Summary: Paramount - High Seismic



Summary: Paramount - High Seismic



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Low & Moderate Seismic Calculations

Find the Seismic Design Category (SDC) **Unit : Paramount/S Series**

Project Location: Low & Moderate Seismic
Latitude: Varies Longitude: Varies

Soil Classification: D Table 1613.5.2 & Section 1613.5.2
Occupancy Category: II Table 1604.5

Information from U.S. Geological Survey Website
http://earthquake.usgs.gov/research/hazmaps/

S_S=	1.500	g	
S_1=	1.070	g	
F_a=	1.000		Table 1613.5.3(1)
F_v=	1.500		Table 1613.5.3(2)
S_{MS}=	1.50	g	(Equation 16-37)
S_{M1}=	1.61	g	(Equation 16-38)
S_{DS}=	1.000	g	(Equation 16-39)
S_{D1}=	1.070	g	(Equation 16-40)

Seismic Design Category (SDC): Varies

Load Case: Single Unit (Ground Flr.)

Unit Dimensions

Width(w) (in) =	24	Edge Length	3 in
Depth(D) (in) =	34.5		
Frame Height (in) =	96		
Unit Weight (lb.) =	230		

			Center of Gravity Location		
Unit	**Part**	**Weight (lbs)**	**X (in)**	**Y (in)**	**Z (in)**
Paramount/S Series	Frame +Contents	2,030	12	12	48

Longitudinal Anchorage Spacing (in) = 24

Transverse Anchorage Spacing (in) = 18

Seismic Force

S_{DS} =	1.0	Low & Moderate Seismic
I_p =	1.5	(Importance)
a_p =	1.0	(Cabinets)
R_p =	2.5	(Cabinets)
z/h =	0.0	(Ground Floor)
F_p =	0.240	W
$F_{p,min}$ =	0.45	W
$F_{p,max}$ =	2.40	W
Use F_p =	**0.45**	**W**

Longitudinal Overturning

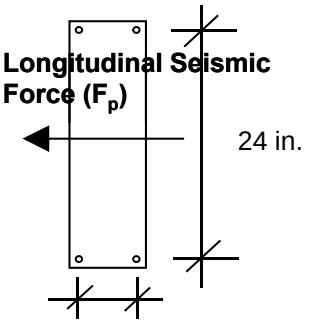
Overturning Moment = 0.45 (48 in. x 2030lbs.) = 43,848 lb-in

0.9xResisting Moment = 0.9 [2030 lbs. x (9in)]= 16,443 lb-in

Total # of Bolts = 4

Anchorage Force =	761	lbs/per bolt
Shear Force =	457	lbs/per bolt

Paramount/S Series unit Plan



Design Bolts for 761 lbs tension, 457 lbs. shear, longitudinal direction

Transverse Overturning

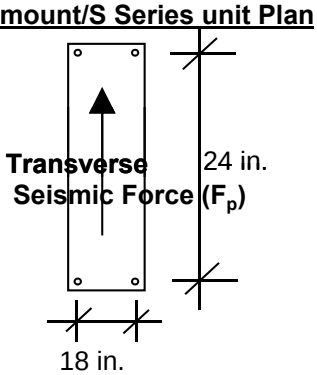
Overturning Moment = 0.45 (48 in. x 2030lbs.) = 43,848 lb-in

0.9xResisting Moment = 0.9 [2030 lbs. x (12in.)]= 21,924 lb-in

Total # of Bolts = 4

Anchorage Force =	457	lbs/per bolt
Shear Force =	457	lbs/per bolt

Paramount/S Series unit Plan



Design Bolts for 0 lbs tension, 457 lbs. shear, transverse direction

Drawing Reference See: SK-3 & SK-6

Load Case: <u>Single Unit on 24" Raised Computer Floor (Ground Flr.)</u>

Unit Dimensions

Width(w) (in) =	24	Edge Length	3 in
Depth(D) (in) =	34.5	Raised Floor Height =	24 in
Frame Height (in) =	96		
Unit Weight (lb) =	230		

			Center of Gravity Location		
Unit	**Part**	**Weight (lbs)**	**X (in)**	**Y (in)**	**Z (in)**
Paramount/S Series	Frame +Contents	2,030	12	12	72

Longitudinal Anchorage Spacing (in) = 24

Transverse Anchorage Spacing (in) = 18

Seismic Force

S_{DS} =	1.0	Low & Moderate Seismic
I_p =	1.5	(Importance)
a_p =	1.0	(Cabinets)
R_p =	2.5	(Cabinets)
z/h =	0.0	(Ground Floor)
F_p =	0.240	W
$F_{p,min}$ =	0.45	W
$F_{p,max}$ =	2.40	W
Use F_p =	**0.45**	**W**

Longitudinal Overturning

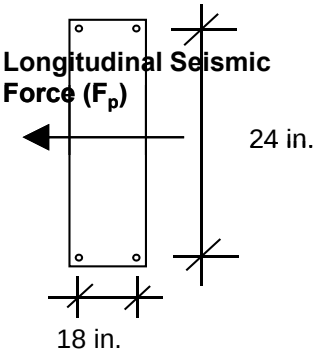
Overturning Moment = 0.45 (72 in. x 2030lbs.) = 65,772 lb-in

0.9xResisting Moment = 0.9 [2030 lbs. x (12in.)]= 21,924 lb-in

Total # of Bolts = 4

Anchorage Force =	914	lbs/per bolt
Shear Force =	457	lbs/per bolt

Paramount/S Series unit Plan



Design Bolts for 914 lbs tension, 457 lbs. shear, longitudinal direction

Transverse Overturning

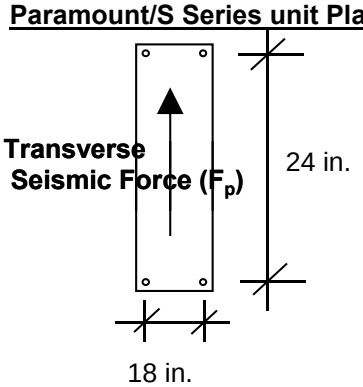
Overturning Moment = 0.45 (72 in. x 2030lbs.) = 65,772 lb-in

0.9xResisting Moment = 0.9 [2030 lbs. x (12in)]= 21,924 lb-in

Total # of Bolts = 4

Anchorage Force =	914	lbs/per bolt
Shear Force =	457	lbs/per bolt

Paramount/S Series unit Plan



Design Bolts for 914 lbs tension, 457 lbs. shear, transverse direction

Drawing Reference See: <u>SK-3 & SK-8</u>

Load Case: Ganged Unit (Ground Flr.)

# of Units ganged (min.)= 3

Single Unit Dimension

Width(w) (in) =	24	Edge Length	3 in
Depth(D) (in) =	34.5		
Frame Height (in) =	96		
Frame Weight (lb.) =	230		

Unit	Part	Weight (lbs)	Center of Gravity Location X (in)	Y (in)	Z (in)
3 - Paramount/S Series	Frame +Contents	7,590	21	12	48

Longitudinal Anchorage Spacing (in) = 24
Transverse Anchorage Spacing (in) = 42

Seismic Force

S_{DS} =	1.0	Low & Moderate Seismic
I_p =	1.5	(Importance)
a_p =	1.0	(Cabinets)
R_p =	2.5	(Cabinets)
z/h =	0.0	(Ground Floor)
F_p =	0.240	W
$F_{p,min}$ =	0.45	W
$F_{p,max}$ =	2.40	W
Use F_p =	**0.45**	**W**

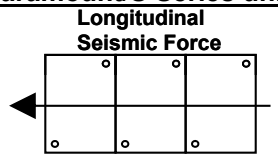
Longitudinal Overturning

Overturning Moment = 0.45 (96/2 in. x 7590lbs.) = 163,944 lb-in

0.9xResisting Moment = 0.9 (7590 lbs. x21 in.)= 143,451 lb-in

Anchorage Force = 488 lbs
Shear Force = 1,139 lbs/per bolt

Paramount/S Series unit Plan



3 ganged units
# of bolts per unit = 2

Design Bolts for 0 lbs tension, 1,139 lbs. shear, longitudinal direction

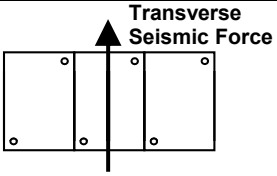
Transverse Overturning

Overturning Moment = 0.45 (96/2 in. x 7590lbs.) = 163,944 lb-in

0.9xResisting Moment = 0.9 (7590 lbs x12 in.) = 81,972 lb-in

Anchorage Force = 1,139 lbs/per bolt
Shear Force = 1,139 lbs/per bolt

Ganged Paramount/S Series unit Plan



3 ganged units
# of bolts per unit = 2

Design Bolts for 1 lbs tension, 1,139 lbs. shear, transverse direction

Drawing Reference See: SK-4 & SK-6

Load Case: <u>Ganged Unit on 24" Raised Comp. Flr. (Ground Flr.)</u>

# of Units ganged (min.)= 3 Raised Floor = 24 in

Single Unit Dimension

Width(w) (in) =	24	Edge Length	3 in
Depth(D) (in) =	34.5		
Frame Height (in) =	96		
Frame Weight (lb.) =	230		

Unit	Part	Weight (lbs)	Center of Gravity Location X (in)	Y (in)	Z (in)
3 - Paramount/S Series	Frame +Contents	7,590	66	12	72

Longitudinal Anchorage Spacing (in) = 34.5
Transverse Anchorage Spacing (in) = 54

Seismic Force

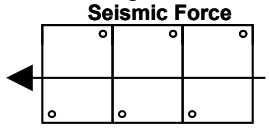
S_{DS} =	1.0	Low & Moderate Seismic
I_p =	1.5	(Importance)
a_p =	1.0	(Cabinets)
R_p =	2.5	(Cabinets)
z/h =	0.0	(Ground Floor)
F_p =	0.240	W
$F_{p,min}$ =	0.45	W
$F_{p,max}$ =	2.40	W
Use F_p =	**0.45**	**W**

Longitudinal Overturning

Overturning Moment = 0.5 (72 in. x 7590lbs.) = 245,916 lb-in

0.9xResisting Moment = 0.9 (7590 lbs. x66 in.)= 450,846 lb-in

Ganged Paramount/S Series unit Plan



Anchorage Force = 0 lbs/per bolt
Shear Force = 1,139 lbs/per bolt

3 ganged units
# of bolts per unit = 2

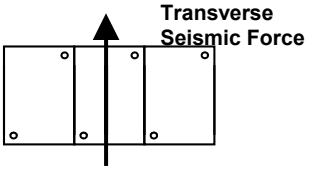
Design Bolts for 0 lbs tension, 1,139 lbs. shear, longitudinal direction

Transverse Overturning

Overturning Moment = 0.5 (72in. x 7590lbs.) = 245,916 lb-in

0.9xResisting Moment = 0.9 (7590 lbs x17.25 in.) = 117,835 lb-in

Ganged Paramount/S Series unit Plan



Anchorage Force = 1,238 lbs/per bolt
Shear Force = 1,139 lbs/per bolt

3 ganged units
# of bolts per unit = 2

Design Bolts for 1,238 lbs tension, 1,139 lbs. shear, transverse direction

Drawing Reference See: <u>SK-4 & SK-9</u>

Load Case: ***Single Unit (≤ 50% of Bldg. Ht.)***

(i.e. 2nd floor of a 4 story building or 4th floor of an 8 story building)

Unit Dimensions			
Width(w) (in) =	24	Edge Length	3 in
Depth(D) (in) =	34.5		
Frame Height (in) =	96		
Unit Weight (lb) =	230		

Unit	Part	Weight (lbs)	Center of Gravity Location X (in)	Y (in)	Z (in)
Paramount/S Series	Frame +Contents	1,430	12	12	48

Longitudinal Anchorage Spacing (in) = 18

Transverse Anchorage Spacing (in) = 24

Seismic Force

S_{DS} =	1.0	Low & Moderate Seismic
I_p =	1.5	(Importance)
a_p =	1.0	(Cabinets)
R_p =	2.5	(Cabinets)
z/h =	0.5	(50% of bldg ht.)
F_p =	0.480	W
$F_{p,min}$ =	0.45	W
$F_{p,max}$ =	2.40	W
Use F_p =	**0.48**	**W**

Longitudinal Overturning

Overturning Moment = 0.48 (48 in. x 1430lbs.) = 32,947 lb-in

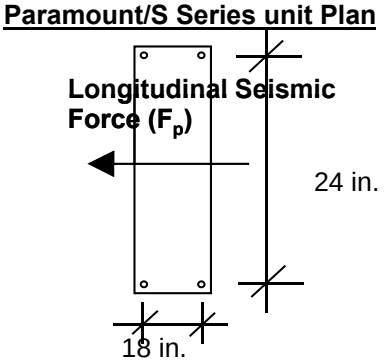
0.9xResisting Moment = 0.9 [1430 lbs. x (12in.)]= 15,444 lb-in

Add 30% increase due to 13.4.2. ASCE-7-10

Total # of Bolts = 4

Anchorage Force =	365	lbs/per bolt
Shear Force =	446	lbs/per bolt

Paramount/S Series unit Plan



Design Bolts for 365 lbs tension, 446 lbs. shear, longitudinal direction

Transverse Overturning

Overturning Moment = 0.48 (48 in. x 1430lbs.) = 32,947 lb-in

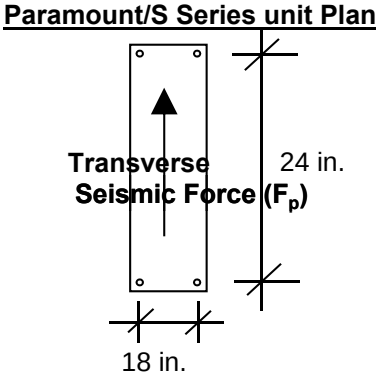
0.9xResisting Moment = 0.9 [1430 lbs. x (9in)]= 11,583 lb-in

Add 30% increase due to 13.4.2. ASCE-7-10

Total # of Bolts = 4

Anchorage Force =	771	lbs/per bolt
Shear Force =	446	lbs/per bolt

Paramount/S Series unit Plan



Design Bolts for 1 lbs tension, 446 lbs. shear, transverse direction

Drawing Reference See: SK-3 & SK-7

Load Case: ***Single Unit on 24" Raised Comp. Flr. (≤ 50% of Bldg. Ht.)***
(i.e. 2nd floor of a 4 story building or 4th floor of an 8 story building)

Unit Dimensions			
Width(w) (in) =	24	Edge Length	3 in
Depth(D) (in) =	34.5		
Frame Height (in) =	96		
Unit Weight (lb) =	230		

Raised Floor = 24 in

Unit	Part	Weight (lbs)	Center of Gravity Location X (in)	Y (in)	Z (in)
Paramount/S Series	Frame +Contents	1,130	12	12	72

Longitudinal Anchorage Spacing (in) = 24
Transverse Anchorage Spacing (in) = 18

Seismic Force

S_{DS} =	1.0	Low & Moderate Seismic
I_p =	1.5	(Importance)
a_p =	1.0	(Cabinets)
R_p =	2.5	(Cabinets)
z/h =	0.5	(50% of bldg ht.)
F_p =	0.480	W
$F_{p,min}$ =	0.45	W
$F_{p,max}$ =	2.40	W
Use F_p =	**0.48**	**W**

Longitudinal Overturning

Overturning Moment = 0.48 (72 in. x 1130lbs.) = 39,053 lb-in

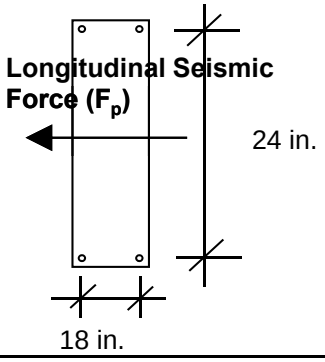
0.9xResisting Moment = 0.9 [1130 lbs. x (12in)]= 12,204 lb-in

Add 30% increase due to 13.4.2. ASCE-7-10

Total # of Bolts = 4

Anchorage Force = 970 lbs/per bolt
Shear Force = 353 lbs/per bolt

Paramount/S Series unit Plan



Design Bolts for 970 lbs tension, 353 lbs. shear, longitudinal direction

Transverse Overturning

Overturning Moment = 0.48 (72 in. x 1130lbs.) = 39,053 lb-in

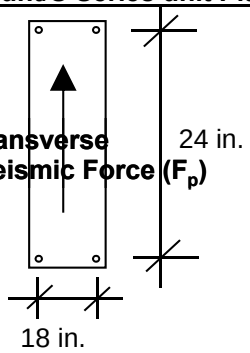
0.9xResisting Moment = 0.9 [1130 lbs. x (12in.)]= 12,204 lb-in

Add 30% increase due to 13.4.2. ASCE-7-10

Total # of Bolts = 4

Anchorage Force = 727 lbs/per bolt
Shear Force = 353 lbs/per bolt

Paramount/S Series unit Plan



Design Bolts for 727 lbs tension, 353 lbs. shear, transverse direction

Drawing Reference See: SK-3 & SK-9

Load Case: <u>Ganged Unit (≤ 50% of Bldg. Ht.)</u>

# of Units ganged (max)= 3

Single Unit Dimension

Width(w) (in) =	24	Edge Length	3 in
Depth(D) (in) =	34.5		
Frame Height (in) =	96		
Frame Weight (lb.) =	230		

			Center of Gravity Location		
Unit	**Part**	**Weight (lbs)**	**X (in)**	**Y (in)**	**Z (in)**
3 - Paramount/S Series	Frame +Contents	4,590	21	12	48

Longitudinal Anchorage Spacing (in) = 24
Transverse Anchorage Spacing (in) = 42

Seismic Force

S_{DS} =	1.0	Low & Moderate Seismic
I_p =	1.5	(Importance)
a_p =	1.0	(Cabinets)
R_p =	2.5	(Cabinets)
z/h =	0.5	(50% of bldg ht.)
F_p =	0.480	W
$F_{p,min}$ =	0.45	W
$F_{p,max}$ =	2.40	W
Use F_p =	**0.48**	**W**

Longitudinal Overturning

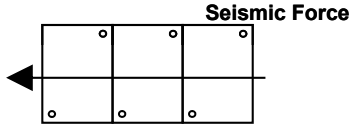
Overturning Moment = 0.48 (96/2 in. x 4590lbs.) = 105,754 lb-in

0.9xResisting Moment = 0.9 (4590 lbs. x21 in.)= 86,751 lb-in

Add 30% increase due to 13.4.2. ASCE-7-10

Anchorage Force =	294	lbs
Shear Force =	955	lbs/per bolt

<u>Ganged Paramount/S Series unit Plan</u>



3 ganged units
# of bolts per unit = 2

Design Bolts for 294 lbs tension, 955 lbs. shear, longitudinal direction

Transverse Overturning

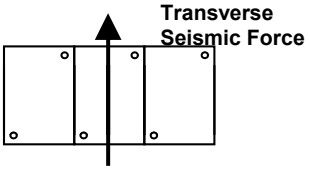
Overturning Moment = 0.48 (96/2 in. x 4590lbs.) = 105,754 lb-in

0.9xResisting Moment = 0.9 (4590 lbs x12 in.) = 49,572 lb-in

Add 30% increase due to 13.4.2. ASCE-7-10

Anchorage Force =	1,014	lbs/per bolt
Shear Force =	955	lbs/per bolt

<u>Ganged Paramount/S Series unit Plan</u>



3 ganged units
# of bolts per unit = 2

Design Bolts for 1 lbs tension, 955 lbs. shear, transverse direction

Drawing Reference See: <u>SK-4 & SK-7</u>

Load Case: <u>Ganged Unit on 24" Raised Comp. Flr. (≤ 50% of Bldg. Ht.)</u>

# of Units ganged (max)= 3 Raised Floor = 24 in

Single Unit Dimension					
Width(w) (in) =	24	Edge Length	3	in	Edge length
Depth(D) (in) =	34.5				
Frame Height (in) =	96				
Frame Weight (lb.) =	230				

			Center of Gravity Location		
Unit	**Part**	**Weight (lbs)**	**X (in)**	**Y (in)**	**Z (in)**
3 - Paramount/S Series	Frame +Contents	2,190	66	12	72

Longitudinal Anchorage Spacing (in) = 24
Transverse Anchorage Spacing (in) = 42

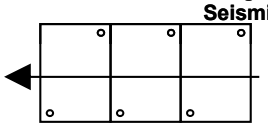
Seismic Force		
S_{DS} =	1.0	Low & Moderate Seismic
I_p =	1.5	(Importance)
a_p =	1.0	(Cabinets)
R_p =	2.5	(Cabinets)
z/h =	0.5	(50% of bldg ht.)
F_p =	0.480	W
$F_{p,min}$ =	0.45	W
$F_{p,max}$ =	2.40	W
Use F_p =	**0.48**	**W**

Longitudinal Overturning

Overturning Moment = 0.48 (72 in. x 2190lbs.) = 75,686 lb-in

0.9xResisting Moment = 0.9 (2190 lbs. x66 in.)= 130,086 lb-in

<u>Ganged Paramount/S Series unit Plan</u>
Longitudinal Seismic Force



Add 30% increase due to 13.4.2. ASCE-7-10

Anchorage Force =	0	lbs/per bolt
Shear Force =	456	lbs/per bolt

3 ganged units
# of bolts per unit = 2

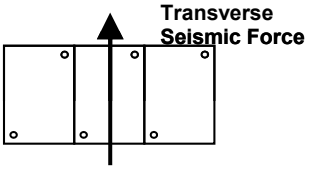
Design Bolts for 0 lbs tension, 456 lbs. shear, longitudinal direction

Transverse Overturning

Overturning Moment = 0.5 (72in. x 2190lbs.) = 75,686 lb-in

0.9xResisting Moment = 0.9 (2190 lbs x12 in.) = 23,652 lb-in

<u>Ganged Paramount/S Series unit Plan</u>
Transverse Seismic Force



Add 30% increase due to 13.4.2. ASCE-7-10

Anchorage Force =	940	lbs/per bolt
Shear Force =	456	lbs/per bolt

3 ganged units
# of bolts per unit = 2

Design Bolts for 940 lbs tension, 456 lbs. shear, transverse direction

Drawing Reference See: <u>SK-4 & SK-9</u>

RMJ

Structural Engineers

Robinson
Meier
Juilly & Associates

Principals
Peter Robinson, S.E.
Jayson E. Haines, S.E.

High Seismic Calculations

Find the Seismic Design Category (SDC) **Unit : Paramount/S Series**

Project Location: High Seismic
Latitude: Varies Longitude: Varies

Soil Classification: D Table 1613.5.2 & Section 1613.5.2
Occupancy Category: II Table 1604.5

Information from U.S. Geological Survey Website
http://earthquake.usgs.gov/research/hazmaps/

S_S=	2.750	g	
S_1=	1.070	g	
F_a=	1.000		Table 1613.5.3(1)
F_v=	1.500		Table 1613.5.3(2)
S_{MS}=	2.75	g	(Equation 16-37)
S_{M1}=	1.61	g	(Equation 16-38)
S_{DS}=	1.833	g	(Equation 16-39)
S_{D1}=	1.070	g	(Equation 16-40)

Seismic Design Category (SDC): Varies

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Job No. : 14107 Date: 01/17/14
By: MAS Page: 24

Load Case: Single Unit (Ground Flr.)

Unit Dimensions			
Width(w) (in) =	24	Edge Length	3 in
Depth(D) (in) =	34.5		
Frame Height (in) =	96		
Unit Weight (lb.) =	230		

			Center of Gravity Location		
Unit	**Part**	**Weight (lbs)**	**X (in)**	**Y (in)**	**Z (in)**
Paramount/S Series	Frame +Contents	1,030	12	12	48

Longitudinal Anchorage Spacing (in) =	24
Transverse Anchorage Spacing (in) =	18

Seismic Force		
S_{DS} =	1.83	High Seismic
I_p =	1.5	(Importance)
a_p =	1.0	(Cabinets)
R_p =	2.5	(Cabinets)
z/h =	0.0	(Ground Floor)
F_p =	0.440	W
$F_{p,min}$ =	0.83	W
$F_{p,max}$ =	4.40	W
Use F_p =	**0.83**	**W**

Longitudinal Overturning

Overturning Moment = 0.83 (48 in. x 1030lbs.) = 40,788 lb-in

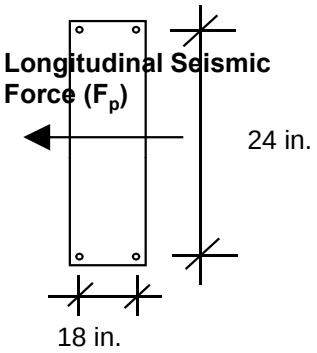
0.9xResisting Moment = 0.9 [(1030 lbs. - Vert. Comp.) x 12in.]= 7,045 lb-in

Vertical Component (0.2*SDS*Wp) = 378 lbs

Total # of Bolts = 4

Anchorage Force =	937	lbs/per bolt
Shear Force =	425	lbs/per bolt

Paramount/S Series unit Plan



Design Bolts for 937 lbs tension, 425 lbs. shear, longitudinal direction

Transverse Overturning

Overturning Moment = 0.83 (48 in. x 1030lbs.) = 40,788 lb-in

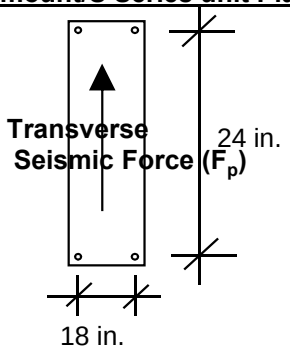
0.9xResisting Moment = 0.9 [(1030 lbs. - Vert. Comp.) x (12in.)]= 7,045 lb-in

Vertical Component (0.2*SDS*Wp) = 378 lbs

Total # of Bolts = 4

Anchorage Force =	703	lbs/per bolt
Shear Force =	425	lbs/per bolt

Paramount/S Series unit Plan



Design Bolts for 703 lbs tension, 425 lbs. shear, longitudinal direction

Drawing Reference See: SK-3 & SK-6

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Load Case: Single Unit on 24" Raised Computer Floor (Ground Flr.)

Unit Dimensions			Raised Floor =	24	in
Width(w) (in) =	24	Edge Length	3	in	
Depth(D) (in) =	34.5				
Frame Height (in) =	96				
Unit Weight (lb.) =	230				

			Center of Gravity Location		
Unit	**Part**	**Weight (lbs)**	**X (in)**	**Y (in)**	**Z (in)**
Paramount/S Series	Frame +Contents	630	12	12	72

Longitudinal Anchorage Spacing (in) = 24

Transverse Anchorage Spacing (in) = 18

Seismic Force		
S_{DS} =	1.83	High Seismic
I_p =	1.5	(Importance)
a_p =	1.0	(Cabinets)
R_p =	2.5	(Cabinets)
z/h =	0.0	(Ground Floor)
F_p =	0.440	W
$F_{p,min}$ =	0.83	W
$F_{p,max}$ =	4.40	W
Use F_p =	**0.83**	**W**

Longitudinal Overturning

Overturning Moment = 0.83 (72 in. x 630lbs.) = 37,422 lb-in

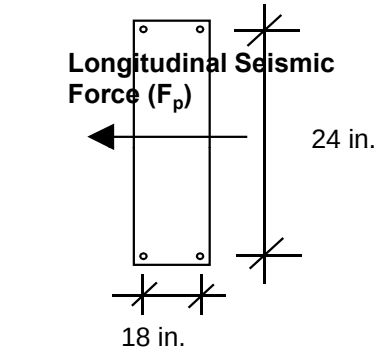
0.9xResisting Moment = 0.9 [(630 lbs. - Vert. Comp.) x (12in.)]= 4,309 lb-in

Vertical Component (0.2*SDS*Wp) = 231 lbs

Total # of Bolts = 4

Anchorage Force =	920	lbs/per bolt
Shear Force =	260	lbs./per bolt

Paramount/S Series unit Plan



Design Bolts for 920 lbs tension, 260 lbs. shear, longitudinal direction

Transverse Overturning

Overturning Moment = 0.83 (72 in. x 630lbs.) = 37,422 lb-in

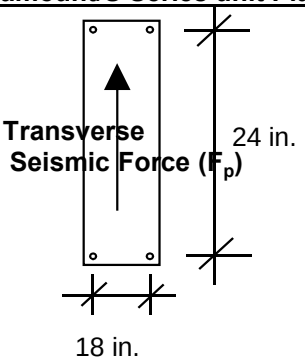
0.9xResisting Moment = 0.9 [(630 lbs. - Vert. Comp.) x (12in)]= 4,309 lb-in

Vertical Component (0.2*SDS*Wp) = 231 lbs

Total # of Bolts = 4

Anchorage Force =	690	lbs/per bolt
Shear Force =	425	lbs/per bolt

Paramount/S Series unit Plan



Design Bolts for 690 lbs tension, 425 lbs. shear, longitudinal direction

Drawing Reference See: SK-3 & SK-9

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Job No. : 14107 Date: 01/17/14
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Load Case: Ganged Unit (Ground Flr.)

# of Units ganged (min)= 3

Single Unit Dimension

Width(w) (in) =	24	Edge Length	3 in
Depth(D) (in) =	34.5		
Frame Height (in) =	96		
Unit Weight (lb.) =	230		

			Center of Gravity Location		
Unit	**Part**	**Weight (lbs)**	**X (in)**	**Y (in)**	**Z (in)**
3 - Paramount/S Series	Frame +Contents	3,990	21	12	48

Seismic Force		
S_{DS} =	1.83	High Seismic
I_p =	1.5	(Importance)
a_p =	1.0	(Cabinets)
R_p =	2.5	(Cabinets)
z/h =	0.0	(Ground Floor)
F_p =	0.440	W
$F_{p,min}$ =	0.83	W
$F_{p,max}$ =	4.40	W
Use F_p =	**0.83**	**W**

Longitudinal Anchorage Spacing (in) = 24
Transverse Anchorage Spacing (in) = 42

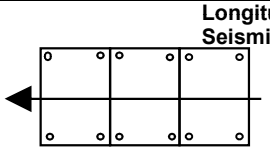
Longitudinal Overturning

Overturning Moment = 0.83 (96/2 in. x 3990lbs.) = 158,004 lb-in

0.9xResisting Moment = 0.9 [(3990 lbs. - Vert. Comp.) x21 in.]= 47,760 lb-in
Vertical Component (0.2*SDS*Wp) = 1,463 lbs

Anchorage Force =	656	lbs/per bolt
Shear Force =	549	lbs/per bolt

Ganged Paramount/S Series unit Plan



3 ganged units
Total # of bolts = 4

Design Bolts for 656 lbs tension, 549 lbs. shear, longitudinal direction

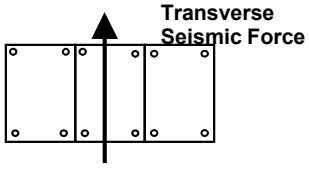
Transverse Overturning

Overturning Moment = 0.83 (96/2 in. x 3990lbs.) = 158,004 lb-in

0.9xResisting Moment = 0.9 [(3990 lbs - Vert. Comp.) x12 in.] = 27,292 lb-in
Vertical Component (0.2*SDS*Wp) = 1,463 lbs

Anchorage Force =	908	lbs/per bolt
Shear Force =	549	lbs/per bolt

Ganged Paramount/S Series unit Plan



3 ganged units
Total # of bolts = 4

Design Bolts for 908 lbs tension, 549 lbs. shear, transverse direction

Drawing Reference See: SK-4 & SK-6

Load Case: <u>Ganged Unit on 24" Raised Comp. Flr. (Ground Flr.)</u>

# of Units ganged (min)= 3

Single Unit Dimension				
Width(w) (in) =	24	Raised Floor =	24	in
Depth(D) (in) =	34.5	Edge Length	3	in
Frame Height (in) =	96			
Unit Weight (lb.) =	230			

			Center of Gravity Location		
Unit	**Part**	**Weight (lbs)**	**X (in)**	**Y (in)**	**Z (in)**
3 - Paramount/S Series	Frame +Contents	2,490	21	12	72

Longitudinal Anchorage Spacing (in) =	24
Transverse Anchorage Spacing (in) =	57

Seismic Force		
S_{DS} =	1.83	High Seismic
I_p =	1.5	(Importance)
a_p =	1.0	(Cabinets)
R_p =	2.5	(Cabinets)
z/h =	0.0	(Ground Floor)
F_p =	0.440	W
$F_{p,min}$ =	0.83	W
$F_{p,max}$ =	4.40	W
Use F_p =	**0.83**	**W**

Longitudinal Overturning

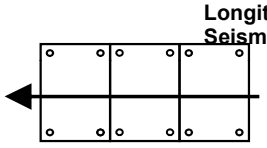
Overturning Moment = 0.8 (72 in. x 2490lbs.) = 147,906 lb-in

0.9xResisting Moment = 0.9 [(2490 lbs. - Vert. Comp.) x21 in.]= 29,805 lb-in

Vertical Component (0.2*SDS*Wp) = 913 lbs

Anchorage Force =	518	lbs/per bolt
Shear Force =	342	lbs/per bolt

<u>Ganged Paramount/S Series unit Plan</u>



3 ganged units

# of bolts per unit = 4

Design Bolts for 518 lbs tension, 342 lbs. shear, longitudinal direction

Transverse Overturning

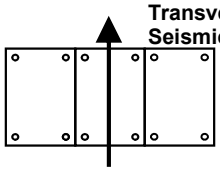
Overturning Moment = 0.8 (72in. x 2490lbs.) = 147,906 lb-in

0.9xResisting Moment = 0.9 [(2490 lbs - Vert. Comp.) x12 in.] = 17,032 lb-in

Vertical Component (0.2*SDS*Wp) = 913 lbs

Anchorage Force =	909	lbs/per bolt
Shear Force =	342	lbs/per bolt

<u>Ganged Paramount/S Series unit Plan</u>



3 ganged units

# of bolts per unit = 4

Design Bolts for 909 lbs tension, 342 lbs. shear, longitudinal direction

Drawing Reference See: <u>SK-5 & SK-9</u>

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Job No. : 14107 Date: 01/17/14
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Load Case: ***Single Unit (≤ 50% of Bldg. Ht.)***
(i.e. 2nd floor of a 4 story building or 4th floor of an 8 story building)

Unit Dimensions

Width(w) (in) =	24	Edge Length	3 in
Depth(D) (in) =	34.5		
Frame Height (in) =	96		
Unit Weight (lb.) =	230		

			Center of Gravity Location		
Unit	**Part**	**Weight (lbs)**	**X (in)**	**Y (in)**	**Z (in)**
Paramount/S Series	Frame +Contents	730	12	12	48

Longitudinal Anchorage Spacing (in) = 24
Transverse Anchorage Spacing (in) = 18

Seismic Force

S_{DS} =	1.83	High Seismic
I_p =	1.5	(Importance)
a_p =	1.0	(Cabinets)
R_p =	2.5	(Cabinets)
z/h =	0.5	(50% of bldg ht.)
F_p =	0.880	W
$F_{p,min}$ =	0.83	W
$F_{p,max}$ =	4.40	W
Use F_p =	**0.88**	**W**

Longitudinal Overturning

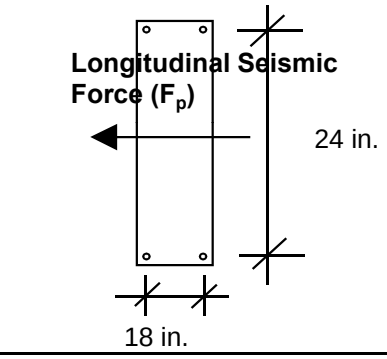
Overturning Moment = 0.88 (48 in. x 730lbs.) = 30,835 lb-in

0.9xResisting Moment = 0.9 [(730 lbs. - Vert. Comp.) x (9in.)]= 4,993 lb-in
Vertical Component (0.2*SDS*Wp) = 268 lbs

Total # of Bolts = 4

Anchorage Force =	718	lbs/per bolt
Shear Force =	321	lbs/per bolt

Paramount/S Series unit Plan



Design Bolts for 718 lbs tension, 321 lbs. shear, longitudinal direction

Transverse Overturning

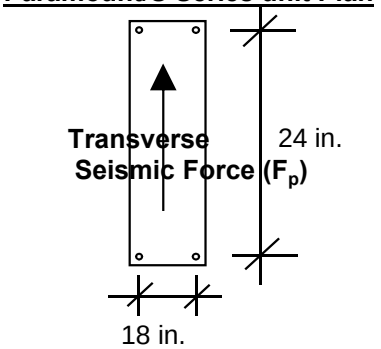
Overturning Moment = 0.88 (48 in. x 730lbs.) = 30,835 lb-in

0.9xResisting Moment = 0.9 [(730 lbs. - Vert. Comp.) x (12in)]= 4,993 lb-in
Vertical Component (0.2*SDS*Wp) = 268 lb-in

Total # of Bolts = 4

Anchorage Force =	538	lbs/per bolt
Shear Force =	321	lbs/per bolt

Paramount/S Series unit Plan



Design Bolts for 538 lbs tension, 321 lbs. shear, longitudinal direction

Drawing Reference See: SK-3 & SK-7

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High Seismic

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Load Case: ***Single Unit on 24" Raised Comp. Flr. (≤ 50% of Bldg. Ht.)***
(i.e. 2nd floor of a 4 story building or 4th floor of an 8 story building)

Unit Dimensions					
Width(w) (in) =	24	Raised Floor =	24	in	
Depth(D) (in) =	34.5	Edge Length	3	in	
Frame Height (in) =	96				
Frame Weight (lb) =	230				

			Center of Gravity Location		
Unit	**Part**	**Weight (lbs)**	**X (in)**	**Y (in)**	**Z (in)**
Paramount/S Series	Frame +Contents	530	12	12	72

Longitudinal Anchorage Spacing (in) = 24

Transverse Anchorage Spacing (in) = 18

Seismic Force		
S_{DS} =	1.83	High Seismic
I_p =	1.5	(Importance)
a_p =	1.0	(Cabinets)
R_p =	2.5	(Cabinets)
z/h =	0.5	(50% of bldg ht.)
F_p =	0.880	W
$F_{p,min}$ =	0.83	W
$F_{p,max}$ =	4.40	W
Use F_p =	**0.88**	**W**

Longitudinal Overturning

Overturning Moment = 0.88 (72 in. x 530lbs.) = 33,581 lb-in

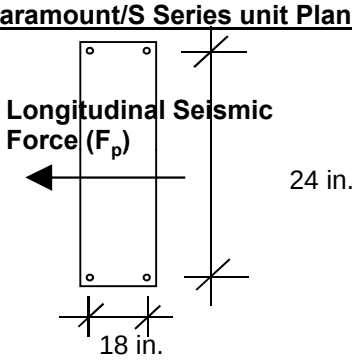
0.9xResisting Moment = 0.9 [(530 lbs. - Vert. Comp.) x (12in)]= 3,625 lb-in

Vertical Component (0.2*SDS*Wp) = 194 lbs

Total # of Bolts = 4

Anchorage Force =	832	lbs/per bolt
Shear Force =	425	lbs/per bolt

Paramount/S Series unit Plan



Design Bolts for 832 lbs tension, 425 lbs. shear, longitudinal direction

Transverse Overturning

Overturning Moment = 0.88 (72 in. x 530lbs.) = 33,581 lb-in

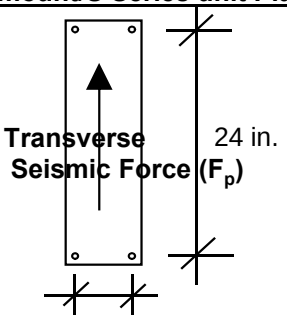
0.9xResisting Moment = 0.9 [(530 lbs. - Vert. Comp.) x (12in.)]= 3,625 lb-in

Vertical Component (0.2*SDS*Wp*12in) = 194 lb-in

Total # of Bolts = 4

Anchorage Force =	624	lbs/per bolt
Shear Force =	425	lbs/per bolt

Paramount/S Series unit Plan



Design Bolts for 624 lbs tension, 425 lbs. shear, longitudinal direction

Drawing Reference See: SK-3 & SK-8

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Load Case: <u>Ganged Unit (≤ 50% of Bldg. Ht.)</u>

# of Units ganged (min)= 3

Single Unit Dimension

Width(w) (in) =	24	Edge Length	3	in
Depth(D) (in) =	34.5			
Frame Height (in) =	96			
Unit Weight (lb.) =	230			

			Center of Gravity Location		
Unit	**Part**	**Weight (lbs)**	**X (in)**	**Y (in)**	**Z (in)**
3 - Paramount/S Series	Frame +Contents	2,790	21	12	48

Seismic Force		
S_{DS} =	1.83	High Seismic
I_p =	1.5	(Importance)
a_p =	1.0	(Cabinets)
R_p =	2.5	(Cabinets)
z/h =	0.5	(50% of bldg ht.)
F_p =	0.880	W
$F_{p,min}$ =	0.83	W
$F_{p,max}$ =	4.40	W
Use F_p =	**0.88**	**W**

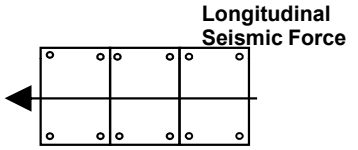
Longitudinal Anchorage Spacing (in) = 24
Transverse Anchorage Spacing (in) = 57

Longitudinal Overturning

Overturning Moment = 0.88 (96/2 in. x 2790lbs.) = 117,850 lb-in

0.9xResisting Moment = 0.9 [(2790 lbs. - Vert. Comp.) x21 in.]= 33,396 lb-in
Vertical Component (0.2*SDS*Wp) = 1,023 lbs

<u>Ganged Paramount/S Series unit Plan</u>



3 ganged units

Anchorage Force =	370	lbs
Shear Force =	585	lbs/per bolt

# of bolts per unit = 4

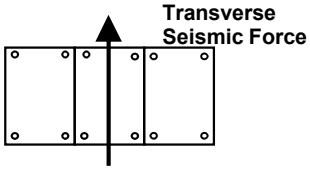
Design Bolts for 370 lbs tension, 585 lbs. shear, longitudinal direction

Transverse Overturning

Overturning Moment = 0.88 (96/2 in. x 2790lbs.) = 117,850 lb-in

0.9xResisting Moment = 0.9 [(2790 lbs - Vert. Comp.) x12 in.] = 19,084 lb-in
Vertical Component (0.2*SDS*Wp) = 1,023 lbs

<u>Ganged Paramount/S Series unit Plan</u>



3 ganged units

Anchorage Force =	686	lbs/per bolt
Shear Force =	409	lbs/per bolt

# of bolts per unit = 4

Design Bolts for 686 lbs tension, 409 lbs. shear, longitudinal direction

Drawing Reference See: <u>SK-4 & SK-7</u>

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Job No. : 14107 Date: 01/17/14
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Load Case: <u>Ganged Unit on 24" Raised Comp. Flr. (≤ 50% of Bldg. Ht.)</u>

# of Units ganged (min)= 3

Single Unit Dimension					
Width(w) (in) =	24	Raised Floor =	24	in	
Depth(D) (in) =	34.5	Edge Length	3	in	
Frame Height (in) =	96				
Frame Weight (lb.) =	230				

			Center of Gravity Location		
Unit	**Part**	**Weight (lbs)**	**X (in)**	**Y (in)**	**Z (in)**
3 - Paramount/S Series	Frame +Contents	1,590	21	12	72

Longitudinal Anchorage Spacing (in) = 24

Transverse Anchorage Spacing (in) = 57

Seismic Force		
S_{DS} =	1.83	High Seismic
I_p =	1.5	(Importance)
a_p =	1.0	(Cabinets)
R_p =	2.5	(Cabinets)
z/h =	0.5	(50% of bldg ht.)
F_p =	0.880	W
$F_{p,min}$ =	0.83	W
$F_{p,max}$ =	4.40	W
Use F_p =	**0.88**	**W**

Longitudinal Overturning

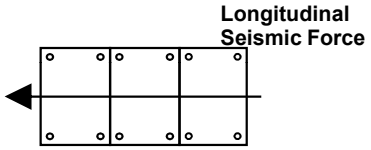
Overturning Moment = 0.88 (72 in. x 1590lbs.) = 100,742 lb-in

0.9xResisting Moment = 0.9 (1590 lbs. x21 in.)= 30,051 lb-in

Vert. Comp. (0.2*SDS*Wp) (To be Resisted my 2 Center Bolts)= 583 lbs

Anchorage Force =	310	lbs/per bolt
Shear Force =	585	lbs/per bolt

<u>Ganged Paramount/S Series unit Plan</u>



3 ganged units

# of bolts per unit = 4

Design Bolts for 310 lbs tension, 585 lbs. shear, longitudinal direction

Transverse Overturning

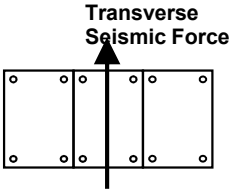
Overturning Moment = 0.9 (72in. x 1590lbs.) = 100,742 lb-in

0.9xResisting Moment = 0.9 [(1590 lbs - Vert. Comp.) x12 in.] = 10,876 lb-in

Vertical Component (0.2*SDS*Wp) = 583 lb-in

Anchorage Force =	624	lbs/per bolt
Shear Force =	233	lbs/per bolt

<u>Ganged Paramount/S Series unit Plan</u>



3 ganged units

# of bolts per unit = 4

Design Bolts for 624 lbs tension, 233 lbs. shear, longitudinal direction

Drawing Reference See: <u>SK-5 & SK-8</u>

RMJ

Structural Engineers

Robinson
Meier
Juilly & Associates

Principals
Peter Robinson, S.E.
Jayson E. Haines, S.E.

Drawing Details

GENERAL NOTES

DESIGN

Design conforms to the International Building Code, 2012 & the California Building Code, 2013 Edition.

Design Criteria:
Importance Factor 1.5
Seismic Design Category (SDC).... VARIES
Maximum Value of Ss..... 2.75

Dimensions: Refer to rough concrete surfaces, face of studs, face of conc. block, top of sheathing, or top of slab, unless otherwise indicated.

Typical Details: Details and notes on these sheets shall apply unless specifically shown or noted otherwise. Construction details not fully shown or noted shall be similar to details for similar conditions. All work and construction shall comply with all applicable building codes, regulations, and safety requirements.

Discrepancies: The Contractor shall inform the Architect in writing, during the bidding period, of any discrepancies or omissions noted on the drawings or in the specifications, or of any variations needed in order to conform to codes, rules, and regulations. Upon receipt of such information, the Architect will send written instructions to all concerned. Any such discrepancy, omission, or variation not reported shall be the responsibility of the Contractor, and work shall be performed in a manner as directed by the Architect.

EXISTING CONSTRUCTION

Existing construction shown on the drawings was obtained from existing drawings or field surveys. The Contractor shall verify all existing conditions and shall notify the Architect of all exceptions before proceeding with the work. The removal, cutting, drilling, etc. of existing work shall be performed with great care and small tools in order not to jeopardize the structural integrity of the building. If existing structural members, not indicated for removal, interfere with the new work, the Structural Engineer shall be notified immediately, and approval obtained, before removal of the existing members.

FASTENERS

Wedge Anchors: Hilti Kwik Bolt Wedge Anchor, types as indicated per ICBO evaluation report No. 1917 or by manufacture having current ICBO evaluation report with values Iin shear and tension) equal or greater.

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EATON PARAMOUNT/
S SERIES UNIT ANCHORAGE

ALL SEISMIC REGIONS

Signed by MAS Date 01/2014

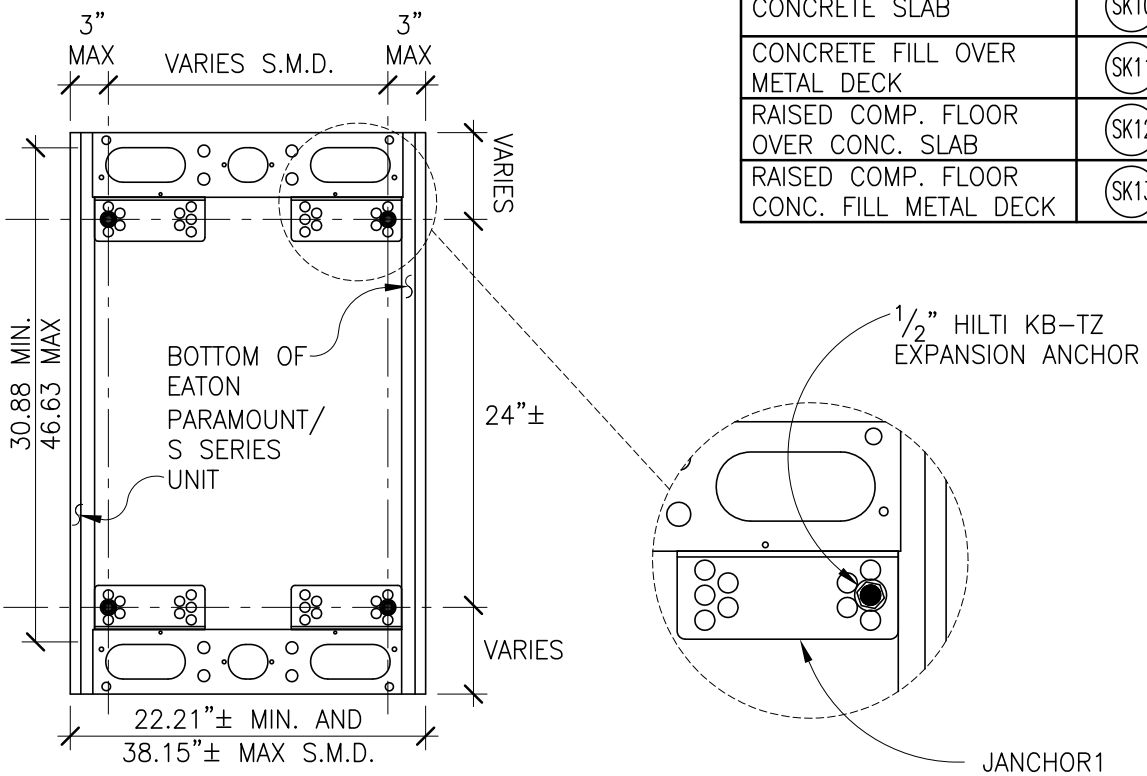
Job No. 14107

Sheet No. SK1

NOTES:
* POSITION BOLTS IN OUTER OR UPPER HALF OF SLOTTED BOLT HOLES WHERE APPLICABLE
*SEE MANUFACTURERS DRAWINGS FOR EXACT DIMENSIONS AND SIZE OF PARAMOUNT UNITS

CONDITION SCHEDULE

CONDITION	SEE
CONCRETE SLAB	SK6
CONCRETE FILL OVER METAL DECK	SK7
RAISED COMP. FLOOR CONC. SLAB	SK8
RAISED COMP. FLOOR CONC. FILL METAL DECK	SK9
CONCRETE SLAB	SK10
CONCRETE FILL OVER METAL DECK	SK11
RAISED COMP. FLOOR OVER CONC. SLAB	SK12
RAISED COMP. FLOOR CONC. FILL METAL DECK	SK13



SINGLE UNIT BOTTOM PLAN VIEW

PLAN 1 / SK3
1"=1'-0"

NOTE:

FOR THE TOTAL NUMBER OF BOLT SEE FLOWCHART & DETAIL

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EATON PARAMOUNT/ S SERIES UNIT ANCHORAGE

ALL SEISMIC REGIONS

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Job No. 14107

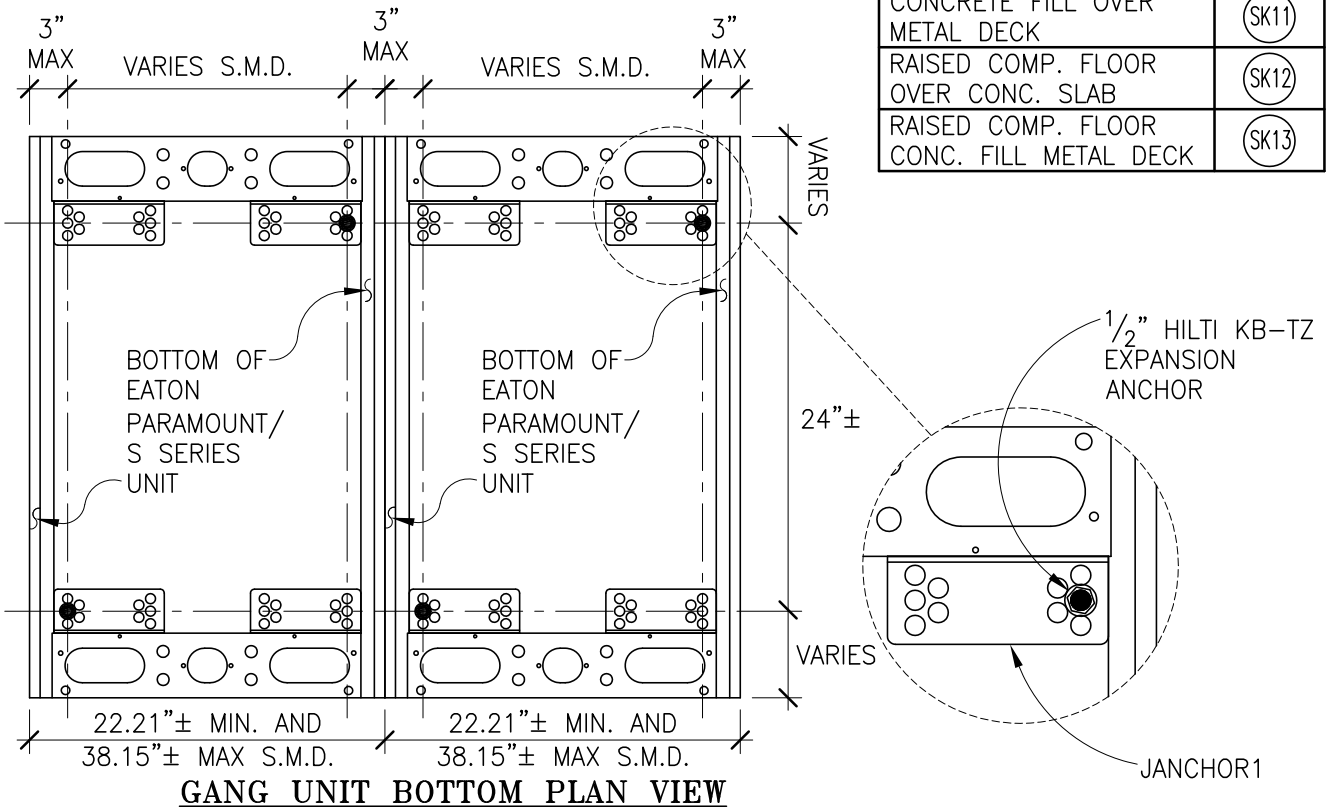
Sheet No. SK3

NOTES:
* POSITION BOLTS IN OUTER OR UPPER HALF OF SLOTTED BOLT HOLES WHERE APPLICABLE
*SEE MANUFACTURERS DRAWINGS FOR EXACT DIMENSIONS AND SIZE OF PARAMOUNT UNITS

SPECIAL NOTE:
TWO UNITS SHOWN GANGED THREE UNITS MINIMUM REQUIRED.

CONDITION SCHEDULE

CONDITION	SEE
CONCRETE SLAB	SK6
CONCRETE FILL OVER METAL DECK	SK7
RAISED COMP. FLOOR CONC. SLAB	SK8
RAISED COMP. FLOOR CONC. FILL METAL DECK	SK9
CONCRETE SLAB	SK10
CONCRETE FILL OVER METAL DECK	SK11
RAISED COMP. FLOOR OVER CONC. SLAB	SK12
RAISED COMP. FLOOR CONC. FILL METAL DECK	SK13



GANG UNIT BOTTOM PLAN VIEW
(3 UNITS MIN. GANGED TOGETHER)

PLAN 1/SK4
1"=1'-0"

NOTE:

FOR THE TOTAL NUMBER OF BOLT SEE FLOWCHART & DETAIL

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EATON PARAMOUNT/ S SERIES UNIT ANCHORAGE

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Job No. 14107

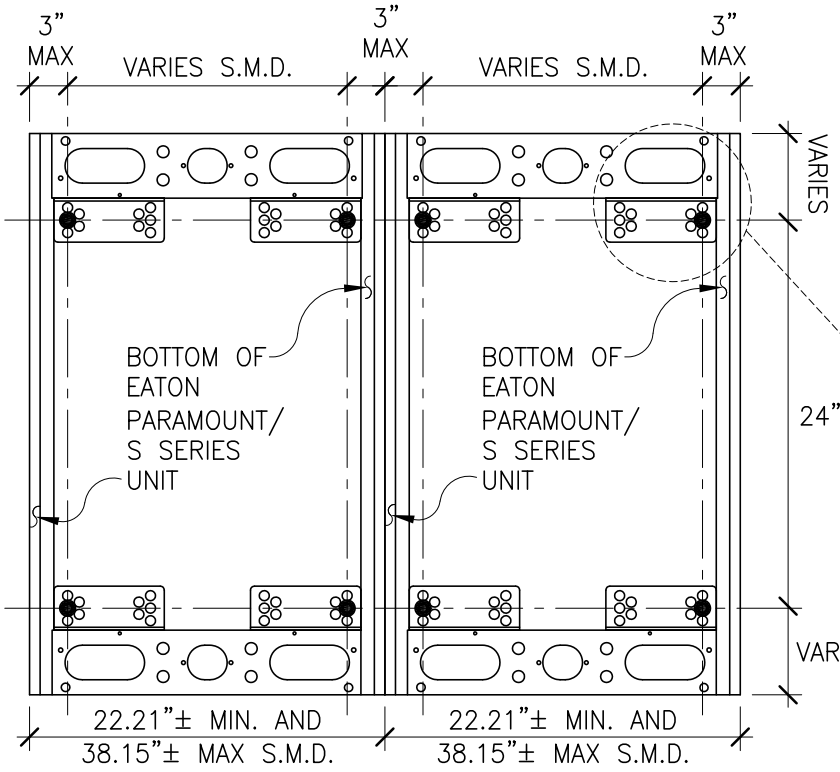
Sheet No. SK4

NOTES:
* POSITION BOLTS IN OUTER OR UPPER HALF OF SLOTTED BOLT HOLES WHERE APPLICABLE
*SEE MANUFACTURERS DRAWINGS FOR EXACT DIMENSIONS AND SIZE OF PARAMOUNT UNITS

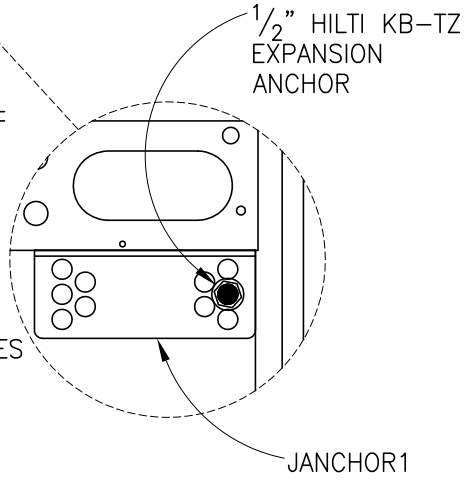
SPECIAL NOTE:
TWO UNITS SHOWN GANGED THREE UNITS MINIMUM REQUIRED.

CONDITION SCHEDULE

CONDITION	SEE
CONCRETE SLAB	SK6
CONCRETE FILL OVER METAL DECK	SK7
RAISED COMP. FLOOR CONC. SLAB	SK8
RAISED COMP. FLOOR CONC. FILL METAL DECK	SK9
CONCRETE SLAB	SK10
CONCRETE FILL OVER METAL DECK	SK11
RAISED COMP. FLOOR OVER CONC. SLAB	SK12
RAISED COMP. FLOOR CONC. FILL METAL DECK	SK13



GANG UNIT BOTTOM PLAN VIEW
(3 UNITS MIN. GANGED TOGETHER)



FOR SINGLE UNIT SEE SK1

PLAN 1
1"=1'-0" SK5

NOTE:

FOR THE TOTAL NUMBER OF BOLTS SEE FLOWCHART & DETAIL

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EATON PARAMOUNT/ S SERIES UNIT ANCHORAGE

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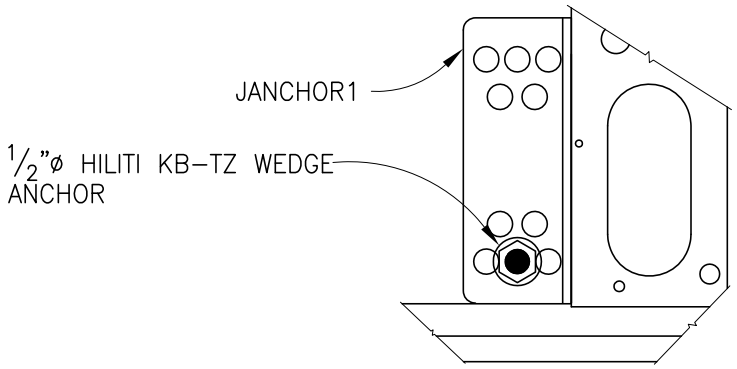
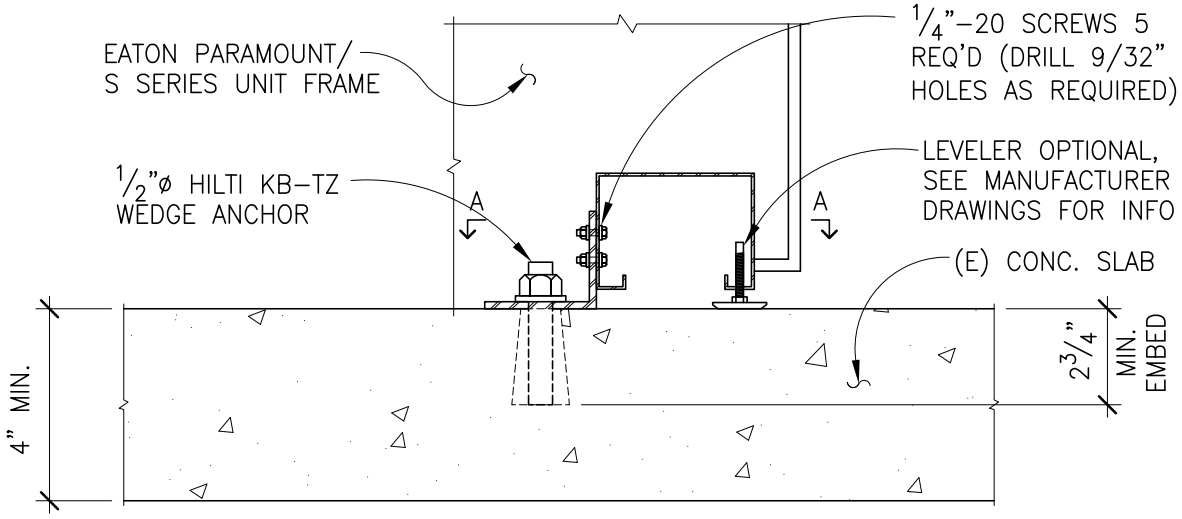
Job No. 14107

Sheet No. SK5



SECTION A-A



CONCRETE SLAB INSTALLATION

DETAIL 1 / SK6

3"=1'-0"

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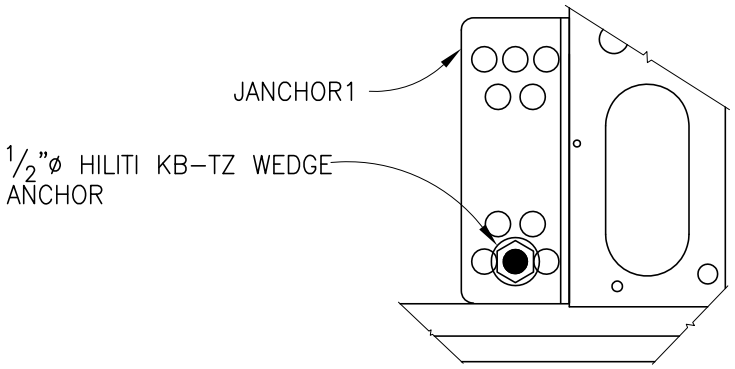
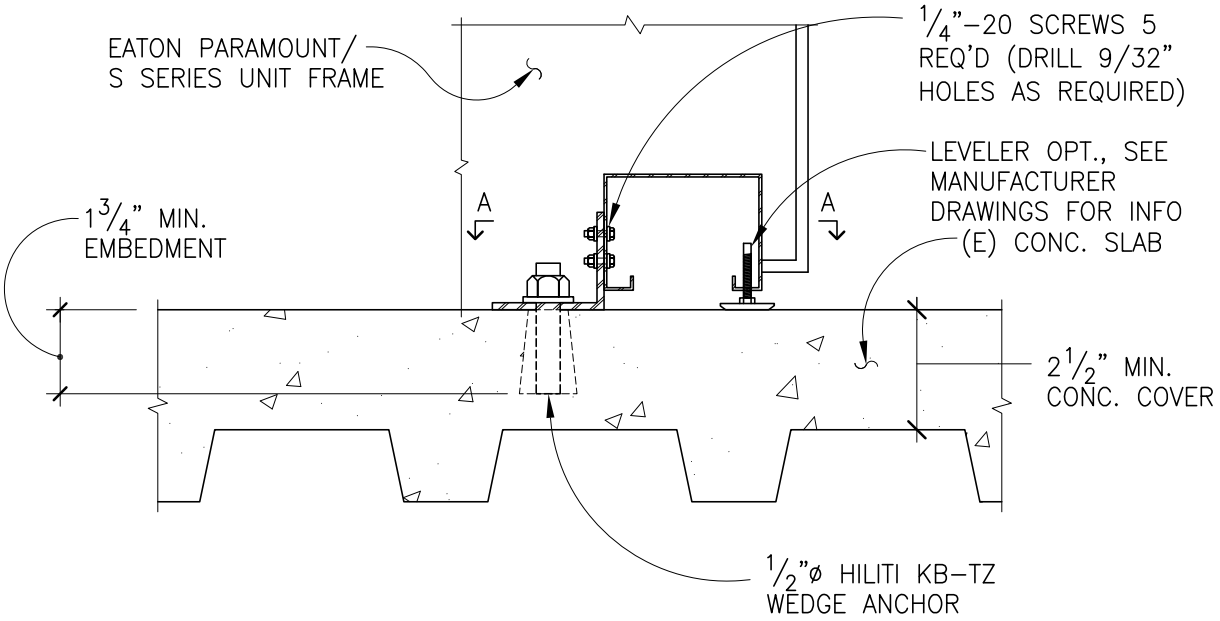


SECTION A-A



CONCRETE FILL OVER METAL DECK INSTALLATION

DETAIL 1/SK7

3"=1'-0"

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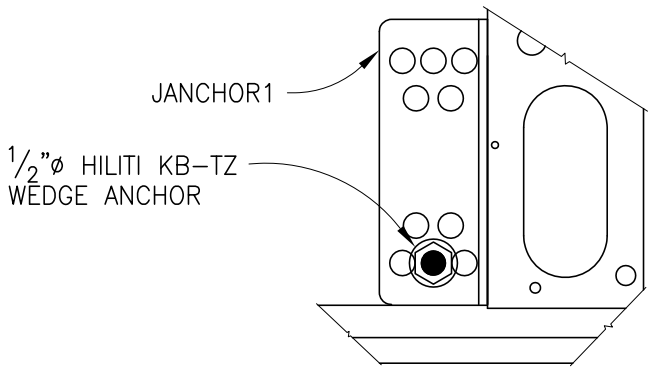
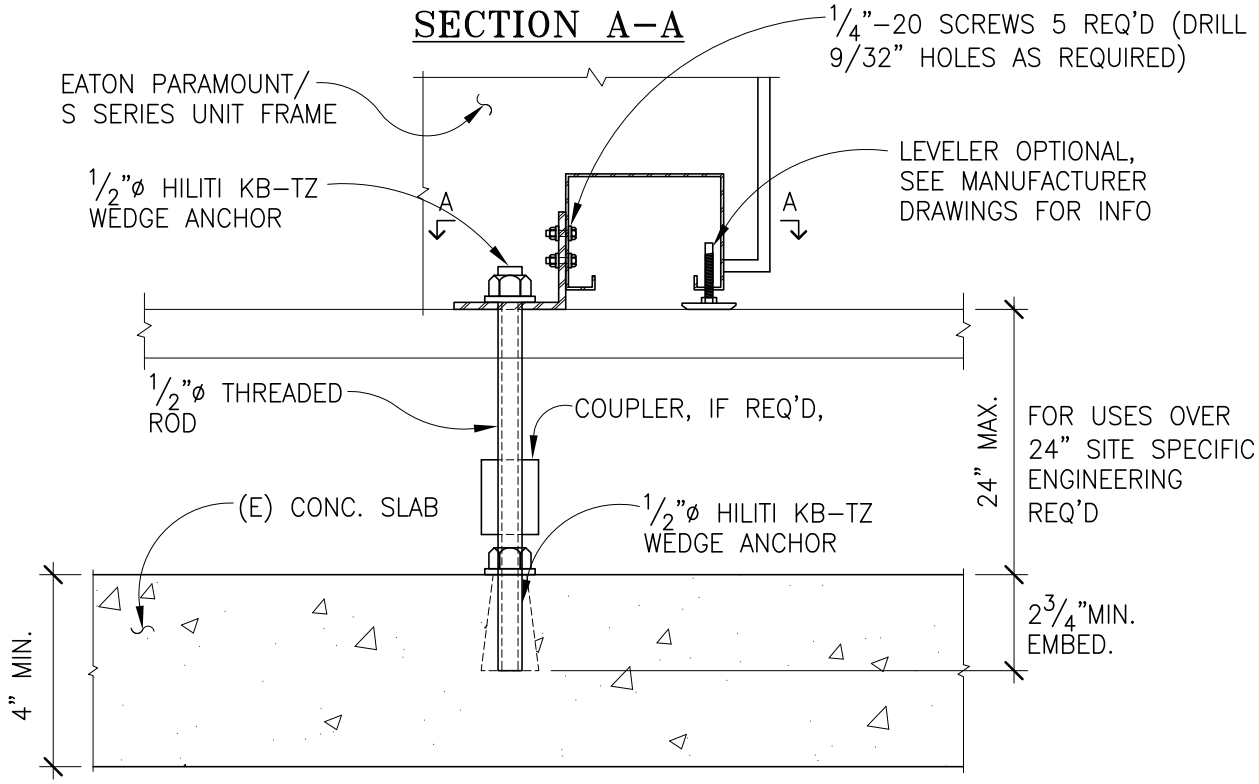


SECTION A-A



RAISED COMPUTER FLOOR OVER CONC. SLAB INSTALLATION

DETAIL 1 / SK8

3"=1'-0"

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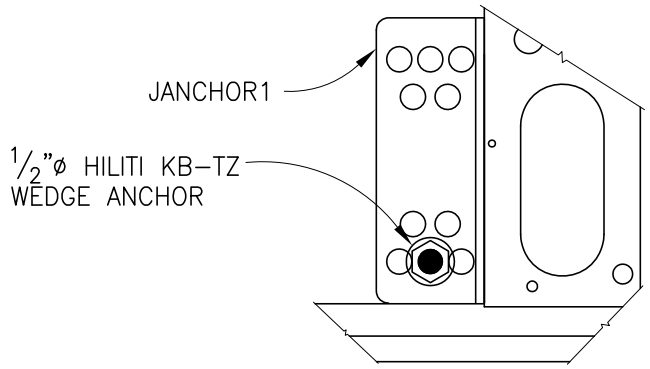
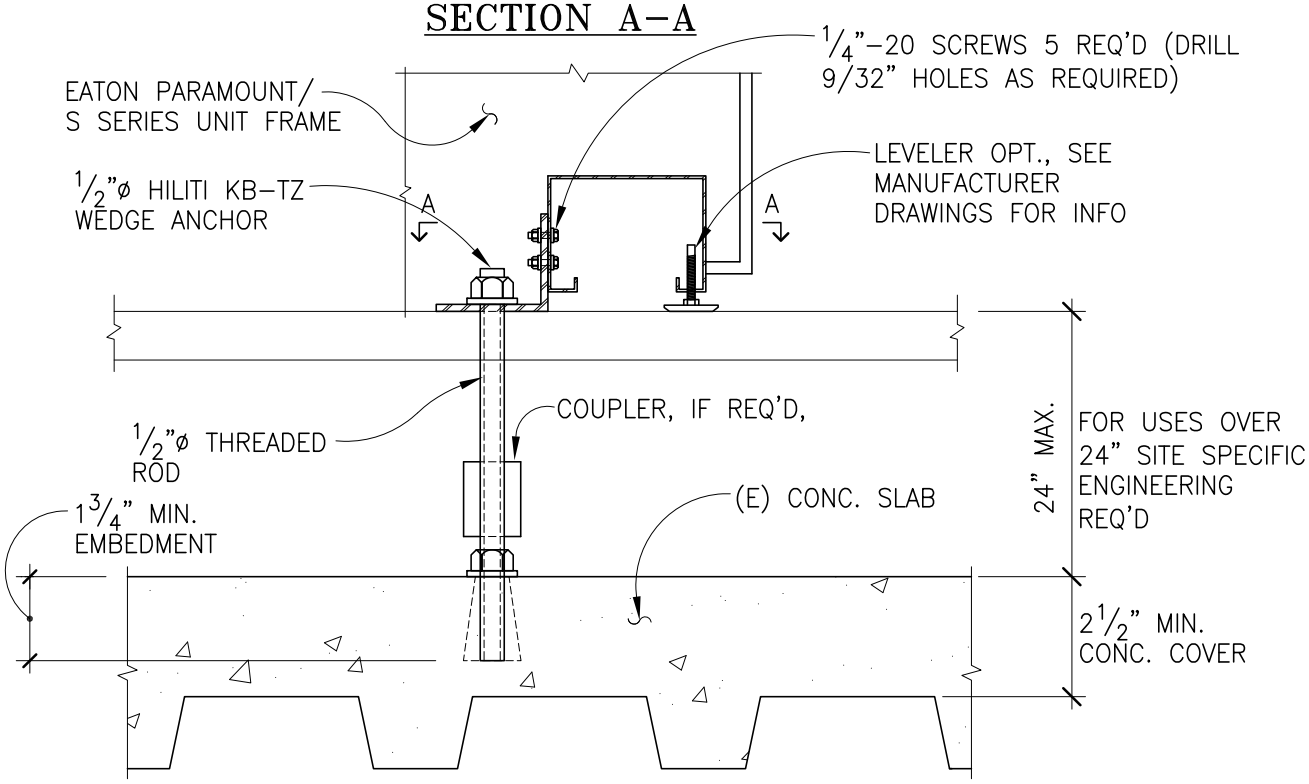


SECTION A-A



RAISED COMPUTER FLOOR OVER CONC. FILLED METAL DECK INSTALLATION

DETAIL 1/SK9

3"=1'-0"

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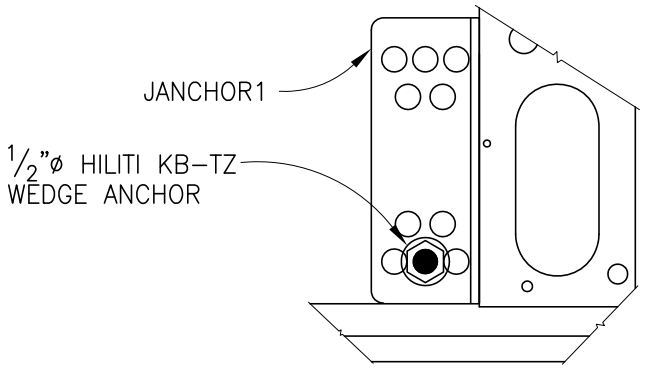
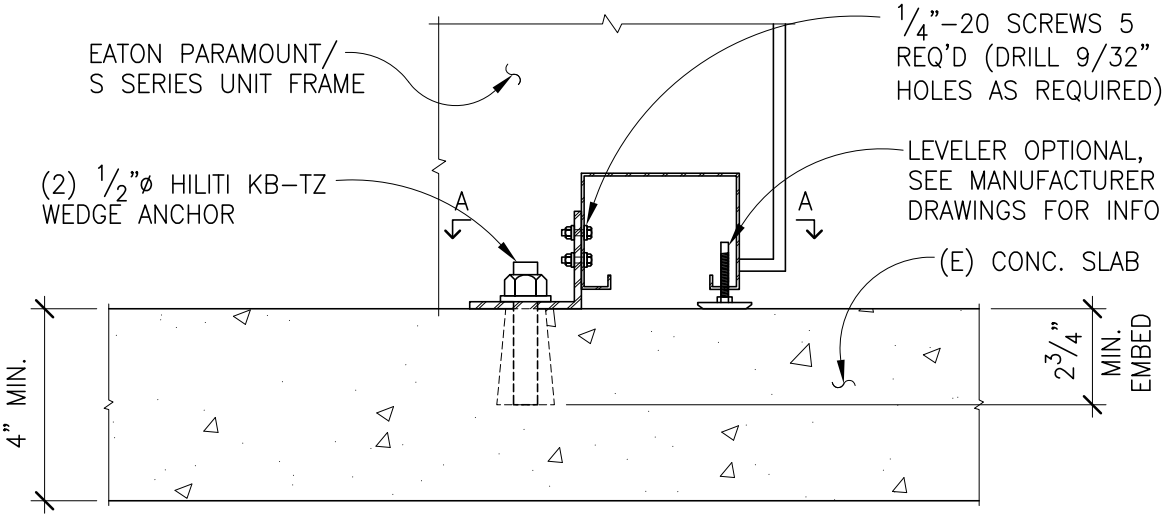


SECTION A-A



CONCRETE SLAB INSTALLATION

DETAIL 1/SK10

3"=1'-0"

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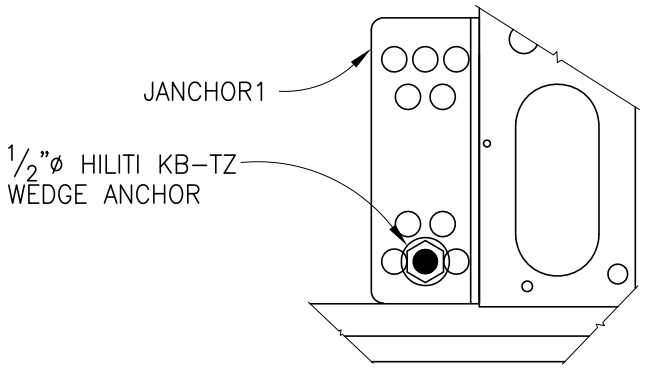
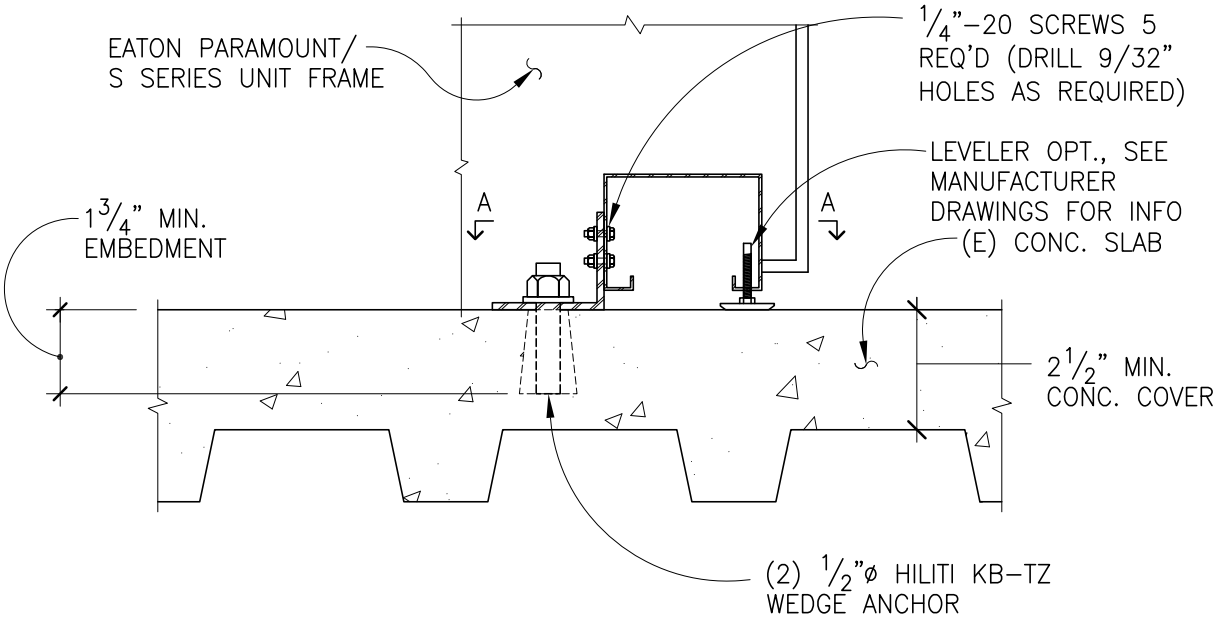


SECTION A-A



CONCRETE FILL OVER METAL DECK INSTALLATION

DETAIL 1/SK11

3"=1'-0"

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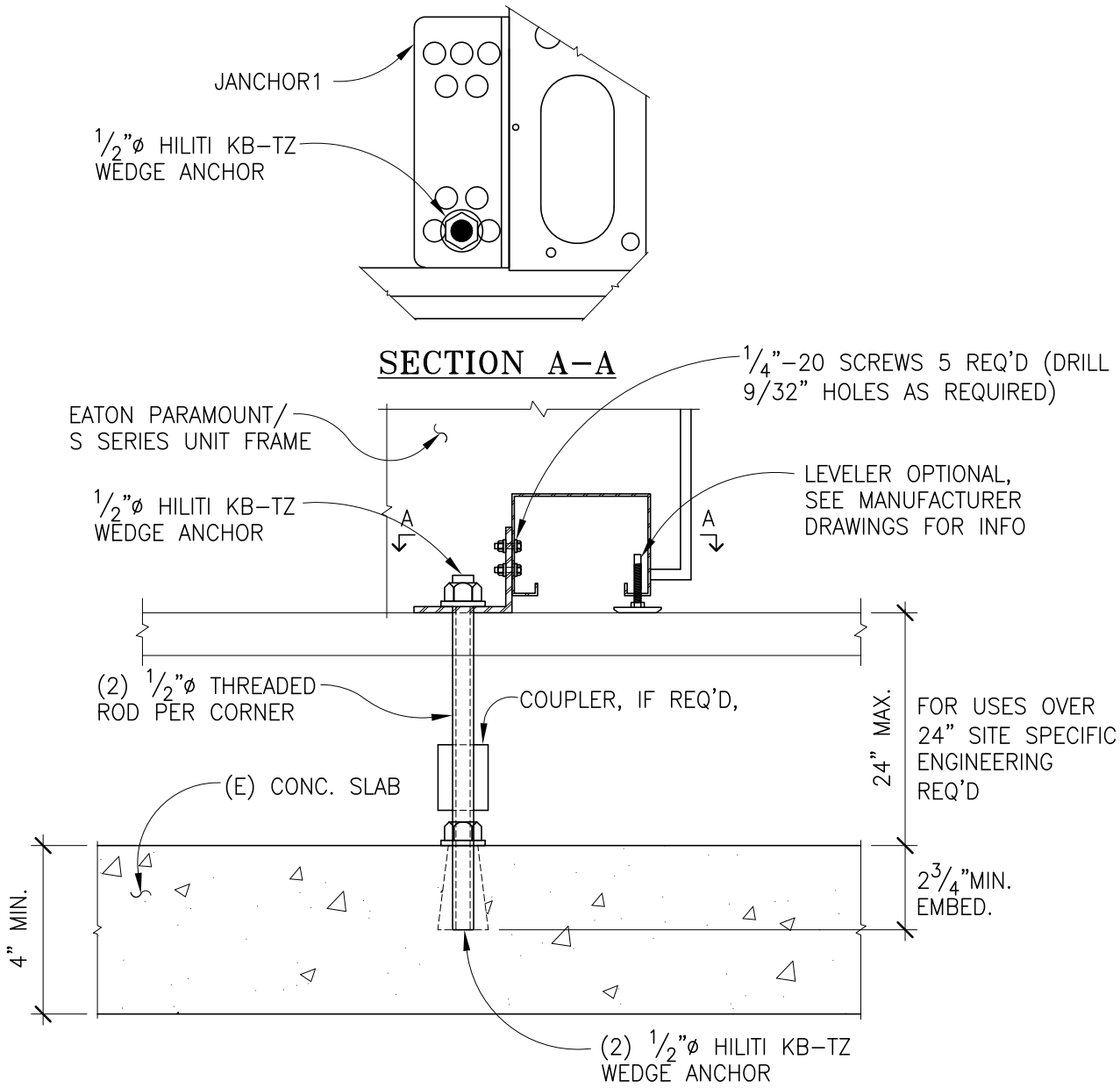
	ALL SEISMIC REGIONS	Sheet No. SK11
	Signed by MAS Date 01/2014	

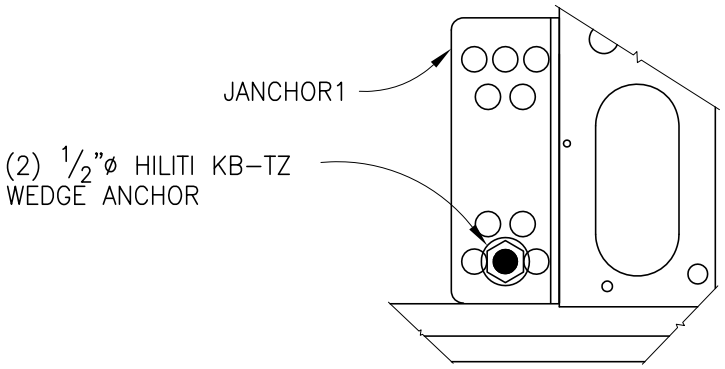


RAISED COMPUTER FLOOR OVER CONC. SLAB INSTALLATION

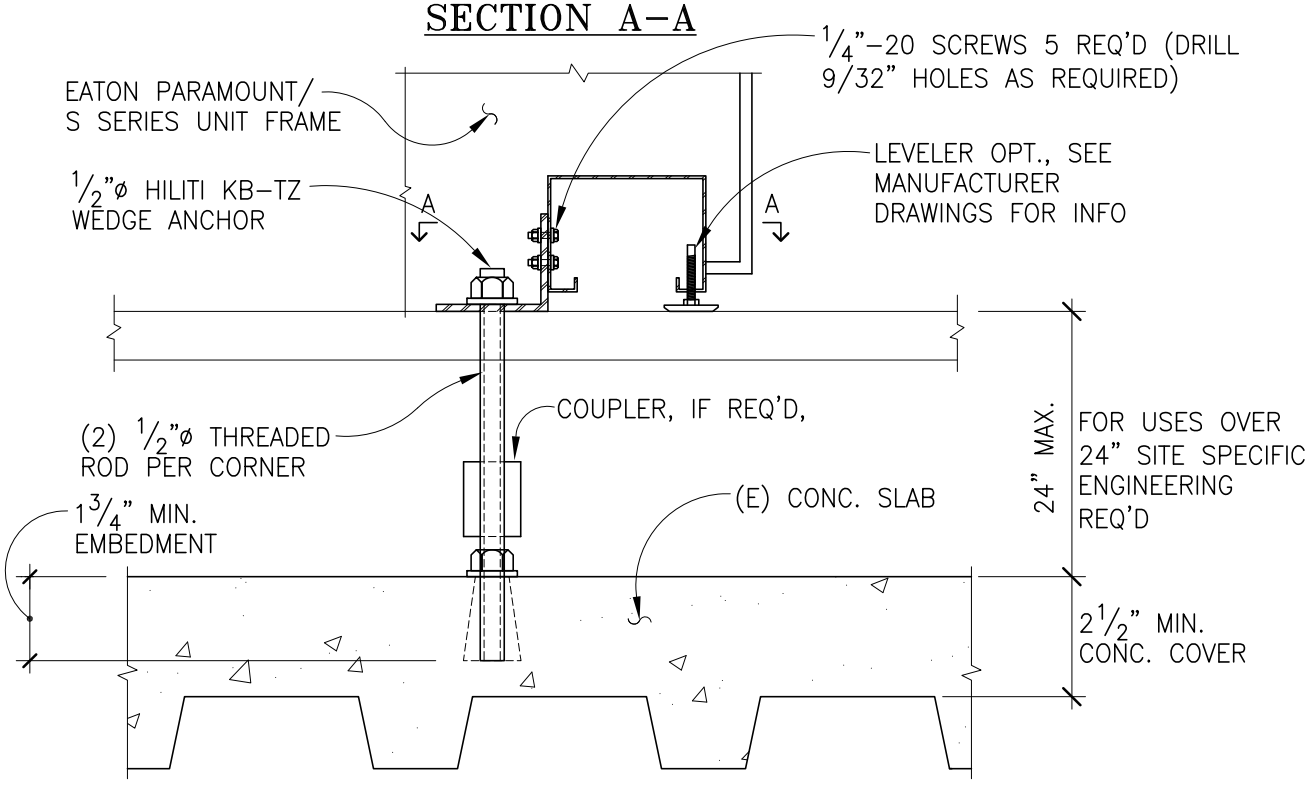
DETAIL 1/SK12

3"=1'-0"

RMJ Robinson Meier Juilly & Associates Structural Engineers 241 Joaquin Ave. San Leandro, CA 94577 510 991·0977	EATON PARAMOUNT/ S SERIES UNIT ANCHORAGE	Job No. 14107
	ALL SEISMIC REGIONS	Sheet No. SK12
	Signed by MAS Date 01/2014	



SECTION A-A



RAISED COMPUTER FLOOR OVER CONC. FILLED METAL DECK INSTALLATION

DETAIL 1 / SK13

3"=1'-0"

RMJ Robinson Meier Juilly & Associates Structural Engineers 241 Joaquin Ave. San Leandro, CA 94577 510 991·0977	EATON PARAMOUNT/ S SERIES UNIT ANCHORAGE ALL SEISMIC REGIONS Signed by MAS Date 01/2014	Job No. 14107 Sheet No. SK13

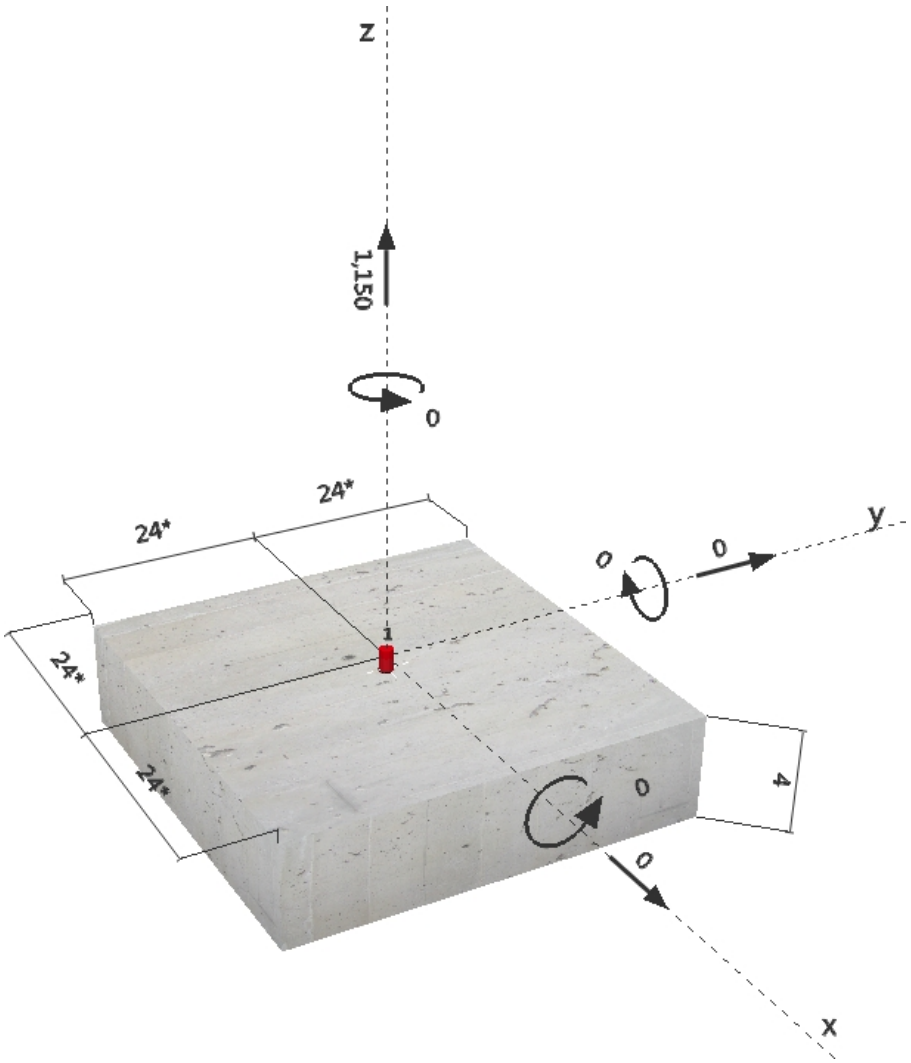
Company:	RMJ	Page:	1
Specifier:	mario	Project:	Eaton
Address:	241 Joaquin Ave.	Sub-Project I Pos. No.:	14107
Phone I Fax:	510.991.0977 |	Date:	1/16/2014
E-Mail:	msigala@rmjse.com		

Specifier's comments: Tension

1 Input data

Anchor type and diameter:	**Kwik Bolt TZ - CS 1/2 (2)**
Effective embedment depth:	$h_{ef,act}$ = 2.000 in., h_{nom} = 2.375 in.
Material:	Carbon Steel
Evaluation Service Report:	ESR-1917
Issued I Valid:	5/1/2013 | 5/1/2015
Proof:	design method ACI 318-11 / Mech.
Stand-off installation:	- (Recommended plate thickness: not calculated)
Profile:	no profile
Base material:	cracked concrete, 2500, f_c' = 2500 psi; h = 4.000 in.
Installation:	hammer drilled hole, installation condition: dry
Reinforcement:	tension: condition B, shear: condition B; no supplemental splitting reinforcement present edge reinforcement: none or < No. 4 bar
Seismic loads (cat. C, D, E, or F)	Tension load: yes (D.3.3.4.3 (c)) Shear load: yes (D.3.3.5.3 (b))

Geometry [in.] & Loading [lb, in.lb]



Company: RMJ
Specifier: mario
Address: 241 Joaquin Ave.
Phone I Fax: 510.991.0977 |
E-Mail: msigala@rmjse.com

2 Load case/Resulting anchor forces

Load case: Design loads

Anchor reactions [lb]
Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	1150	0	0	0

max. concrete compressive strain: - [‰]
max. concrete compressive stress: - [psi]
resulting tension force in (x/y)=(0.000/0.000): 0 [lb]
resulting compression force in (x/y)=(0.000/0.000): 0 [lb]

3 Tension load

	Load N_{ua} [lb]	Capacity ϕN_n [lb]	Utilization $\beta_N = N_{ua}/\phi N_n$	Status
Steel Strength*	1150	8029	15	OK
Pullout Strength*	N/A	N/A	N/A	N/A
Concrete Breakout Strength**	1150	1172	99	OK

* anchor having the highest loading **anchor group (anchors in tension)

3.1 Steel Strength

N_{sa} = ESR value refer to ICC-ES ESR-1917
$\phi N_{steel} \geq N_{ua}$ ACI 318-11 Table D.4.1.1

Variables

n	$A_{se,N}$ [in.^{2}]	f_{uta} [psi]
1	0.10	106000

Calculations

N_{sa} [lb]
10705

Results

N_{sa} [lb]	ϕ_{steel}	ϕN_{sa} [lb]	N_{ua} [lb]
10705	0.750	8029	1150

Company:	RMJ	Page:	3
Specifier:	mario	Project:	Eaton
Address:	241 Joaquin Ave.	Sub-Project I Pos. No.:	14107
Phone I Fax:	510.991.0977 |	Date:	1/16/2014
E-Mail:	msigala@rmjse.com		

3.2 Concrete Breakout Strength

$N_{cb} = \left(\frac{A_{Nc}}{A_{Nc0}}\right) \psi_{ed,N}\, \psi_{c,N}\, \psi_{cp,N}\, N_b$ — ACI 318-11 Eq. (D-3)

$\phi\, N_{cb} \geq N_{ua}$ — ACI 318-11 Table D.4.1.1

A_{Nc} see ACI 318-11, Part D.5.2.1, Fig. RD.5.2.1(b)

$A_{Nc0} = 9\, h_{ef}^2$ — ACI 318-11 Eq. (D-5)

$\psi_{ec,N} = \left(\frac{1}{1 + \frac{2\, e'_N}{3\, h_{ef}}}\right) \leq 1.0$ — ACI 318-11 Eq. (D-8)

$\psi_{ed,N} = 0.7 + 0.3 \left(\frac{c_{a,min}}{1.5 h_{ef}}\right) \leq 1.0$ — ACI 318-11 Eq. (D-10)

$\psi_{cp,N} = \text{MAX}\left(\frac{c_{a,min}}{c_{ac}}, \frac{1.5 h_{ef}}{c_{ac}}\right) \leq 1.0$ — ACI 318-11 Eq. (D-12)

$N_b = k_c\, \lambda_a \sqrt{f'_c}\, h_{ef}^{1.5}$ — ACI 318-11 Eq. (D-6)

Variables

h_{ef} [in.]	$e_{c1,N}$ [in.]	$e_{c2,N}$ [in.]	$c_{a,min}$ [in.]	$\psi_{c,N}$
2.000	0.000	0.000	24.000	1.000

c_{ac} [in.]	k_c	λ_a	f'_c [psi]
5.500	17	1.000	2500

Calculations

A_{Nc} [in.^{2}]	A_{Nc0} [in.^{2}]	$\psi_{ec1,N}$	$\psi_{ec2,N}$	$\psi_{ed,N}$	$\psi_{cp,N}$	N_b [lb]
36.00	36.00	1.000	1.000	1.000	1.000	2404

Results

N_{cb} [lb]	$\phi_{concrete}$	$\phi_{seismic}$	$\phi_{nonductile}$	$\phi\, N_{cb}$ [lb]	N_{ua} [lb]
2404	0.650	0.750	1.000	1172	1150

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Address:	241 Joaquin Ave.	Sub-Project I Pos. No.:	14107
Phone I Fax:	510.991.0977 |	Date:	1/16/2014
E-Mail:	msigala@rmjse.com		

4 Shear load

	Load V_{ua} [lb]	Capacity ϕV_n [lb]	Utilization $\beta_V = V_{ua}/\phi V_n$	Status
Steel Strength*	N/A	N/A	N/A	N/A
Steel failure (with lever arm)*	N/A	N/A	N/A	N/A
Pryout Strength*	N/A	N/A	N/A	N/A
Concrete edge failure in direction **	N/A	N/A	N/A	N/A

* anchor having the highest loading **anchor group (relevant anchors)

5 Warnings

- To avoid failure of the anchor plate the required thickness can be calculated in PROFIS Anchor. Load re-distributions on the anchors due to elastic deformations of the anchor plate are not considered. The anchor plate is assumed to be sufficiently stiff, in order not to be deformed when subjected to the loading!
- Condition A applies when supplementary reinforcement is used. The Φ factor is increased for non-steel Design Strengths except Pullout Strength and Pryout strength. Condition B applies when supplementary reinforcement is not used and for Pullout Strength and Pryout Strength. Refer to your local standard.
- Refer to the manufacturer's product literature for cleaning and installation instructions.
- Checking the transfer of loads into the base material and the shear resistance are required in accordance with ACI 318 or the relevant standard!
- An anchor design approach for structures assigned to Seismic Design Category C, D, E or F is given in ACI 318-11 Appendix D, Part D.3.3.4.3 (a) that requires the governing design strength of an anchor or group of anchors be limited by ductile steel failure. If this is NOT the case, the connection design (tension) shall satisfy the provisions of Part D.3.3.4.3 (b), Part D.3.3.4.3 (c), or Part D.3.3.4.3 (d). The connection design (shear) shall satisfy the provisions of Part D.3.3.5.3 (a), Part D.3.3.5.3 (b), or Part D.3.3.5.3 (c).
- Part D.3.3.4.3 (b) / part D.3.3.5.3 (a) requires that the attachment the anchors are connecting to the structure be designed to undergo ductile yielding at a load level corresponding to anchor forces no greater than the controlling design strength. Part D.3.3.4.3 (c) / part D.3.3.5.3 (b) waives the ductility requirements and requires that the anchors shall be designed for the maximum tension / shear that can be transmitted to the anchors by a non-yielding attachment. Part D.3.3.4.3 (d) / part D.3.3.5.3 (c) waives the ductility requirements and requires the design strength of the anchors to equal or exceed the maximum tension / shear obtained from design load combinations that include E, with E increased by Ω_0.
- Hilti post-installed anchors shall be installed in accordance with the Hilti Manufacturer's Printed Installation Instructions (MPII). Reference ACI 318-11, Part D.9.1

Fastening meets the design criteria!

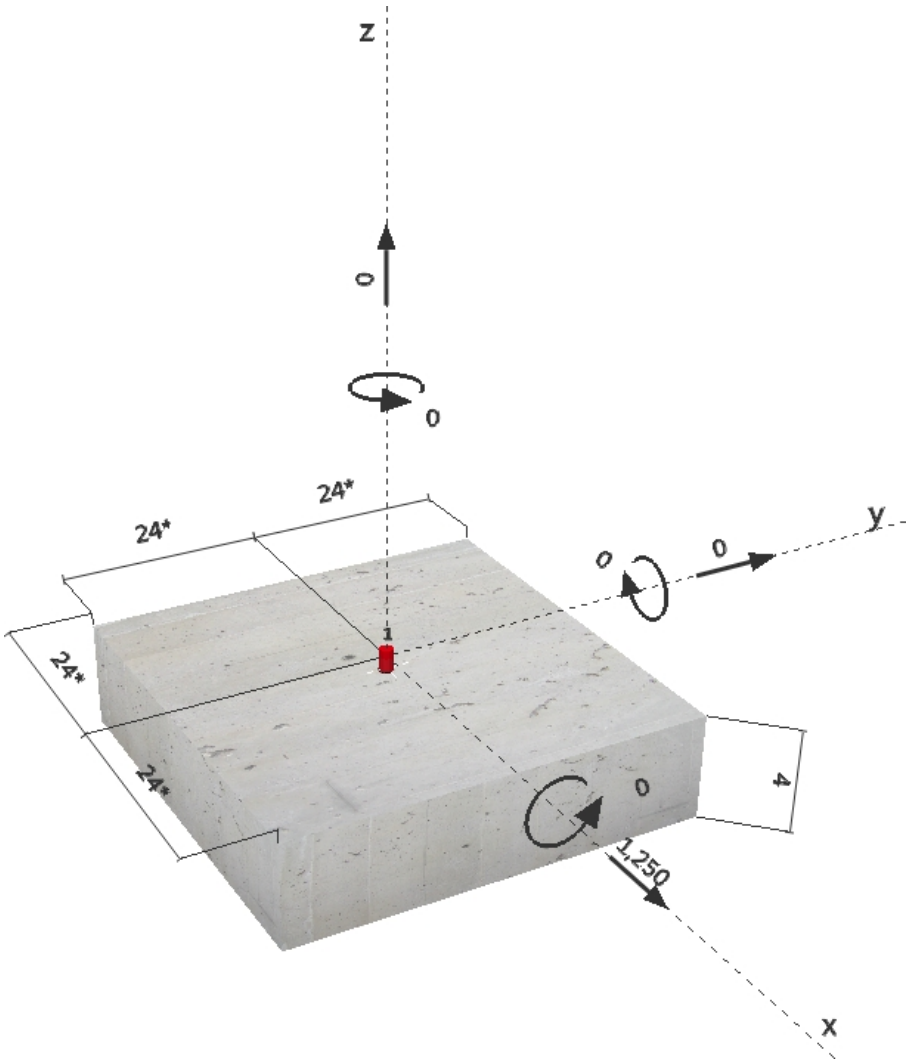
Company:	RMJ	Page:	1
Specifier:	mario	Project:	Eaton
Address:	241 Joaquin Ave.	Sub-Project I Pos. No.:	14107
Phone I Fax:	510.991.0977 |	Date:	1/16/2014
E-Mail:	msigala@rmjse.com		

Specifier's comments: Shear

1 Input data

Anchor type and diameter:	**Kwik Bolt TZ - CS 1/2 (2)**
Effective embedment depth:	$h_{ef,act}$ = 2.000 in., h_{nom} = 2.375 in.
Material:	Carbon Steel
Evaluation Service Report:	ESR-1917
Issued I Valid:	5/1/2013 | 5/1/2015
Proof:	design method ACI 318-11 / Mech.
Stand-off installation:	- (Recommended plate thickness: not calculated)
Profile:	no profile
Base material:	cracked concrete, 2500, f_c' = 2500 psi; h = 4.000 in.
Installation:	hammer drilled hole, installation condition: dry
Reinforcement:	tension: condition B, shear: condition B; no supplemental splitting reinforcement present edge reinforcement: none or < No. 4 bar
Seismic loads (cat. C, D, E, or F)	Tension load: yes (D.3.3.4.3 (c)) Shear load: yes (D.3.3.5.3 (b))

Geometry [in.] & Loading [lb, in.lb]



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Specifier:	mario	Project:	Eaton
Address:	241 Joaquin Ave.	Sub-Project I Pos. No.:	14107
Phone I Fax:	510.991.0977 |	Date:	1/16/2014
E-Mail:	msigala@rmjse.com		

2 Load case/Resulting anchor forces

Load case: Design loads

Anchor reactions [lb]
Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	0	1250	1250	0

max. concrete compressive strain: - [‰]
max. concrete compressive stress: - [psi]
resulting tension force in (x/y)=(0.000/0.000): 0 [lb]
resulting compression force in (x/y)=(0.000/0.000): 0 [lb]

3 Tension load

	Load N_{ua} [lb]	Capacity ϕN_n [lb]	Utilization $\beta_N = N_{ua}/\phi N_n$	Status
Steel Strength*	N/A	N/A	N/A	N/A
Pullout Strength*	N/A	N/A	N/A	N/A
Concrete Breakout Strength**	N/A	N/A	N/A	N/A

* anchor having the highest loading **anchor group (anchors in tension)

Company: RMJ
Specifier: mario
Address: 241 Joaquin Ave.
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E-Mail: msigala@rmjse.com

4 Shear load

	Load V_{ua} [lb]	Capacity ϕV_n [lb]	Utilization $\beta_V = V_{ua}/\phi V_n$	Status
Steel Strength*	1250	3572	35	OK
Steel failure (with lever arm)*	N/A	N/A	N/A	N/A
Pryout Strength**	1250	1683	75	OK
Concrete edge failure in direction x+**	1250	5973	21	OK

* anchor having the highest loading **anchor group (relevant anchors)

4.1 Steel Strength

V_{seis} = ESR value refer to ICC-ES ESR-1917
$\phi V_{steel} \geq V_{ua}$ ACI 318-11 Table D.4.1.1

Variables

n	$A_{se,V}$ [in.^{2}]	f_{uta} [psi]
1	0.10	106000

Calculations

V_{sa} [lb]
5495

Results

$V_{sa,eq}$ [lb]	ϕ_{steel}	ϕV_{sa} [lb]	V_{ua} [lb]
5495	0.650	3572	1250

4.2 Pryout Strength

$V_{cp} = k_{cp}\left[\left(\frac{A_{Nc}}{A_{Nc0}}\right)\psi_{ed,N}\,\psi_{c,N}\,\psi_{cp,N}\,N_b\right]$ ACI 318-11 Eq. (D-40)

$\phi V_{cp} \geq V_{ua}$ ACI 318-11 Table D.4.1.1

A_{Nc} see ACI 318-11, Part D.5.2.1, Fig. RD.5.2.1(b)

$A_{Nc0} = 9 h_{ef}^2$ ACI 318-11 Eq. (D-5)

$\psi_{ec,N} = \left(\frac{1}{1 + \frac{2\,e'_N}{3\,h_{ef}}}\right) \leq 1.0$ ACI 318-11 Eq. (D-8)

$\psi_{ed,N} = 0.7 + 0.3\left(\frac{c_{a,min}}{1.5h_{ef}}\right) \leq 1.0$ ACI 318-11 Eq. (D-10)

$\psi_{cp,N} = MAX\left(\frac{c_{a,min}}{c_{ac}}, \frac{1.5h_{ef}}{c_{ac}}\right) \leq 1.0$ ACI 318-11 Eq. (D-12)

$N_b = k_c\,\lambda_a\,\sqrt{f'_c}\,h_{ef}^{1.5}$ ACI 318-11 Eq. (D-6)

Variables

k_{cp}	h_{ef} [in.]	$e_{c1,N}$ [in.]	$e_{c2,N}$ [in.]	$c_{a,min}$ [in.]
1	2.000	0.000	0.000	24.000

$\psi_{c,N}$	c_{ac} [in.]	k_c	λ_a	f'_c [psi]
1.000	5.500	17	1.000	2500

Calculations

A_{Nc} [in.^{2}]	A_{Nc0} [in.^{2}]	$\psi_{ec1,N}$	$\psi_{ec2,N}$	$\psi_{ed,N}$	$\psi_{cp,N}$	N_b [lb]
36.00	36.00	1.000	1.000	1.000	1.000	2404

Results

V_{cp} [lb]	$\phi_{concrete}$	$\phi_{seismic}$	$\phi_{nonductile}$	ϕV_{cp} [lb]	V_{ua} [lb]
2404	0.700	1.000	1.000	1683	1250

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E-Mail:	msigala@rmjse.com		

4.3 Concrete edge failure in direction x+

$V_{cb} = \left(\frac{A_{Vc}}{A_{Vc0}}\right) \psi_{ed,V}\ \psi_{c,V}\ \psi_{h,V}\ \psi_{parallel,V}\ V_b$ ACI 318-11 Eq. (D-30)

$\phi\ V_{cb} \geq V_{ua}$ ACI 318-11 Table D.4.1.1

A_{Vc} see ACI 318-11, Part D.6.2.1, Fig. RD.6.2.1(b)

$A_{Vc0} = 4.5\ c_{a1}^2$ ACI 318-11 Eq. (D-32)

$\psi_{ec,V} = \left(\frac{1}{1 + \frac{2e'_v}{3c_{a1}}}\right) \leq 1.0$ ACI 318-11 Eq. (D-36)

$\psi_{ed,V} = 0.7 + 0.3\left(\frac{c_{a2}}{1.5c_{a1}}\right) \leq 1.0$ ACI 318-11 Eq. (D-38)

$\psi_{h,V} = \sqrt{\frac{1.5c_{a1}}{h_a}} \geq 1.0$ ACI 318-11 Eq. (D-39)

$V_b = \left(7\left(\frac{l_e}{d_a}\right)^{0.2}\sqrt{d_a}\right)\lambda_a \sqrt{f'_c}\ c_{a1}^{1.5}$ ACI 318-11 Eq. (D-33)

Variables

c_{a1} [in.]	c_{a2} [in.]	e_{cV} [in.]	$\psi_{c,V}$	h_a [in.]
16.000	24.000	0.000	1.000	4.000

l_e [in.]	λ_a	d_a [in.]	f'_c [psi]	$\psi_{parallel,V}$
2.000	1.000	0.500	2500	1.000

Calculations

A_{Vc} [in.^{2}]	A_{Vc0} [in.^{2}]	$\psi_{ec,V}$	$\psi_{ed,V}$	$\psi_{h,V}$	V_b [lb]
192.00	1152.00	1.000	1.000	2.449	20900

Results

V_{cb} [lb]	$\phi_{concrete}$	$\phi_{seismic}$	$\phi_{nonductile}$	$\phi\ V_{cb}$ [lb]	V_{ua} [lb]
8532	0.700	1.000	1.000	5973	1250

5 Warnings

- To avoid failure of the anchor plate the required thickness can be calculated in PROFIS Anchor. Load re-distributions on the anchors due to elastic deformations of the anchor plate are not considered. The anchor plate is assumed to be sufficiently stiff, in order not to be deformed when subjected to the loading!
- Condition A applies when supplementary reinforcement is used. The Φ factor is increased for non-steel Design Strengths except Pullout Strength and Pryout strength. Condition B applies when supplementary reinforcement is not used and for Pullout Strength and Pryout Strength. Refer to your local standard.
- Refer to the manufacturer's product literature for cleaning and installation instructions.
- Checking the transfer of loads into the base material and the shear resistance are required in accordance with ACI 318 or the relevant standard!
- An anchor design approach for structures assigned to Seismic Design Category C, D, E or F is given in ACI 318-11 Appendix D, Part D.3.3.4.3 (a) that requires the governing design strength of an anchor or group of anchors be limited by ductile steel failure. If this is NOT the case, the connection design (tension) shall satisfy the provisions of Part D.3.3.4.3 (b), Part D.3.3.4.3 (c), or Part D.3.3.4.3 (d). The connection design (shear) shall satisfy the provisions of Part D.3.3.5.3 (a), Part D.3.3.5.3 (b), or Part D.3.3.5.3 (c).
- Part D.3.3.4.3 (b) / part D.3.3.5.3 (a) requires that the attachment the anchors are connecting to the structure be designed to undergo ductile yielding at a load level corresponding to anchor forces no greater than the controlling design strength. Part D.3.3.4.3 (c) / part D.3.3.5.3 (b) waives the ductility requirements and requires that the anchors shall be designed for the maximum tension / shear that can be transmitted to the anchors by a non-yielding attachment. Part D.3.3.4.3 (d) / part D.3.3.5.3 (c) waives the ductility requirements and requires the design strength of the anchors to equal or exceed the maximum tension / shear obtained from design load combinations that include E, with E increased by Ω_0.
- Hilti post-installed anchors shall be installed in accordance with the Hilti Manufacturer's Printed Installation Instructions (MPII). Reference ACI 318-11, Part D.9.1

Fastening meets the design criteria!

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Eaton

Paramount/ S Series

Job No. 14107 Date

Signed by MAS Sheet No. 53 of

DESIGN EXPANSION ANCHOR

TRY: ½"ϕ HILTI KB-TZ

h_{ef} = 1¾"

SHEAR

CONC. BREAKOUT STRENGTH OF ANCHOR IN SHEAR [SEC. D.6.2]

$$V_{cb} = \frac{A_{Vc}}{A_{Vco}} \cdot \psi_{ed,V} \cdot \psi_{c,V} \cdot V_b \quad [Eq\ D\text{-}21]$$

* NOTE: CONCRETE ANCHORS NOT NEAR ANY EDGES ∴ THIS WILL NOT CONDITION WILL NOT GOVERN *

CONC. PRYOUT STRENGTH OF ANCHOR IN SHEAR [SEC. D.6.3]

$V_{cp} = k_{cp} \cdot N_{cb}$ [EQN. D-29]

$k_{cp} = 1$

$N_{cb} = 2,156\#$ (SEE TENSION CALC.)

$V_{cp} = 2,156\#$

$\phi = 0.7$; $\phi_s = 0.75$

$\phi V_{cp} = 1,132\#$

STEEL STRENGTH OF ANCHOR IN SHEAR [SEC. D.6.1.]

$V_{sa} = 6,405\#$ (HILTI CAT. PG. 319)

$\phi = 0.65$ [D.4.4]

$\phi V_{sa} = 0.75 \times 0.65 \times 6,405\#$

$= 3,122\#$

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Paramount/ S Series

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TENSION

STEEL STRENGTH OF ANCHOR IN TENSION [SEC. D.5.1]

$N_{sa} = n \cdot A_{se} f_{uta}$ [EQN. D-3]

$n = 1$; $A_{se} = 0.101 in^2$ (HIGH CRT.)

$f_{uta} = 115{,}000$ #

$\phi = 0.75$

$\phi N_{sa} = 0.75 \times 0.101 \times 115{,}000$

$= 8{,}711$ #

CONC. BREAKOUT STRENGTH OF ANCHOR IN TENSION [SEC. D.5.2]

$N_{cb} = \frac{A_{Nc}}{A_{Nco}} \cdot \psi_{ed,N} \cdot \psi_{c,N} \cdot \psi_{cp,N} \cdot N_b$ [EQN. D-4]

$h_{ef} = 1\ 3/4$ "

$A_{Nco} = A_{Nc} = 9 \cdot h_{ef} = 9 \times 1.75^2$

$= 27.6 in^2$

$\psi_{ed,N} = 1.0$

$\psi_{c,N} = 1.0$ [EQN. D-10 OR D-11]

$\psi_{cp,N} = 1.0$ [SEC. D.5.2.6]

$N_b = k_c \cdot \sqrt{f'_c} \cdot h_{ef}^{1.5}$ [EQN. D-7]

$k_c = 17$

$N_b = 17 \cdot \sqrt{3{,}000} \cdot 1.75^{1.5}$

$= 2{,}156$ #

$\phi = 0.65$ [D.4.4]

$\phi N_{cb} = 0.75 \times 0.65 \times 2{,}156$ #

$= 1{,}051$ #

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Eaton

Paramount/ S Series

Job No. 14107 Date

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CONC PULLOUT STRENGTH OF ANCHOR IN TENSION [SEC D.5.3]

$\phi n N_{pn,fc} = \psi_{c,p} N_p$

$= 0.65 \times 1,460\#$ (HILTI PROFIS CALC PG. 319)

$= 949\#$ <--- GOVERNS

SIDE FACE BLOWOUT OF ANCHOR IN TENSION [SEC, D.5.4]

ANCHOR NOT CLOSE TO ANY EDGE

STEEL STRENGTH OF ANCHOR IN SHEAR [SEC. D.6.1]

$V_{sa} = n \cdot 0.6 A_{se} \cdot f_{uta}$

$= 1.0 \cdot 0.6 \times 0.101 \times 106,000$

$= 6,424\#$

$\phi V_{sa} = 0.75 \times 0.65 \times 6,424\#$

$= 3,132\#$