DOOR SYSTEMS INC

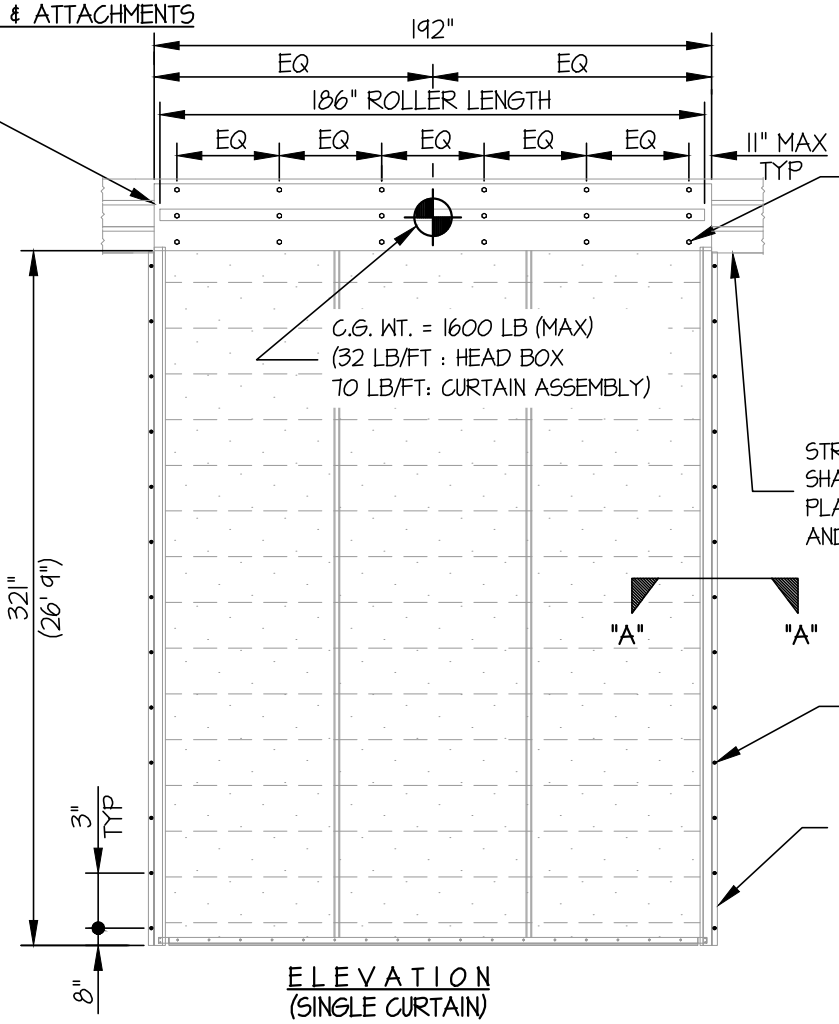
DSI-FW-W119 ELEVATOR SMOKE AND FIRE CURTAIN

DES.	J. ROBERSON
JOB NO.	11-2503
DATE	4/30/25

SHEET 1 OF 7 SHEETS

SEISMIC SUPPORTS & ATTACHMENTS

WALL MOUNTED



ELEVATION
(SINGLE CURTAIN)

NOTES:

1. FORCES ARE DETERMINED PER 2022 CALIFORNIA BUILDING CODE AND ASCE 7-16. STRENGTH DESIGN IS USED. (EXAMPLE: a_p = 1.0, I_p = 1.5, R_p = 1.5, z/h ≤ 1)

S_{DS}	1.60	2.00
HORIZONTAL FORCE (Eh)	1.92 Wp	2.40 Wp
HORIZONTAL FORCE (Emh)	3.84 Wp	4.80 Wp
VERTICAL FORCE (Ev)	0.32 Wp	0.40 Wp

2. THIS CALCULATION ENCOMPASSES WEIGHTS AND C.G. POSITIONS NOT EXCEEDING VALUES SHOWN.
3. THIS CALCULATION WAS PREPARED WITHOUT KNOWLEDGE OF ANY SITE CONDITION. COMPATIBILITY FOR USE WITH A SITE SHALL BE EVALUATED BY THE STRUCTURAL ENGINEER OF RECORD OF THE INSTALLATION (SEOR). USE REQUIRES APPROVAL BY THE SEOR.
4. STRUCTURAL ENGINEER OF RECORD FOR THE INSTALLATION SHALL VERIFY ALL CONDITIONS, EVALUATE INTERACTION WITH ADJACENT EQUIPMENT AND ANCHORS, AND PROVIDE SUPPORT STRUCTURE DESIGNED TO SUPPORT WEIGHTS AND FORCES SHOWN IN COMBINATION WITH ALL OTHER LOADS THAT MAY BE PRESENT.

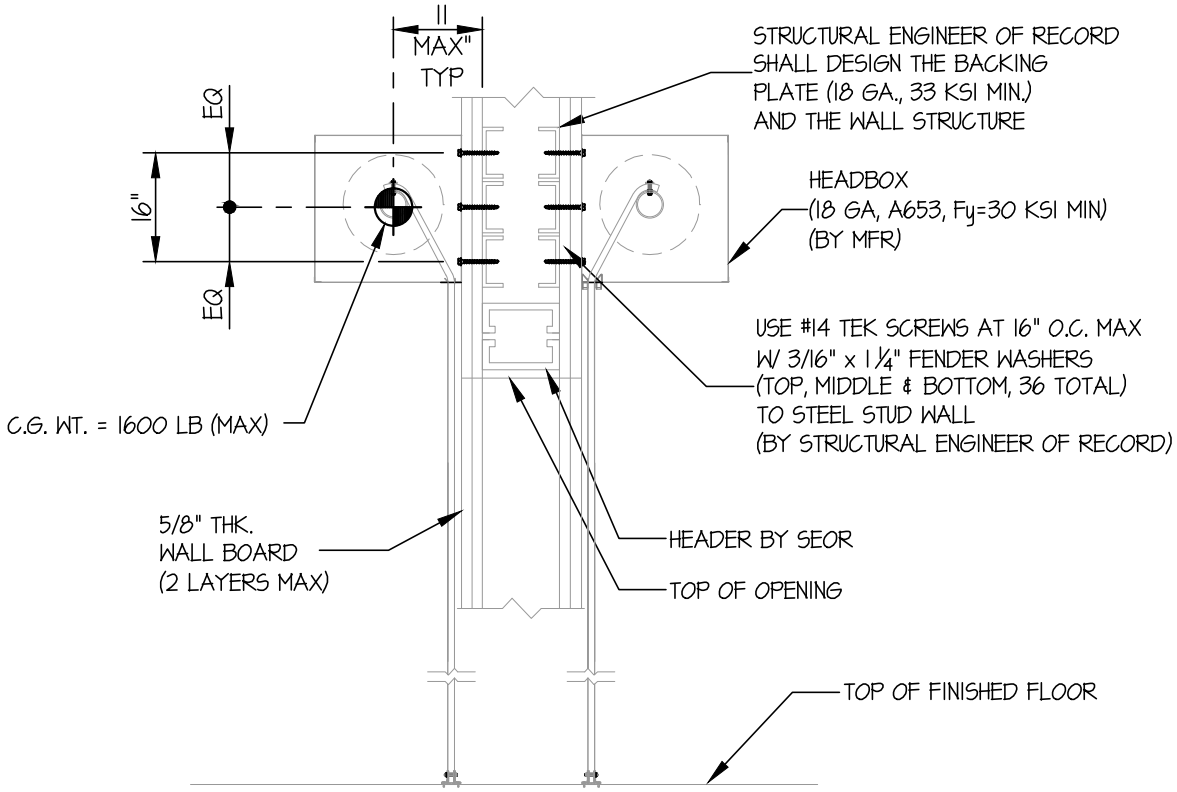
REGISTERED PROFESSIONAL ENGINEER
JONATHAN ROBERSON
No. 4197
EXP. 6-30-2026
4/30/25
STRUCTURAL
STATE OF CALIFORNIA

DOOR SYSTEMS INC

DSI-FW-W119 ELEVATOR SMOKE AND FIRE CURTAIN

DES. J. ROBERSON
JOB NO. 11-2503
DATE 4/30/25
SHEET 2 OF 7 SHEETS

SEISMIC SUPPORTS & ATTACHMENTS — $S_{DS} \leq 1.60$ — WALL MOUNTED



SECTION AT STEEL STUD WALL
(SINGLE CURTAIN)

LOADS:

WEIGHT (W_p) = 1600 LB MAX
HORIZONTAL FORCE (E_h) = 1.92 W_p = 3072 LB
VERTICAL FORCE (E_v) = 0.32 W_p = 512 LB
(EXAMPLE: S_{DS} = 1.60, a_p = 1.0, I_p = 1.5, R_p = 1.5, Ω_o = 2.0, z/h = 0)

SCREW FORCES:

TENSION (T)

$$T_{U\ VERTICAL} = \frac{(1.2(1600\#) + 512\#)(11'')}{12\ SCREWS(16'')} = 140\ LB/SCREW$$

$$T_{U\ PARALLEL} = \frac{3072\#(11'')}{6\ SCREWS(160'')} = 35\ LB/SCREW$$

$$T_{U\ PERP} = \frac{3072\#}{36\ SCREWS} = 85\ LB/SCREW$$

$T_{U\ MAX}$ = 140# + 35#(0.3) + 85# = 236 LB/SCREW (MAX)

SHEAR (V)

$$V_{U\ WALL} = \sqrt{\left(\frac{(1.2(1600\#) + 512\#)}{36\ SCREWS}\right)^2 + \left(\frac{3072\#}{36\ SCREWS}\right)^2} = 109\ LB/SCREW\ (MAX)$$

#14 TEK SCREWS (16 GA, 50 KSI STEEL STUDS)
W/ 2 LAYERS GYP BOARD MAX
ϕT = 418 LB/SCREW
ϕV = 266 LB/SCREW

UNITY CHECK:

$$\left(\frac{T_u}{\phi T}\right) + \left(\frac{V_u}{\phi V}\right) \leq 1.0$$

$$\left(\frac{236}{418}\right) + \left(\frac{109}{266}\right) = 0.98 \leq 1.0 \quad \therefore \text{ O.K.}$$

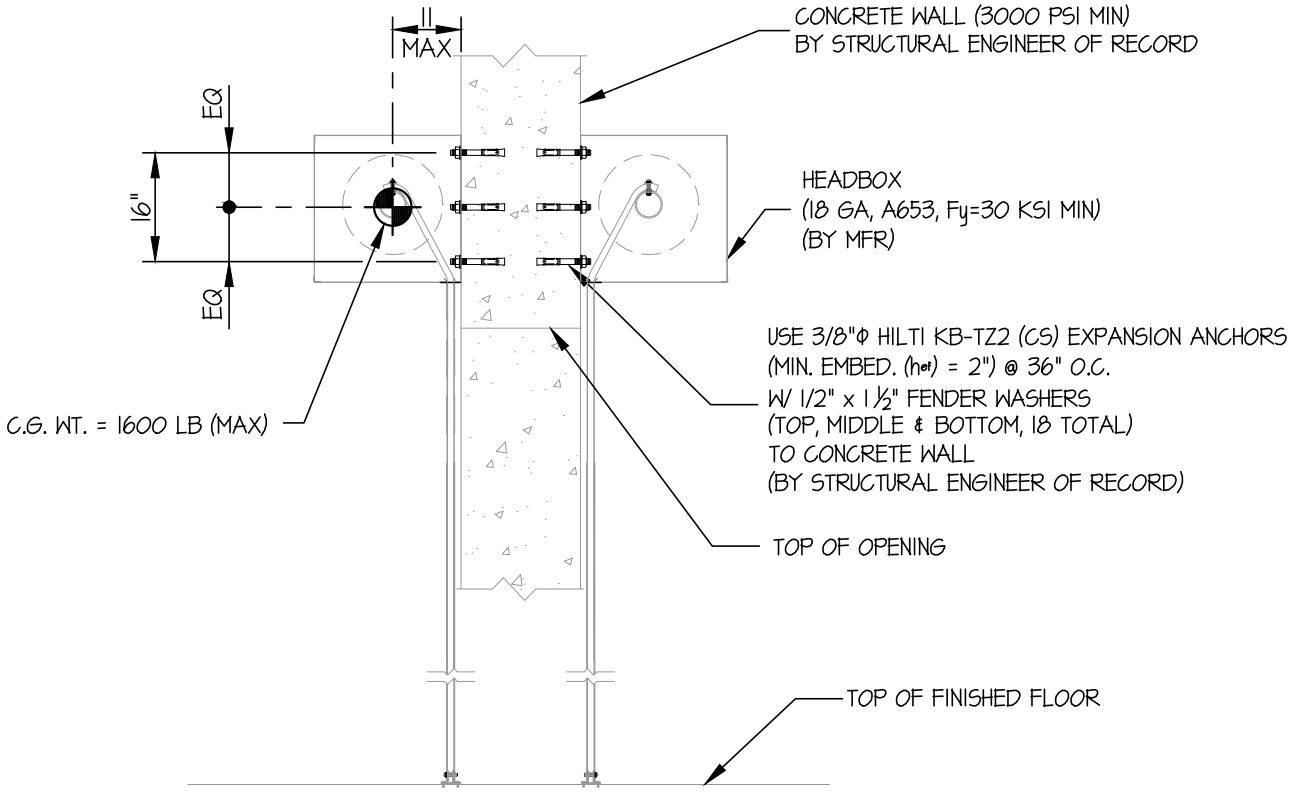
DOOR SYSTEMS INC

DSI-FW-W119 ELEVATOR SMOKE AND FIRE CURTAIN

DES. J. ROBERSON
JOB NO. 11-2503
DATE 4/30/25

SHEET 3 OF 7 SHEETS

SEISMIC SUPPORTS & ATTACHMENTS — $S_{DS} \leq 2.00$ — WALL MOUNTED



SECTION AT CONCRETE WALL
(SINGLE CURTAIN)

LOADS:

WEIGHT (W_p) = 1600 LB MAX
HORIZONTAL FORCE (E_{mh}) = 4.80 W_p = 7680 LB
VERTICAL FORCE (E_v) = 0.40 W_p = 640 LB
(EXAMPLE: S_{DS} = 2.00, a_p = 1.0, I_p = 1.5, R_p = 1.5, Ω_o = 2.0, z/h = 0)

SCREW FORCES:

TENSION (T)

$$T_{U\ VERTICAL} = \frac{(1.2(1600\#) + 640\#)(11'')}{6\ BOLTS\ (16'')} = 293\ LB/BOLT$$

$$T_{U\ PARALLEL} = \frac{7680\#(11'')}{3\ BOLTS\ (180'')} = 157\ LB/BOLT$$

$$T_{U\ PERP} = \frac{7680\#}{18\ BOLTS} = 437\ LB/BOLT$$

$T_{U\ MAX}$ =
293# + 157#(0.3) + 427# = 767 LB/BOLT (MAX)

SHEAR (V)

$$V_{U\ WALL} = \sqrt{\left(\frac{(1.2(1600\#) + 640\#)}{18\ BOLTS}\right)^2 + \left(\frac{7680\#}{18\ BOLTS}\right)^2} = 450\ LB/BOLT\ (MAX)$$

ANCHOR SPEC: 3/8"Φ HILTI KB-TZ2 (CS): (h_{ef} = 2")
SPACING = 6" MIN
EDGE DISTANCE = 14" MIN:
$\phi T = 0.75\phi N_n$ = 1586 LB/ANCHOR (TENSION)
$\phi V = \phi V_n$ = 2201 LB/ANCHOR (SHEAR)

INTERACTION:

$$\left(\frac{T_u}{\phi T}\right) + \left(\frac{V_u}{\phi V}\right) \leq 1.2$$

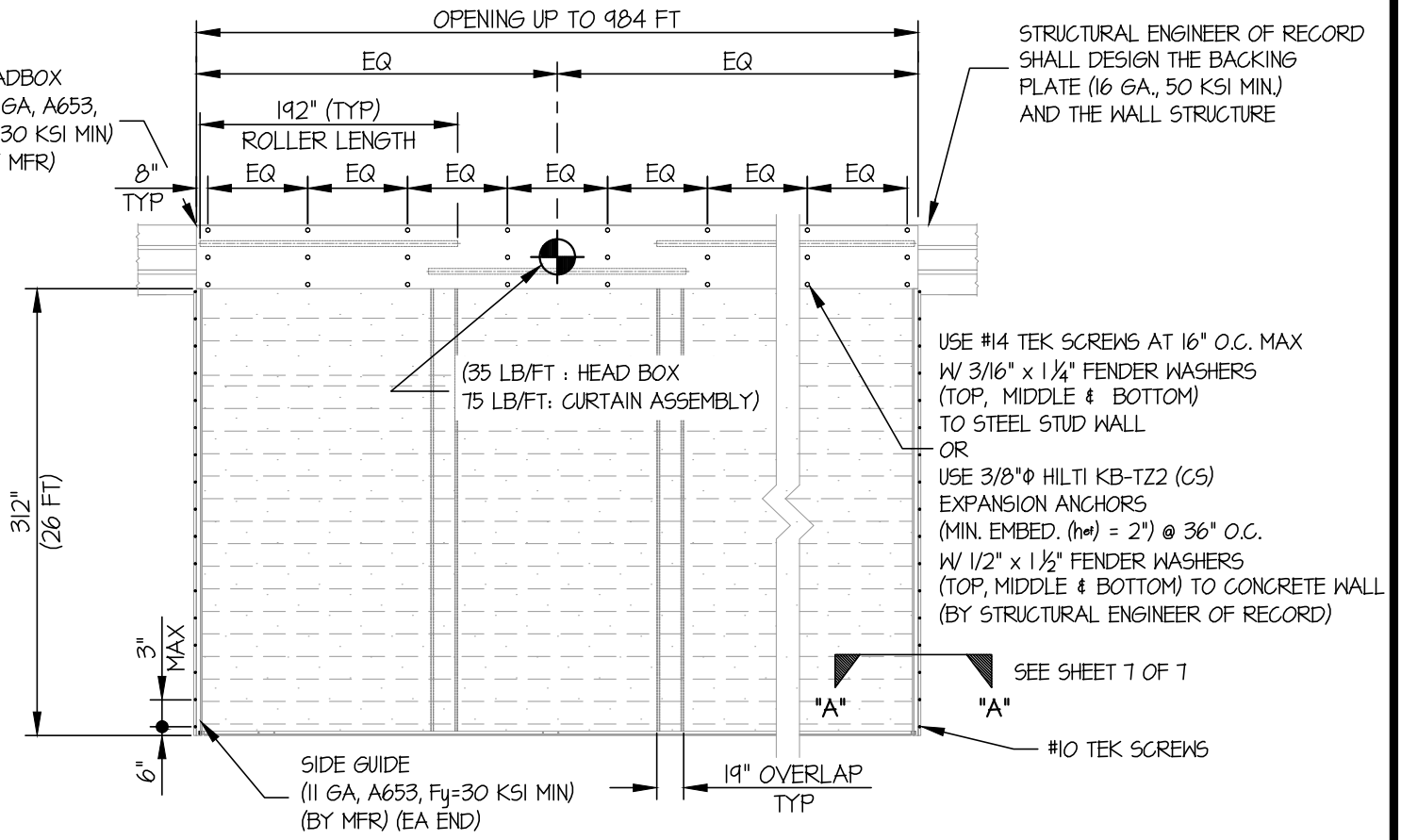
$$\left(\frac{767}{1586}\right) + \left(\frac{450}{2201}\right) = 0.69 \leq 1.2 \quad \therefore \text{ O.K.}$$

DOOR SYSTEMS INC

DSI-FW-W119 ELEVATOR SMOKE AND FIRE CURTAIN

SEISMIC SUPPORTS & ATTACHMENTS

WALL MOUNTED



ELEVATION
(MULTIPLE CURTAINS)

NOTES:

1. FORCES ARE DETERMINED PER 2022 CALIFORNIA BUILDING CODE AND ASCE 7-16. STRENGTH DESIGN IS USED. (EXAMPLE: a_p = 1.0, I_p = 1.5, R_p = 1.5, z/h ≤ 1)

S_{DS}	1.60	2.00
HORIZONTAL FORCE (Eh)	1.92 Wp	2.40 Wp
HORIZONTAL FORCE (Emh)	3.84 Wp	4.80 Wp
VERTICAL FORCE (Ev)	0.32 Wp	0.40 Wp

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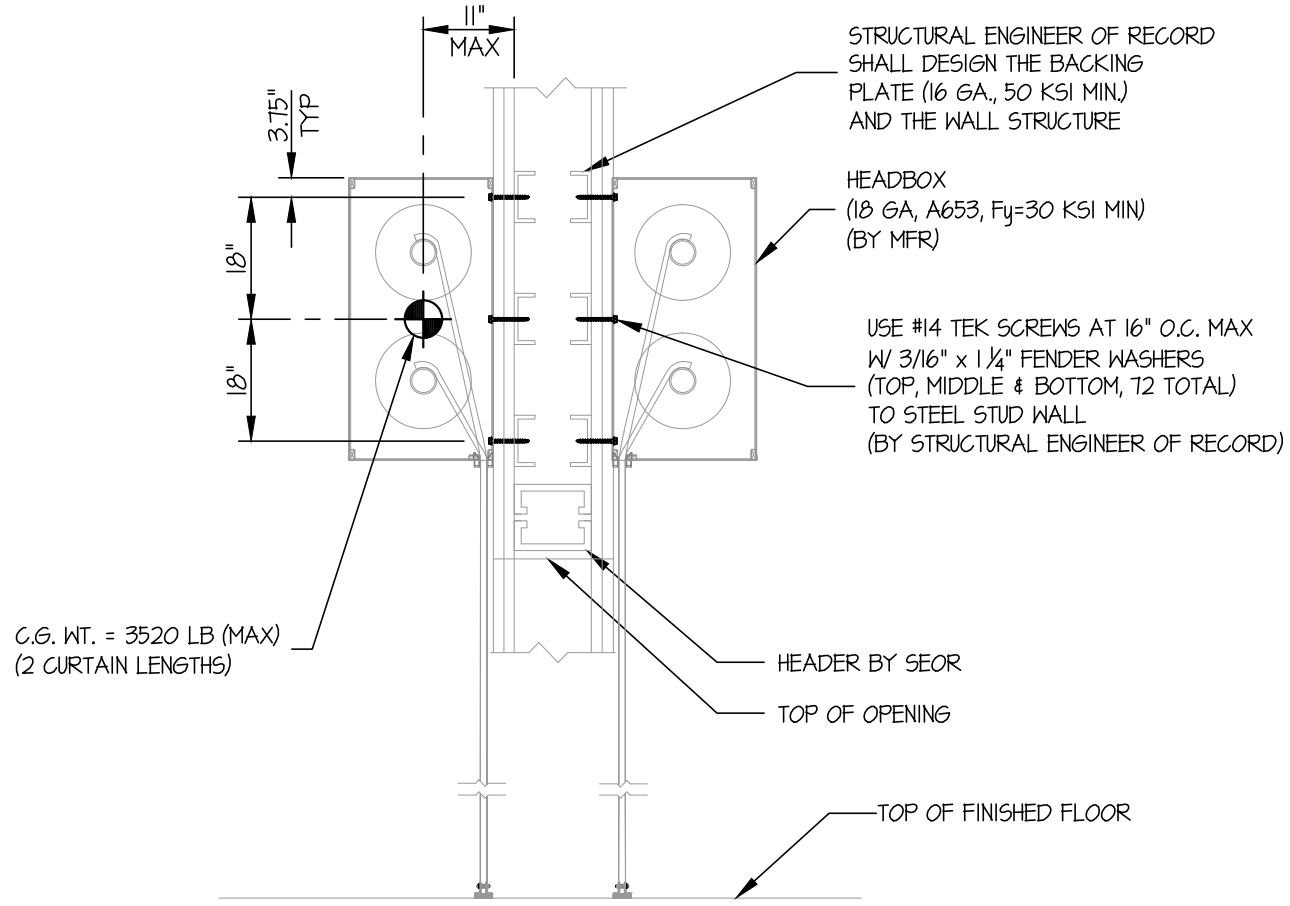
DSI-FW-W119 ELEVATOR SMOKE AND FIRE CURTAIN

SEISMIC SUPPORTS & ATTACHMENTS — $S_{DS} \leq 1.60$ — WALL MOUNTED



SECTION AT STEEL STUD WALL
(MULTIPLE CURTAINS)

LOADS:

WEIGHT (W_p) = 3520 LB MAX (2 CURTAIN LENGTHS)
HORIZONTAL FORCE (E_h) = 1.92 W_p = 6759 LB
VERTICAL FORCE (E_v) = 0.32 W_p = 1127 LB
(EXAMPLE: S_{DS} = 1.60, a_p = 1.0, I_p = 1.5, R_p = 1.5, Ω_o = 2.0, z/h = 0)

SCREW FORCES:

TENSION (T)

$$T_{U\ VERTICAL} = \frac{(1.2(3520\#) + 1127\#)(11'')}{24\ SCREWS(36'')} = 68\ LB/SCREW$$

$$T_{U\ PARALLEL} = \frac{6759\#(11'')}{3\ SCREWS(368'')} = 68\ LB/SCREW$$

$$T_{U\ PERP} = \frac{6759\#}{72\ SCREWS} = 94\ LB/SCREW$$

$T_{U\ MAX}$ = 68# + 68#(0.3) + 94# = 183 LB/SCREW (MAX)

SHEAR (V)

$$V_{U\ WALL} = \sqrt{\left(\frac{(1.2(3520\#) + 1127\#)}{72\ SCREWS}\right)^2 + \left(\frac{6759\#}{72\ SCREWS}\right)^2} = 120\ LB/SCREW\ (MAX)$$

#14 TEK SCREWS (16 GA, 50 KSI STEEL STUDS)
W/ 2 LAYERS GYP BOARD MAX
ϕT = 418 LB/SCREW
ϕV = 266 LB/SCREW

UNITY CHECK:

$$\left(\frac{T_u}{\phi T}\right) + \left(\frac{V_u}{\phi V}\right) \leq 1.0$$

$$\left(\frac{183}{418}\right) + \left(\frac{120}{266}\right) = 0.89 \leq 1.0 \quad \therefore \text{ O.K.}$$

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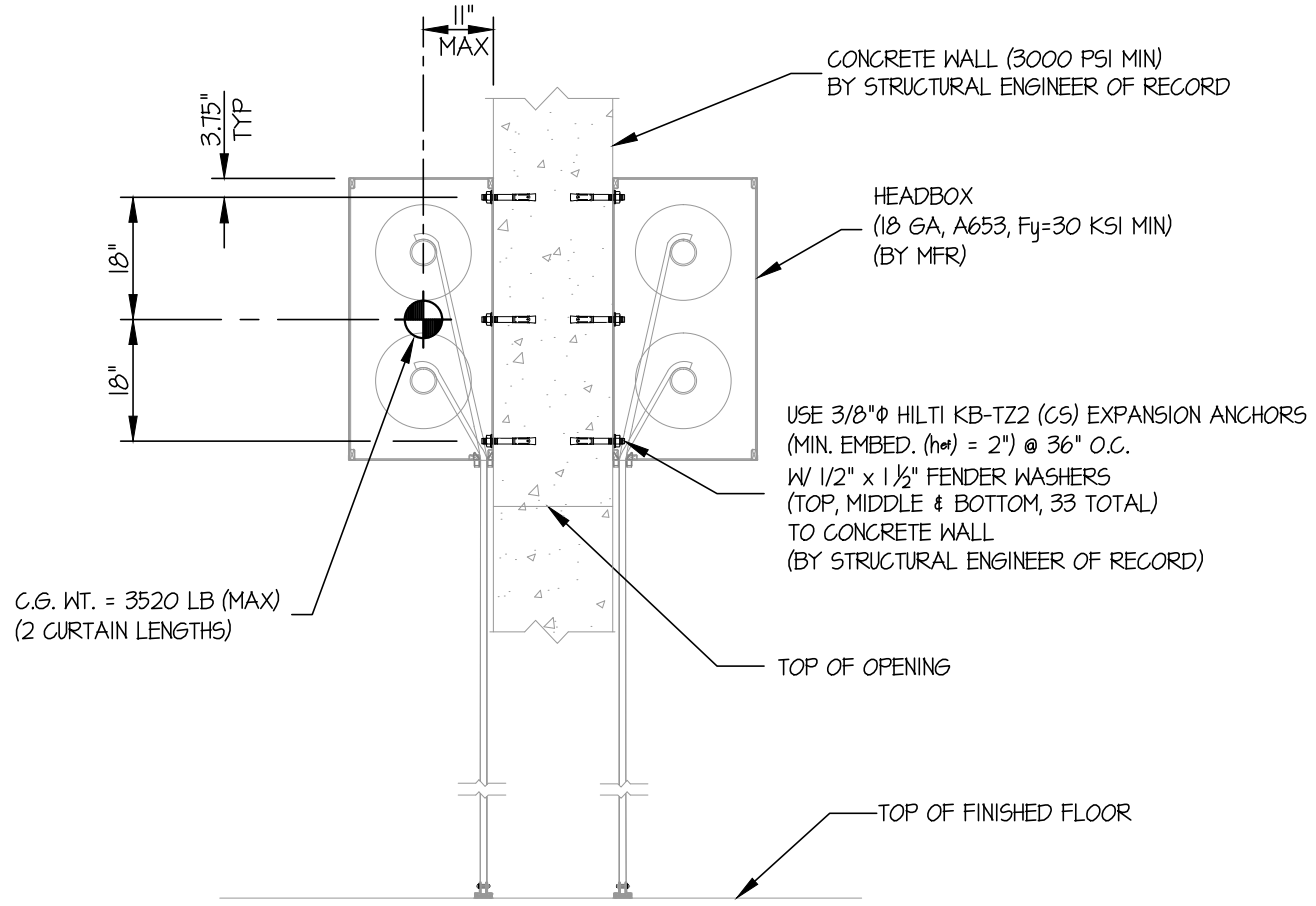
SEISMIC SUPPORTS & ATTACHMENTS — $S_{DS} \leq 2.00$ — WALL MOUNTED



SECTION AT CONCRETE WALL
(MULTIPLE CURTAINS)

LOADS:

WEIGHT (W_p) = 3520 LB MAX (2 CURTAIN LENGTHS)
HORIZONTAL FORCE (E_{mh}) = 4.80 W_p = 16,896 LB
VERTICAL FORCE (E_v) = 0.40 W_p = 1408 LB
(EXAMPLE: S_{DS} = 2.00, a_p = 1.0, I_p = 1.5, R_p = 1.5, Ω_o = 2.0, z/h = 0)

SCREW FORCES:

TENSION (T)

$$T_{U\ VERTICAL} = \frac{(1.2(3520\#) + 1408\#)(11")}{11\ BOLTS\ (36")} = 157\ LB/BOLT$$

$$T_{U\ PARALLEL} = \frac{16896\#(11")}{3\ BOLTS\ (368")} = 168\ LB/BOLT$$

$$T_{U\ PERP} = \frac{16896\#}{33\ BOLTS} = 512\ LB/BOLT$$

$T_{U\ MAX}$ =
157# + 168#(0.3) + 512# = 720 LB/BOLT (MAX)

SHEAR (V)

$$V_{U\ WALL} = \sqrt{\left(\frac{(1.2(3520\#) + 1408\#)}{33\ BOLTS}\right)^2 + \left(\frac{16896\#}{33\ BOLTS}\right)^2} = 540\ LB/BOLT\ (MAX)$$

ANCHOR SPEC: 3/8"Φ HILTI KB-TZ2 (CS): (h_{ef} = 2")
SPACING = 6" MIN
EDGE DISTANCE = 14" MIN:
$\phi T = 0.75\phi Nn$ = 1586 LB/ANCHOR (TENSION)
$\phi V = \phi Vn$ = 2201 LB/ANCHOR (SHEAR)

INTERACTION:

$$\left(\frac{T_u}{\phi T}\right) + \left(\frac{V_u}{\phi V}\right) \leq 1.2$$

$$\left(\frac{720}{1586}\right) + \left(\frac{540}{2201}\right) = 0.70 \leq 1.2 \quad \therefore \text{O.K.}$$

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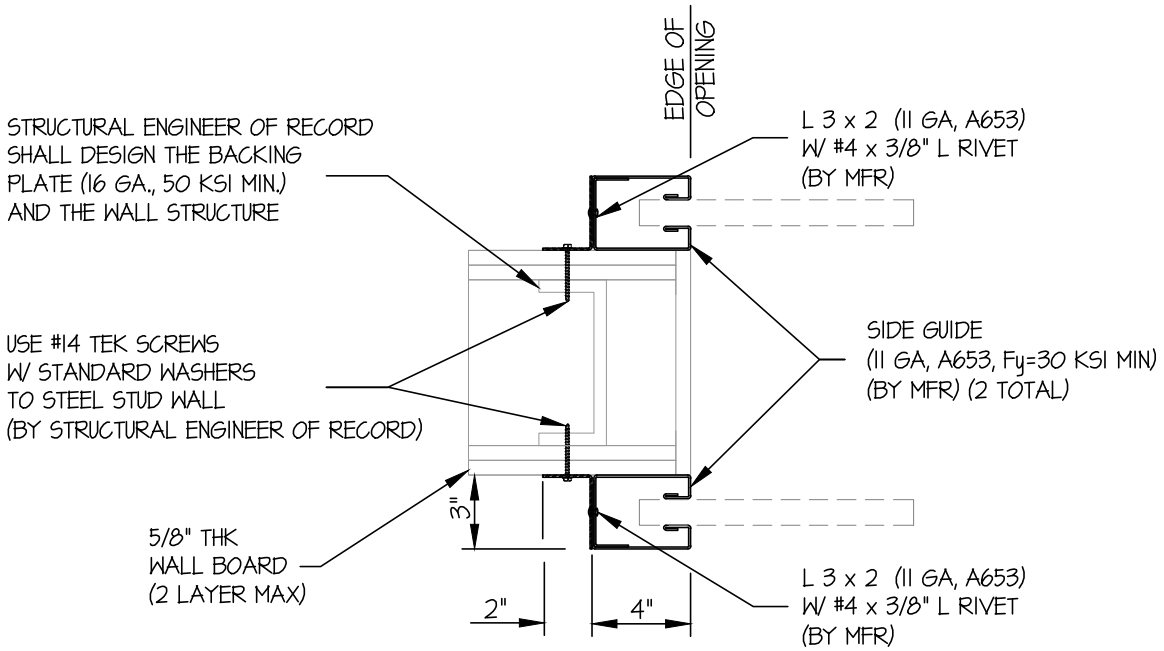
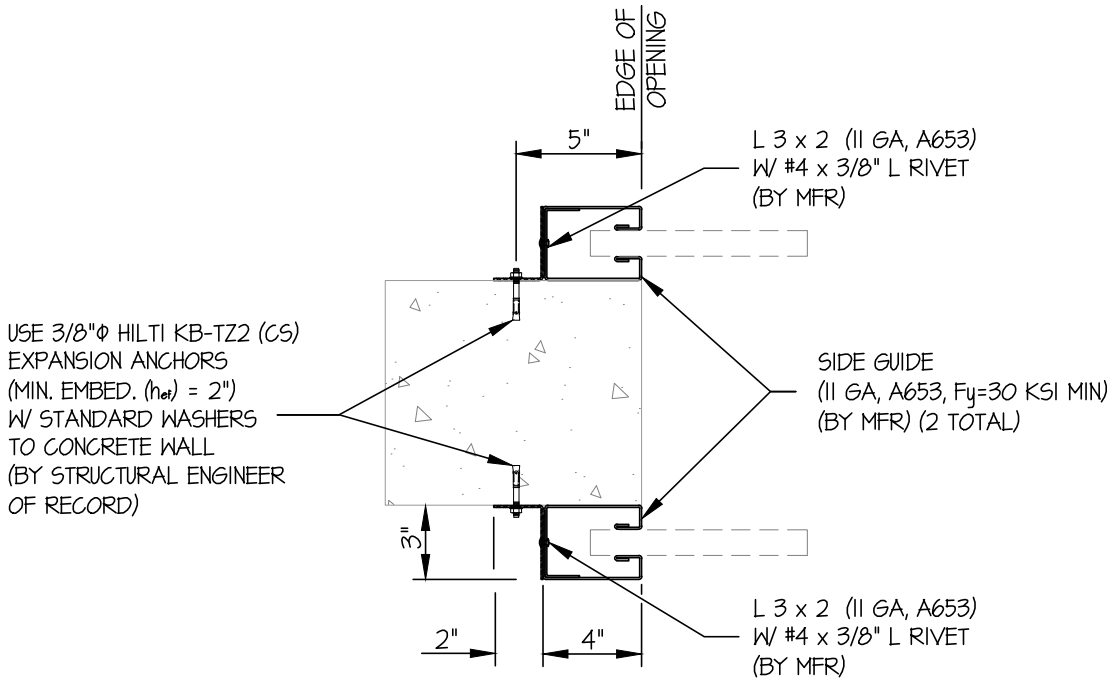
SEISMIC SUPPORTS & ATTACHMENTS

WALL MOUNTED



SECTION AT STEEL STUD WALL



SECTION AT CONCRETE WALL

SECTION A-A