CITY PLAN COMMISSION **Thursday, August 7, 2025**

Planner: Scott Roper

APPLICATION FOR A CERTIFICATE OF APPROPRIATENESS FOR A SIGN IN A SPECIAL PROVISION SIGN DISTRICT (SPSD)

DEEP ELLUM/ NEAR EAST SIGN DISTRICT

CASE NUMBER: SIGN-25-000460 **DATE FILED:** June 26th, 2025

LOCATION: 2700 COMMERCE ST, STE 1500 (S ELEVATION) **SIZE OF REQUEST:** 234 sq. ft.

COUNCIL DISTRICT: 2 **ZONING:** PD-269, TRACT A

APPLICANT: Josephine Gonzales of Pattison ID

OWNER: HW Commerce Office LP

TENANT: WWEX Group

REQUEST: An application for a Certificate of Appropriateness by Josephine Gonzales of Pattison ID, for a 234-square-foot LED illuminated channel letter sign at 2700 COMMERCE ST, STE 1500 (S ELEVATION).

SUMMARY: The applicant proposes to install a 234-square-foot LED illuminated channel sign, Five inch white channel front lit channel letters emit white light from the front, to be mounted to a steel frame that attaches to/ overhangs the parapet.

STAFF RECOMMENDATION: **Approval**.

SSDAC RECOMMENDATION: **Approval**.

BACKGROUND:

- The subject site is located in Deep Ellum/ Near East Sign District. This district is zoned PD No. 269, Tract A, Deep Ellum/Near East Side District.
  These regulations are established in: Sec. 51A-7.1300 (Specific details included below).
- The applicant proposes to install a 234-square-foot LED illuminated channel sign, Five inch white channel front lit channel letters emit white light from the front, to be mounted to a steel frame that attaches to/ overhangs the parapet.
  - The sign is composed of 5" aluminum channel letters, painted white with white acrylic faces and 1" metal retainers, painted white, mounted to a steel frame that overhangs the parapet. Sign elements are constructed entirely of metal, plastic, and LED lighting. The overall height of the sign is 199.5'.
  - The sign will be back-lit by LED, emitting a white glow through the faces.
- This is the first of two applications under review by this body for this site. This sign is to be located on Clover Street, and is submitted as Sign A.
- Construction of the proposed sign is in accordance with SPSD regulations and meets the requirements of the Dallas City Code per Sec. 51A-7.1300.

51A-7.1302 PURPOSE.

The purpose of this division is to promote signage that is compatible with the architectural character and design guidelines of the Deep Ellum/Near East Side Planned Development District while encouraging artistic, creative, and innovative signs which are reflective of themes that have grown and developed in the Deep Ellum area.

51A-7.1305 SPECIAL PROVISIONS FOR ALL SIGNS.

(b) Except for wallscape signs, painted applied signs, and district identification signs, no sign may exceed 150 square feet unless it is located more than 65 feet above grade, at which point no sign may exceed 300 square feet.

This proposed sign is 234 square-feet and is located between 192.5' - 199.5' above grade.

51A-7.1306 SPECIAL PROVISIONS FOR ATTACHED SIGNS.

(a) Attached signs in general.
  (1) No portion of an attached sign may be located:
    (A) more than 10 feet from the facade to which it is attached; or
    (B) less than two feet from the back of a street curb.

The total projection of the proposed sign will not exceed ten-inches.

51A-7.505 PERMIT PROCEDURES FOR SPECIAL PROVISION SIGN DISTRICTS.

(B) **Factors the committee shall consider.** In reviewing an application, the committee shall first consider whether the applicant has submitted sufficient information for the committee to make an informed decision. If the committee finds the proposed sign to be consistent with the special character of the special provision sign district, the committee shall make a recommendation of approval to the city plan commission. The committee shall consider the proposed sign in terms of its appropriateness to the special provision sign district with particular attention to the effect of the proposed sign upon the economic structure of the special provision sign district and the effect of the sign upon adjacent and surrounding premises without regard to any consideration of the message conveyed by the sign. After consideration of these factors, the committee shall recommend approval or denial of the application and forward that recommendation to the city plan commission.

(6) Decision by the commission. Upon receipt of a recommendation by the committee, the commission shall hold a public hearing to consider the application. At least 10 days before the hearing, notice of the date, time, and place of the hearing, the name of the applicant, and the location of the proposed sign must be published in the official newspaper of the city and the building official shall serve, by hand-delivery or mail, a written notice to the applicant that contains a reference to this section, and the date, time, and location of this hearing. A notice sent by mail is served by depositing it properly addressed and postage paid in the United States mail. In addition, if the application is for a detached sign or for an attached sign that has more than 100 square feet of effective area, the applicant must post the required number of notification signs in accordance with Section 51A-1.106. In making its decision, the commission shall consider the same factors that were required to be considered by the committee in making its recommendation. If the commission approves the application, it shall forward a certificate of appropriateness to the building official within 15 days after its approval. If the commission denies the application, it shall so inform the building official in writing. Upon receipt of the written denial, the building official shall so advise the applicant within five working days of the date of receipt of the written notice.

Property Ownership
HW Commerce Office LP
2700 Commerce Street, Suite #113
Dallas, TX 75226

Officer names: SEE ATTACHED

Tenant Ownership
WWEX Group
2700 Commerce Street, Suite #1500
Dallas, TX 75226

Officer names: SEE ATTACHED

Officer list for the tenant and building owner:

BUILDING OWNER :

Owner: HW Commerce Office LP **(**2700 Commerce Street, Suite #113, Dallas, TX

75226)

HW COMMERCE OFFICE LP is a partnership between Hines, Westdale, and IvanhoeCambridge.

Contacts for each are below:

Hines

Corbin Eckel, Managing Director

Westdale

Jeff Allen, Executive Vice President, Commercial Division

Rhonda Thompson, Director

IvanhoeCambridge

Marc-Antoine Bedard

TENANT :

-Tenant: WWEX Group

-Tenant Officers:

-Tom Madine, CEO

-Jack Pearlstein, CFO

-Joel Clum, COO

SSDAC Action:

July 15, 2025

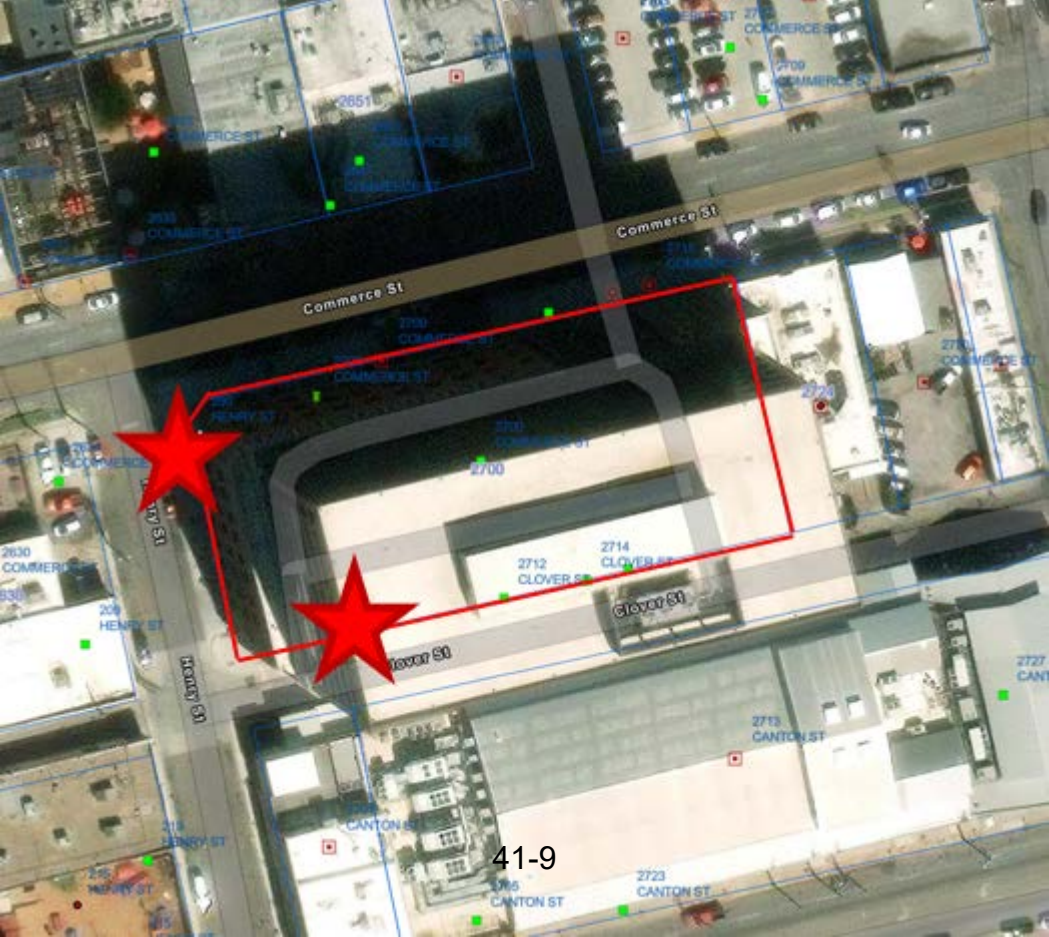
MOTION: It was moved to **approve**:
An application for a Certificate of Appropriateness by Josephine Gonzales of Pattison ID, for a 234-square-foot LED illuminated channel letter sign at 2700 COMMERCE ST, STE 1500 (S ELEVATION).

Maker:	Dumas
Second:	Hall
Result:	Carried: 4 to 0

For:	4	- Peadon, Dumas, Hardin and Hall
Against:	0	- none
Absent:	1	- Webster
Conflict:	0	- none

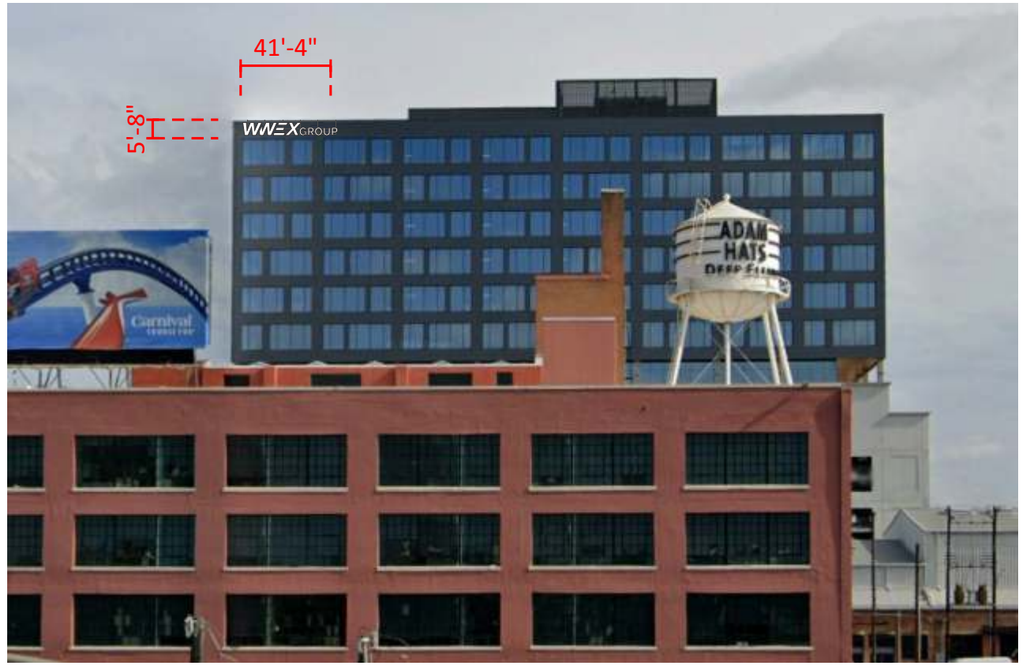
Speakers: Matt Wilson - Pattison ID


PD-269
2653 COMMERCE ST
2651
2645 COMMERCE ST
2651 COMMERCE ST
2647 COMMERCE ST
2633 COMMERCE ST
2631 COMMERCE ST
2718 COMMERCE ST
2700 COMMERCE ST
2706 COMMERCE ST
HENRY ST
2700 COMMERCE ST
2700
2724
2730 COMMERCE ST
2634 COMMERCE ST
2630 COMMERCE ST
209 HENRY ST
2712 CLOVER ST
2714 CLOVER ST
Clover St
2713 CANTON ST
2727
2701 CANTON ST
219 HENRY ST
215 HENRY ST
2706 CANTON ST
2723 CANTON ST
Commerce St
Canton St


Commerce St
Commerce St
Clover St
Clover St
Henry St
2700
2712
CLOVER ST
2714
CLOVER ST
2713
CANTON ST
2723
CANTON ST
2630
COMMERCE ST
209
HENRY ST

SOUTH ELEVATION - EXISTING

(16 STORIES)



A SOUTH ELEVATION - PROPOSED SIGNAGE

Project ID
0420531AR7

WWEX GROUP
2700 COMMERCE ST
DALLAS, TX.

Date: 03.01.23
Contact: M WILSON
Designer: SDM

Sign Item

SIGN ITEM

Scale: ----------

Revision Note

R7 RFF 05.21.25

Information Required for Production

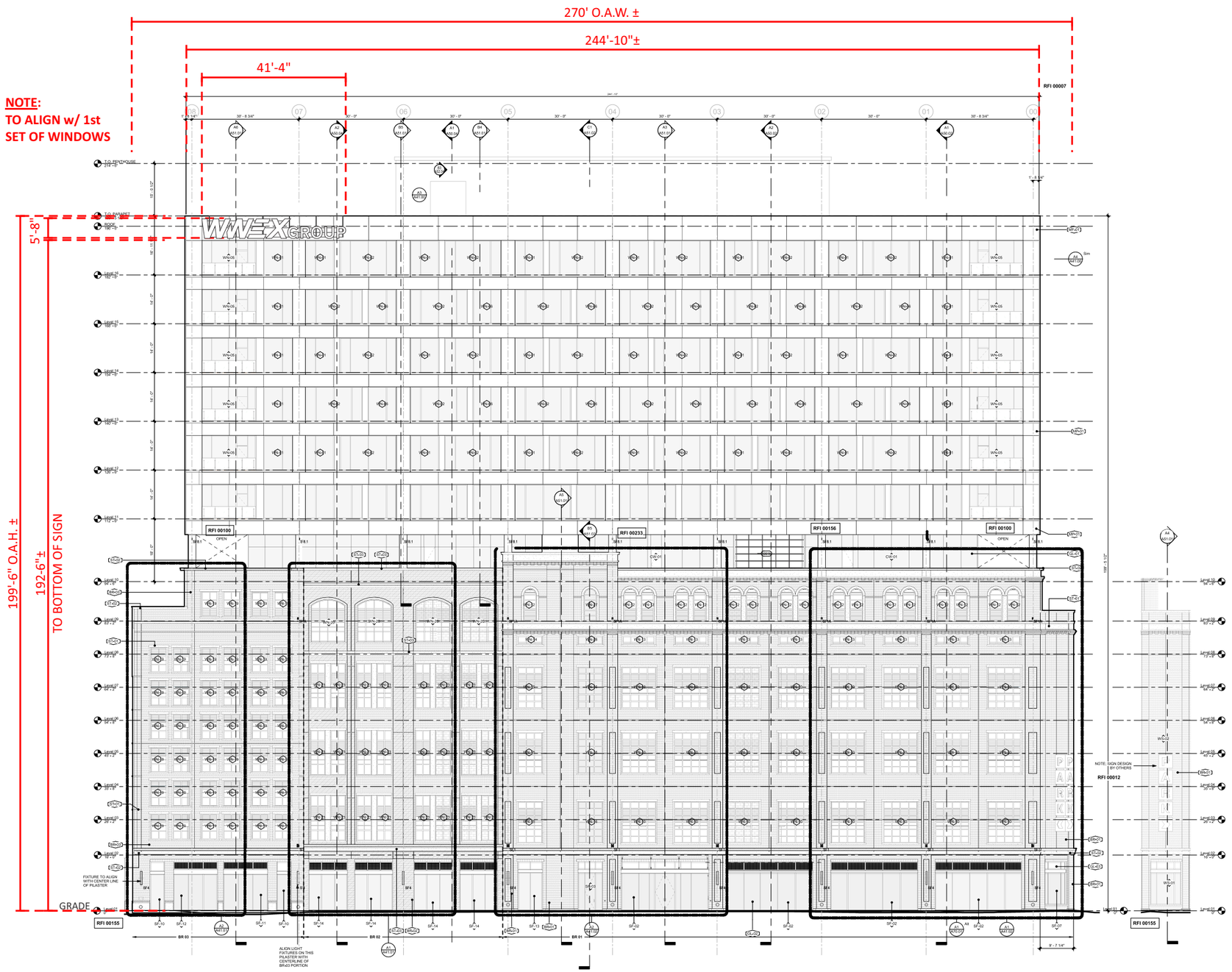
Customer Approval

Signature

MM/DD/YYYY

It is the Customer's responsibility to ensure that the sign installation location is suitable to accept and support the installation of the signs being ordered. Notify Pattison ID immediately if further details are required.

Pattison id
1.866.635.1110
pattisonid.com



A **SOUTH ELEVATION - PROPOSED SIGNAGE**
(16 STORIES)

SCALE: 1/32" = 1'-0"

EFFECTIVE AREA OF SOUTH ELEVATION: 53,865 Sq.Ft.

Project ID
0420531AR7

WWEX GROUP
2700 COMMERCE ST
DALLAS, TX.

Date: 03.01.23
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Designer: SDM

Sign Item

SIGN ITEM

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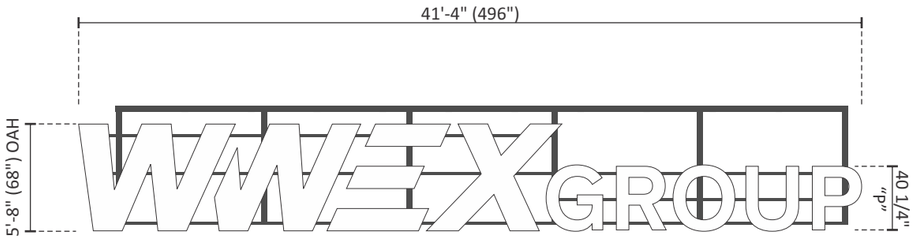
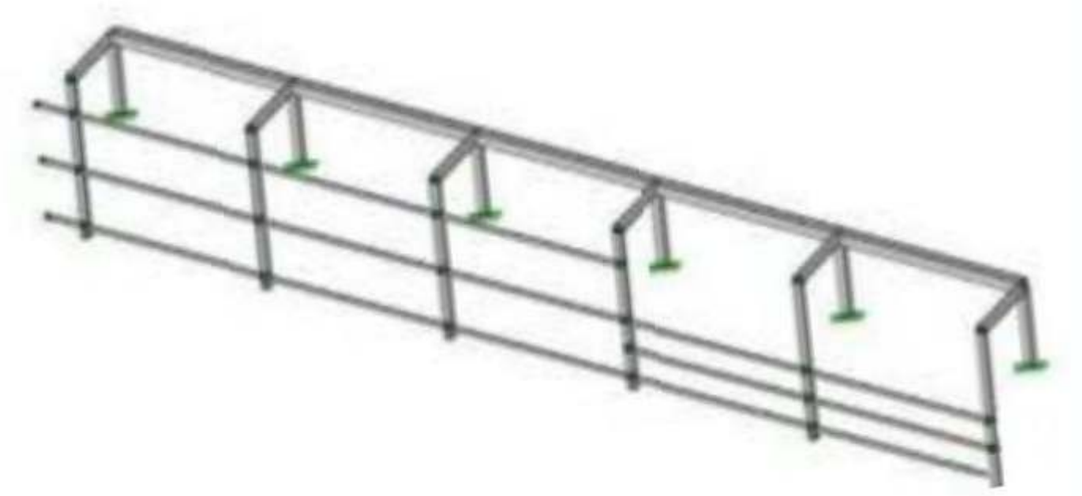


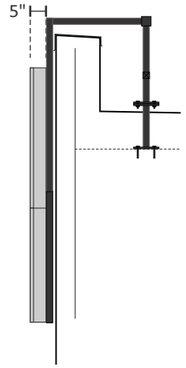
A SOUTH ELEVATION - CHANNEL LETTERS SCALE: 1/8" = 1'-0"

ONE [1] SET REQUIRED - MANUFACTURE & INSTALL 234 SQ.FT.

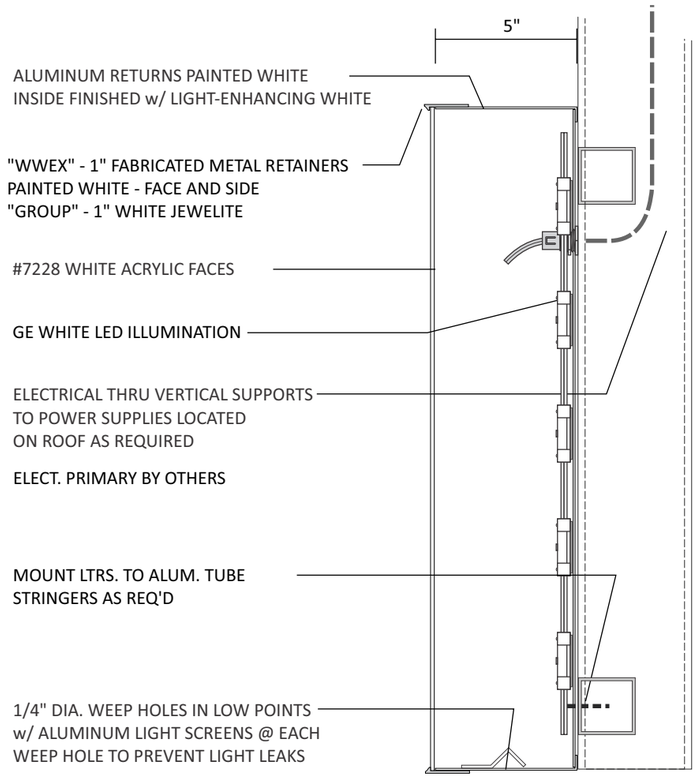
BACK SIDE VIEW



NIGHT VIEW



SIDE VIEW



LETTER SECTION DETAIL 3/16"=1"

Project ID
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Sign Item

SIGN ITEM

Scale:

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Customer Approval

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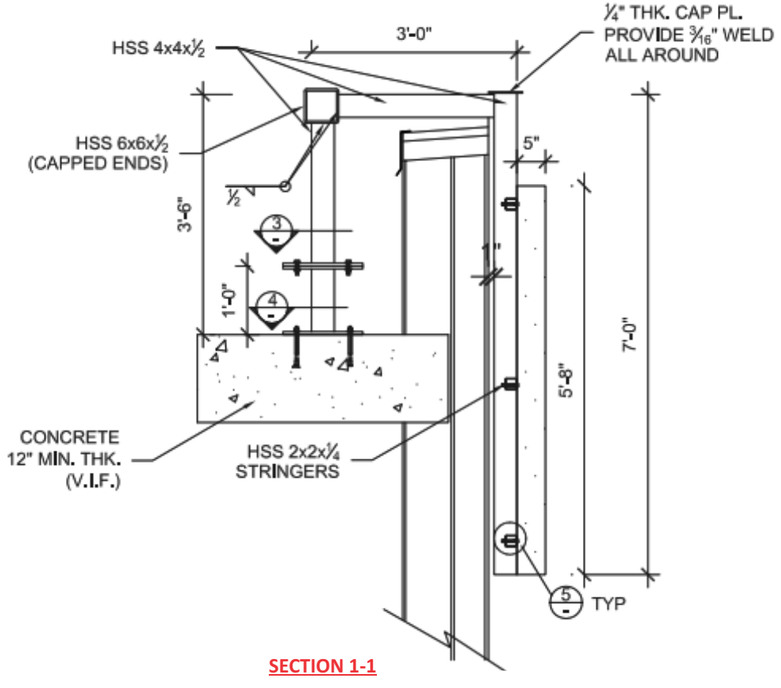
PARAPET/ROOF DETAIL



SECTION 1-1

WELDED SPREAD SUPPORTS BETWEEN VERTICALS, BELOW ROOF

3'-0"±

16"±

20"±

BOLTED SPREADER FOR LIFTING REMOVE AFTER FRAME IS SET

5"

RFI 00228 RFI 00258

15"±

T.O. PARAPET

14"±

8"±

6"±

3'-6"±

22"±

22"±

44" CONCRETE BEAM

SIGN ATTACHMENT POSITIONED IN THE MIDDLE

14" x 14" x 1/2" THICK MOUNTING PLATE W/ 3/4"DIA. A325 TYPE X-BOLTS ANCHORED TO CONCRETE DECK w/ CONCRETE ANCHORS AS REQUIRED

HANGER & STRINGER SUPPORT SYSTEM WITHOUT ANY ATTACHMENTS TO THE PARAPET WALL & ACM PANELS

MOUNTING FRAME PAINTED COLOR T.B.D.

4" x 4" x 1/2" THICK STEEL TUBING EXTENDING VERTICAL FROM THE PLATE TO CONNECT w/ ANOTHER 14" x 14" x 1/2" PLATE ABOVE THE ROOF DECK REMOTE POWER SUPPLIES- LEADS WITHIN TUBES, OR OUTSIDE TUBE

PRIMARY ELECTRICAL TO BE FED FROM ELECTRICAL PANEL LRA IN THE PENTHOUSE AND SUBMETER TO BE PROVIDED

CHANDLER SIGNS TO HIRE K-POST ROOFING TO BE RESPONSIBLE FOR CUTTING HOLES IN ROOF DECK AND SEALING ALL ROOF PENETRATIONS

WWEX TO HIRE A LICENSED ELECTRICIAN PRIMARY ELECTRICAL TO BE FED FROM ELECTRICAL PANEL LRA IN THE PENTHOUSE AND SUBMETER TO BE PROVIDED

5'-8"±

7'-0"± AREA

A WALL SECTION/SIGNAGE MOUNTING DETAIL

SCALE: 1" = 1'-0"

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0420531AR7

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2700 COMMERCE ST
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Designer: SDM

Sign Item

SIGN ITEM

Scale:

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AERIAL SITE VIEW - SIGN LOCATIONS

Project ID
0420531AR7

WWEX GROUP
2700 COMMERCE ST
DALLAS, TX.

Date: 03.01.23
Contact: M WILSON
Designer: SDM

Sign Item

SIGN ITEM

Scale:

Revision Note

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Signature

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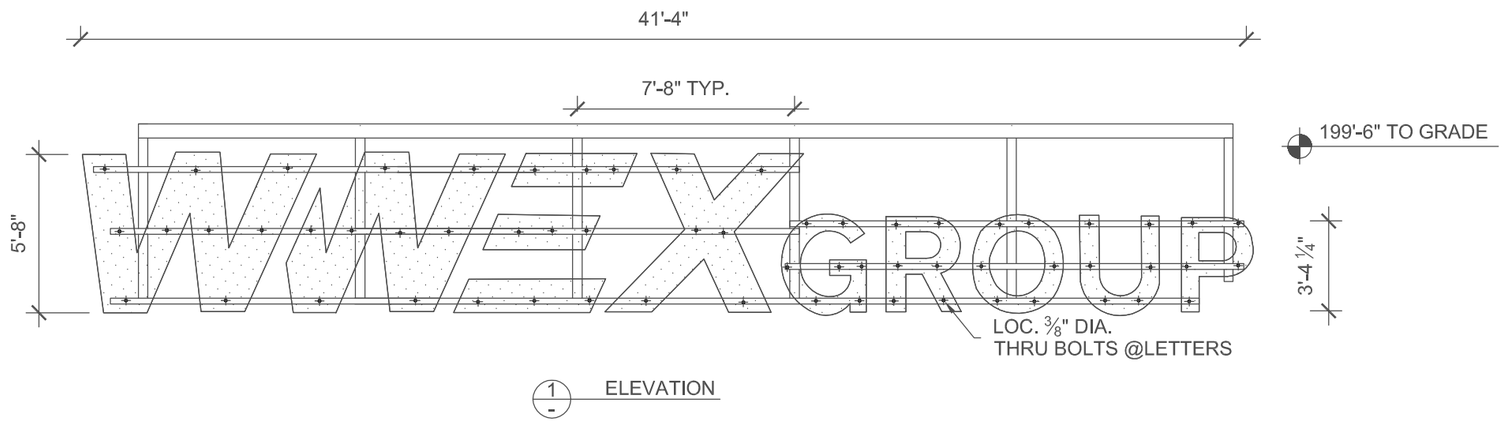
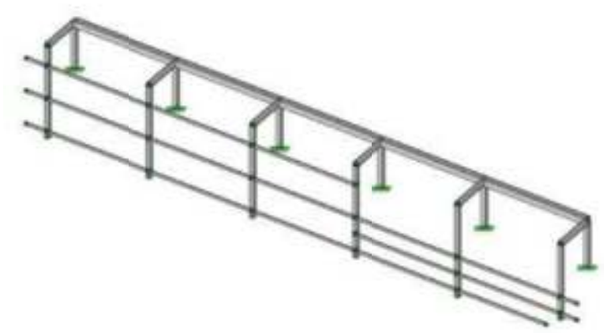
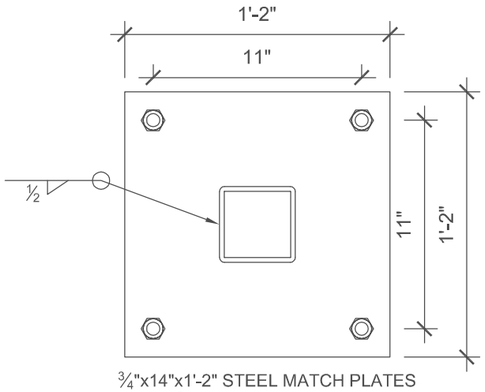


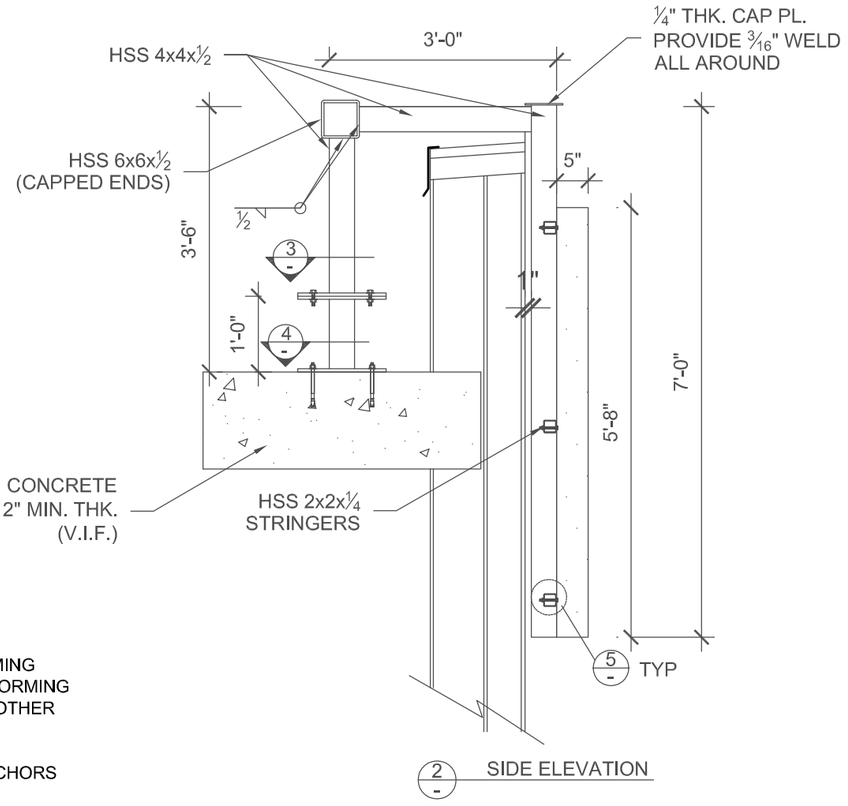
1 - ELEVATION



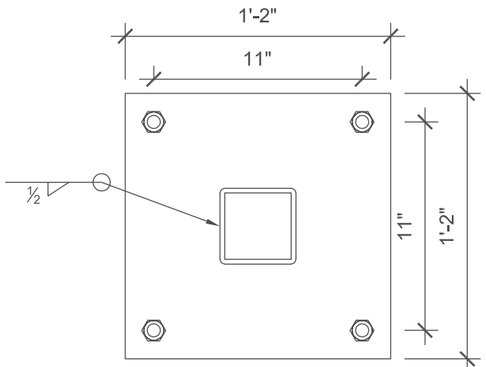


¾"x14"x1'-2" STEEL MATCH PLATES
W/ (4) ¾" DIA. A325 TYPE X GALV.
THRU-BOLTS

3 - PLATE DETAIL

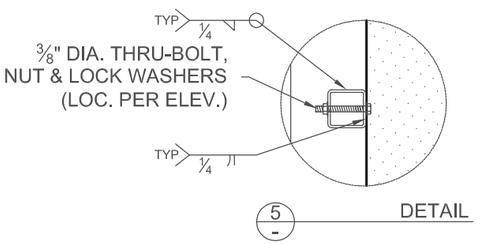


2 - SIDE ELEVATION



¾"x14"x1'-2" STEEL BASE PLATE
W/ (4) ¾" DIA. S.S. HILTI KB-TZ2'S
5.5" NOM. EMBED. INTO CONCRETE

4 - PLATE DETAIL



5 - DETAIL

GENERAL NOTES

1. DESIGN CODE: IBC 2021 W/ DALLAS AMMENDMENTS
2. DESIGN LOADS: ASCE 7-16
3. WIND VELOCITY 105 MPH, RISK CATEGORY II, EXPOSURE C
4. INSTALL HILTI KB-TZ2'S PER ICC ESR-4266
5. HSS RECT. STEEL A500 GRADE B, 46 KSI
6. BOLT STEEL ASTM A325 TYPE X
7. USE HOT DIPPED GALVANIZED HARDWARE
8. ALL BOLT HOLES SHALL BE DRILLED 1/32" TO 1/16" OVERSIZED
9. STRUCTURAL STEEL BARS, PLATES AND ROLLED SHAPES ASTM A36
10. SCOPE OF WORK IS LIMITED TO THE DESIGN OF SIGN SUPPORT FRAMING AND ATTACHMENTS TO BUILDING. SCOPE OF WORK EXCLUDES PERFORMING CAPACITY CHECKS OF WALL ELEMENTS, BUILDING STRUCTURE, OR OTHER EXISTING STRUCTURAL ELEMENTS, ALL OF WHICH ARE BY OTHERS
11. ALL FABRICATING TO BE PERFORMED IN AN APPROVED SHOP
12. PERIODIC SPECIAL INSPECTION REQUIRED FOR POST INSTALLED ANCHORS PER IBC SEC. 1704
13. INSTALLER/CONTRACTOR MUST VERIFY EXISTING CONDITIONS ARE ACCURATE WITH YUNGMAN ENGINEERING DRAWINGS BEFORE INSTALLATION. CONTACT YUNGMAN ENGINEERING IMMEDIATELY IF INCONSISTENCIES OR DISCREPANCIES ARE FOUND
14. STRUCTURAL STEEL WELDS SHALL BE IN COMPLIANCE WITH ANSI/AWS D1.1 AND AISC SPECIFICATIONS CHAPTER J. WELDERS SHALL BE CERTIFIED AS REQUIRED BY GOVERNING CODE AUTHORITY. WELDING SHALL BE PERFORMED BY ELECTRIC ARC PROCESS USING LOW-HYDROGEN ELECTRODES WITH Fexx=70 KSI MIN

YUNGMAN ENGINEERING
2127 MISSOURI ST.
SAN DIEGO, CA 92109
(858) 705-0557
michael@yungmanengineering.com

PREPARED FOR:
CHANDLER SIGNS

WWEX GROUP
2700 COMMERCE ST.,
DALLAS, TX

PROJECT NUMBER:
3151A

DATE: 01-23-2024

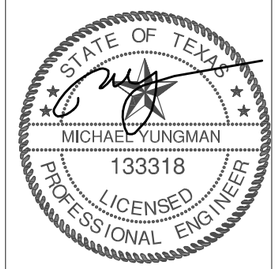
SCALE: NO SCALE

DRAWN BY: MTY

DESIGNED BY: MTY

REVISIONS:

NO.	DATE
1	02-05-2024
2	02-10-2024
3	



SHEET:
S1

YUNGMAN
ENGINEERING

CALCULATIONS FOR:

WWEX GROUP
2700 COMMERCE ST.,
DALLAS, TX

PREPARED FOR:
CHANDLER SIGNS
by

YUNGMAN ENGINEERING
PROJECT #3151A-2
DATE: 2-10-24

YUNGMAN ENGINEERING
2127 Missouri St.
San Diego, CA 92109
(858) 705-0557

PROJECT:	WWEX GROUP, 2700 COMMERCE ST., DALLAS, TX	DATE:	2/10/2024
PROJ. NO.:	3151	ENGINEER:	MTY
CLIENT:	CHANDLER SIGNS		
building code:	IBC 2021		

Applied Wind Loads; from ASCE 7-16, Ch. 30 - part 3 (h > 60 ft)

Width=	5	ft	Height=	5	ft	A=	25	s.f.
Kz=	1.46					(per Table 26.10-1)		
Kzt=	1					(per Section 26.8.2)		
Kd=	0.85					(per Table 26.6-1)		
V=	105	mph						
Exp.=	C							
q=	.00256*Kz*Kzt*Kd*V^2 =			35.03	psf	(per EQ. 26.10-1)		
Gcp=	0.90	-1.80				(per Figure 30.5-1)		
Gcpi=	0	0				(per Table 26.13-1)		
P=	31.52	**31.52**	P= q(GCp) - qi(GCpi)			(per eq. 30.5-1)		
P=	**-63.05**	-63.05	P= q(GCp) - qi(GCpi)			(per eq. 30.5-1)		

Check Conn: Use 3/4" Dia. Thru-Bolts @ Match Plates:

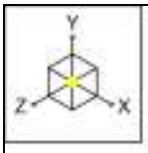
Tu=	2301	#	(assume conservative loads @ Hilti Locations)	
Tc=	29800	#		
Vu=	181	#	(assume conservative loads @ Hilti Locations)	
Vc=	15900	#		
T/Tc+V/Vc=	0.09	<	1	ok

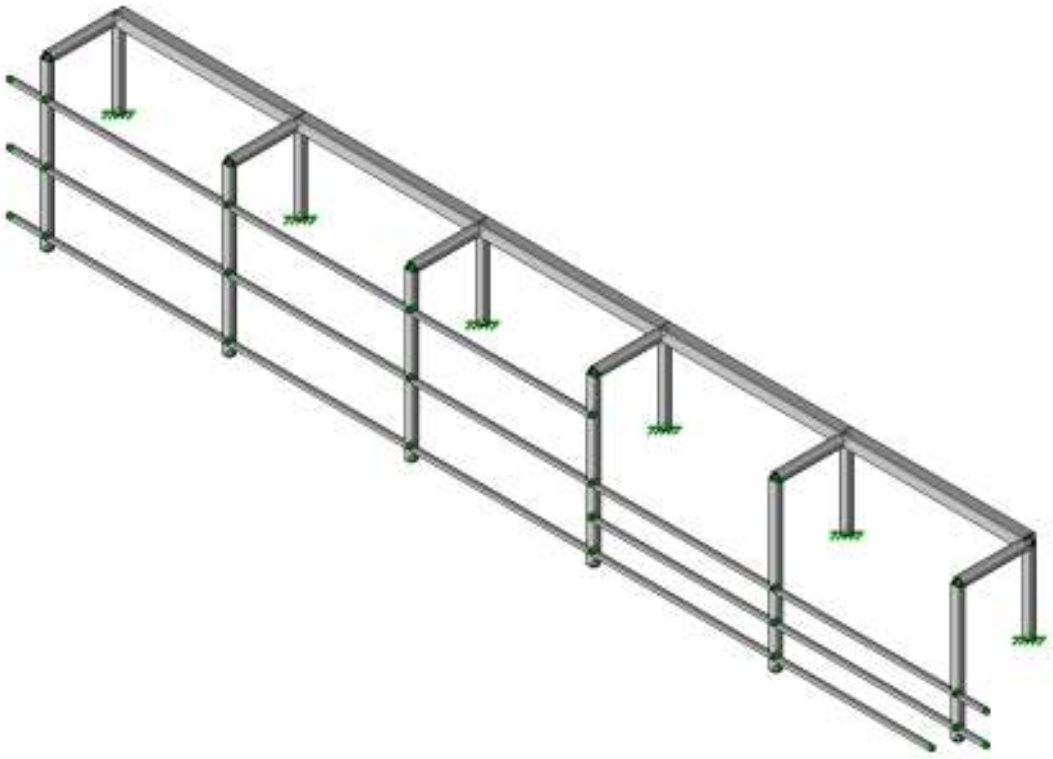
Check 14"x14" Match Plates: **Fy= 36000 psi** **t= 0.75 "** **ϕ= 0.9**

Tu=	2301	#		
Mu=	11620	in #		
Bending Width, b=	9.13	in		
Z= bt^2/4	1.28	in		
ϕMn= ϕ*Fy*Z	41576	>	11620	ok

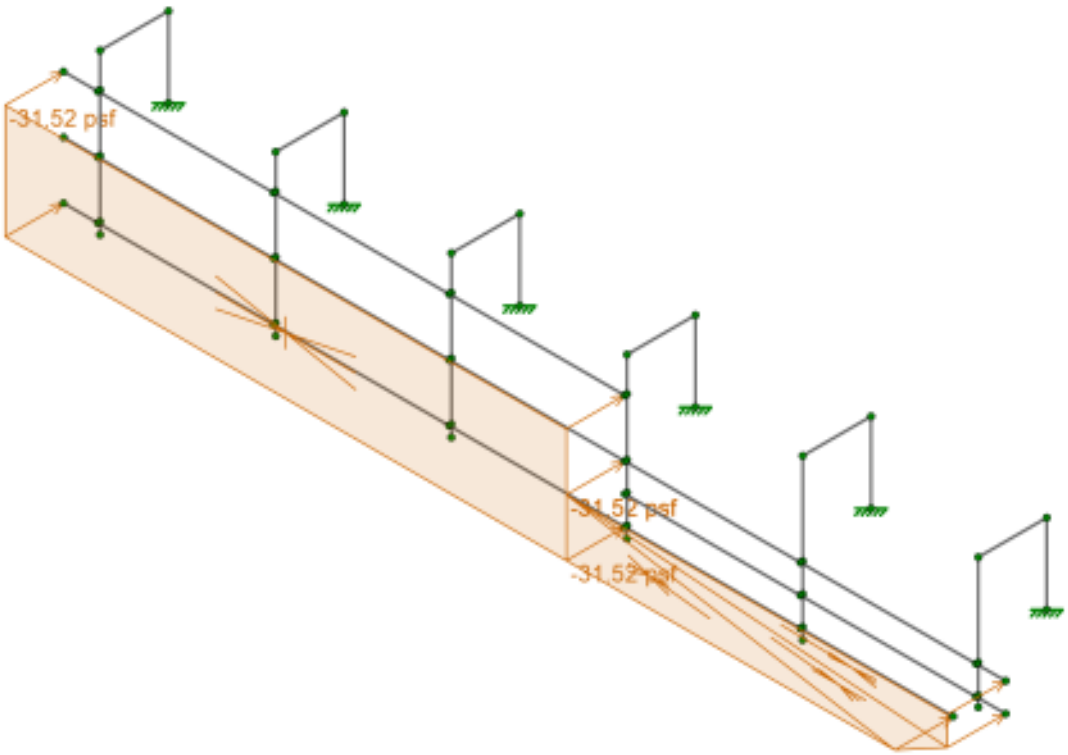
Check Conn: Use 3/8" Dia. Thru-Bolts @ Letters: n= 9

A=	27	sf	(max Letter Size W)	
WL=	1697	#		
DL=	135	#		
Tu=	189	#		
Tc=	3718	#		
Vu=	15	#		
Vc=	1911	#		
T/Tc+V/Vc=	0.06	<	1	ok



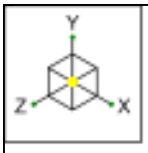


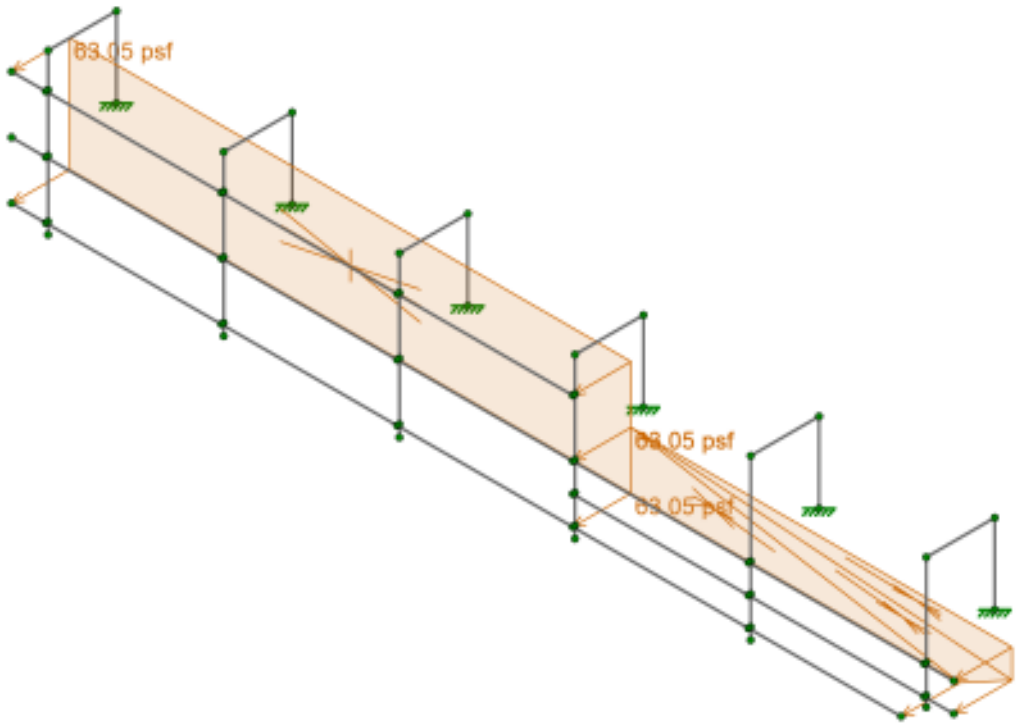
RISA	Yungman Engineering		SK-1
	MTY		3151A-1.r3d



Loads: BLC 4, WL1
Envelope Only Solution

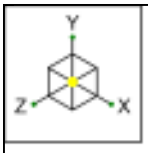
RISA	Yungman Engineering		SK-3
	MTY		3151A-1.r3d

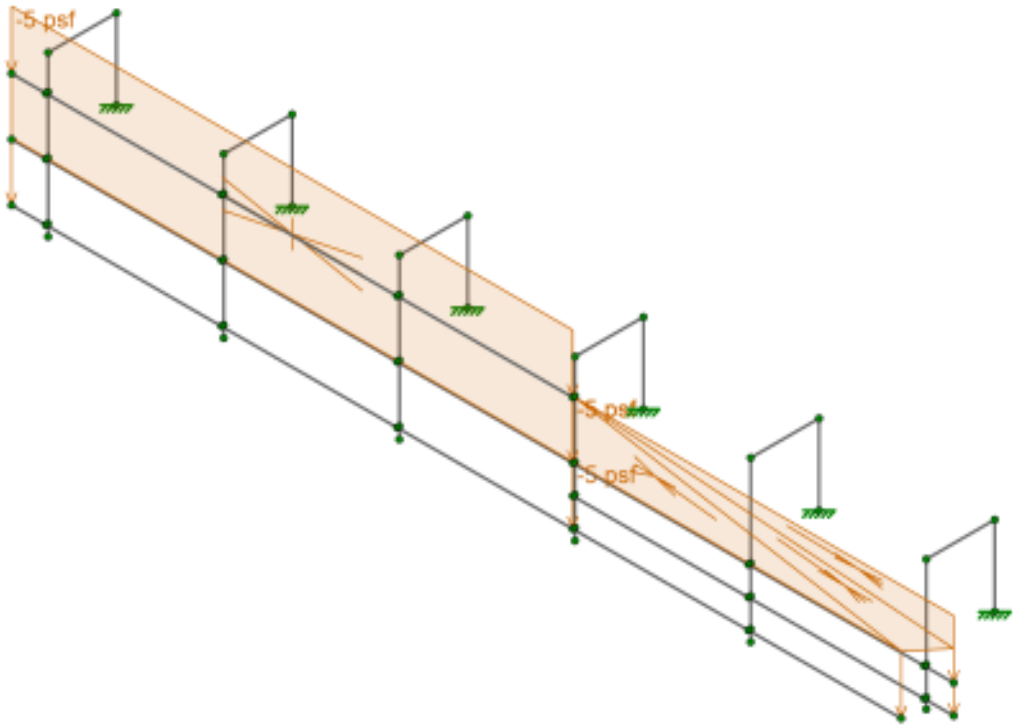




Loads: BLC 5, WL2
Envelope Only Solution

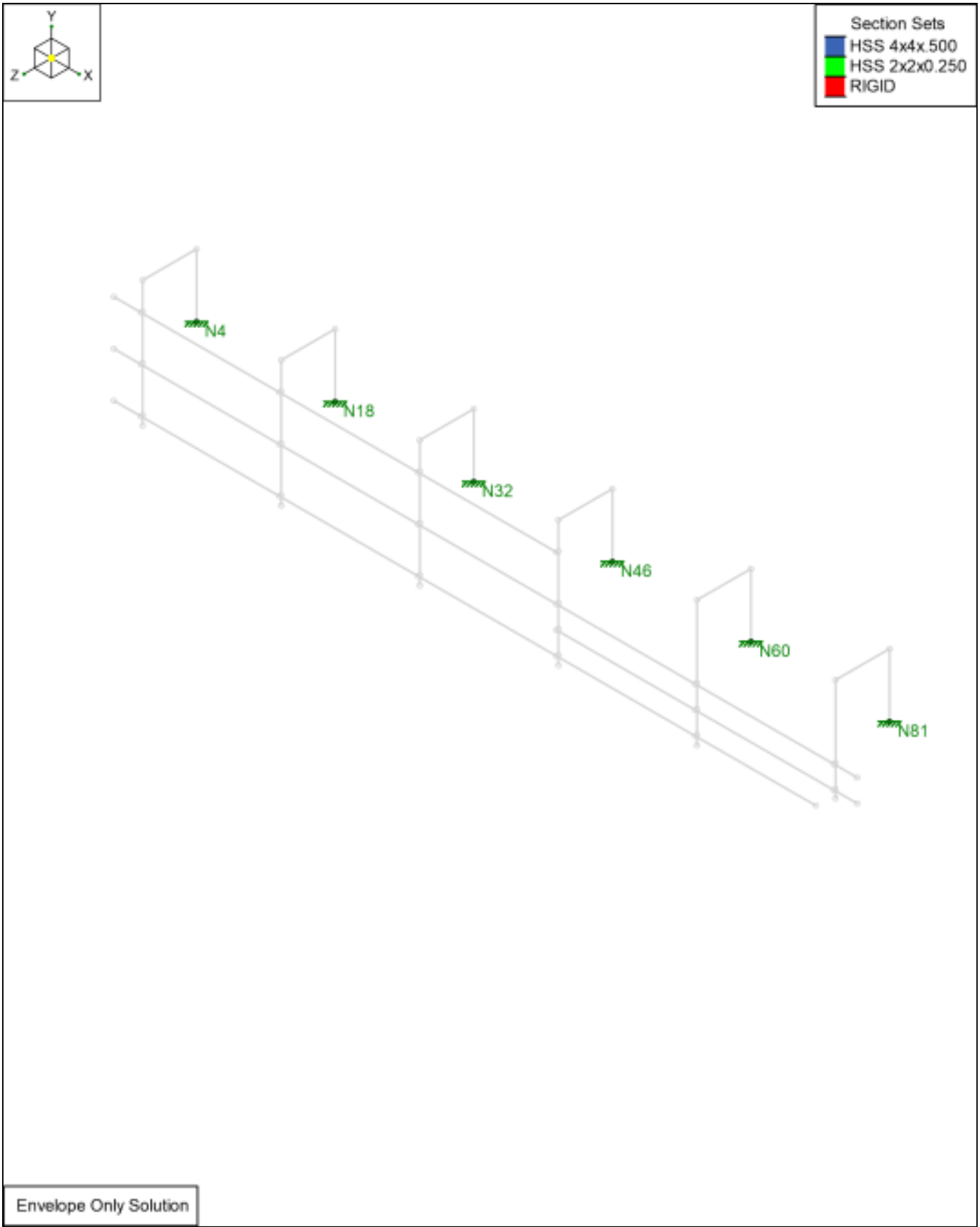
RISA	Yungman Engineering		SK-2
	MTY		3151A-1.r3d





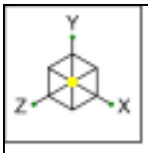
Loads: BLC 1, DL
Envelope Only Solution

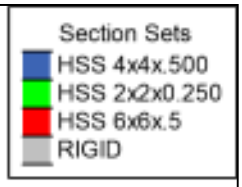
RISA	Yungman Engineering		SK-4
	MTY		3151A-1.r3d

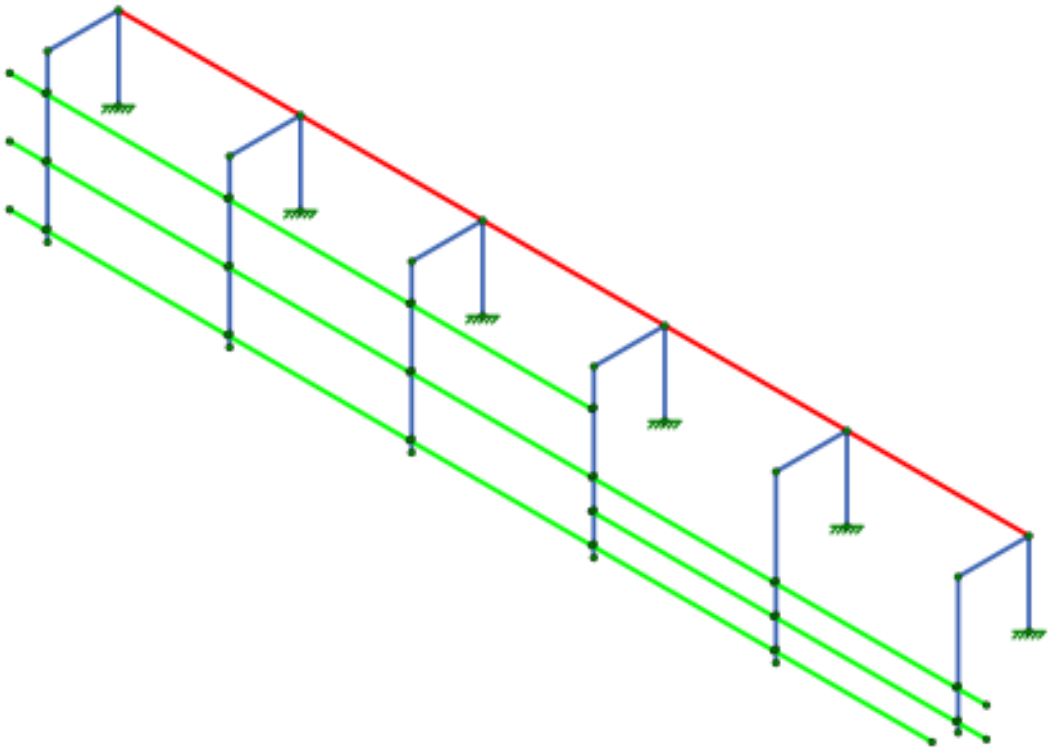


Envelope Only Solution

RISA	Yungman Engineering		SK-6
	MTY		3151A-1.r3d


Y
Z
X


Section Sets
HSS 4x4x.500
HSS 2x2x0.250
HSS 6x6x.5
RIGID



Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Distributed	Area(Member)
1	DL	DL		-1			4
2	SL	SL					
3	LL	LL					
4	WL1	WL					4
5	WL2	WL					4
6	WL3	WL					
7	WL4	WL					
8	WL5	WL					
9	WL6	WL					
10	ELF-X	ELX	0.35				
11	ELF-Z	ELZ			0.35		
12	BLC 1 Transient Area Loads	None				71	
13	BLC 4 Transient Area Loads	None				71	
14	BLC 5 Transient Area Loads	None				71	

Load Combinations

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor
1	1.4DL	Yes	Y	1	1.4				
2	0.9DL+ WL1	Yes	Y	1	0.9	4	1		
3	0.9DL+ WL2	Yes	Y	1	0.9	5	1		
4	0.9DL+ WL3	Yes	Y	1	0.9	6	1		
5	0.9DL+ WL4	Yes	Y	1	0.9	7	1		
6	0.9DL+ WL5	Yes	Y	1	0.9	8	1		
7	0.9DL+ WL6	Yes	Y	1	0.9	9	1		
8	1.2DL+WL1+.5Lr	Yes	Y	1	1.2	4	1	3	0.5
9	1.2DL+WL2+.5Lr	Yes	Y	1	1.2	5	1	3	0.5
10	1.2DL+WL3+.5Lr	Yes	Y	1	1.2	6	1	3	0.5
11	1.2DL+WL4+.5Lr	Yes	Y	1	1.2	7	1	3	0.5
12	1.2DL+WL5+.5Lr	Yes	Y	1	1.2	8	1	3	0.5
13	1.2DL+WL6+.5Lr	Yes	Y	1	1.2	9	1	3	0.5
14	1.2DL+.5WL1+1.6LL	Yes	Y	1	1.2	4	0.5	3	1.6
15	1.2DL+.5WL2+1.6LL	Yes	Y	1	1.2	5	0.5	3	1.6
16	1.2DL+.5WL3+1.6LL	Yes	Y	1	1.2	6	0.5	3	1.6
17	1.2DL+.5WL4+1.6LL	Yes	Y	1	1.2	7	0.5	3	1.6
18	1.2DL+.5WL5+1.6LL	Yes	Y	1	1.2	8	0.5	3	1.6
19	1.2DL+.5WL6+1.6LL	Yes	Y	1	1.2	9	0.5	3	1.6
20	1.2DL+WL1+.5SL	Yes	Y	1	1.2	4	1	2	0.5
21	1.2DL+WL2+.5SL	Yes	Y	1	1.2	5	1	2	0.5
22	1.2DL+WL3+.5SL	Yes	Y	1	1.2	6	1	2	0.5
23	1.2DL+WL4+.5SL	Yes	Y	1	1.2	7	1	2	0.5
24	1.2DL+WL5+.5SL	Yes	Y	1	1.2	8	1	2	0.5
25	1.2DL+WL6+.5SL	Yes	Y	1	1.2	9	1	2	0.5
26	1.2DL+.5WL1+1.6SL	Yes	Y	1	1.2	4	0.5	2	1.6
27	1.2DL+.5WL2+1.6SL	Yes	Y	1	1.2	5	0.5	2	1.6
28	1.2DL+.5WL3+1.6SL	Yes	Y	1	1.2	6	0.5	2	1.6
29	1.2DL+.5WL4+1.6SL	Yes	Y	1	1.2	7	0.5	2	1.6
30	1.2DL+.5WL5+1.6SL	Yes	Y	1	1.2	8	0.5	2	1.6
31	1.2DL+.5WL6+1.6SL	Yes	Y	1	1.2	9	0.5	2	1.6
32	1.2DL+WL1+.5Lr	Yes	Y	1	1.2	4	1	3	0.5
33	1.2DL+WL2+.5Lr	Yes	Y	1	1.2	5	1	3	0.5
34	1.2DL+WL3+.5Lr	Yes	Y	1	1.2	6	1	3	0.5
35	1.2DL+WL4+.5Lr	Yes	Y	1	1.2	7	1	3	0.5
36	1.2DL+WL5+.5Lr	Yes	Y	1	1.2	8	1	3	0.5
37	1.2DL+WL6+.5Lr	Yes	Y	1	1.2	9	1	3	0.5

Load Combinations (Continued)

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor
38	1.2DL+.5WL1+1.6LL	Yes	Y	1	1.2	4	0.5	3	1.6
39	1.2DL+.5WL2+1.6LL	Yes	Y	1	1.2	5	0.5	3	1.6
40	1.2DL+.5WL3+1.6LL	Yes	Y	1	1.2	6	0.5	3	1.6
41	1.2DL+.5WL4+1.6LL	Yes	Y	1	1.2	7	0.5	3	1.6
42	1.2DL+.5WL5+1.6LL	Yes	Y	1	1.2	8	0.5	3	1.6
43	1.2DL+.5WL6+1.6LL	Yes	Y	1	1.2	9	0.5	3	1.6
44	1.2DL+WL1+.5SL	Yes	Y	1	1.2	4	1	2	0.5
45	1.2DL+WL2+.5SL	Yes	Y	1	1.2	5	1	2	0.5
46	1.2DL+WL3+.5SL	Yes	Y	1	1.2	6	1	2	0.5
47	1.2DL+WL4+.5SL	Yes	Y	1	1.2	7	1	2	0.5
48	1.2DL+WL5+.5SL	Yes	Y	1	1.2	8	1	2	0.5
49	1.2DL+WL6+.5SL	Yes	Y	1	1.2	9	1	2	0.5
50	1.2DL+.5WL1+1.6SL	Yes	Y	1	1.2	4	0.5	2	1.6
51	1.2DL+.5WL2+1.6SL	Yes	Y	1	1.2	5	0.5	2	1.6
52	1.2DL+.5WL3+1.6SL	Yes	Y	1	1.2	6	0.5	2	1.6
53	1.2DL+.5WL4+1.6SL	Yes	Y	1	1.2	7	0.5	2	1.6
54	1.2DL+1.0ELX+0.2SL		Y	1	1.2	10	1	2	0.2
55	1.2DL+1.0ELZ+0.2SL		Y	1	1.2	11	1	2	0.2
56	0.9DL+1.0ELX		Y	1	0.9	10	1		
57	0.9DL+1.0ELZ		Y	1	0.9	11	1		

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [k/ft³]	Yield [ksi]	Ry	Fu [ksi]	Rt
1	A36 Gr.36	29000	11154	0.3	0.65	0.49	36	1.5	58	1.2
2	A363	29000	11154	0.3	0.65	0.49	103	1.1	58	1.2
3	A500 Gr.42	29000	11154	0.3	0.65	0.49	42	1.3	58	1.1
4	A500 Gr.46	29000	11154	0.3	0.65	0.49	46	1.2	58	1.1
5	a53 GR B	29000	11154	0.3	0.65	0.49	35	1.5	58	1.2
6	ASTM A513	29000	11154	0.3	0.65	0.49	72	1.5	45	1.2
7	ASTM A992	29000	11154	0.3	0.65	0.49	50	1.5	58	1.2

Aluminum Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [k/ft³]	Table B.4	kt	Ftu [ksi]	Fty [ksi]	Fcy [ksi]	Fsu [ksi]	Ct
1	3003-H14	10100	3787.5	0.33	1.3	0.173	Table B.4-1	1	19	16	13	12	141
2	6061-T6	10100	3787.5	0.33	1.3	0.173	Table B.4-2	1	19	17.5	17.5	12	141
3	6063-T5	10100	3787.5	0.33	1.3	0.173	Table B.4-2	1	22	16	16	13	141
4	6063-T6	10100	3787.5	0.33	1.3	0.173	Table B.4-2	1	30	25	25	19	141
5	5052-H34	10200	3787.5	0.33	1.3	0.173	Table B.4-1	1	34	26	24	20	141
6	6061-T6 W	10100	3787.5	0.33	1.3	0.173	Table B.4-1	1	24	15	15	15	141
7	6063-T6W	10100	3787.5	0.33	1.3	0.173	Table B.4-1	1	17	8	8	11	141
8	6061-T6_1	10100	3787.5	0.33	1.3	0.173	Table B.4-2	1	38	35	35	24	141

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rule	Area [in²]	Iyy [in⁴]	Izz [in⁴]	J [in⁴]
1	HSS 4x4x.500	HSS4X4X8	Beam	Tube	A500 Gr.46	Typical	6.02	11.9	11.9	21
2	HSS 2x2x0.250	HSS2X2X4	Beam	Tube	A500 Gr.46	Typical	1.51	0.747	0.747	1.31
3	HSS 6x6x.5	HSS6X6X8	Beam	Tube	A500 Gr.46	Typical	9.74	48.3	48.3	81.1

Aluminum Section Sets

	Label	Shape	Type	Design List	Material	Design Rule	Area [in²]	Iyy [in⁴]	Izz [in⁴]	J [in⁴]
1	Alum. 1	RT1X1X0.125	Beam	Rectangular Tubes	6061-T6 W	Typical	0.438	0.057	0.057	0.084

Envelope Node Reactions

	Node Label		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
0	N4	max	0.051	44	0.842	1	0.855	2	0.222	3	0.03	45	0.039	3
1		min	-0.023	3	0.509	3	-1.742	9	-2.36	8	-0.009	2	-0.063	8
2	N18	max	-0.001	2	1.208	1	1.193	44	-0.711	3	0.03	45	0.024	45
3		min	-0.014	9	0.766	2	-2.358	3	-1.93	8	-0.009	2	-0.002	2
4	N32	max	0.002	44	1.173	1	1.198	44	-0.726	3	-0.001	2	0.004	3
5		min	-0.001	3	0.742	2	-2.371	3	-1.911	8	-0.023	9	-0.003	8
6	N46	max	0.018	3	1.101	1	0.92	2	0.035	3	-0.012	3	0.013	44
7		min	-0.011	8	0.704	2	-1.842	9	-2.186	8	-0.02	1	-0.021	3
8	N60	max	0.009	44	1.111	1	0.686	44	0.623	3	0.001	3	-0.002	3
9		min	-0.001	3	0.713	2	-1.352	3	-2.284	8	-0.038	8	-0.01	8
10	N81	max	0.02	3	0.655	1	0.303	2	1.471	3	0.004	2	0.055	44
11		min	-0.048	8	0.401	3	-0.638	9	-2.515	8	-0.064	9	-0.026	3
12	Totals:	max	0	44	6.09	1	5.148	44						
13		min	0	3	3.915	2	-10.297	3						

Envelope AISC 15TH (360-16): LRFD Member Steel Code Checks

	Member	Shape	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]	Dir	LC	phi*Pnc [k]	phi*Pnt [k]	phi*Mn y-y [k-ft]	phi*Mn z-z [k-ft]	Cb	Eqn
0	M93	HSS2X2X4	0.392	0	45	0.019	0	z	45	25.956	62.514	3.326	3.326	2.272	H1-1b
1	M8	HSS4X4X8	0.361	0	3	0.013	3	y	45	238.475	249.228	26.565	26.565	1.069	H1-1b
2	M14	HSS4X4X8	0.361	0	3	0.014	3	y	45	238.475	249.228	26.565	26.565	1.067	H1-1b
3	M13	HSS4X4X8	0.354	0	3	0.045	1.361	z	3	196.028	249.228	26.565	26.565	1.498	H1-1b
4	M7	HSS4X4X8	0.352	0	3	0.047	1.361	z	3	196.028	249.228	26.565	26.565	1.59	H1-1b
5	M20	HSS4X4X8	0.33	0	3	0.017	3	y	45	238.475	249.228	26.565	26.565	1.064	H1-1b
6	M2	HSS4X4X8	0.311	0	3	0.017	3	y	45	238.475	249.228	26.565	26.565	1.055	H1-1b
7	M19	HSS4X4X8	0.303	0	3	0.064	1.361	z	3	196.028	249.228	26.565	26.565	1.722	H1-1b
8	M15	HSS4X4X8	0.286	0	3	0.04	3.5	z	45	234.707	249.228	26.565	26.565	1.751	H1-1b
9	M9	HSS4X4X8	0.286	0	3	0.04	3.5	z	45	234.707	249.228	26.565	26.565	2.27	H1-1b
10	M1	HSS4X4X8	0.273	0	3	0.076	1.361	z	3	196.028	249.228	26.565	26.565	1.656	H1-1b
11	M58	HSS2X2X4	0.272	7.7	45	0.065	7.7	z	3	19.766	62.514	3.326	3.326	2.523	H1-1b
12	M59	HSS2X2X4	0.266	7.7	45	0.041	7.7	z	3	19.766	62.514	3.326	3.326	2.685	H1-1b
13	M60	HSS2X2X4	0.262	0	45	0.056	7.7	z	3	19.766	62.514	3.326	3.326	2.632	H1-1b
14	M26	HSS4X4X8	0.259	0	3	0.011	3	y	45	238.475	249.228	26.565	26.565	1.076	H1-1b
15	M25	HSS4X4X8	0.257	0	3	0.043	5.25	z	45	196.028	249.228	26.565	26.565	1.282	H1-1b
16	M21	HSS4X4X8	0.247	0	3	0.031	3.5	z	45	234.707	249.228	26.565	26.565	2.18	H1-1b
17	M3	HSS4X4X8	0.24	0	3	0.03	3.5	z	45	234.707	249.228	26.565	26.565	2.252	H1-1b
18	M27	HSS4X4X8	0.203	0	3	0.023	3.5	z	45	234.707	249.228	26.565	26.565	1.291	H1-1b
19	M98	HSS2X2X4	0.201	0	3	0.067	0	z	3	19.766	62.514	3.326	3.326	2.456	H1-1b
20	M35	HSS4X4X8	0.171	0	3	0.016	3	y	45	238.475	249.228	26.565	26.565	1.062	H1-1b
21	M52	HSS2X2X4	0.161	7.7	45	0.041	7.7	z	3	19.766	62.514	3.326	3.326	2.631	H1-1b
22	M66	HSS2X2X4	0.158	7.7	45	0.037	7.7	z	3	19.766	62.514	3.326	3.326	2.673	H1-1b
23	M64	HSS2X2X4	0.156	0	3	0.046	0	z	3	19.766	62.514	3.326	3.326	2.424	H1-1b
24	M99	HSS2X2X4	0.155	0	45	0.032	0	z	3	19.766	62.514	3.326	3.326	2.624	H1-1b
25	M54	HSS2X2X4	0.152	0	45	0.034	0	z	3	19.766	62.514	3.326	3.326	2.63	H1-1b
26	M34	HSS4X4X8	0.147	0	3	0.047	3.958	z	3	212.546	249.228	26.565	26.565	1.663	H1-1b
27	M53	HSS2X2X4	0.144	7.7	45	0.021	7.7	z	3	19.766	62.514	3.326	3.326	2.866	H1-1b
28	M36	HSS4X4X8	0.141	0	3	0.013	3.5	z	45	234.707	249.228	26.565	26.565	2.192	H1-1b
29	M65	HSS2X2X4	0.14	7.7	45	0.021	7.7	z	3	19.766	62.514	3.326	3.326	2.813	H1-1b
30	M92	HSS2X2X4	0.14	7.7	45	0.024	7.7	z	3	19.766	62.514	3.326	3.326	2.923	H1-1b

Envelope AISC 15TH (360-16): LRFD Member Steel Code Checks (Continued)

	Member	Shape	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]	Dir	LC	phi*Pnc [k]	phi*Pnt [k]	phi*Mn y-y [k-ft]	phi*Mn z-z [k-ft]	Cb	Eqn
31	M69	HSS2X2X4	0.108	0	3	0.052	0	z	3	19.766	62.514	3.326	3.326	2.501	H1-1b
32	M73	HSS2X2X4	0.105	7.7	45	0.023	7.7	z	3	19.766	62.514	3.326	3.326	2.769	H1-1b
33	M108	HSS2X2X4	0.061	0	45	0.016	0	z	45	59.82	62.514	3.326	3.326	2.326	H1-1b
34	M107	HSS2X2X4	0.032	0	45	0.008	0	z	3	59.82	62.514	3.326	3.326	2.326	H1-1b
35	M109	HSS2X2X4	0.032	0	45	0.008	0	z	45	59.82	62.514	3.326	3.326	2.326	H1-1b
36	M97	HSS2X2X4	0.017	0	45	0.006	0	z	45	60.479	62.514	3.326	3.326	2.387	H1-1b
37	M111	HSS2X2X4	0.012	0	45	0.003	0	z	3	60.479	62.514	3.326	3.326	2.327	H1-1b
38	M72	HSS6X6X8	0.009	7.7	3	0.013	0	y	44	359.138	403.236	68.31	68.31	3	H1-1b
39	M68	HSS6X6X8	0.008	7.7	45	0.007	0	y	44	359.138	403.236	68.31	68.31	2.813	H1-1b
40	M61	HSS6X6X8	0.007	7.7	45	0.006	7.7	y	44	359.138	403.236	68.31	68.31	2.234	H1-1b
41	M67	HSS6X6X8	0.006	0	45	0.002	0	y	1	359.138	403.236	68.31	68.31	2.593	H1-1b
42	M70	HSS6X6X8	0.004	0	44	0.009	0	y	44	359.138	403.236	68.31	68.31	3	H1-1b

Company:		Page:	1
Address:		Specifier:	Michael
Phone I Fax:	|	E-Mail:	
Design:	Drafts_Drafts_Drafts_3151A	Date:	2/10/2024
Fastening point:			

Specifier's comments:

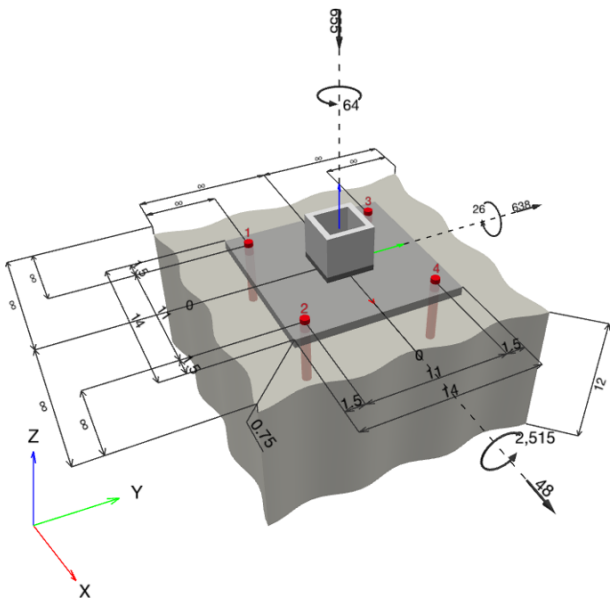
1 Anchor Design

1.1 Input data

Anchor type and diameter:	**Kwik Bolt TZ2 - SS 304 3/4 (4 3/4) hnom3**
Item number:	2210288 KB-TZ2 3/4x7 SS304
Effective embedment depth:	$h_{ef,act}$ = 4.750 in., h_{nom} = 5.500 in.
Material:	AISI 304
Evaluation Service Report:	ESR-4266
Issued I Valid:	12/17/2021 | 12/1/2023
Proof:	Design Method ACI 318-19 / Mech
Stand-off installation:	e_b = 0.000 in. (no stand-off); t = 0.750 in.
Anchor plate[CBFEM]:	l_x x l_y x t = 14.000 in. x 14.000 in. x 0.750 in.;
Profile:	Square HSS (AISC), HSS4X4X.500; (L x W x T) = 4.000 in. x 4.000 in. x 0.500 in.
Base material:	cracked concrete, 2500, f_c' = 2,500 psi; h = 12.000 in.
Installation:	**hammer drilled hole, Installation condition: Dry**
Reinforcement:	tension: present, shear: present; no supplemental splitting reinforcement present edge reinforcement: > No. 4 bar

[CBFEM] - The anchor calculation is based on a component-based Finite Element Method (CBFEM)

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



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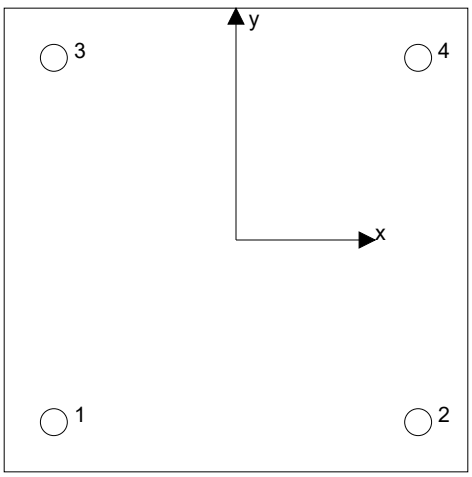
1.1.1 Design results

Case	Description	Forces [lb] / Moments [ft.lb]	Seismic	Max. Util. Anchor [%]
1	Load case: Design loads	N = -655; V_x = 48; V_y = 638; M_x = 2,515.000; M_y = 26.000; M_z = 64.000;	no	41

1.2 Load case/Resulting anchor forces



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

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	0	147	29	144
2	0	181	30	179
3	2,301	140	7	140
4	2,277	176	-18	175

resulting tension force in (x/y)=(0.000/0.000): 0 [lb]
resulting compression force in (x/y)=(0.000/0.000): 0 [lb]

Anchor forces are calculated based on a component-based Finite Element Method (CBFEM)

1.3 Tension load

	Load N_{ua} [lb]	Capacity ϕ N_n [lb]	Utilization $\beta_N = N_{ua}/\phi$ N_n	Status
Steel Strength*	2,301	18,041	13	OK
Pullout Strength*	2,301	5,719	41	OK
Concrete Breakout Failure**	4,578	14,386	32	OK

* highest loaded anchor **anchor group (anchors in tension)

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1.3.1 Steel Strength

N_{sa} = ESR value — refer to ICC-ES ESR-4266
$\phi\ N_{sa} \geq N_{ua}$ — ACI 318-19 Table 17.5.2

Variables

$A_{se,N}$ [in.^{2}]	f_{uta} [psi]
0.24	100,504

Calculations

N_{sa} [lb]
24,055

Results

N_{sa} [lb]	ϕ_{steel}	$\phi\ N_{sa}$ [lb]	N_{ua} [lb]
24,055	0.750	18,041	2,301

1.3.2 Pullout Strength

$N_{pn,f_c'} = N_{p,2500}\ \lambda_a\ (f_c'/2500)^{0.5}$ — refer to ICC-ES ESR-4266
$\phi\ N_{pn,f_c'} \geq N_{ua}$ — ACI 318-19 Table 17.5.2

Variables

f_c' [psi]	λ_a	$N_{p,2500}$ [lb]
2,500	1.000	8,799

Calculations

$(f_c'/2500)^{0.5}$
1.000

Results

$N_{pn,f_c'}$ [lb]	$\phi_{concrete}$	$\phi\ N_{pn,f_c'}$ [lb]	N_{ua} [lb]
8,799	0.650	5,719	2,301

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1.3.3 Concrete Breakout Failure

$N_{cbg} = \left(\frac{A_{Nc}}{A_{Nc0}}\right) \psi_{ec,N}\ \psi_{ed,N}\ \psi_{c,N}\ \psi_{cp,N}\ N_b$ — ACI 318-19 Eq. (17.6.2.1b)

$\phi\ N_{cbg} \geq N_{ua}$ — ACI 318-19 Table 17.5.2

A_{Nc} see ACI 318-19, Section 17.6.2.1, Fig. R 17.6.2.1(b)

$A_{Nc0} = 9\ h_{ef}^2$ — ACI 318-19 Eq. (17.6.2.1.4)

$\psi_{ec,N} = \left(\frac{1}{1 + \frac{2\ e'_N}{3\ h_{ef}}}\right) \leq 1.0$ — ACI 318-19 Eq. (17.6.2.3.1)

$\psi_{ed,N} = 0.7 + 0.3\left(\frac{c_{a,min}}{1.5h_{ef}}\right) \leq 1.0$ — ACI 318-19 Eq. (17.6.2.4.1b)

$\psi_{cp,N} = \text{MAX}\left(\frac{c_{a,min}}{c_{ac}}, \frac{1.5h_{ef}}{c_{ac}}\right) \leq 1.0$ — ACI 318-19 Eq. (17.6.2.6.1b)

$N_b = k_c\ \lambda_a\ \sqrt{f'_c}\ h_{ef}^{1.5}$ — ACI 318-19 Eq. (17.6.2.2.1)

Variables

h_{ef} [in.]	$e_{c1,N}$ [in.]	$e_{c2,N}$ [in.]	$c_{a,min}$ [in.]	$\psi_{c,N}$
4.750	0.030	0.000	∞	1.000

c_{ac} [in.]	k_c	λ_a	f'_c [psi]
10.000	21	1.000	2,500

Calculations

A_{Nc} [in.^{2}]	A_{Nc0} [in.^{2}]	$\psi_{ec1,N}$	$\psi_{ec2,N}$	$\psi_{ed,N}$	$\psi_{cp,N}$	N_b [lb]
359.81	203.06	0.996	1.000	1.000	1.000	10,870

Results

N_{cbg} [lb]	$\phi_{concrete}$	$\phi\ N_{cbg}$ [lb]	N_{ua} [lb]
19,181	0.750	14,386	4,578

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1.4 Shear load

	Load V_{ua} [lb]	Capacity ϕ V_n [lb]	Utilization $\beta_V = V_{ua}/\phi$ V_n	Status
Steel Strength*	181	10,768	2	OK
Steel failure (with lever arm)*	N/A	N/A	N/A	N/A
Pryout Strength**	640	40,397	2	OK
Concrete edge failure in direction **	N/A	N/A	N/A	N/A

* highest loaded anchor **anchor group (relevant anchors)

1.4.1 Steel Strength

V_{sa} = ESR value refer to ICC-ES ESR-4266
ϕ $V_{steel} \geq V_{ua}$ ACI 318-19 Table 17.5.2

Variables

$A_{se,V}$ [in.^{2}]	f_{uta} [psi]
0.24	100,504

Calculations

V_{sa} [lb]
16,567

Results

V_{sa} [lb]	ϕ_{steel}	ϕ V_{sa} [lb]	V_{ua} [lb]
16,567	0.650	10,768	181

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1.4.2 Pryout Strength

$V_{cpg} = k_{cp} \left[\left(\frac{A_{Nc}}{A_{Nc0}} \right) \psi_{ec,N} \psi_{ed,N} \psi_{c,N} \psi_{cp,N} N_b \right]$ ACI 318-19 Eq. (17.7.3.1b)

$\phi V_{cpg} \geq V_{ua}$ ACI 318-19 Table 17.5.2

A_{Nc} see ACI 318-19, Section 17.6.2.1, Fig. R 17.6.2.1(b)

$A_{Nc0} = 9 h_{ef}^2$ ACI 318-19 Eq. (17.6.2.1.4)

$\psi_{ec,N} = \left(\frac{1}{1 + \frac{2 e'_N}{3 h_{ef}}} \right) \leq 1.0$ ACI 318-19 Eq. (17.6.2.3.1)

$\psi_{ed,N} = 0.7 + 0.3 \left(\frac{c_{a,min}}{1.5 h_{ef}} \right) \leq 1.0$ ACI 318-19 Eq. (17.6.2.4.1b)

$\psi_{cp,N} = \text{MAX}\left(\frac{c_{a,min}}{c_{ac}}, \frac{1.5 h_{ef}}{c_{ac}} \right) \leq 1.0$ ACI 318-19 Eq. (17.6.2.6.1b)

$N_b = k_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5}$ ACI 318-19 Eq. (17.6.2.2.1)

Variables

k_{cp}	h_{ef} [in.]	$e_{c1,N}$ [in.]	$e_{c2,N}$ [in.]	$c_{a,min}$ [in.]
2	4.750	1.197	0.090	∞

$\psi_{c,N}$	c_{ac} [in.]	k_c	λ_a	f'_c [psi]
1.000	10.000	21	1.000	2,500

Calculations

A_{Nc} [in.^{2}]	A_{Nc0} [in.^{2}]	$\psi_{ec1,N}$	$\psi_{ec2,N}$	$\psi_{ed,N}$	$\psi_{cp,N}$	N_b [lb]
637.56	203.06	0.856	0.987	1.000	1.000	10,870

Results

V_{cpg} [lb]	$\phi_{concrete}$	ϕV_{cpg} [lb]	V_{ua} [lb]
57,711	0.700	40,397	640

1.5 Combined tension and shear loads, per ACI 318-19 section 17.8

β_N	β_V	ζ	Utilization $\beta_{N,V}$ [%]	Status
0.402	0.017	5/3	23	OK

$\beta_{NV} = \beta_N^{\zeta} + \beta_V^{\zeta} <= 1$

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1.6 Warnings

- The anchor design methods in PROFIS Engineering require rigid anchor plates as per current regulations (ETAG 001/Annex C, EOTA TR029, etc.). This means load re-distribution 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 design loading. PROFIS Engineering calculates the minimum required anchor plate thickness with CBFEM to limit the stress of the anchor plate based on the assumptions explained above. The proof if the rigid base plate assumption is valid is not carried out by PROFIS Engineering. Input data and results must be checked for agreement with the existing conditions and for plausibility!
- Condition A applies where the potential concrete failure surfaces are crossed by supplementary reinforcement proportioned to tie the potential concrete failure prism into the structural member. Condition B applies where such supplementary reinforcement is not provided, or where pullout or pryout strength governs.
- Refer to the manufacturer's product literature for cleaning and installation instructions.
- For additional information about ACI 318 strength design provisions, please go to https://submittals.us.hilti.com/PROFISAnchorDesignGuide/
- Hilti post-installed anchors shall be installed in accordance with the Hilti Manufacturer's Printed Installation Instructions (MPII). Reference ACI 318-19, Section 26.7.
- The anchor design methods in PROFIS Engineering require rigid anchor plates, as per current regulations (AS 5216:2021, ETAG 001/Annex C, EOTA TR029 etc.). This means that the anchor plate should be sufficiently rigid to prevent load re-distribution to the anchors due to elastic/plastic displacements. The user accepts that the anchor plate is considered close to rigid by engineering judgment."

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1.7 Installation data

Anchor type and diameter: Kwik Bolt TZ2 - SS 304 3/4 (4 3/4) hnom3

Profile: Square HSS (AISC), HSS4X4X.500; (L x W x T) = 4.000 in. x 4.000 in. x 0.500 in.

Item number: 2210288 KB-TZ2 3/4x7 SS304

Hole diameter in the fixture: d_f = 0.812 in.

Maximum installation torque: 125.386 ft.lb

Plate thickness (input): 0.750 in.

Hole diameter in the base material: 0.750 in.

Hole depth in the base material: 5.750 in.

Drilling method: Hammer drilled

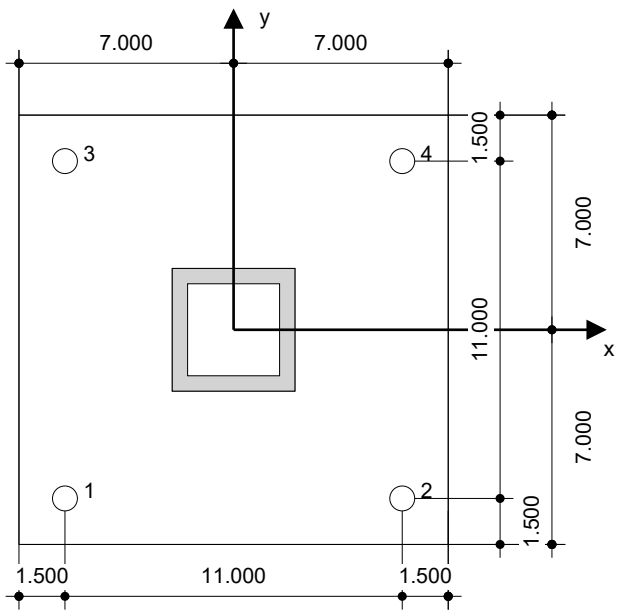
Minimum thickness of the base material: 8.000 in.

Cleaning: Manual cleaning of the drilled hole according to instructions for use is required.

Hilti KB-TZ2 stud anchor with 5.5 in embedment, 3/4 (4 3/4) hnom3, Stainless steel, installation per ESR-4266

1.7.1 Recommended accessories

Drilling	Cleaning	Setting
• Suitable Rotary Hammer • Properly sized drill bit	• Manual blow-out pump	• Torque wrench • Hammer



Coordinates Anchor [in.]

Anchor	x	y	c_{-x}	c_{+x}	c_{-y}	c_{+y}
1	-5.500	-5.500	-	-	-	-
2	5.500	-5.500	-	-	-	-
3	-5.500	5.500	-	-	-	-
4	5.500	5.500	-	-	-	-

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2 Anchor plate design

2.1 Input data

Anchor plate:	Shape: Rectangular l_x x l_y x t = 14.000 in x 14.000 in x 0.750 in Calculation: CBFEM Material: ASTM A36; F_y = 36,000 psi; ε_{lim} = 5.00%
Anchor type and size:	Kwik Bolt TZ2 - SS 304 3/4 (4 3/4) hnom3, h_{ef} = 4.750 in
Anchor stiffness:	The anchor is modeled considering stiffness values determined from load displacement curves tested in an independent laboratory. Please note that no simple replacement of the anchor is possible as the anchor stiffness has a major impact on the load distribution results.
Design method:	AISC and LRFD-based design using component-based FEM
Stand-off installation:	e_b = 0.000 in (No stand-off); t = 0.750 in
Profile:	HSS4X4X.500; (L x W x T x FT) = 4.000 in x 4.000 in x 0.500 in x - Material: ASTM A500 Gr.B Rect; F_y = 46,000 psi; ε_{lim} = 5.00% Eccentricity x: 0.000 in Eccentricity y: 0.000 in
Base material:	Cracked concrete; 2500; $f_{c,cyl}$ = 2,500 psi; h = 12.000 in
Welds (profile to anchor plate):	Type of redistribution: Plastic Material: E70xx
Mesh size:	Number of elements on edge: 8 Min. size of element: 0.394 in Max. size of element: 1.969 in

2.2 Summary

	Profile		Anchor plate			Concrete [%]
	σ_{Ed} [psi]	ε_{Pl} [%]	σ_{Ed} [psi]	ε_{Pl} [%]	Hole bearing [%]	
1	14,046	0.00	9,197	0.00	1	3

2.3 Anchor plate classification

Anchor tension forces	Equivalent rigid anchor plate (CBFEM)	Component-based Finite Element Method (CBFEM) anchor plate design
Anchor 1	0 lb	0 lb
Anchor 2	0 lb	0 lb
Anchor 3	1,630 lb	2,301 lb
Anchor 4	1,581 lb	2,277 lb

User accepted to consider the selected anchor plate as rigid by his/her engineering judgement. This means the anchor design guidelines can be applied.

2.4 Profile/Stiffeners/Plate

Profile and stiffeners are verified at the level of the steel to concrete connection. The connection design does not replace the steel design for critical cross sections, which should be performed outside of PROFIS Engineering.

2.4.1 Equivalent stress and plastic strain

Part	Material	f_y [psi]	ε_{lim} [%]	σ_{Ed} [psi]	ε_{Pl} [%]	Status
Plate	ASTM A36	36,000	5.00	9,197	0.00	OK
Profile	ASTM A500 Gr.B Rect	46,000	5.00	14,046	0.00	OK
Profile	ASTM A500 Gr.B	46,000	5.00	13,738	0.00	OK

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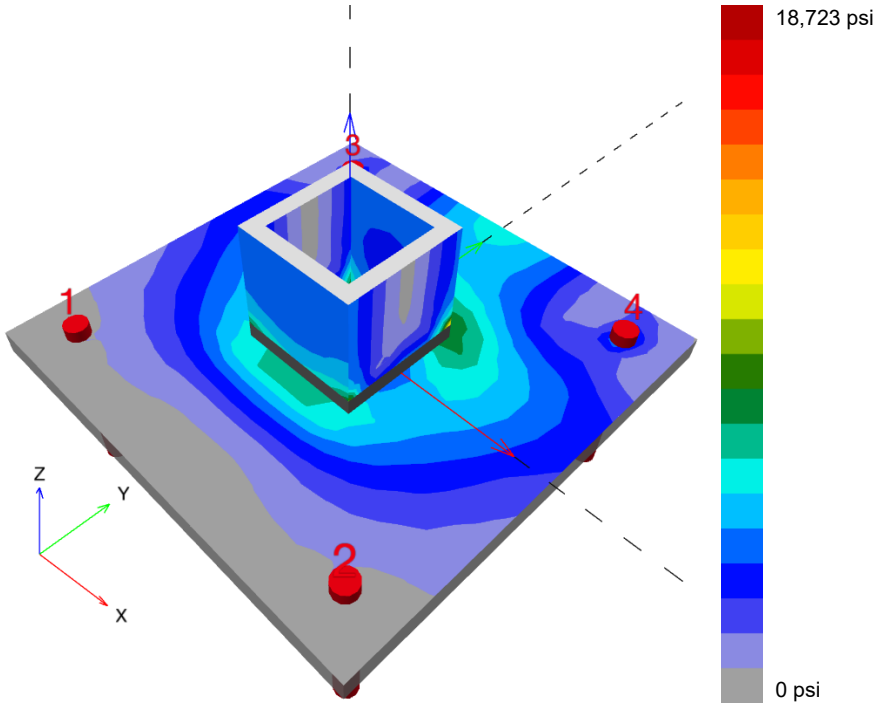
Part	Material	f_y [psi]	ε_{lim} [%]	σ_{Ed} [psi]	ε_{Pl} [%]	Status
	Rect					
Profile	ASTM A500 Gr.B Rect	46,000	5.00	8,968	0.00	OK
Profile	ASTM A500 Gr.B Rect	46,000	5.00	8,252	0.00	OK

2.4.1.1 Equivalent stress



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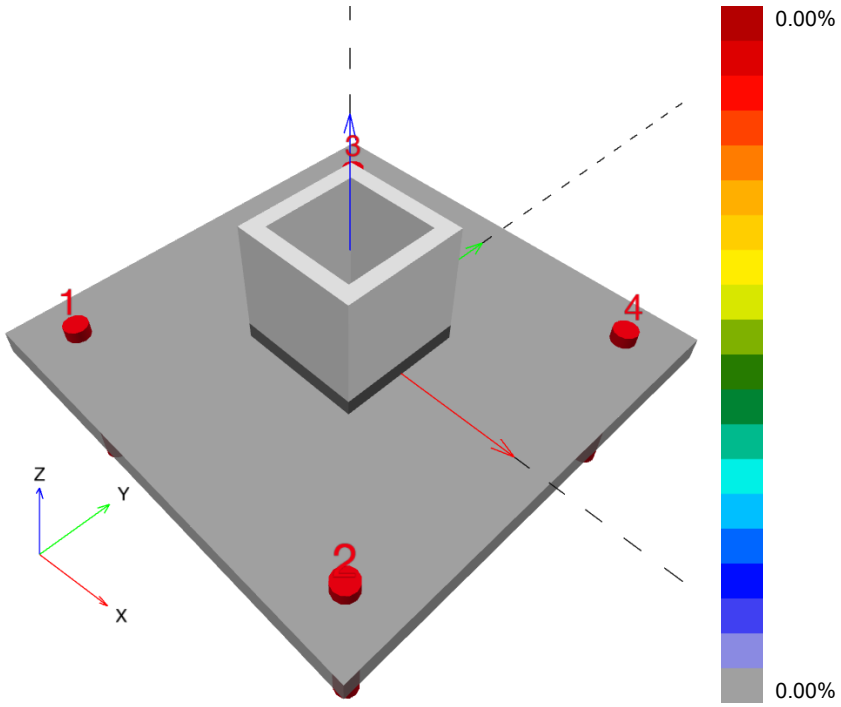
2.4.1.2 Plastic strain



2.4.2 Plate hole bearing resistance, AISC 360-16 Section J3

Equations

$R_n = \min(1.2\, l_c\, t\, F_u\, ,\ 2.4\, d\, t\, F_u)$ (AISC 360-16 J3-6a, c)

$\Phi R_n = 0.75\, R_n$

$V \leq \Phi R_n$

Variables

	l_c [in]	t [in]	F_u [psi]	d [in]	R_n [lb]
Anchor 1	1.124	0.750	58,000	0.750	58,681
Anchor 2	1.115	0.750	58,000	0.750	58,177
Anchor 3	10.188	0.750	58,000	0.750	78,300
Anchor 4	12.159	0.750	58,000	0.750	78,300

Results

	V [lb]	ΦR_n [lb]	Utilization [%]	Status
Anchor 1	147	44,010	1	OK
Anchor 2	181	43,633	1	OK
Anchor 3	140	58,725	1	OK
Anchor 4	176	58,725	1	OK

2.5 Concrete

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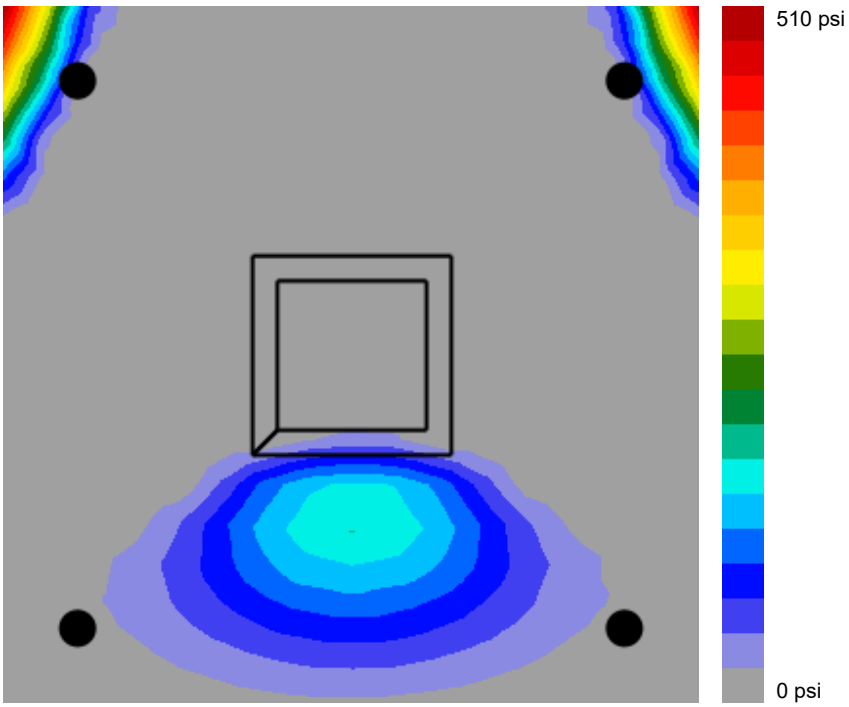
2.5.1 Compression in concrete under the anchor plate



2.5.2 Concrete block compressive strength resistance check, AISC 360-16 Section J8

Equations

$$F_p = \Phi f_{p,max}$$

$$f_{p,max} = 0.85 f_c' \sqrt{\left(\frac{A_2}{A_1}\right)} \le 1.7 f_c;\ \sqrt{\left(\frac{A_2}{A_1}\right)} \le 2$$

$$\sigma = \frac{N}{A_1}$$

$$\text{Utilization} = \frac{\sigma}{F_p}$$

Variables

N [lb]	f_c' [psi]	Φ	A_1 [in²]	A_2 [in²]
5,428	2,500	0.65	85.18	3,435.47

Results

Load combination	F_p [psi]	σ [psi]	Utilization [%]	Status
	2,762	64	3	OK

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2.6 Symbol explanation

A_1	Loaded area of concrete
A_2	Supporting area
d	Nominal diameter of the bolt
ε_{lim}	Limit plastic strain
ε_{Pl}	Plastic strain from CBFEM results
f_c	Concrete compressive strength
f_c'	Concrete compressive strength
F_u	Specified minimum tensile strength of the connected material
F_p	Concrete block design bearing strength
$f_{p,max}$	Concrete block design bearing strength maximum
f_y	Yield strength
l_c	Clear distance, in the direction of the force, between the edge of the hole and the edge of the adjacent hole or edge of the material
N	Resulting compression force
σ	Average stress in concrete
σ_{Ed}	Equivalent stress
Φ	Resistance factor
ΦR_n	Factored resistance
t	Thickness of the anchor plate
V	Resultant of shear forces Vy, Vz in bolt.

2.7 Warnings

- By using the CBFEM calculation functionality of PROFIS Engineering you may act outside the applicable design codes and your specified anchor plate may not behave rigid. Please, validate the results with a professional designer and/or structural engineer to ensure suitability and adequacy for your specific jurisdiction and project requirements.
- The anchor is modeled considering stiffness values determined from load displacement curves tested in an independent laboratory. Please note that no simple replacement of the anchor is possible as the anchor stiffness has a major impact on the load distribution results.

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3 Summary of results

Design of the anchor plate, anchors, welds and other elements are based on CBFEM (component based finite element method) and AISC.

	Max. utilization	Status
Anchors	41%	OK
Anchor plate	26%	OK
Concrete	3%	OK
Profile	31%	OK

Fastening meets the design criteria!

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4 Remarks; Your Cooperation Duties

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