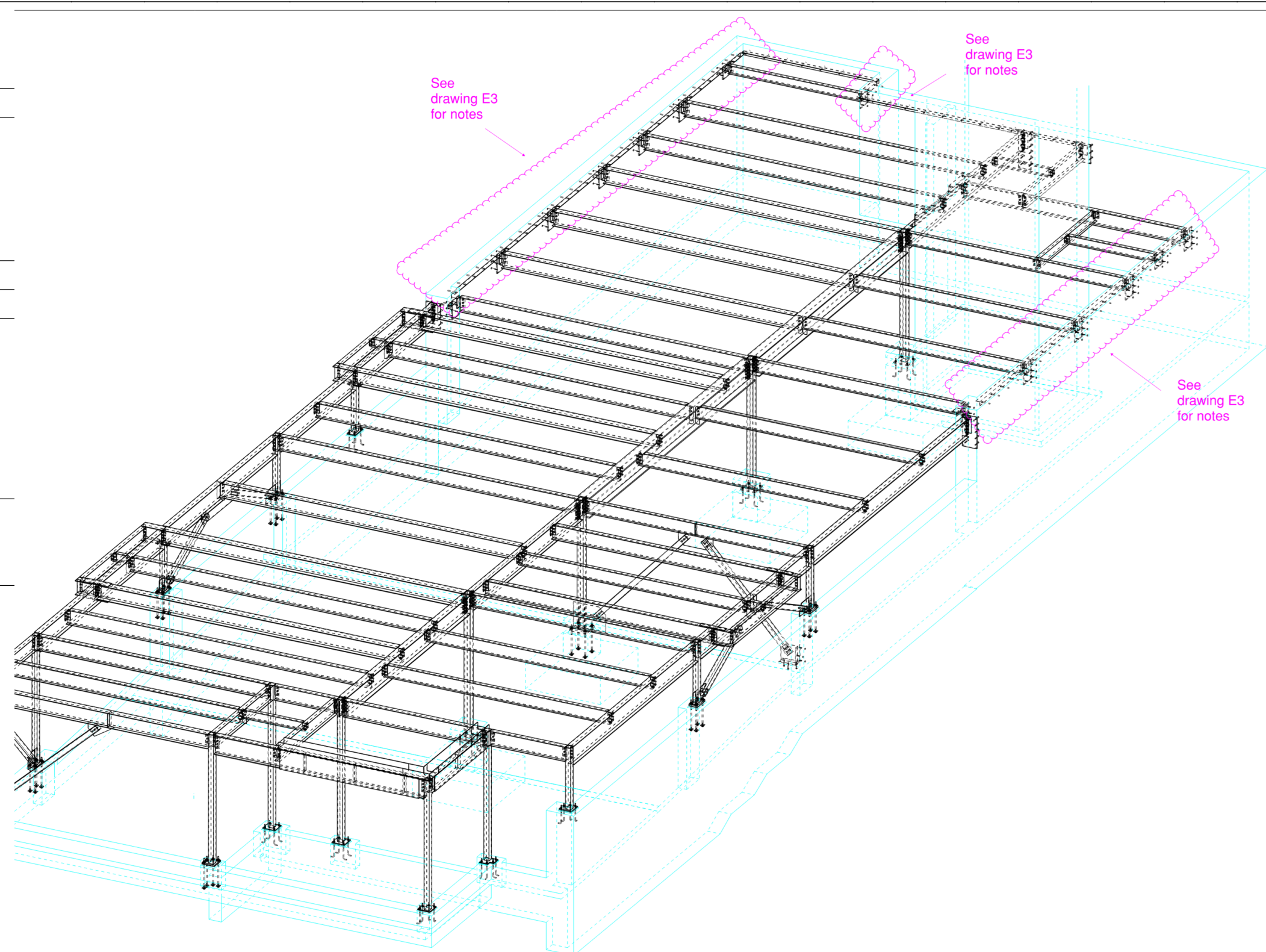


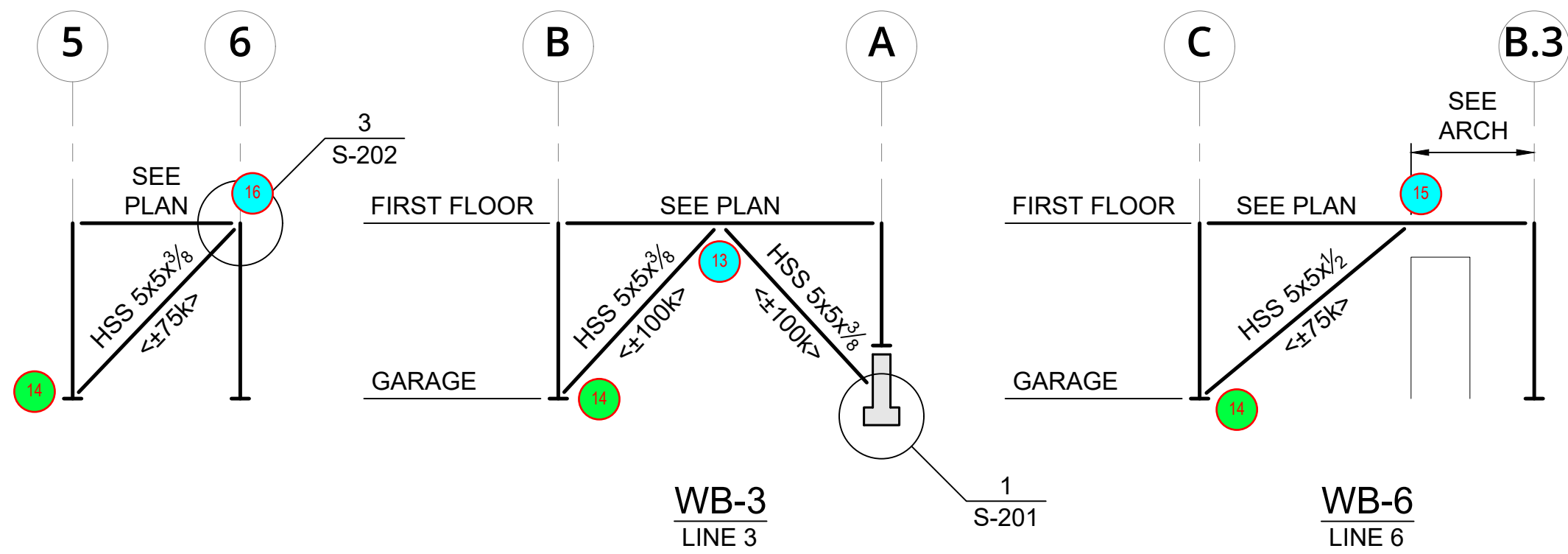
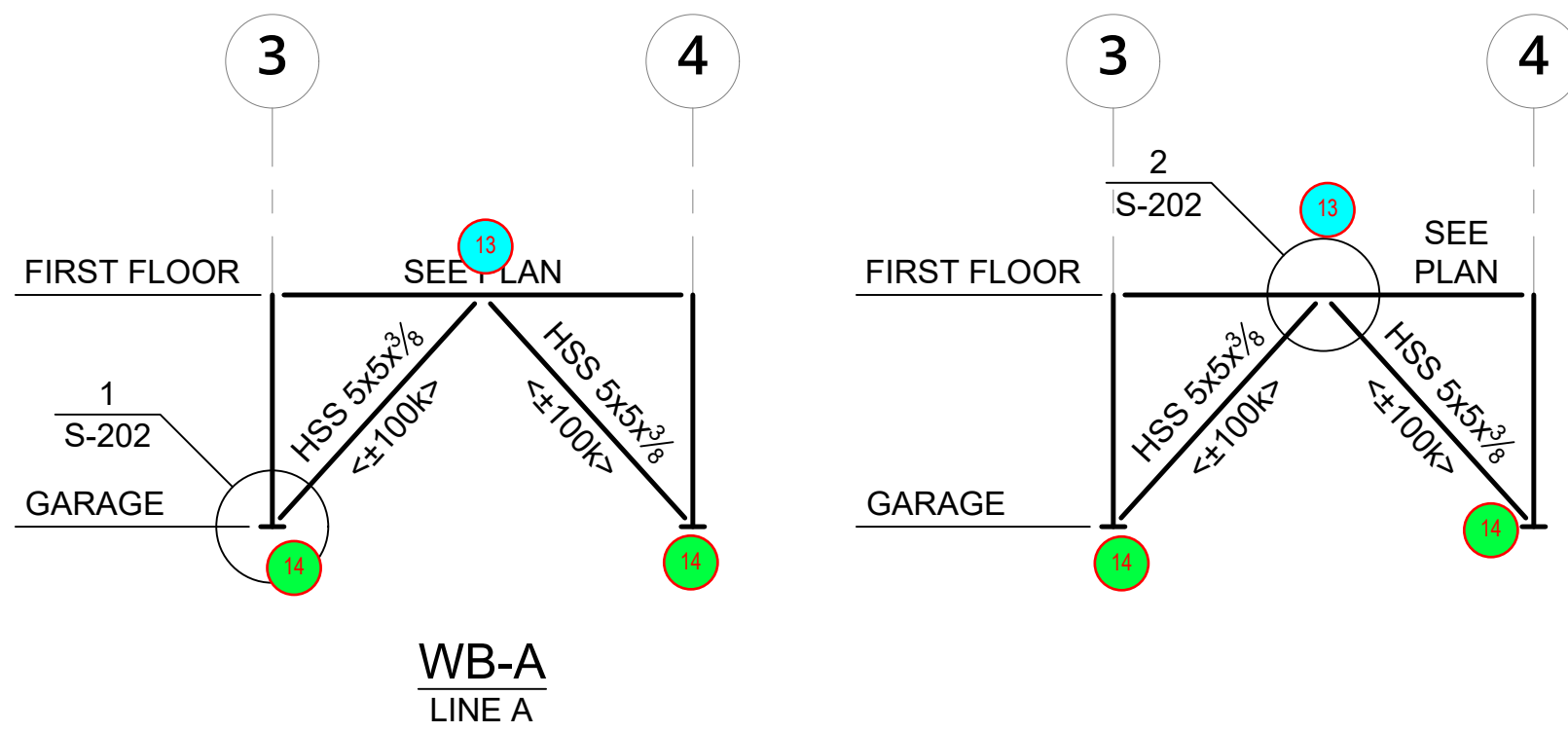
C O L U M N S C H E D U L E

LEVEL		MARK		A 3	A 4	A 5	A.3 5	A.3 6	B 1	B 2	B 3	B 4	B 5	B.3 5	B.3 6	C 2.5	C 3	C 4	C 5	C 6				
FIRST FLOOR																								
GARAGE			HSS 5x5½%	HSS 5x5½%	HSS 5x5½%	HSS 5x5½%	HSS 5x5½%	HSS 6x6½%	HSS 6x6½%	HSS 6x6½%	HSS 6x6½%	HSS 6x6½%	HSS 5x5½%	HSS 5x5½%	HSS 5x5½%	HSS 5x5½%	HSS 5x5½%	HSS 5x5½%	HSS 5x5½%	HSS 5x5½%				
		TYPE	B1	B1	C	C	C	A	A	A1	A	A	A	A	C1	B	B1	B1	B1	C1				
BASEPLATES F _y =36 (UNO)		SIZE	1½x8x15	1½x8x15	¾x8x12	½x8x12	½x8x12	¾x14x14	1x14x14	1½x16x16	1x14x14	¾x12x12	½x12x12	1x8x12	¾x8x15	1x8x15	1x8x15	1x8x15	1x8x15	1x8x12				
		TXWXL																						
LEVEL		MARK		A 3	A 4	A 5	A.3 5	A.3 6	B 1	B 2	B 3	B 4	B 5	B.3 5	B.3 6	C 2.5	C 3	C 4	C 5	C 6				

		MARK	
		LEVEL	
		FIRST FLOOR	
		GARAGE	
		TYPE	
		SIZE	
		TxWxL	BASEPLATES Fy=36 (UNO)
		LEVEL	
		MARK	

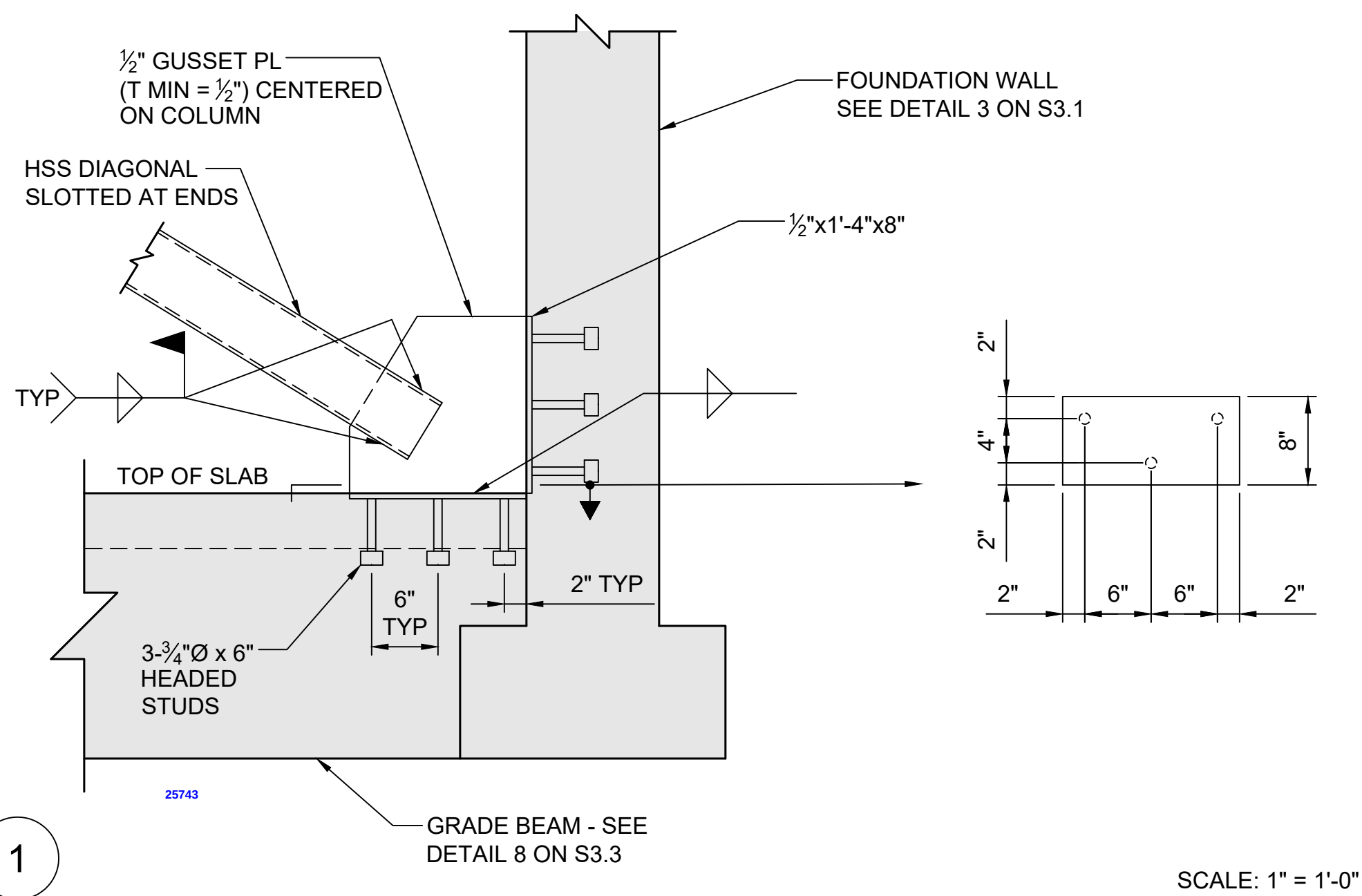


ISOMETRIC VIEW



BRACING NOTES:

1. FOR GENERAL NOTES & TYPICAL DETAILS SEE S-001, S-002, S-003, S-004, S-005, S-006, & S-007.
2. FOR COLUMN SIZES SEE THIS DRAWING.
3. FOR BASE PLATE TYPES SEE DETAILS ON S-202.
4. FOR BRACE ELEVATIONS SEE THIS DRAWING.
5. CONNECTIONS SHALL BE DESIGNED FOR THE AXIAL FORCES SHOWN (NO INCREASE FOR SHORT TERM LOADS IS PERMITTED.)
6. $\pm 20k$ ETC INDICATES AXIAL FORCE IN BRACING MEMBERS IN KIPS. $\langle + \rangle$ = TENSION ; $\langle - \rangle$ = COMPRESSION. ALL LOADS PROVIDED IN ASD.
7. BOLTS USED IN BRACING CONNECTIONS SHALL BE SLIP CRITICAL TYPE HIGH STRENGTH BOLTS.
8. CONTRACTOR TO COORDINATE GUSSET PLATE CONFIGURATIONS WITH OPENINGS.



LEGENDS

<u>SYMBOL</u>	<u>DESCRIPTION</u>
	BEAM TO BEAM BRACE CONNECTION
	BEAM TO COLUMN BASE BRACE CONNECTION

Gelinas Comment

JOB NO :

GELINAS COMMENTS

Drawing No.

S-201

B) VERTICAL BRACING CONNECTIONS SUMMARY

NOTES:

- 1) ALL STRUCTURAL STEEL GRADE A992 (GR50 KSI), FOR WIDE FLANGE SHAPES, FOR PIPE SECTIONS ASTM A53 GR B & A500 GRADE-B (Fy=46) FOR HSS SECTIONS.
- 2) CONNECTION MATERIAL GRADE : ANGLES AND PLATE (A36). U,N.O.
- 3) ALL BOLTS ARE A325-N & A490-N BOLTS (U.N.O)
- 4) WELDING ELECTRODES SHALL CONFORM TO ASTM SPECIFICATION E-70XX.
- 5) **DESIGN METHOD - ASD PER AISC 15TH EDITION (AISC 360 - 16)**

BEAM TO BEAM/COLUMN - SHEAR & BRACE CONNECTIONS SUMMARY						
CONN. ID	BEAM SIZE	BEAM OR COLUMN SIZE	TYPE OF CONNECTION	ANGLE OF INCLINATION	SHEAR PLATE/ANGLE & WELD THICKNESS	REACTIONS PER SHEET - S101
13	HSS5X5X3/8 BRACE	W12X14 / W18X35	BRACE TO BEAM CONNECTION	25°	1/2" THICK GUSSET PLATE WITH 4/16" THICK WELD	(+/-) 100 KIPS
14	HSS5X5X3/8 HSS5X5X1/2 BRACE	HSS5X5X1/2 HSS5X5X3/8 HSS6X6X5/8	BRACE TO COLUMN BASE CONNECTION	46°	1/2" THICK GUSSET PLATE WITH 4/16" THICK WELD	(+/-) 100 KIPS
15	HSS5X5X1/2 BRACE	W14X30	BRACE TO BEAM CONNECTION	42°	1/2" THICK GUSSET PLATE WITH 4/16" THICK WELD	(+/-) 75 KIPS
16	HSS5X5X3/8 BRACE	HSS5X5X3/8 COLUMN & W14X22 BEAM	BRACE TO BEAM-COLUMN JUNCTION	45°	1/2" THICK GUSSET PLATE WITH 4/16" THICK WELD	(+/-) 75 KIPS

16) Brace-Beam-Column Connection – HSS 5x5x3/8" Brace connected to HSS5x5x1/2" Steel Column & W14x22 Steel Beam with 1/2" thick gusset plate and 1/4" thick welded connection. - (For +/- 75 kips load & Angle between Brace & Beam is 45°)



RAM Connection

Units system: English

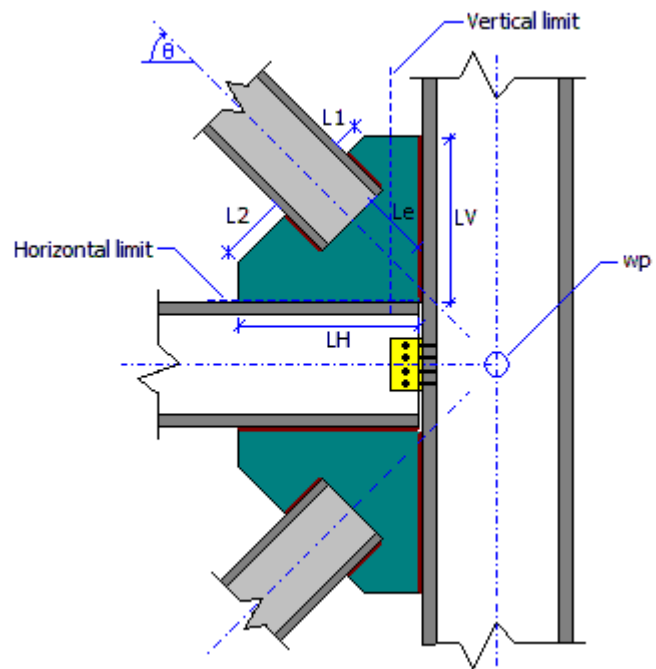
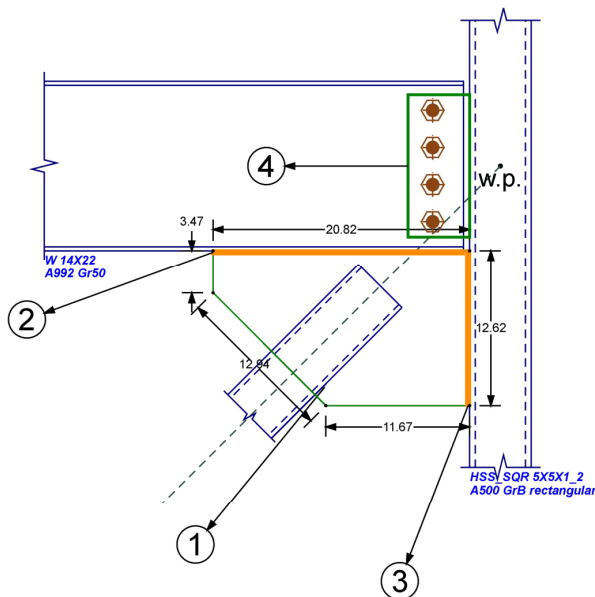
Steel Connections Data

Connection: 16 - CBB_DW

Family: Column - Beams - Braces (CBB)
Type: Gusset
Description: CONN. ID-16 - HSS5x5x3/8" Brace to HSS5x5x1/2" Column & W14x22 Beam

Connector

General information



Members

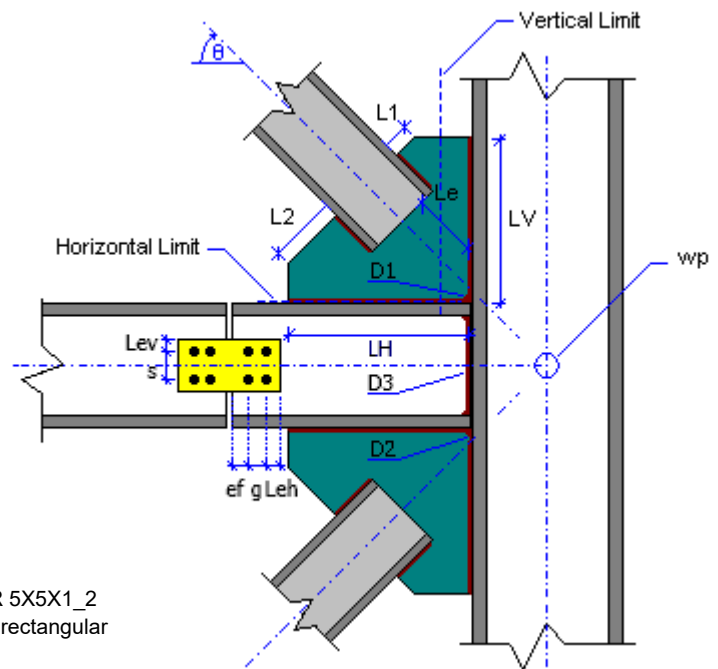
Existing members

Right beam	:	No
Left beam	:	Yes
Upper right brace	:	No
Upper left brace	:	No
Lower left brace	:	Yes
Lower right brace	:	No
Align beams to top edge	:	No

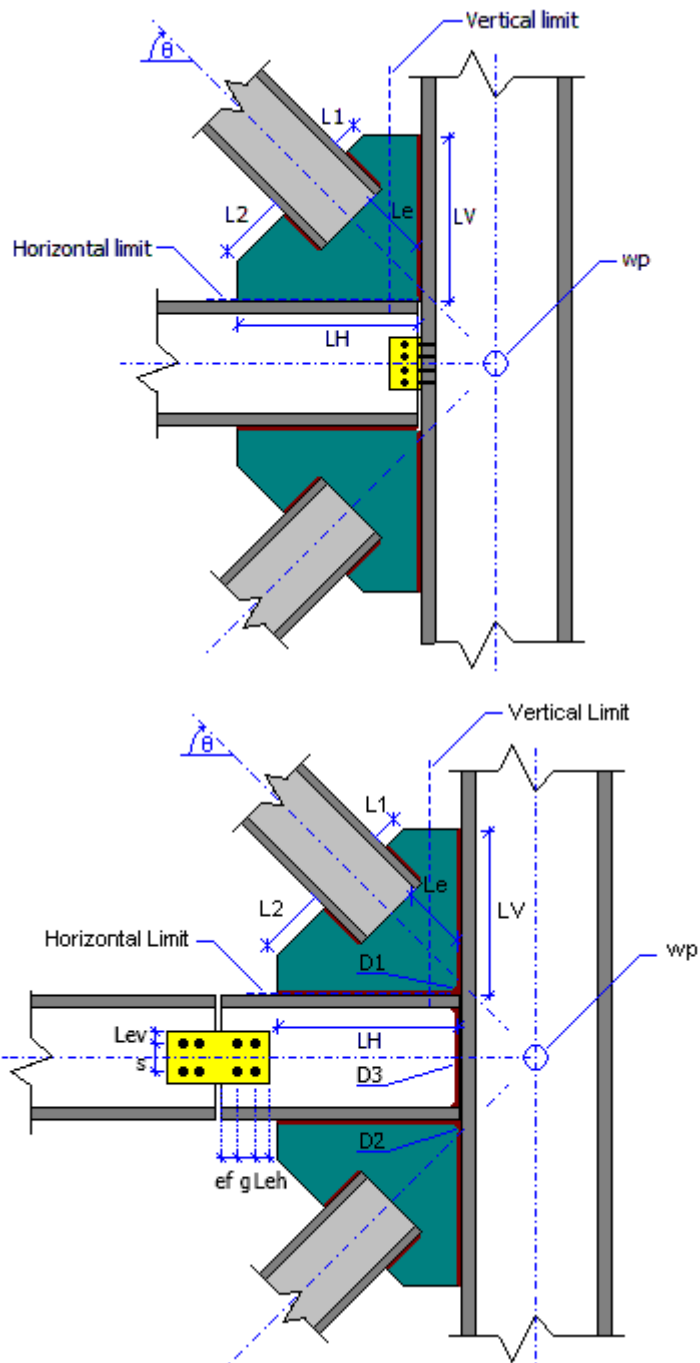
Column

General

Column section	:	HSS_SQR 5X5X1_2
Column material	:	A500 GrB rectangular



Connector



Members

Existing members

Right beam	:	No
Left beam	:	Yes
Upper right brace	:	No
Upper left brace	:	No
Lower left brace	:	Yes
Lower right brace	:	No
Align beams to top edge	:	No

Column

General

Column section	:	HSS_SQR 5X5X1_2
Column material	:	A500 GrB rectangular

Column orientation	:	Longitudinal
Is column end	:	No
Left beam		
<u>General</u>		
Section	:	W 14X22
Material	:	A992 Gr50
<u>Coped</u>		
dct: Top cope depth	:	0 in
ct: Top-flange cope length	:	0 in
dcb: Bottom cope depth	:	0 in
cb: Bottom-flange cope length	:	0 in
Lower left brace		
<u>General</u>		
Section	:	HSS_SQR 5X5X3_8
Material	:	A500 GrB rectangular
Brace slope angle (degrees)	:	45
Brace long leg on gusset	:	Yes
<u>Additional geometric data</u>		
wpx: WP horizontal displacement	:	0 in
wpy: WP vertical displacement	:	0 in
Le: Minimum distance to other members	:	1 in
L1: Left distance	:	1 in
L2: Right distance	:	1 in

Interfaces

Left beam

Beam-to-Column connection

Connection type to column	:	Connection: Single plate
sb: Setback to column	:	0.5 in

Single plate

Description	:	PL 1/2x5x11 1/2
tp: Plate thickness	:	0.5 in
Material	:	A36
Bolts	:	1" A490 N
Hole type	:	Standard (STD)
nr: Rows of Bolts	:	4
nc: Bolt columns	:	1
s: Pitch - longitudinal center-to-center spacing	:	3 in
Lev: Vertical edge distance	:	1.25 in
Leh: Horizontal edge distance	:	2 in
a: Distance between weld and bolts	:	3 in
Weld to column	:	E70XX
D: Weld size (1/16 in)	:	5
Eccentricity	:	0 in

Lower left brace

Gusset

General

tp: Thickness	:	0.5 in
Material	:	A36
LV: Length on column	:	12.624 in
LH: Length on beam	:	20.824 in

Gusset-to-Brace connection

General

Connection type	:	Welded
Lt: Length on toe	:	9 in
Lh: Length on heel	:	9 in
Brace weld	:	E70XX
D: Weld size (1/16 in)	:	4
dp: Distance between weld and plate end	:	1 in

Gusset-to-Column connection

General

Connection type to column	:	Connection: Directly welded
---------------------------	---	-----------------------------

Directly welded

Column weld	:	E70XX
D: Weld size to column (1/16 in)	:	4

Gusset-to-Beam connection

General

Connection type to beam : Connection: Directly welded

Directly welded

Welding electrode to beam : E70XX

D: Weld size to beam (1/16 in) : 4



Steel Connections Results

Connection: 16 - CBB_DW

Family: Column - Beams - Braces (CBB)
Type: Gusset
Description: CONN. ID-16 - HSS5x5x3/8" Brace to HSS5x5x1/2" Column & W14x22 Beam

Design code: AISC 360-16 ASD

Demands

Description	Right beam			Left beam			Column		Load type
	Pu [kip]	Vu [kip]	Mu33 [kip*ft]	Pu [kip]	Vu [kip]	Mu33 [kip*ft]	Pu [kip]	Vu [kip]	
DL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Design

Description	Pu				Load type
	Brace1 [kip]	Brace2 [kip]	Brace3 [kip]	Brace4 [kip]	
DL	0.00	0.00	75.00	0.00	Design

Design calculations

Interface between Gusset - Bottom left brace
Connection: Directly welded

Demands

Pu [kip]	Description	Load type
75.00	DL	Design

Geometric Considerations

Dimensions	Unit	Value	Min.	Max.	Sta.	References
Member						
Weld size	[1/16in]	4	3	--	✓	table J2.4

Design Check

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
Branch						
Total weld design strength	[Kip]	133.64	75.00	DL	0.56	Eq. J2-6
Maximum weld force that brace can develop	[Kip]	218.61	75.00	DL	0.34	Eq. J4-4
Maximum weld force that gusset can develop	[Kip]	156.60	75.00	DL	0.48	Eq. J4-4
Shear rupture of base metal at fillet weld	[in]	0.50	0.43	DL	0.85	Eq. 9-3
Gusset						
Block shear on gusset	[Kip]	180.50	75.00	DL	0.42	Eq. J4-5
Ratio	0.85					

Checks for gusset and brace

Demands

Pu [kip]	Description	Load type
75.00	DL	Design

Design Check

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
Member						
Yielding strength due to axial load	[Kip]	170.23	75.00	DL	0.44	Eq. J4-1
Tension rupture	[Kip]	131.87	75.00	DL	0.57	Eq. J4-2
Gusset						
Tension yielding on the Whitmore section	[Kip]	151.92	75.00	DL	0.49	Eq. J4-1
Ratio	0.57					

Interface Lower left gusset - beam
Connection: Directly welded

Demands

Description	Beam			Opposite beam			Column		Load type
	Ru [kip]	Pu [kip]	Mu [kip*ft]	Ru [kip]	Pu [kip]	Pu [kip]	Mu22 [kip*ft]	Mu33 [kip*ft]	
DL	42.96	27.60	0.00	0.00	0.00	0.00	0.00	0.00	Design

Geometric Considerations

Dimensions	Unit	Value	Min.	Max.	Sta.	References
Gusset						
Weld size	[1/16in]	4	3	--	✓	table J2.4

Design Check

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
Gusset						
Beam yielding (normal stress)	[Kip]	219.07	27.60	DL	0.13	Eq. B-1, Appendix B, DG29
Shear yielding	[Kip]	146.34	42.96	DL	0.29	Eq. J4-3
Gusset edge tension stress	[Kip/in2]	21.56	2.72	DL	0.13	Eq. B-1, Appendix B, DG29
Gusset edge shear stress	[Kip/in2]	14.40	4.23	DL	0.29	J4-1
Weld capacity	[Kip]	180.88	63.83	DL	0.35	Tables 8-4 .. 8-11
Shear rupture of base metal at fillet weld	[in]	0.33	0.19	DL	0.57	Eq. 9-2
Chord						
Weld block shear	[Kip]	129.87	42.96	DL	0.33	Eq. J4-5
Web crippling	[Kip]	108.61	27.60	DL	0.25	Eq. B-1, Appendix B, DG29
Local web yielding	[Kip]	169.91	27.60	DL	0.16	Eq. B-1, Appendix B, DG29
Transverse section web yielding	[Kip]	63.02	27.60	DL	0.44	Eq. G2-1
Ratio		0.57				

Interface Lower left gusset - column *Connection: Directly welded*

Demands

Description	Beam			Opposite beam			Column		Load type
	Ru [kip]	Pu [kip]	Mu [kip*ft]	Ru [kip]	Pu [kip]	Pu [kip]	Mu22 [kip*ft]	Mu33 [kip*ft]	
DL	25.43	10.07	0.00	0.00	0.00	0.00	0.00	0.00	Design

Geometric Considerations

Dimensions	Unit	Value	Min.	Max.	Sta.	References
Gusset						
Weld size	[1/16in]	4	3	--	✓	table J2.4

Design Check

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
Gusset						
Beam yielding (normal stress)	[Kip]	136.07	10.07	DL	0.07	Eq. B-1, Appendix B, DG29
Shear yielding	[Kip]	90.90	25.43	DL	0.28	Eq. J4-3
Gusset edge tension stress	[Kip/in2]	21.56	1.60	DL	0.07	Eq. B-1, Appendix B, DG29
Gusset edge shear stress	[Kip/in2]	14.40	4.03	DL	0.28	J4-1
Weld capacity	[Kip]	104.20	34.19	DL	0.33	Tables 8-4 .. 8-11
Shear rupture of base metal at fillet weld	[in]	0.47	0.21	DL	0.46	Eq. 9-2

ChordHSS wall strength due out-of-plane transverse load [Kip] 82.50 10.07 DL **0.12** p.9-16**Ratio 0.46****Interface Left beam - column**
Connection: Single plate**Demands**

Description	Beam		Left beam		Column			Load type
	Ru [kip]	Pu [kip]	Ru [kip]	Pu [kip]	Pu [kip]	Mu22 [kip*ft]	Mu33 [kip*ft]	
DL	27.60	42.96	0.00	0.00	0.00	0.00	0.00	Design

Geometric Considerations

Dimensions	Unit	Value	Min.	Max.	Sta.	References
Shear plate						
Number of bolts		4	2	12	✓	p. 10-88
Distance from the bolt line to the weld line	[in]	3.00	--	3.50	✓	p. 10-88
Minimum plate or beam web thickness	[in]	0.23	--	0.56	✓	Table 10-9
Length	[in]	11.50	6.11	12.23	✓	p. 10-7
Thickness, precludes a punching failure of the HSS...	[in]	0.50	--	--	✓	
Vertical edge distance	[in]	1.25	1.25	--	✓	Tables J3.4, J3.5
Horizontal edge distance	[in]	2.00	2.00	--	✓	p. 10-88
Vertical center-to-center spacing (pitch)	[in]	3.00	2.67	5.52	✓	Sec. J3.5
Clear distance between holes (longitudinal)	[in]	1.88	1.00	--	✓	Sec. J3.3
Beam						
Vertical edge distance	[in]	2.35	1.25	--	✓	Tables J3.4, J3.5
Horizontal edge distance	[in]	2.50	2.00	--	✓	p. 10-88
Support						
Maximum value of the specified yield stress	[Kip/in ²]	46.00	--	--	✓	
Yield stress to tensile stress ratio		0.79	--	0.80	✓	Table K2.1
Weld size	[1/16in]	5	5	--	✓	p. 10-87
Weld length	[in]	11.50	1.25	--	✓	Sec. J2.2b

Design Check

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
Shear plate						
Bolts shear	[Kip]	91.98	51.06	DL	0.56	Tables (7-1..14)
Bolt bearing under shear load	[Kip]	120.82	51.06	DL	0.42	Tables (7-1..14)
Bolt tearout under shear load	[Kip]	90.56	51.06	DL	0.56	Sec. J3.6
Shear yielding	[Kip]	82.80	27.60	DL	0.33	Eq. J4-3
Shear rupture	[Kip]	58.73	27.60	DL	0.47	Eq. J4-4
Block shear	[Kip]	73.41	27.60	DL	0.38	Eq. J4-5
Flexural rupture	[Kip]	105.13	27.60	DL	0.26	p. 9-6
Flexural yielding	[Kip*ft]	29.70	6.90	DL	0.23	Sec. F1
Lateral torsional buckling	[Kip*ft]	29.16	6.90	DL	0.24	Sec. F1
Tension yielding	[Kip]	123.95	42.96	DL	0.35	Eq. J4-1

Tension rupture	[Kip]	97.88	42.96	DL	0.44	Eq. J4-2
Compression	[Kip]	123.95	0.00	DL	0.00	Sec. J4.4
Tear out under axial load	[Kip]	99.16	42.96	DL	0.43	Eq. J4-5
Plate (support side)						
Weld capacity	[Kip]	147.91	51.06	DL	0.35	Tables 8-4 .. 8-11
Interaction of axial, flexure and shear yielding		1.00	0.42	DL	0.42	Ch. H, Eq. 10-5
Interaction of axial, flexure and shear rupture		1.00	0.67	DL	0.67	Ch. H, Eq. 10-5
Beam						
Bolt bearing under shear load	[Kip]	62.29	51.06	DL	0.82	Tables (7-1..14)
Bolt tearout under shear load	[Kip]	91.82	51.06	DL	0.56	Sec. J3.6
Shear yielding	[Kip]	63.02	27.60	DL	0.44	Eq. J4-3
Yielding strength due to axial load	[Kip]	194.31	42.96	DL	0.22	Eq. D2-1
Tension rupture	[Kip]	81.00	42.96	DL	0.53	Eq. J4-2
Tear out under axial load	[Kip]	57.74	42.96	DL	0.74	Eq. J4-5
Bolt group						
Bolt effective strength	[Kip]	60.01	51.06	DL	0.85	Sec. J3.6
Support						
Shear rupture of base metal at fillet weld	[in]	0.47	0.27	DL	0.57	Eq. 9-2
Shear strength at welds	[Kip]	186.09	27.60	DL	0.15	Eq. J4-4
Punching shear (shear rupture)	[Kip]	118.89	27.60	DL	0.23	p. 10-153
HSS wall strength due out-of-plane transverse load	[Kip]	61.85	42.96	DL	0.69	p.9-16

Ratio	0.85
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Global critical strength ratio	0.85
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Notes

The plate is designed with the conventional configuration criteria.

References

- [9] AISC 2005, Design Examples Version 13.0, pp. IIC-26 - IIC-27
 [8] Dowswell, B., 2003, Connection Design For Steel Structures, Structural Design Solutions, LLC. Chapter 13, p. 14
 [14] Dowswell, B. et al, 2016, "Design of wrap-around gusset plates", Structural Design Solutions, LLC.

RAM Connection Standalone

Units system: s

Current Date: s

