Blackwell
Structural Engineers

SUMMIT LOT 14R
STRUCTURAL DESIGN
CALCULATION PACKAGE

7-16-2018

Our Project 170950
July 06, 2018

Rev. 0 Issued for Permit

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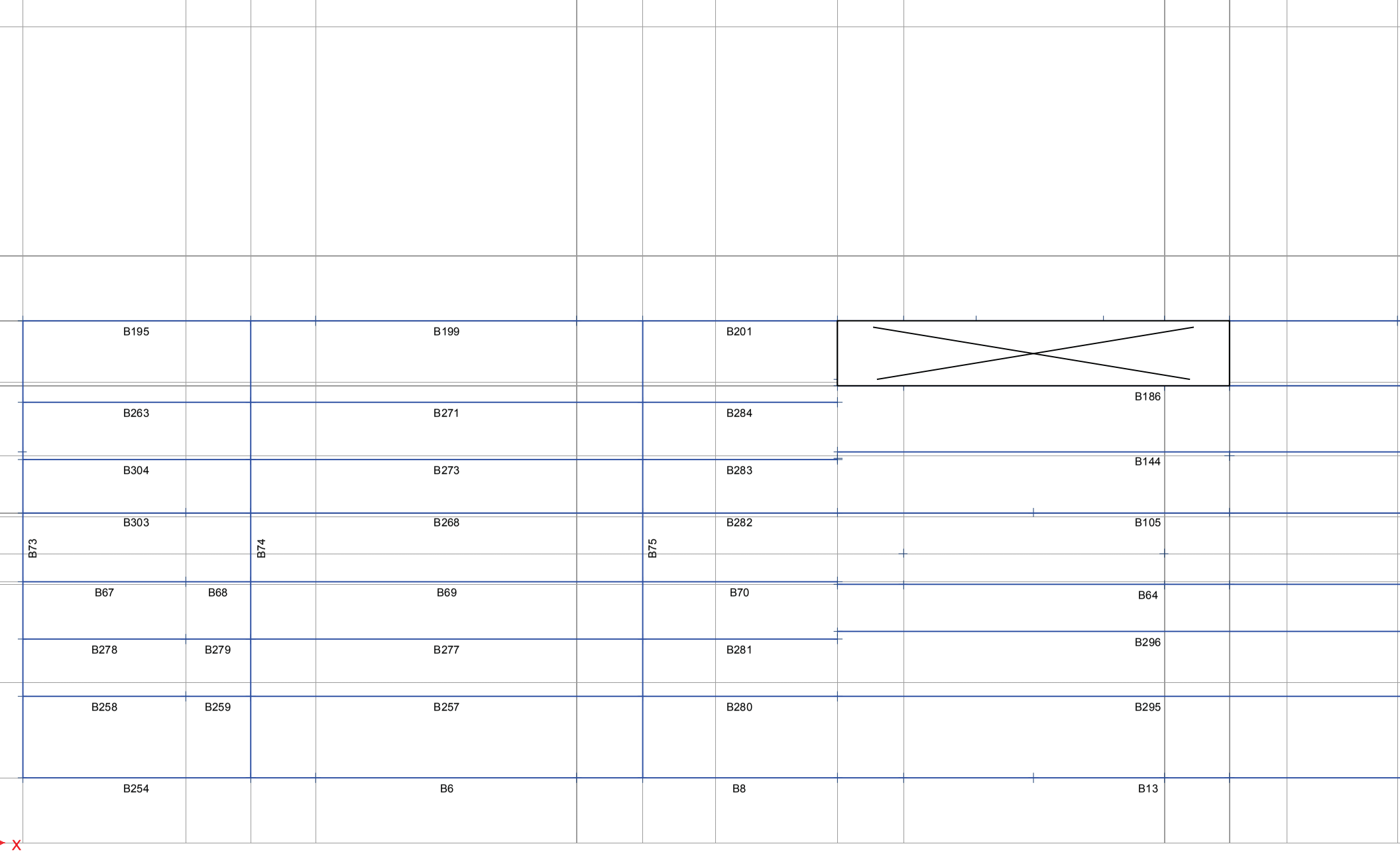
Blackwell
Structural Engineers

GRAVITY SYSTEM

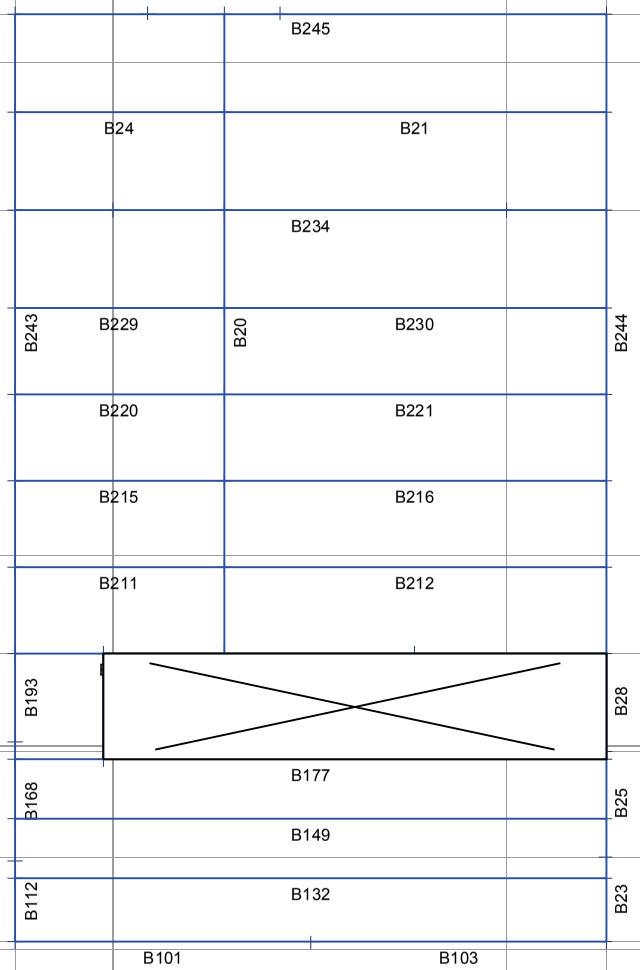
Designed using ETABS



Blackwell

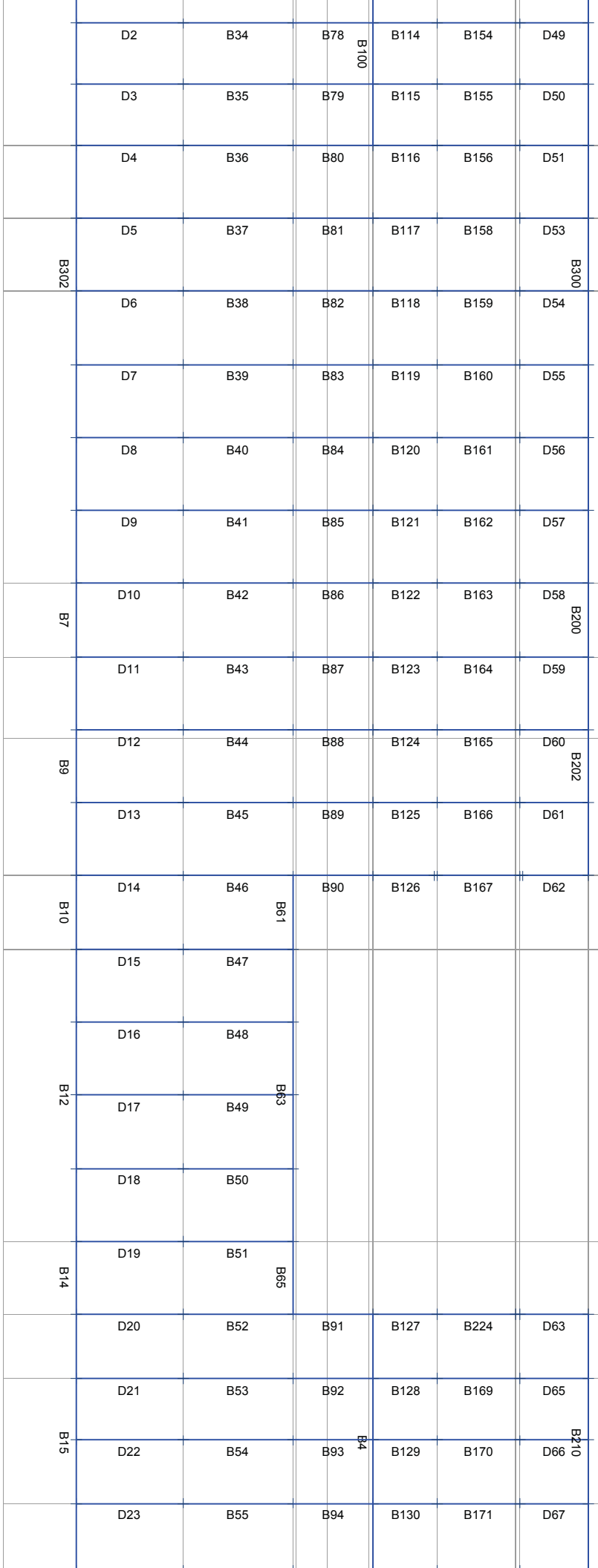
Seal	Title	Project #
	MAIN FLOOR FRAMING LABELS	170950
		Designer: MSC
		Checked by: TJ

Toronto 416.593.5300 | Waterloo 519.616.0895 | Victoria 778.817.1010 | Halifax 902.593.0125 | blackwell.ca



Blackwell

Seal	Title	Project #
	GARAGE FLOOR FRAMING LABELS	170950
		Designer: MSC
		Checked by: TJ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B302
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D6 B38 B82 B118 B159 D54
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B4
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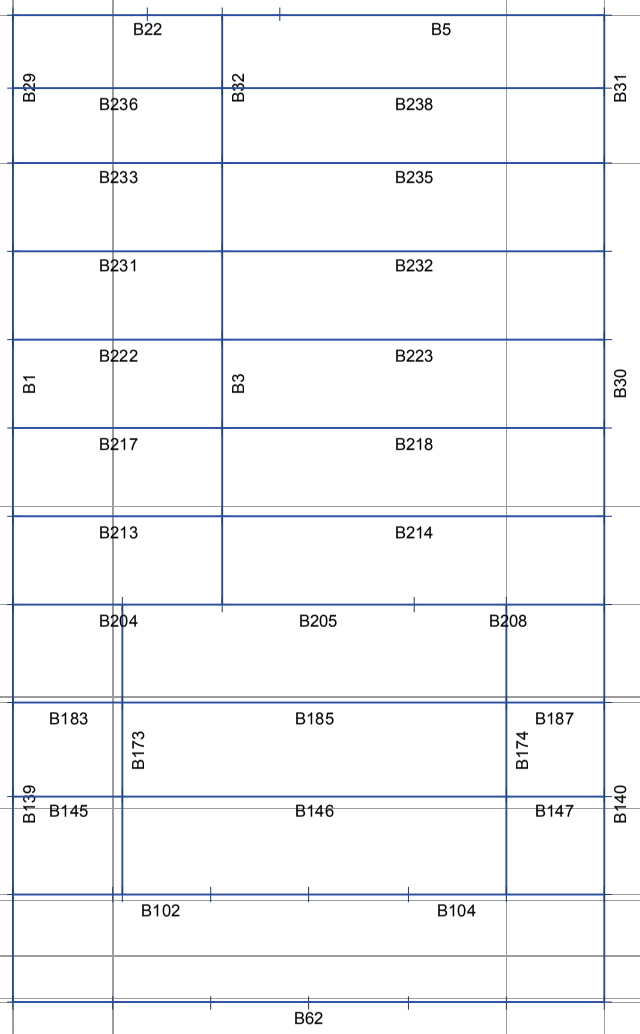
D23 B55 B94 B130 B171 D67



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Seal

Title
GARAGE ROOF FRAMING LABELS

Project #
170950

Designer
MSC

Checked by
TJ

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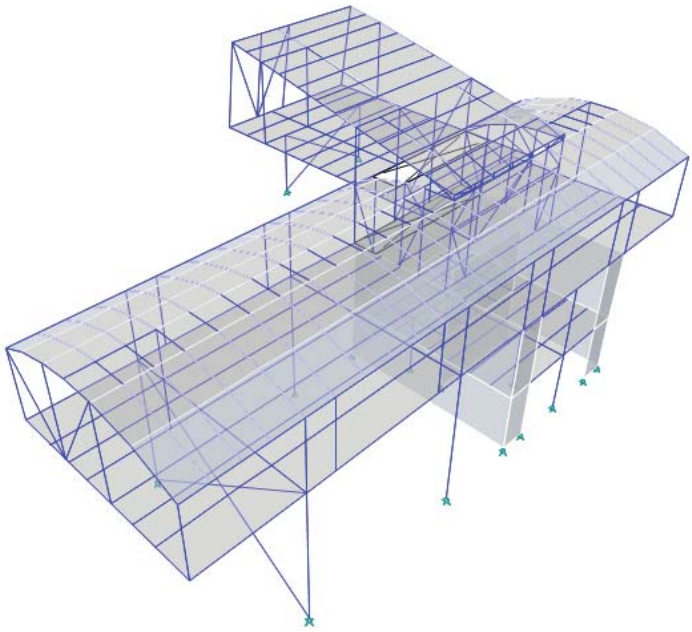
ETABS® 2016
Integrated Building Design Software



Gravity System

Lot 14R

Model File: ETABS Model, Revision 0

2018-07-13

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1 Properties

This chapter provides property information for materials, frame sections, shell sections, and links.

1.1 Materials

Table 1.1 - Material Properties - Summary

Name	Type	E lb/in²	v	Unit Weight lb/ft³	Design Strengths
4000Psi	Concrete	3604997	0.2	150	Fc=4000 lb/in²
A416Gr270	Tendon	28500000	0	490	Fy=245100 lb/in², Fu=270000 lb/in²
A615Gr60	Rebar	29000000	0	490	Fy=60000 lb/in², Fu=90000 lb/in²
A992Fy50	Steel	29000000	0.3	490	Fy=50000 lb/in², Fu=65000 lb/in²

1.2 Frame Sections

Table 1.2 - Frame Sections - Summary

Name	Material	Shape
C10X15.3	A992Fy50	Steel Channel
ConcBm	4000Psi	Concrete Rectangular
ConcCol	4000Psi	Concrete Rectangular
HSS2-1/2X2-1/2X3/16	A992Fy50	Steel Tube
HSS2X2X1/4	A992Fy50	Steel Tube
HSS3-1/2X3-1/2X1/4	A992Fy50	Steel Tube
HSS3X3X1/4	A992Fy50	Steel Tube
HSS3X3X5/16	A992Fy50	Steel Tube
HSS4X0.250	A992Fy50	Steel Pipe
HSS6X6X1/2	A992Fy50	Steel Tube
HSS6X6X1/4	A992Fy50	Steel Tube
HSS6X6X3/8	A992Fy50	Steel Tube
W10X22	A992Fy50	Steel I/Wide Flange
W10X39	A992Fy50	Steel I/Wide Flange
W10X45	A992Fy50	Steel I/Wide Flange
W10X49	A992Fy50	Steel I/Wide Flange
W10X54	A992Fy50	Steel I/Wide Flange
W10X68	A992Fy50	Steel I/Wide Flange
W12X26	A992Fy50	Steel I/Wide Flange
W12X35	A992Fy50	Steel I/Wide Flange
W12X79	A992Fy50	Steel I/Wide Flange
W16X26	A992Fy50	Steel I/Wide Flange
W16X31	A992Fy50	Steel I/Wide Flange
W16X40	A992Fy50	Steel I/Wide Flange
W16X45	A992Fy50	Steel I/Wide Flange
W16X67	A992Fy50	Steel I/Wide Flange
W18X46	A992Fy50	Steel I/Wide Flange
W21X166	A992Fy50	Steel I/Wide Flange
W21X44	A992Fy50	Steel I/Wide Flange
W21X68	A992Fy50	Steel I/Wide Flange
W24X117	A992Fy50	Steel I/Wide Flange

Table 1.2 - Frame Sections - Summary (continued)

Name	Material	Shape
W27X102	A992Fy50	Steel I/Wide Flange
W27X129	A992Fy50	Steel I/Wide Flange
W27X146	A992Fy50	Steel I/Wide Flange
W27X84	A992Fy50	Steel I/Wide Flange
W30X90	A992Fy50	Steel I/Wide Flange
W6X25	A992Fy50	Steel I/Wide Flange
W8X18	A992Fy50	Steel I/Wide Flange
W8X21	A992Fy50	Steel I/Wide Flange
W8x28	A992Fy50	Steel I/Wide Flange

1.3 Shell Sections

Table 1.3 - Shell Sections - Summary

Name	Design Type	Element Type	Material	Total Thickness in	Deck Material	Deck Depth in
Floors	Deck	Membrane	4000Psi	4	A992Fy50	1.5
Roof	Deck	Membrane	Not Applicable	1.5	A992Fy50	1.5
Wall1	Wall	Shell-Thin	4000Psi	10		

2 Assignments

This chapter provides a listing of the assignments applied to the model.

2.1 Frame Assignments

Table 2.1 - Frame Assignments - Summary (Part 1 of 2)

Story	Label	Unique Name	Design Type	Length in	Analysis Section	Design Section	Axis Angle deg	Max Station Spacing in
Story5	C53	3 E-7	Column	207.5664	HSS6X6X1/2	HSS6X6X1/2	90	
Story5	C54	3 E-8(+)	Column	207.5673	HSS6X6X1/2	HSS6X6X1/2	90	
Story5	C55	3 E-9(-)	Column	207.5664	HSS6X6X1/2	HSS6X6X1/2	90	
Story5	C56	3 E-10	Column	207.5664	HSS6X6X1/2	HSS6X6X1/2	90	
Story4	C15	3 H-7	Column	156	HSS6X6X1/2	HSS6X6X1/2	90	
Story4	C17	3 H-8	Column	156	HSS6X6X1/2	HSS6X6X1/2	90	
Story4	C22	3 H-9	Column	156	HSS6X6X1/2	HSS6X6X1/2	90	
Story4	C24	3 H-10	Column	156	HSS6X6X1/2	HSS6X6X1/2	90	
Story4	C26	3 H-2	Column	156	HSS6X6X1/2	HSS6X6X1/2	90	
Story4	C29	3 G-7	Column	156	HSS6X6X1/2	HSS6X6X1/2	90	
Story4	C32	3 G-10	Column	156	HSS6X6X1/2	HSS6X6X1/2	90	
Story4	C34	3 G(-)-7	Column	151.2386	HSS6X6X1/2	HSS6X6X1/2	90	
Story4	C39	3 G(-)-10	Column	151	HSS6X6X1/2	HSS6X6X1/2	90	
Story4	C40	3 F+-2	Column	150.1667	HSS6X6X1/2	HSS6X6X1/2	90	
Story4	C42	3 F-10	Column	136.8333	HSS6X6X1/2	HSS6X6X1/2	90	
Story4	C44	3 F-7	Column	135.1093	HSS6X6X1/2	HSS6X6X1/2	90	
Story4	C45	3 E-2	Column	116	HSS6X6X1/2	HSS6X6X1/2	90	
Story3	C30	3 G-8(+)	Column	108	HSS6X6X1/2	HSS6X6X1/2	90	
Story3	C59	2 C-8	Column	108	W10X45	W10X45	90	
Story3	C61	2 C-9	Column	108	W10X45	W10X45	90	
Story2	C2	1 I-3	Column	240	W10X49	W10X49	90	
Story2	C47	1E-3	Column	240	W10X49	W10X49	90	
Story5	B62	RB11-1 HIGH	Beam	288	HSS3-1/2X3-1/2X1/4	HSS3-1/2X3-1/2X1/4		24
Story5	B139	RB8-1	Beam	198.5103	W10X22	W10X22		
Story5	B140	RB8-2	Beam	198.5103	W10X22	W10X22		
Story5	B205	RB10-3	Beam	93	W16X26	W16X26		24
Story5	B208	RB10-4	Beam	93	W16X26	W16X26		24
Story5	B5	RB9-19	Beam	158.4996	C10X15.3	C10X15.3		24
Story5	B22	RB18-1	Beam	129.5004	W16X31	W16X31		24
Story5	B1	RB12-1	Beam	221.0172	W10X39	W10X39		
Story5	B29	RB19-1	Beam	73.6724	W10X22	W10X22		
Story5	B30	RB12-2	Beam	221.0172	W10X39	W10X39		
Story5	B31	RB19-2	Beam	73.6724	W10X22	W10X22		
Story4	B7	RB4-1	Beam	48	W16X26	W16X26		24
Story4	B9	RB5-1	Beam	144	W16X26	W16X26		24
Story4	B10	RB4-3	Beam	48	W16X40	W16X40		24
Story4	B12	RB6-1	Beam	192	W16X26	W16X26		24
Story4	B14	RB4-4	Beam	48	W16X26	W16X26		24
Story4	B15	RB5-3	Beam	168	W16X26	W16X26		24

Table 2.1 - Frame Assignments - Summary (Part 1 of 2, continued)

Story	Label	Unique Name	Design Type	Length in	Analysis Section	Design Section	Axis Angle deg	Max Station Spacing in
Story4	B33	RB2-1b	Beam	72.9892	W16X31	W16X31		
Story4	B56	RB2-3b	Beam	72.9892	W16X31	W16X31		
Story4	B61	RB10-1	Beam	48	W16X26	W16X26		24
Story4	B63	RB11-1	Beam	192	W16X26	W16X26		24
Story4	B65	RB10-2	Beam	48	W16X26	W16X26		24
Story4	B77	RB2-2a	Beam	53.004	W16X31	W16X31		24
Story4	B90	60	Beam	53.004	W12X35	W12X35		24
Story4	B91	201	Beam	53.004	W12X35	W12X35		24
Story4	B95	RB2-3c	Beam	53.004	W16X31	W16X31		24
Story4	B113	RB2-2b	Beam	42.2966	W16X31	W16X31		
Story4	B126	284	Beam	42.2966	W12X35	W12X35		
Story4	B127	323	Beam	42.2966	W12X35	W12X35		
Story4	B131	RB2-4a	Beam	42.2966	W16X31	W16X31		
Story4	B153	RB2-2c	Beam	56.0446	W16X31	W16X31		
Story4	B167	285	Beam	56.0446	W12X35	W12X35		
Story4	B172	RB2-4b	Beam	56.0446	W16X31	W16X31		
Story4	B200	RB4-2	Beam	48	W16X26	W16X26		24
Story4	B202	RB5-2	Beam	144	W16X26	W16X26		24
Story4	B210	RB3-1	Beam	168	W16X26	W16X26		24
Story4	B224	168	Beam	56.0446	W12X35	W12X35		
Story4	B300	RB16-2	Beam	408	W24X117	W24X117		24
Story4	B302	RB16-1	Beam	408	W24X117	W24X117		24
Story3	B61	24	Beam	48	W8X21	W8X21		24
Story3	B65	34	Beam	48	W8X21	W8X21		24
Story3	B101	3B15-1	Beam	144	W16X45	W16X45		24
Story3	B103	3B15-2	Beam	144	W16X45	W16X45		24
Story3	B112	3B3-1	Beam	39.996	W8X21	W8X21		24
Story3	B168	3B3-2	Beam	58.008	W8X21	W8X21		24
Story3	B193	3B3-3	Beam	42.996	W8X21	W8X21		24
Story3	B206	3B2-1	Beam	93	W12X79	W12X79		24
Story3	B209	3B2-2	Beam	93	W12X79	W12X79		24
Story3	B234	3B10-1	Beam	288	W30X90	W30X90		24
Story3	B243	3B9-1	Beam	312	W10X68	W10X68		24
Story3	B244	3B8-1	Beam	312	W18X46	W18X46		24
Story3	B245	3B4-1	Beam	288	W12X35	W12X35		24
Story3	B23	3B3-4	Beam	42	W8X21	W8X21		24
Story3	B25	3B4-5	Beam	51	W8X21	W8X21		24
Story3	B28	3B3-6	Beam	48	W8X21	W8X21		24
Story2	B6	2B4-1	Beam	288	W27X129	W27X129		24
Story2	B8	2B1-1	Beam	144	W12X26	W12X26		24
Story2	B13	2B9-R-1	Beam	456	W27X129	W27X129		24
Story2	B64	2B5-R-1	Beam	456	W27X129	W27X129		24
Story2	B73	2B2-1	Beam	336	W27X129	W27X129		24
Story2	B74	2B7-1	Beam	336	W27X146	W27X146		24

Table 2.1 - Frame Assignments - Summary (Part 1 of 2, continued)

Story	Label	Unique Name	Design Type	Length in	Analysis Section	Design Section	Axis Angle deg	Max Station Spacing in
Story2	B105	2B5-R-2	Beam	456	W27X129	W27X129		24
Story2	B195	2B4-4C	Beam	168	W27X129	W27X129		24
Story2	B199	2B4-4	Beam	288	W27X129	W27X129		24
Story2	B201	2B1-8	Beam	144	W12X26	W12X26		24
Story2	B207	2B4-R-2	Beam	456	W27X102	W27X102		24
Story2	B254	2B4-1C	Beam	168	W27X129	W27X129		24
Story2	B2	2B2-2	Beam	195	W27X129	W27X129		24
Story2	B19	2B2-3	Beam	141	W27X129	W27X129		24
Story5	D72	9	Brace	136.2448	HSS3X3X1/4	HSS3X3X1/4		
Story5	D74	11	Brace	136.2442	HSS3X3X1/4	HSS3X3X1/4		
Story5	D79	4 A(+)-7	Brace	163.7681	HSS6X6X3/8	HSS6X6X3/8	90	
Story5	D52	4 A(+)-8(+)	Brace	163.7681	HSS6X6X3/8	HSS6X6X3/8	90	
Story5	D77	4 A(+)-9(-)	Brace	163.7681	HSS6X6X3/8	HSS6X6X3/8	90	
Story5	D78	20	Brace	176.1038	HSS2-1/2X2-1/2X3/16	HSS2-1/2X2-1/2X3/16		
Story5	D81	21	Brace	176.104	HSS2-1/2X2-1/2X3/16	HSS2-1/2X2-1/2X3/16		
Story4	D1	RB2-1a	Brace	75.3923	W16X31	W16X31		
Story4	D24	RB2-3a	Brace	75.3923	W16X31	W16X31		
Story4	D39	138	Brace	58.9004	HSS2X2X1/4	HSS2X2X1/4		
Story4	D43	146	Brace	60.1082	HSS2X2X1/4	HSS2X2X1/4		
Story4	D48	RB2-2d	Brace	49.2443	W16X31	W16X31		
Story4	D62	286	Brace	49.2443	W12X35	W12X35		
Story4	D63	325	Brace	49.2443	W12X35	W12X35		
Story4	D68	RB2-4c	Brace	49.2443	W16X31	W16X31		
Story4	D45	6	Brace	150.5722	HSS3X3X1/4	HSS3X3X1/4		
Story4	D28	37	Brace	67.8823	HSS2X2X1/4	HSS2X2X1/4		
Story4	D25	45	Brace	67.8823	HSS2X2X1/4	HSS2X2X1/4		
Story4	D26	13	Brace	183.1721	HSS3X3X1/4	HSS3X3X1/4		
Story3	D40	87	Brace	115.1681	HSS3X3X1/4	HSS3X3X1/4		
Story3	D42	136	Brace	115.8792	HSS3X3X1/4	HSS3X3X1/4		
Story3	D47	91	Brace	118.1863	HSS3X3X1/4	HSS3X3X1/4		
Story3	D70	90	Brace	116.244	HSS3X3X1/4	HSS3X3X1/4		
Story3	D71	4	Brace	142.5237	HSS3X3X1/4	HSS3X3X1/4		
Story3	D73	2	Brace	142.5237	HSS3X3X1/4	HSS3X3X1/4		
Story3	D75	456	Brace	220.2907	HSS4X0.250	HSS4X0.250		
Story3	D76	455	Brace	220.2907	HSS4X0.250	HSS4X0.250		
Story3	D27	36	Brace	118.1863	HSS2X2X1/4	HSS2X2X1/4		
Story3	D36	44	Brace	118.1863	HSS2X2X1/4	HSS2X2X1/4		
Story2	D41	15	Brace	412.9116	HSS4X0.250	HSS4X0.250		
Story2	D44	16	Brace	412.9116	HSS4X0.250	HSS4X0.250		

Table 2.1 - Frame Assignments - Summary (Part 2 of 2)

Story	Label	Unique Name	Min Number Stations	Releases	T/C Limits
Story5	C53	3 E-7	3	Yes	No
Story5	C54	3 E-8(+)	3	Yes	No
Story5	C55	3 E-9(-)	3	Yes	No
Story5	C56	3 E-10	3	Yes	No
Story4	C15	3 H-7	3	Yes	No
Story4	C17	3 H-8	3	Yes	No
Story4	C22	3 H-9	3	Yes	No
Story4	C24	3 H-10	3	Yes	No
Story4	C26	3 H-2	3	Yes	No
Story4	C29	3 G-7	3	Yes	No
Story4	C32	3 G-10	3	Yes	No
Story4	C34	3 G(-)-7	3	Yes	No
Story4	C39	3 G(-)-10	3	Yes	No
Story4	C40	3 F+-2	3	Yes	No
Story4	C42	3 F-10	3	Yes	No
Story4	C44	3 F-7	3	Yes	No
Story4	C45	3 E-2	3	Yes	No
Story3	C30	3 G-8(+)	3	Yes	No
Story3	C59	2 C-8	3	Yes	No
Story3	C61	2 C-9	3	Yes	No
Story2	C2	1 I-3	3	Yes	No
Story2	C47	1E-3	3	Yes	No
Story5	B62	RB11-1 HIGH		Yes	No
Story5	B139	RB8-1	3	Yes	No
Story5	B140	RB8-2	3	Yes	No
Story5	B205	RB10-3		Yes	No
Story5	B208	RB10-4		Yes	No
Story5	B5	RB9-19		Yes	No
Story5	B22	RB18-1		Yes	No
Story5	B1	RB12-1	3	Yes	No
Story5	B29	RB19-1	3	Yes	No
Story5	B30	RB12-2	3	Yes	No
Story5	B31	RB19-2	3	Yes	No
Story4	B7	RB4-1		Yes	No
Story4	B9	RB5-1		Yes	No
Story4	B10	RB4-3		Yes	No
Story4	B12	RB6-1		Yes	No
Story4	B14	RB4-4		Yes	No
Story4	B15	RB5-3		Yes	No
Story4	B33	RB2-1b	3	Yes	No
Story4	B56	RB2-3b	3	No	No
Story4	B61	RB10-1		Yes	No
Story4	B63	RB11-1		Yes	No
Story4	B65	RB10-2		Yes	No
Story4	B77	RB2-2a		No	No

Table 2.1 - Frame Assignments - Summary (Part 2 of 2, continued)

Story	Label	Unique Name	Min Number Stations	Releases	T/C Limits
Story4	B90	60		Yes	No
Story4	B91	201		Yes	No
Story4	B95	RB2-3c		Yes	No
Story4	B113	RB2-2b	3	No	No
Story4	B126	284	3	No	No
Story4	B127	323	3	No	No
Story4	B131	RB2-4a	3	Yes	No
Story4	B153	RB2-2c	3	No	No
Story4	B167	285	3	No	No
Story4	B172	RB2-4b	3	No	No
Story4	B200	RB4-2		Yes	No
Story4	B202	RB5-2		Yes	No
Story4	B210	RB3-1		No	No
Story4	B224	168	3	No	No
Story4	B300	RB16-2		Yes	No
Story4	B302	RB16-1		Yes	No
Story3	B61	24		Yes	No
Story3	B65	34		Yes	No
Story3	B101	3B15-1		Yes	No
Story3	B103	3B15-2		Yes	No
Story3	B112	3B3-1		Yes	No
Story3	B168	3B3-2		Yes	No
Story3	B193	3B3-3		Yes	No
Story3	B206	3B2-1		Yes	No
Story3	B209	3B2-2		Yes	No
Story3	B234	3B10-1		Yes	No
Story3	B243	3B9-1		Yes	No
Story3	B244	3B8-1		Yes	No
Story3	B245	3B4-1		Yes	No
Story3	B23	3B3-4		Yes	No
Story3	B25	3B4-5		Yes	No
Story3	B28	3B3-6		Yes	No
Story2	B6	2B4-1		Yes	No
Story2	B8	2B1-1		Yes	No
Story2	B13	2B9-R-1		Yes	No
Story2	B64	2B5-R-1		Yes	No
Story2	B73	2B2-1		Yes	No
Story2	B74	2B7-1		Yes	No
Story2	B105	2B5-R-2		Yes	No
Story2	B195	2B4-4C		No	No
Story2	B199	2B4-4		Yes	No
Story2	B201	2B1-8		Yes	No
Story2	B207	2B4-R-2		Yes	No

Table 2.1 - Frame Assignments - Summary (Part 2 of 2, continued)

Story	Label	Unique Name	Min Number Stations	Releases	T/C Limits
Story2	B254	2B4-1C		No	No
Story2	B2	2B2-2		Yes	No
Story2	B19	2B2-3		Yes	No
Story5	D72	9	3	Yes	No
Story5	D74	11	3	Yes	No
Story5	D79	4 A(+)-7	3	Yes	No
Story5	D52	4 A(+)-8(+)	3	Yes	No
Story5	D77	4 A(+)-9(-)	3	Yes	No
Story5	D78	20	3	Yes	No
Story5	D81	21	3	Yes	No
Story4	D1	RB2-1a	3	Yes	No
Story4	D24	RB2-3a	3	Yes	No
Story4	D39	138	3	Yes	No
Story4	D43	146	3	Yes	No
Story4	D48	RB2-2d	3	Yes	No
Story4	D62	286	3	Yes	No
Story4	D63	325	3	Yes	No
Story4	D68	RB2-4c	3	Yes	No
Story4	D45	6	3	Yes	No
Story4	D28	37	3	Yes	No
Story4	D25	45	3	Yes	No
Story4	D26	13	3	Yes	No
Story3	D40	87	3	Yes	No
Story3	D42	136	3	Yes	No
Story3	D47	91	3	Yes	No
Story3	D70	90	3	Yes	No
Story3	D71	4	3	Yes	No
Story3	D73	2	3	Yes	No
Story3	D75	456	3	Yes	Yes
Story3	D76	455	3	Yes	Yes
Story3	D27	36	3	Yes	No
Story3	D36	44	3	Yes	No
Story2	D41	15	3	Yes	Yes
Story2	D44	16	3	Yes	Yes

2.2 Shell Assignments

Table 2.2 - Shell Assignments - Summary

Story	Label	Unique Name	Section	Diaphragm	Axis Angle deg	Pier
Story2	W14	1	Wall1			P2
Story2	W20	5	Wall1			P5
Story2	W26	6	Wall1			P4
Story2	W27	2	Wall1			P1

Table 2.2 - Shell Assignments - Summary (continued)

Story	Label	Unique Name	Section	Diaphragm	Axis Angle deg	Pier
Story2	W28	4	Wall1			P6
Story2	W42	3	Wall1			P3
Story1	W14	14	Wall1			P2
Story1	W20	15	Wall1			P5
Story1	W26	7	Wall1			P4
Story1	W27	12	Wall1			P1
Story1	W28	13	Wall1			P6
Story1	W42	11	Wall1			P3
Story3	F88	24	Floors	D1	90	
Story2	F25	8	Floors	D1	90	
Story1	F1	19	Floors	D1	90	
Story1	F69	17	Floors	D1		

3 Loads

This chapter provides loading information as applied to the model.

3.1 Load Patterns

Table 3.1 - Load Patterns

Name	Type	Self Weight Multiplier
Dead	Dead	0
Live	Live	0
Snow	Snow	0

3.2 Applied Loads

3.2.1 Line Loads

Table 3.2 - Frame Loads - Distributed

Story	Label	Unique Name	Design Type	Load Pattern	LoadType	Direction	Relative Distance Start	Relative Distance End	Absolute Distance Start in	Absolute Distance End in	Force at Start kip/ft	Force at End kip/ft
Story5	B102	RB13-1	Beam	Dead	Force	Gravity Proj	0	1	0	144	0.085	0.085
Story5	B104	RB13-2	Beam	Dead	Force	Gravity Proj	0	1	0	144	0.085	0.085
Story5	B139	RB8-1	Beam	Dead	Force	Gravity Proj	0	1	0	198.5103	0.085	0.085
Story5	B140	RB8-2	Beam	Dead	Force	Gravity Proj	0	1	0	198.5103	0.085	0.085
Story5	B233	RB9-15	Beam	Dead	Force	Gravity Proj	0	1	0	102	0.085	0.085
Story5	B235	RB9-16	Beam	Dead	Force	Gravity Proj	0	1	0	186	0.085	0.085
Story5	B1	RB12-1	Beam	Dead	Force	Gravity Proj	0	1	0	221.0172	0.085	0.085
Story5	B29	RB19-1	Beam	Dead	Force	Gravity Proj	0	1	0	73.6724	0.085	0.085
Story5	B30	RB12-2	Beam	Dead	Force	Gravity Proj	0	1	0	221.0172	0.085	0.085
Story5	B31	RB19-2	Beam	Dead	Force	Gravity Proj	0	1	0	73.6724	0.085	0.085
Story4	B7	RB4-1	Beam	Dead	Force	Gravity Proj	0	1	0	48	0.108	0.108
Story4	B9	RB5-1	Beam	Dead	Force	Gravity Proj	0	1	0	144	0.108	0.108
Story4	B10	RB4-3	Beam	Dead	Force	Gravity Proj	0	1	0	48	0.108	0.108
Story4	B12	RB6-1	Beam	Dead	Force	Gravity Proj	0	1	0	192	0.108	0.108
Story4	B14	RB4-4	Beam	Dead	Force	Gravity Proj	0	1	0	48	0.108	0.108
Story4	B15	RB5-3	Beam	Dead	Force	Gravity Proj	0	1	0	168	0.108	0.108
Story4	B33	RB2-1b	Beam	Dead	Force	Gravity Proj	0	1	0	72.9892	0.148	0.148
Story4	B56	RB2-3b	Beam	Dead	Force	Gravity Proj	0	1	0	72.9892	0.148	0.148
Story4	B77	RB2-2a	Beam	Dead	Force	Gravity Proj	0	1	0	53.004	0.148	0.148
Story4	B95	RB2-3c	Beam	Dead	Force	Gravity Proj	0	1	0	53.004	0.148	0.148
Story4	B113	RB2-2b	Beam	Dead	Force	Gravity Proj	0	1	0	42.2966	0.148	0.148
Story4	B131	RB2-4a	Beam	Dead	Force	Gravity Proj	0	1	0	42.2966	0.148	0.148
Story4	B153	RB2-2c	Beam	Dead	Force	Gravity Proj	0	1	0	56.0446	0.148	0.148
Story4	B172	RB2-4b	Beam	Dead	Force	Gravity Proj	0	1	0	56.0446	0.148	0.148
Story4	B200	RB4-2	Beam	Dead	Force	Gravity Proj	0	1	0	48	0.108	0.108
Story4	B202	RB5-2	Beam	Dead	Force	Gravity Proj	0	1	0	144	0.108	0.108
Story4	B210	RB3-1	Beam	Dead	Force	Gravity Proj	0	1	0	168	0.108	0.108
Story4	B300	RB16-2	Beam	Dead	Force	Gravity Proj	0	0.294118	0	120	0.108	0.108
Story4	B300	RB16-2	Beam	Dead	Force	Gravity Proj	0.294118	0.411765	120	168	0.108	0.108

Table 3.2 - Frame Loads - Distributed (continued)

Story	Label	Unique Name	Design Type	Load Pattern	LoadType	Direction	Relative Distance Start	Relative Distance End	Absolute Distance Start in	Absolute Distance End in	Force at Start kip/ft	Force at End kip/ft
Story4	B300	RB16-2	Beam	Dead	Force	Gravity Proj	0.411765	0.529412	168	216	0.108	0.108
Story4	B300	RB16-2	Beam	Dead	Force	Gravity Proj	0.529412	1	216	408	0.108	0.108
Story4	B302	RB16-1	Beam	Dead	Force	Gravity Proj	0	0.411765	0	168	0.108	0.108
Story4	B302	RB16-1	Beam	Dead	Force	Gravity Proj	0.411765	0.529412	168	216	0.108	0.108
Story4	B302	RB16-1	Beam	Dead	Force	Gravity Proj	0.529412	1	216	408	0.108	0.108
Story3	B101	3B15-1	Beam	Dead	Force	Gravity Proj	0	1	0	144	0.128	0.128
Story3	B103	3B15-2	Beam	Dead	Force	Gravity Proj	0	1	0	144	0.128	0.128
Story3	B234	3B10-1	Beam	Dead	Force	Gravity Proj	0	1	0	288	0.128	0.128
Story3	B243	3B9-1	Beam	Dead	Force	Gravity Proj	0	1	0	312	0.128	0.128
Story3	B244	3B8-1	Beam	Dead	Force	Gravity Proj	0	1	0	312	0.128	0.128
Story3	B23	3B3-4	Beam	Dead	Force	Gravity Proj	0	1	0	42	0.128	0.128
Story3	B25	3B4-5	Beam	Dead	Force	Gravity Proj	0	1	0	51	0.128	0.128
Story3	B28	3B3-6	Beam	Dead	Force	Gravity Proj	0	1	0	48	0.128	0.128
Story2	B6	2B4-1	Beam	Dead	Force	Gravity	0	1	0	288	0.108	0.108
Story2	B8	2B1-1	Beam	Dead	Force	Gravity	0	1	0	144	0.108	0.108
Story2	B13	2B9-R-1	Beam	Dead	Force	Gravity	0	1	0	456	0.108	0.108
Story2	B73	2B2-1	Beam	Dead	Force	Gravity	0	0.428571	0	144	0.148	0.148
Story2	B73	2B2-1	Beam	Dead	Force	Gravity	0.428571	1	144	336	0.148	0.148
Story2	B75	2B8-1	Beam	Dead	Force	Gravity Proj	0	1	0	336	0.128	0.128
Story2	B195	2B4-4C	Beam	Dead	Force	Gravity	0	1	0	168	0.108	0.108
Story2	B199	2B4-4	Beam	Dead	Force	Gravity	0	1	0	288	0.108	0.108
Story2	B201	2B1-8	Beam	Dead	Force	Gravity	0	1	0	144	0.108	0.108
Story2	B207	2B4-R-2	Beam	Dead	Force	Gravity	0	1	0	456	0.108	0.108
Story2	B254	2B4-1C	Beam	Dead	Force	Gravity	0	0.714286	0	120	0.108	0.108
Story2	B254	2B4-1C	Beam	Dead	Force	Gravity	0.714286	1	120	168	0.108	0.108
Story2	B2	2B2-2	Beam	Dead	Force	Gravity	0	1	0	195	0.148	0.148
Story2	B19	2B2-3	Beam	Dead	Force	Gravity	0	1	0	141	0.148	0.148
Story4	B33	RB2-1b	Beam	Snow	Force	Gravity	0	1	0	72.9892	0.768	0.768
Story4	B56	RB2-3b	Beam	Snow	Force	Gravity	0	1	0	72.9892	0.768	0.768
Story4	B77	RB2-2a	Beam	Snow	Force	Gravity	0	1	0	53.004	0.768	0.768
Story4	B95	RB2-3c	Beam	Snow	Force	Gravity	0	1	0	53.004	0.768	0.768
Story4	B113	RB2-2b	Beam	Snow	Force	Gravity	0	1	0	42.2966	0.768	0.768
Story4	B131	RB2-4a	Beam	Snow	Force	Gravity	0	1	0	42.2966	0.768	0.768
Story4	B153	RB2-2c	Beam	Snow	Force	Gravity	0	1	0	56.0446	0.768	0.768
Story4	B172	RB2-4b	Beam	Snow	Force	Gravity	0	1	0	56.0446	0.768	0.768
Story2	B73	2B2-1	Beam	Snow	Force	Gravity	0	1	0	336	0.768	0.768
Story2	B2	2B2-2	Beam	Snow	Force	Gravity	0	1	0	195	0.768	0.768
Story2	B19	2B2-3	Beam	Snow	Force	Gravity	0	1	0	141	0.768	0.768
Story4	D1	RB2-1a	Brace	Dead	Force	Gravity Proj	0	1	0	75.3923	0.148	0.148
Story4	D24	RB2-3a	Brace	Dead	Force	Gravity Proj	0	1	0	75.3923	0.148	0.148
Story4	D48	RB2-2d	Brace	Dead	Force	Gravity Proj	0	1	0	49.2443	0.148	0.148
Story4	D68	RB2-4c	Brace	Dead	Force	Gravity Proj	0	1	0	49.2443	0.148	0.148
Story4	D1	RB2-1a	Brace	Snow	Force	Gravity	0	1	0	75.3923	0.768	0.768
Story4	D24	RB2-3a	Brace	Snow	Force	Gravity	0	1	0	75.3923	0.768	0.768

Table 3.2 - Frame Loads - Distributed (continued)

Story	Label	Unique Name	Design Type	Load Pattern	LoadType	Direction	Relative Distance Start	Relative Distance End	Absolute Distance Start in	Absolute Distance End in	Force at Start kip/ft	Force at End kip/ft
Story4	D48	RB2-2d	Brace	Snow	Force	Gravity	0	1	0	49.2443	0.768	0.768
Story4	D68	RB2-4c	Brace	Snow	Force	Gravity	0	1	0	49.2443	0.768	0.768

3.2.2 Area Loads

Table 3.3 - Shell Loads - Uniform

Story	Label	Unique Name	Load Pattern	Direction	Load lb/ft²
Story4	W1	21	Dead	Gravity	29
Story4	W2	25	Dead	Gravity	29
Story4	W3	27	Dead	Gravity	29
Story4	W4	28	Dead	Gravity	29
Story4	W5	29	Dead	Gravity	29
Story4	W6	30	Dead	Gravity	29
Story4	W7	31	Dead	Gravity	29
Story4	W8	32	Dead	Gravity	29
Story4	W9	33	Dead	Gravity	29
Story4	W10	34	Dead	Gravity	29
Story4	W11	35	Dead	Gravity	29
Story4	W12	36	Dead	Gravity	29
Story4	W13	37	Dead	Gravity	29
Story4	W15	38	Dead	Gravity	29
Story4	W16	39	Dead	Gravity	29
Story4	W17	42	Dead	Gravity	29
Story4	W18	43	Dead	Gravity	29
Story4	W19	44	Dead	Gravity	29
Story4	W21	45	Dead	Gravity	29
Story4	W22	46	Dead	Gravity	29
Story4	W23	47	Dead	Gravity	29
Story4	W24	48	Dead	Gravity	29
Story4	W25	49	Dead	Gravity	29
Story4	W29	108	Dead	Gravity	29
Story4	W30	109	Dead	Gravity	29
Story4	W31	110	Dead	Gravity	29
Story4	W32	111	Dead	Gravity	29
Story4	W33	112	Dead	Gravity	29
Story4	W34	113	Dead	Gravity	29
Story4	W35	114	Dead	Gravity	29
Story4	W36	115	Dead	Gravity	29
Story4	W37	116	Dead	Gravity	29
Story4	W38	117	Dead	Gravity	29
Story4	W39	118	Dead	Gravity	29
Story4	W40	119	Dead	Gravity	29
Story4	W41	120	Dead	Gravity	29
Story4	W43	56	Dead	Gravity	29

Table 3.3 - Shell Loads - Uniform (continued)

Story	Label	Unique Name	Load Pattern	Direction	Load lb/ft²
Story4	W44	57	Dead	Gravity	29
Story4	W45	58	Dead	Gravity	29
Story4	W46	59	Dead	Gravity	29
Story2	W14	1	Dead	Gravity	125
Story2	W20	5	Dead	Gravity	125
Story2	W26	6	Dead	Gravity	125
Story2	W27	2	Dead	Gravity	125
Story2	W28	4	Dead	Gravity	125
Story2	W42	3	Dead	Gravity	125
Story1	W14	14	Dead	Gravity	125
Story1	W20	15	Dead	Gravity	125
Story1	W26	7	Dead	Gravity	125
Story1	W27	12	Dead	Gravity	125
Story1	W28	13	Dead	Gravity	125
Story1	W42	11	Dead	Gravity	125
Story4	W1	21	Snow	Gravity Proj	189
Story4	W2	25	Snow	Gravity Proj	189
Story4	W3	27	Snow	Gravity Proj	189
Story4	W4	28	Snow	Gravity Proj	189
Story4	W5	29	Snow	Gravity Proj	189
Story4	W6	30	Snow	Gravity Proj	189
Story4	W7	31	Snow	Gravity Proj	189
Story4	W8	32	Snow	Gravity Proj	189
Story4	W9	33	Snow	Gravity Proj	189
Story4	W10	34	Snow	Gravity Proj	189
Story4	W11	35	Snow	Gravity Proj	189
Story4	W12	36	Snow	Gravity Proj	189
Story4	W13	37	Snow	Gravity Proj	189
Story4	W15	38	Snow	Gravity Proj	189
Story4	W16	39	Snow	Gravity Proj	189
Story4	W17	42	Snow	Gravity Proj	189
Story4	W18	43	Snow	Gravity Proj	189
Story4	W19	44	Snow	Gravity Proj	189
Story4	W21	45	Snow	Gravity Proj	189
Story4	W22	46	Snow	Gravity Proj	189
Story4	W23	47	Snow	Gravity Proj	189
Story4	W24	48	Snow	Gravity Proj	189
Story4	W25	49	Snow	Gravity Proj	189
Story4	W29	108	Snow	Gravity Proj	189
Story4	W30	109	Snow	Gravity Proj	189
Story4	W31	110	Snow	Gravity Proj	189
Story4	W32	111	Snow	Gravity Proj	189
Story4	W33	112	Snow	Gravity Proj	189
Story4	W34	113	Snow	Gravity Proj	189
Story4	W35	114	Snow	Gravity Proj	189

Table 3.3 - Shell Loads - Uniform (continued)

Story	Label	Unique Name	Load Pattern	Direction	Load lb/ft²
Story4	W36	115	Snow	Gravity Proj	189
Story4	W37	116	Snow	Gravity Proj	189
Story4	W38	117	Snow	Gravity Proj	189
Story4	W39	118	Snow	Gravity Proj	189
Story4	W40	119	Snow	Gravity Proj	189
Story4	W41	120	Snow	Gravity Proj	189
Story4	W43	56	Snow	Gravity Proj	189
Story4	W44	57	Snow	Gravity Proj	189
Story4	W45	58	Snow	Gravity Proj	189
Story4	W46	59	Snow	Gravity Proj	189
Story5	F27	9	Dead	Gravity Proj	29
Story5	F46	16	Dead	Gravity Proj	29
Story5	F47	87	Dead	Gravity Proj	29
Story5	F48	96	Dead	Gravity Proj	29
Story5	F66	99	Dead	Gravity Proj	29
Story5	F67	121	Dead	Gravity Proj	29
Story5	F68	123	Dead	Gravity Proj	29
Story5	F70	124	Dead	Gravity Proj	29
Story5	F71	125	Dead	Gravity Proj	29
Story5	F72	126	Dead	Gravity Proj	29
Story5	F73	127	Dead	Gravity Proj	29
Story5	F74	128	Dead	Gravity Proj	29
Story5	F75	130	Dead	Gravity Proj	29
Story5	F76	129	Dead	Gravity Proj	29
Story5	F78	131	Dead	Gravity Proj	29
Story5	F79	132	Dead	Gravity Proj	29
Story5	F80	133	Dead	Gravity Proj	29
Story5	F81	134	Dead	Gravity Proj	29
Story5	F82	136	Dead	Gravity Proj	29
Story5	F83	135	Dead	Gravity Proj	29
Story5	F84	137	Dead	Gravity Proj	29
Story5	F85	139	Dead	Gravity Proj	29
Story5	F86	138	Dead	Gravity Proj	29
Story5	F87	140	Dead	Gravity Proj	29
Story4	F2	18	Dead	Gravity	29
Story4	F3	22	Dead	Gravity	29
Story4	F4	23	Dead	Gravity	29
Story4	F5	26	Dead	Gravity	29
Story4	F6	60	Dead	Gravity	29
Story4	F7	61	Dead	Gravity	29
Story4	F8	62	Dead	Gravity	29
Story4	F9	63	Dead	Gravity	29
Story4	F10	64	Dead	Gravity	29
Story4	F11	65	Dead	Gravity	29
Story4	F12	66	Dead	Gravity	29

Table 3.3 - Shell Loads - Uniform (continued)

Story	Label	Unique Name	Load Pattern	Direction	Load lb/ft²
Story4	F13	67	Dead	Gravity	29
Story4	F14	68	Dead	Gravity	29
Story4	F15	69	Dead	Gravity	29
Story4	F16	70	Dead	Gravity	29
Story4	F17	71	Dead	Gravity	29
Story4	F18	72	Dead	Gravity	29
Story4	F19	73	Dead	Gravity	29
Story4	F20	74	Dead	Gravity	29
Story4	F21	75	Dead	Gravity	29
Story4	F22	76	Dead	Gravity	29
Story4	F23	77	Dead	Gravity	29
Story4	F24	78	Dead	Gravity	29
Story4	F26	10	Dead	Gravity	29
Story4	F28	20	Dead	Gravity	29
Story4	F29	79	Dead	Gravity	29
Story4	F30	80	Dead	Gravity	29
Story4	F31	81	Dead	Gravity	29
Story4	F32	82	Dead	Gravity	29
Story4	F33	83	Dead	Gravity	29
Story4	F34	84	Dead	Gravity	29
Story4	F35	85	Dead	Gravity	29
Story4	F36	86	Dead	Gravity	29
Story4	F37	88	Dead	Gravity	29
Story4	F38	89	Dead	Gravity	29
Story4	F39	90	Dead	Gravity	29
Story4	F40	91	Dead	Gravity	29
Story4	F41	92	Dead	Gravity	29
Story4	F42	40	Dead	Gravity	29
Story4	F43	41	Dead	Gravity	29
Story4	F44	50	Dead	Gravity	29
Story4	F45	51	Dead	Gravity	29
Story4	F49	93	Dead	Gravity	29
Story4	F50	94	Dead	Gravity	29
Story4	F51	95	Dead	Gravity	29
Story4	F52	97	Dead	Gravity	29
Story4	F53	98	Dead	Gravity	29
Story4	F54	100	Dead	Gravity	29
Story4	F55	101	Dead	Gravity	29
Story4	F56	102	Dead	Gravity	29
Story4	F57	103	Dead	Gravity	29
Story4	F58	104	Dead	Gravity	29
Story4	F59	105	Dead	Gravity	29
Story4	F60	106	Dead	Gravity	29
Story4	F61	107	Dead	Gravity	29
Story4	F62	52	Dead	Gravity	29

Table 3.3 - Shell Loads - Uniform (continued)

Story	Label	Unique Name	Load Pattern	Direction	Load lb/ft²
Story4	F63	53	Dead	Gravity	29
Story4	F64	54	Dead	Gravity	29
Story4	F65	55	Dead	Gravity	29
Story3	F88	24	Dead	Gravity	64
Story2	F25	8	Dead	Gravity	87
Story1	F1	19	Dead	Gravity Proj	57.3
Story1	F69	17	Dead	Gravity Proj	57.3
Story3	F88	24	Live	Gravity	40
Story2	F25	8	Live	Gravity	40
Story1	F1	19	Live	Gravity	40
Story1	F69	17	Live	Gravity	40
Story5	F27	9	Snow	Gravity Proj	189
Story5	F46	16	Snow	Gravity Proj	189
Story5	F47	87	Snow	Gravity Proj	189
Story5	F48	96	Snow	Gravity Proj	189
Story5	F66	99	Snow	Gravity Proj	189
Story5	F67	121	Snow	Gravity Proj	189
Story5	F68	123	Snow	Gravity Proj	189
Story5	F70	124	Snow	Gravity Proj	189
Story5	F71	125	Snow	Gravity Proj	189
Story5	F72	126	Snow	Gravity Proj	189
Story5	F73	127	Snow	Gravity Proj	189
Story5	F74	128	Snow	Gravity Proj	189
Story5	F75	130	Snow	Gravity Proj	189
Story5	F76	129	Snow	Gravity Proj	189
Story5	F78	131	Snow	Gravity Proj	189
Story5	F79	132	Snow	Gravity Proj	189
Story5	F80	133	Snow	Gravity Proj	189
Story5	F81	134	Snow	Gravity Proj	189
Story5	F82	136	Snow	Gravity Proj	189
Story5	F83	135	Snow	Gravity Proj	189
Story5	F84	137	Snow	Gravity Proj	189
Story5	F85	139	Snow	Gravity Proj	189
Story5	F86	138	Snow	Gravity Proj	189
Story5	F87	140	Snow	Gravity Proj	189
Story4	F2	18	Snow	Gravity Proj	189
Story4	F3	22	Snow	Gravity Proj	189
Story4	F4	23	Snow	Gravity Proj	189
Story4	F5	26	Snow	Gravity Proj	189
Story4	F6	60	Snow	Gravity Proj	189
Story4	F7	61	Snow	Gravity Proj	189
Story4	F8	62	Snow	Gravity Proj	189
Story4	F9	63	Snow	Gravity Proj	189
Story4	F10	64	Snow	Gravity Proj	189
Story4	F11	65	Snow	Gravity Proj	189

Table 3.3 - Shell Loads - Uniform (continued)

Story	Label	Unique Name	Load Pattern	Direction	Load lb/ft²
Story4	F12	66	Snow	Gravity Proj	189
Story4	F13	67	Snow	Gravity Proj	189
Story4	F14	68	Snow	Gravity Proj	189
Story4	F15	69	Snow	Gravity Proj	189
Story4	F16	70	Snow	Gravity Proj	189
Story4	F17	71	Snow	Gravity Proj	189
Story4	F18	72	Snow	Gravity Proj	189
Story4	F19	73	Snow	Gravity Proj	189
Story4	F20	74	Snow	Gravity Proj	189
Story4	F21	75	Snow	Gravity Proj	189
Story4	F22	76	Snow	Gravity Proj	189
Story4	F23	77	Snow	Gravity Proj	189
Story4	F24	78	Snow	Gravity Proj	189
Story4	F26	10	Snow	Gravity Proj	189
Story4	F28	20	Snow	Gravity Proj	189
Story4	F29	79	Snow	Gravity Proj	189
Story4	F30	80	Snow	Gravity Proj	189
Story4	F31	81	Snow	Gravity Proj	189
Story4	F32	82	Snow	Gravity Proj	189
Story4	F33	83	Snow	Gravity Proj	189
Story4	F34	84	Snow	Gravity Proj	189
Story4	F35	85	Snow	Gravity Proj	189
Story4	F36	86	Snow	Gravity Proj	189
Story4	F37	88	Snow	Gravity Proj	189
Story4	F38	89	Snow	Gravity Proj	189
Story4	F39	90	Snow	Gravity Proj	189
Story4	F40	91	Snow	Gravity Proj	189
Story4	F41	92	Snow	Gravity Proj	189
Story4	F42	40	Snow	Gravity Proj	189
Story4	F43	41	Snow	Gravity Proj	189
Story4	F44	50	Snow	Gravity Proj	189
Story4	F45	51	Snow	Gravity Proj	189
Story4	F49	93	Snow	Gravity Proj	189
Story4	F50	94	Snow	Gravity Proj	189
Story4	F51	95	Snow	Gravity Proj	189
Story4	F52	97	Snow	Gravity Proj	189
Story4	F53	98	Snow	Gravity Proj	189
Story4	F54	100	Snow	Gravity Proj	189
Story4	F55	101	Snow	Gravity Proj	189
Story4	F56	102	Snow	Gravity Proj	189
Story4	F57	103	Snow	Gravity Proj	189
Story4	F58	104	Snow	Gravity Proj	189
Story4	F59	105	Snow	Gravity Proj	189
Story4	F60	106	Snow	Gravity Proj	189
Story4	F61	107	Snow	Gravity Proj	189

Table 3.3 - Shell Loads - Uniform (continued)

Story	Label	Unique Name	Load Pattern	Direction	Load lb/ft²
Story4	F62	52	Snow	Gravity Proj	189
Story4	F63	53	Snow	Gravity Proj	189
Story4	F64	54	Snow	Gravity Proj	189
Story4	F65	55	Snow	Gravity Proj	189

3.3 Load Cases

Table 3.4 - Load Cases - Summary

Name	Type
Seismic Weight	Linear Static
Dead	Linear Static
Live	Linear Static
Snow	Linear Static
RSX (R=MIXED)	Response Spectrum
RSY (R=MIXED)	Response Spectrum

3.4 Load Combinations

Table 3.5 - Load Combinations

Name	Load Case/Combo	Scale Factor	Type	Auto
LL DEF	Live	1	Linear Add	No
LL+DL DEF	Live	1	Linear Add	No
LL+DL DEF	Dead	1		No
LL+DL+SL DEF	Dead	1	Linear Add	No
LL+DL+SL DEF	Live	1		No
LL+DL+SL DEF	Snow	1		No
1.2D+1.6L+0.5S	Dead	1.2	Linear Add	No
1.2D+1.6L+0.5S	Live	1.6		No
1.2D+1.6L+0.5S	Snow	0.5		No
1.2D+1.6S+1.0L	Dead	1.2	Linear Add	No
1.2D+1.6S+1.0L	Live	1		No
1.2D+1.6S+1.0L	Snow	1.6		No

4 Design Data

This chapter provides design data and results.

4.1 Steel Frame Design

Table 4.1 - Steel Frame Preferences - AISC 360-10

Item	Value
Multi-Response Design	Step-by-Step - All
Frame Type	SCBF
Seismic Design Grade	D
Importance Factor	1
Design System Rho	1.3
Design System Sds	0.592
Design System R	1
Design System Omega0	2
Design System Cd	5
Design Provision	LRFD
Analysis Method	Direct Analysis
Second Order Method	General 2nd Order
Stiffness Reduction Method	Tau-b Fixed
Phi (Bending)	0.9
Phi (Compression)	0.9
Phi (Tension-Yielding)	0.9
Phi (Tension-Fracture)	0.75
Phi (Shear)	0.9
Phi (Shear-Short Webbed Rolled I)	1
Phi (Torsion)	0.9
Ignore Seismic Code?	Yes
Ignore Special Seismic Load?	Yes
Doubler Plate Plug-Welded?	Yes
HSS Welding Type	ERW
Reduced HSS Thickness	No
Consider Deflection?	Yes
DL Ratio	120
SDL+LL Ratio	120
LL Ratio	360
Total Ratio	240
Total Camber Limit	240
Pattern Live Load Factor	0.75
D/C Ratio Limit	0.95

Table 4.2 - Steel Column Envelope (Part 1 of 2)

Label	Story	Section	Moment Interaction Check	PMM Combo	V22 Ratio	V33 Ratio	Class
C16	Story5	HSS6X6X1/4	0.03 = 0.028 + 0.002 + 1.237E-04	1.2D+1.6S+1.0L	0.056	0.004	Compact
C18	Story5	HSS6X6X1/4	0.059 = 0.01 + 0.014 + 0.035	1.2D+1.6S+1.0L	0.011	0.028	Compact
C19	Story5	HSS6X6X1/4	0.097 = 0.004 + 0.006 + 0.087	1.2D+1.6S+1.0L	0.005	0.069	Compact
C20	Story5	HSS6X6X1/4	0.033 = 0.004 + 0.019 + 0.01	1.2D+1.6S+1.0L	0.015	0.008	Compact
C21	Story5	HSS6X6X1/4	0.117 = 0.004 + 0.006 + 0.107	1.2D+1.6S+1.0L	0.004	0.085	Compact

Table 4.2 - Steel Column Envelope (Part 1 of 2, continued)

Label	Story	Section	Moment Interaction Check	PMM Combo	V22 Ratio	V33 Ratio	Class
C23	Story5	HSS6X6X1/4	0.054 = 0.011 + 0.011 + 0.031	1.2D+1.6S+1.0L	0.009	0.025	Compact
C25	Story5	HSS6X6X1/4	0.028 = 0.026 + 0.002 + 0	1.2D+1.6S+1.0L	0.058	0.003	Compact
C31	Story5	HSS6X6X1/4	0.075 = 0.072 + 0.001 + 0.003	1.2D+1.6S+1.0L	0	0.0003565	Compact
C53	Story5	HSS6X6X1/2	0.219 = 0.079 + 0.024 + 0.115	1.2D+1.6S+1.0L	0.014	0.176	Seismic HD
C54	Story5	HSS6X6X1/2	0.159 = 0.067 + 0.073 + 0.019	1.2D+1.6S+1.0L	0.007	0.003	Seismic HD
C55	Story5	HSS6X6X1/2	0.068 = 0.052 + 0.015 + 3.991E-04	1.2D+1.6S+1.0L	0.001	0.002	Seismic HD
C56	Story5	HSS6X6X1/2	0.398 = 0.083 + 0.016 + 0.299	1.2D+1.6S+1.0L	0.01	0.286	Seismic HD
C58	Story5	HSS6X6X1/4	0.122 = 0.051 + 0.043 + 0.028	1.2D+1.6S+1.0L	0.002	0.002	Compact
C60	Story5	HSS6X6X1/4	0.393 = 0.272 + 0.1 + 0.021	1.2D+1.6S+1.0L	0.006	0.001	Compact
C62	Story5	HSS6X6X1/4	0.218 = 0.091 + 0.076 + 0.051	1.2D+1.6S+1.0L	0.004	0.003	Compact
C1	Story4	W6X25	0.009 = 0.009 + 0 + 0	1.2D+1.6S+1.0L	0	0	Seismic HD
C3	Story4	W6X25	0.36 = 0.36 + 0 + 0	1.2D+1.6S+1.0L	0	0	Seismic HD
C4	Story4	W6X25	0.204 = 0.204 + 0 + 0	1.2D+1.6S+1.0L	0	0	Seismic HD
C5	Story4	W6X25	0.142 = 0.06 + 0 + 0.081	1.2D+1.6S+1.0L	0	0.002	Seismic HD
C7	Story4	W6X25	0.131 = 0.057 + 0 + 0.073	1.2D+1.6S+1.0L	0	0.002	Seismic HD
C8	Story4	W6X25	0.118 = 0.048 + 0 + 0.069	1.2D+1.6S+1.0L	0	0.002	Seismic HD
C9	Story4	HSS6X6X1/4	0.113 = 0.052 + 0 + 0.062	1.2D+1.6S+1.0L	0	0.005	Compact
C11	Story4	HSS6X6X1/4	0.113 = 0.052 + 0 + 0.062	1.2D+1.6S+1.0L	0	0.005	Compact
C12	Story4	W6X25	0.112 = 0.048 + 0 + 0.063	1.2D+1.6S+1.0L	0	0.002	Seismic HD
C13	Story4	W6X25	0.055 = 0.055 + 0 + 0	1.2D+1.6S+1.0L	0	0	Seismic HD
C15	Story4	HSS6X6X1/2	0.101 = 0.062 + 0.026 + 0.013	1.2D+1.6S+1.0L	0.002	0.002	Seismic HD
C17	Story4	HSS6X6X1/2	0.083 = 0.04 + 0.019 + 0.023	1.2D+1.6S+1.0L	0.001	0.009	Seismic HD
C22	Story4	HSS6X6X1/2	0.087 = 0.046 + 0.02 + 0.021	1.2D+1.6S+1.0L	0.001	0.009	Seismic HD
C24	Story4	HSS6X6X1/2	0.099 = 0.06 + 0.023 + 0.015	1.2D+1.6S+1.0L	0.002	0.002	Seismic HD
C26	Story4	HSS6X6X1/2	0.102 = 0.059 + 0.043 + 0	1.2D+1.6S+1.0L	0.002	0	Seismic HD
C28	Story4	HSS6X6X1/2	0.122 = 0.066 + 0.015 + 0.041	1.2D+1.6S+1.0L	0.001	0.002	Seismic HD
C29	Story4	HSS6X6X1/2	0.056 = 0.021 + 0.007 + 0.028	1.2D+1.6S+1.0L	0.004	0.004	Seismic HD
C32	Story4	HSS6X6X1/2	0.1 = 0.026 + 0.013 + 0.062	1.2D+1.6S+1.0L	0.004	0.004	Seismic HD
C33	Story4	HSS6X6X1/4	0.258 = 0.227 + 0.031 + 0	1.2D+1.6S+1.0L	0.002	0	Compact
C34	Story4	HSS6X6X1/2	0.055 = 0.019 + 0.002 + 0.035	1.2D+1.6S+1.0L	0.003	0.006	Seismic HD
C39	Story4	HSS6X6X1/2	0.101 = 0.026 + 0.003 + 0.072	1.2D+1.6S+1.0L	0.005	0.012	Seismic HD
C40	Story4	HSS6X6X1/2	0.035 = 0.034 + 0.001 + 0	1.2D+1.6S+1.0L	0	0	Seismic HD
C42	Story4	HSS6X6X1/2	0.094 = 0.027 + 0.006 + 0.061	1.2D+1.6S+1.0L	0.01	0.016	Seismic HD
C44	Story4	HSS6X6X1/2	0.052 = 0.02 + 0.008 + 0.024	1.2D+1.6S+1.0L	0.003	0.004	Seismic HD
C45	Story4	HSS6X6X1/2	0.047 = 0.016 + 0.031 + 0	1.2D+1.6S+1.0L	0.003	0	Seismic HD
C48	Story4	HSS6X6X1/4	0.381 = 0.364 + 0.017 + 0	1.2D+1.6S+1.0L	0.001	0	Compact
C49	Story4	HSS6X6X1/4	0.241 = 0.238 + 0.002 + 0	1.2D+1.6S+1.0L	0.0001666	0	Compact
C50	Story4	HSS6X6X1/4	0.13 = 0.071 + 0 + 0.058	1.2D+1.6S+1.0L	0	0.005	Compact
C52	Story4	HSS6X6X1/4	0.125 = 0.068 + 0 + 0.057	1.2D+1.6S+1.0L	0	0.004	Compact
C57	Story4	HSS6X6X1/4	0.068 = 0.068 + 0 + 0	1.2D+1.6S+1.0L	0	0	Compact
C30	Story3	HSS6X6X1/2	0.065 = 0.047 + 0 + 0.018	1.2D+1.6S+1.0L	0	0.001	Seismic HD
C59	Story3	W10X45	0.205 = 0.205 + 0 + 0.001	1.2D+1.6S+1.0L	0	0	Seismic HD
C61	Story3	W10X45	0.099 = 0.098 + 0 + 0.001	1.2D+1.6S+1.0L	0	0	Seismic HD
C2	Story2	W10X49	0.817 = 0.679 + 0.138 + 0	1.2D+1.6S+1.0L	0.019	0	Seismic MD
C6	Story2	W10X49	0.169 = 0.084 + 0.024 + 0.061	1.2D+1.6S+1.0L	0.005	0.001	Seismic MD
C47	Story2	W10X49	0.84 = 0.693 + 0.147 + 0	1.2D+1.6S+1.0L	0.021	0	Seismic MD

Table 4.2 - Steel Column Envelope (Part 1 of 2, continued)

Label	Story	Section	Moment Interaction Check	PMM Combo	V22 Ratio	V33 Ratio	Class
C51	Story2	W10X49	0.162 = 0.082 + 0.023 + 0.057	1.2D+1.6S+1.0L	0.005	0.001	Seismic MD
C14	Story1	HSS6X6X1/4	0.028 = 0.027 + 0.002 + 0	1.2D+1.6L+0.5S	0.0001402	0	Compact
C36	Story1	HSS6X6X1/4	0.022 = 0.01 + 0.003 + 0.009	1.2D+1.6L+0.5S	0.0001935	0.001	Compact
C37	Story1	HSS6X6X1/4	0.016 = 0.014 + 0.003 + 0	1.2D+1.6L+0.5S	0.0001935	0	Compact
C38	Story1	HSS6X6X1/4	0.022 = 0.01 + 0.003 + 0.009	1.2D+1.6L+0.5S	0.0001935	0.001	Compact

Table 4.2 - Steel Column Envelope (Part 2 of 2)

Label	Story	Cont. Plate in²	Dbl. Plate in	B/C Ratio Major	B/C Ratio Minor
C16	Story5				
C18	Story5				
C19	Story5				
C20	Story5				
C21	Story5				
C23	Story5				
C25	Story5				
C31	Story5				
C53	Story5				
C54	Story5				
C55	Story5				
C56	Story5				
C58	Story5				
C60	Story5				
C62	Story5				
C1	Story4				
C3	Story4				
C4	Story4				
C5	Story4				
C7	Story4				
C8	Story4				
C9	Story4				
C11	Story4				
C12	Story4				
C13	Story4				
C15	Story4				
C17	Story4				
C22	Story4				
C24	Story4				
C26	Story4				
C28	Story4				
C29	Story4				
C32	Story4				
C33	Story4				
C34	Story4				
C39	Story4				

Table 4.2 - Steel Column Envelope (Part 2 of 2, continued)

Label	Story	Cont. Plate in²	Dbl. Plate in	B/C Ratio Major	B/C Ratio Minor
C40	Story4				
C42	Story4				
C44	Story4				
C45	Story4				
C48	Story4				
C49	Story4				
C50	Story4				
C52	Story4				
C57	Story4				
C30	Story3				
C59	Story3				
C61	Story3				
C2	Story2				
C6	Story2				
C47	Story2				
C51	Story2				
C14	Story1				
C36	Story1				
C37	Story1				
C38	Story1				

Table 4.3 - Steel Beam Envelope (Part 1 of 2)

Label	Story	Section	Moment Interaction Check	PMM Combo	V22 Ratio	V33 Ratio
B62	Story5	HSS3-1/2X3-1/2X1/4	0.422 = 0.039 + 0.327 + 0.056	1.2D+1.6S+1.0L	0.089	0.01
B102	Story5	W16X26	0.392 = 0.011 + 0.329 + 0.052	1.2D+1.6S+1.0L	0.146	0.014
B104	Story5	W16X26	0.373 = 0.013 + 0.309 + 0.051	1.2D+1.6S+1.0L	0.15	0.003
B139	Story5	W10X22	0.611 = 0.025 + 0.569 + 0.018	1.2D+1.6S+1.0L	0.196	0.001
B140	Story5	W10X22	0.661 = 0.015 + 0.637 + 0.009	1.2D+1.6S+1.0L	0.22	0.001
B145	Story5	C10X15.3	0.05 = 0.003 + 0.048 + 0	1.2D+1.6S+1.0L	0.045	0
B146	Story5	C10X15.3	0.723 = 0.015 + 0.666 + 0.042	1.2D+1.6S+1.0L	0.157	0.001
B147	Story5	C10X15.3	0.046 = 0.002 + 0.044 + 0	1.2D+1.6S+1.0L	0.04	0
B173	Story5	W10X22	0.595 = 0.008 + 0.544 + 0.042	1.2D+1.6S+1.0L	0.194	0.003
B174	Story5	W10X22	0.575 = 0.008 + 0.533 + 0.033	1.2D+1.6S+1.0L	0.19	0.002
B183	Story5	C10X15.3	0.048 = 3.712E-04 + 0.048 + 0	1.2D+1.6S+1.0L	0.045	0
B185	Story5	C10X15.3	0.677 = 0.009 + 0.668 + 0	1.2D+1.6S+1.0L	0.157	0
B187	Story5	C10X15.3	0.044 = 0 + 0.044 + 0	1.2D+1.6S+1.0L	0.04	0
B204	Story5	W16X26	0.243 = 0.011 + 0.219 + 0.014	1.2D+1.6S+1.0L	0.112	0.001
B205	Story5	W16X26	0.12 = 0.004 + 0.114 + 0.002	1.2D+1.6S+1.0L	0.044	0.001
B208	Story5	W16X26	0.203 = 0.002 + 0.19 + 0.011	1.2D+1.6S+1.0L	0.106	0.001
B213	Story5	C10X15.3	0.258 = 0 + 0.258 + 0	1.2D+1.6S+1.0L	0.08	0
B214	Story5	C10X15.3	0.659 = 0.002 + 0.612 + 0.045	1.2D+1.6S+1.0L	0.145	0.001
B217	Story5	C10X15.3	0.258 = 3.648E-04 + 0.258 + 0	1.2D+1.6S+1.0L	0.08	0
B218	Story5	C10X15.3	0.614 = 3.744E-04 + 0.614 + 0	1.2D+1.6S+1.0L	0.145	0
B222	Story5	C10X15.3	0.259 = 0.001 + 0.258 + 0	1.2D+1.6S+1.0L	0.08	0

Table 4.3 - Steel Beam Envelope (Part 1 of 2, continued)

Label	Story	Section	Moment Interaction Check	PMM Combo	V22 Ratio	V33 Ratio
B223	Story5	C10X15.3	0.614 = 0 + 0.614 + 0	1.2D+1.6S+1.0L	0.145	0
B231	Story5	C10X15.3	0.258 = 0.001 + 0.258 + 0	1.2D+1.6S+1.0L	0.08	0
B232	Story5	C10X15.3	0.614 = 1.626E-04 + 0.614 + 0	1.2D+1.6S+1.0L	0.145	0
B233	Story5	C10X15.3	0.225 = 1.635E-04 + 0.225 + 0	1.2D+1.6S+1.0L	0.075	0
B235	Story5	C10X15.3	0.576 = 0.001 + 0.575 + 0	1.2D+1.6S+1.0L	0.141	0
B236	Story5	C10X15.3	0.216 = 0.001 + 0.215 + 0	1.2D+1.6S+1.0L	0.066	0
B238	Story5	C10X15.3	0.512 = 2.532E-04 + 0.512 + 0	1.2D+1.6S+1.0L	0.121	0
B148	Story5	HSS3X3X5/16	0.042 = 0.042 + 0 + 0	1.2D+1.6S+1.0L	0	0
B176	Story5	HSS3X3X5/16	0.092 = 0.092 + 0 + 0	1.2D+1.6S+1.0L	0	0
B5	Story5	C10X15.3	0.184 = 0.002 + 0.182 + 0	1.2D+1.6S+1.0L	0.052	0
B22	Story5	W16X31	0.056 = 0.001 + 0.043 + 0.011	1.2D+1.6S+1.0L	0.033	0.001
B1	Story5	W10X39	0.33 = 0.001 + 0.326 + 0.002	1.2D+1.6S+1.0L	0.117	0.0002187
B29	Story5	W10X22	0.072 = 3.355E-04 + 0.069 + 0.002	1.2D+1.6S+1.0L	0.038	0.000145
B30	Story5	W10X39	0.583 = 0.005 + 0.577 + 0.001	1.2D+1.6S+1.0L	0.206	0.0003394
B31	Story5	W10X22	0.127 = 0.001 + 0.122 + 0.005	1.2D+1.6S+1.0L	0.065	0.0003141
B3	Story5	W10X54	0.607 = 0 + 0.604 + 0.003	1.2D+1.6S+1.0L	0.254	0.0003613
B32	Story5	W10X22	0.188 = 0.002 + 0.182 + 0.003	1.2D+1.6S+1.0L	0.094	0.0002914
B7	Story4	W16X26	0.01 = 0.009 + 0.001 + 0	1.2D+1.6S+1.0L	0.002	0
B9	Story4	W16X26	0.292 = 0.055 + 0.23 + 0.007	1.2D+1.6S+1.0L	0.105	0.003
B10	Story4	W16X40	0.049 = 0.048 + 0.001 + 0	1.2D+1.6S+1.0L	0.002	0
B12	Story4	W16X26	0.498 = 0.077 + 0.374 + 0.047	1.2D+1.6S+1.0L	0.115	0.001
B14	Story4	W16X26	0.098 = 0.097 + 0.001 + 0	1.2D+1.6S+1.0L	0.002	0
B15	Story4	W16X26	0.288 = 0.025 + 0.219 + 0.043	1.2D+1.6S+1.0L	0.09	0.006
B33	Story4	W16X31	0.162 = 0.013 + 0.145 + 0.003	1.2D+1.6S+1.0L	0.082	0.0002946
B34	Story4	W21X44	0.097 = 0.009 + 0.083 + 0.004	1.2D+1.6S+1.0L	0.02	0.0003487
B35	Story4	W21X44	0.113 = 0.002 + 0.108 + 0.003	1.2D+1.6S+1.0L	0.019	0.001
B36	Story4	W21X44	0.205 = 0.018 + 0.182 + 0.004	1.2D+1.6S+1.0L	0.023	0.00033
B37	Story4	W21X44	0.36 = 0.006 + 0.349 + 0.005	1.2D+1.6S+1.0L	0.05	0.0004332
B38	Story4	W21X44	0.378 = 0 + 0.375 + 0.003	1.2D+1.6S+1.0L	0.051	0.0003615
B39	Story4	W21X44	0.372 = 1.02E-04 + 0.366 + 0.006	1.2D+1.6S+1.0L	0.05	0.0003966
B40	Story4	W21X44	0.353 = 0.002 + 0.347 + 0.004	1.2D+1.6S+1.0L	0.049	0.0003713
B41	Story4	W21X44	0.336 = 0.003 + 0.328 + 0.004	1.2D+1.6S+1.0L	0.047	0.0002924
B42	Story4	W21X44	0.32 = 0.005 + 0.313 + 0.002	1.2D+1.6S+1.0L	0.046	0.0001947
B43	Story4	W21X44	0.297 = 0.008 + 0.286 + 0.003	1.2D+1.6S+1.0L	0.042	0.000257
B44	Story4	W21X44	0.205 = 0.022 + 0.174 + 0.008	1.2D+1.6S+1.0L	0.033	0.001
B45	Story4	W21X44	0.176 = 0.034 + 0.111 + 0.031	1.2D+1.6S+1.0L	0.025	0.002
B46	Story4	W21X44	0.189 = 0.039 + 0.141 + 0.009	1.2D+1.6S+1.0L	0.057	0.0003869
B47	Story4	W21X44	0.105 = 0.008 + 0.078 + 0.018	1.2D+1.6S+1.0L	0.04	0.001
B48	Story4	W21X44	0.066 = 0.007 + 0.052 + 0.007	1.2D+1.6S+1.0L	0.033	0.0002695
B49	Story4	W21X44	0.083 = 0.012 + 0.069 + 0.002	1.2D+1.6S+1.0L	0.037	0
B50	Story4	W21X44	0.068 = 0.008 + 0.05 + 0.01	1.2D+1.6S+1.0L	0.032	0.0003882
B51	Story4	W21X44	0.102 = 0.009 + 0.08 + 0.014	1.2D+1.6S+1.0L	0.04	0.001
B52	Story4	W21X44	0.224 = 0.047 + 0.16 + 0.017	1.2D+1.6S+1.0L	0.062	0.001
B53	Story4	W21X44	0.111 = 0.022 + 0.047 + 0.043	1.2D+1.6S+1.0L	0.02	0.002
B54	Story4	W21X44	0.084 = 0.029 + 0.021 + 0.033	1.2D+1.6S+1.0L	0.018	0.001

Table 4.3 - Steel Beam Envelope (Part 1 of 2, continued)

Label	Story	Section	Moment Interaction Check	PMM Combo	V22 Ratio	V33 Ratio
B55	Story4	W21X44	0.085 = 0.04 + 0.012 + 0.033	1.2D+1.6S+1.0L	0.017	0.0003928
B56	Story4	W16X31	0.491 = 0.017 + 0.395 + 0.08	1.2D+1.6S+1.0L	0.063	0.001
B61	Story4	W16X26	0.054 = 0.054 + 0 + 0	1.2D+1.6S+1.0L	0	0
B63	Story4	W16X26	0.397 = 0.083 + 0.255 + 0.058	1.2D+1.6S+1.0L	0.095	0.003
B65	Story4	W16X26	0.063 = 0.063 + 0 + 0	1.2D+1.6S+1.0L	0	0
B77	Story4	W16X31	0.175 = 0.02 + 0.149 + 0.006	1.2D+1.6S+1.0L	0.095	0.001
B78	Story4	W21X44	0.077 = 0.013 + 0.062 + 0.002	1.2D+1.6S+1.0L	0.035	0
B79	Story4	W21X44	0.087 = 0.002 + 0.082 + 0.003	1.2D+1.6S+1.0L	0.042	0.0001604
B80	Story4	W21X44	0.175 = 0.022 + 0.149 + 0.003	1.2D+1.6S+1.0L	0.071	0.0001963
B81	Story4	W21X44	0.363 = 0.002 + 0.359 + 0.002	1.2D+1.6S+1.0L	0.015	0.0003661
B82	Story4	W21X44	0.384 = 0.001 + 0.383 + 0.001	1.2D+1.6S+1.0L	0.014	0
B83	Story4	W21X44	0.374 = 3.036E-04 + 0.374 + 4.419E-04	1.2D+1.6S+1.0L	0.014	0
B84	Story4	W21X44	0.356 = 0.001 + 0.355 + 0	1.2D+1.6S+1.0L	0.014	0
B85	Story4	W21X44	0.34 = 0.003 + 0.337 + 3.896E-04	1.2D+1.6S+1.0L	0.014	0
B86	Story4	W21X44	0.327 = 0.004 + 0.321 + 0.001	1.2D+1.6S+1.0L	0.014	0.000181
B87	Story4	W21X44	0.306 = 0.009 + 0.296 + 0.001	1.2D+1.6S+1.0L	0.015	0.0003679
B88	Story4	W21X44	0.212 = 0.022 + 0.185 + 0.005	1.2D+1.6S+1.0L	0.016	0.001
B89	Story4	W21X68	0.103 = 0.021 + 0.063 + 0.019	1.2D+1.6S+1.0L	0.013	0.002
B90	Story4	W12X35	0.128 = 0.071 + 0.012 + 0.044	1.2D+1.6S+1.0L	0.017	0.003
B91	Story4	W12X35	0.137 = 0.065 + 0.032 + 0.04	1.2D+1.6S+1.0L	0.024	0.002
B92	Story4	W21X44	0.083 = 0.019 + 0.046 + 0.018	1.2D+1.6S+1.0L	0.029	0.001
B93	Story4	W21X44	0.05 = 0.03 + 0.015 + 0.006	1.2D+1.6S+1.0L	0.016	0.0004782
B94	Story4	W21X44	0.057 = 0.036 + 0.001 + 0.02	1.2D+1.6S+1.0L	0.013	0.001
B95	Story4	W16X31	0.389 = 0.015 + 0.302 + 0.071	1.2D+1.6S+1.0L	0.144	0.003
B100	Story4	W16X26	0.265 = 0.001 + 0.259 + 0.005	1.2D+1.6S+1.0L	0.132	0.000479
B113	Story4	W16X31	0.167 = 0.016 + 0.149 + 0.001	1.2D+1.6S+1.0L	0.098	0.001
B114	Story4	W21X44	0.04 = 0.014 + 0.025 + 0.001	1.2D+1.6S+1.0L	0.02	0.0001084
B115	Story4	W21X44	0.047 = 0.002 + 0.044 + 0.001	1.2D+1.6S+1.0L	0.03	0
B116	Story4	W10X22	0.325 = 0.037 + 0.287 + 0.001	1.2D+1.6S+1.0L	0.158	0.0001764
B117	Story4	W21X44	0.364 = 0.002 + 0.354 + 0.009	1.2D+1.6S+1.0L	0.034	0.001
B118	Story4	W21X44	0.38 = 3.537E-04 + 0.374 + 0.005	1.2D+1.6S+1.0L	0.036	0.001
B119	Story4	W21X44	0.371 = 0 + 0.365 + 0.006	1.2D+1.6S+1.0L	0.036	0.001
B120	Story4	W21X44	0.353 = 0.001 + 0.346 + 0.006	1.2D+1.6S+1.0L	0.034	0.001
B121	Story4	W21X44	0.336 = 0.002 + 0.328 + 0.005	1.2D+1.6S+1.0L	0.033	0.001
B122	Story4	W21X44	0.319 = 0.003 + 0.314 + 0.002	1.2D+1.6S+1.0L	0.032	0.0002503
B123	Story4	W21X44	0.301 = 0.006 + 0.288 + 0.007	1.2D+1.6S+1.0L	0.029	0.001
B124	Story4	W21X44	0.211 = 0.016 + 0.179 + 0.016	1.2D+1.6S+1.0L	0.022	0.003
B125	Story4	W21X44	0.175 = 0.025 + 0.112 + 0.037	1.2D+1.6S+1.0L	0.018	0.004
B126	Story4	W12X35	0.103 = 0.061 + 0.012 + 0.031	1.2D+1.6S+1.0L	0.082	0.001
B127	Story4	W12X35	0.087 = 0.049 + 0.017 + 0.021	1.2D+1.6S+1.0L	0.023	0.002
B128	Story4	W21X44	0.054 = 0.009 + 0.034 + 0.011	1.2D+1.6S+1.0L	0.025	0.001
B129	Story4	W21X44	0.063 = 0.021 + 0.02 + 0.021	1.2D+1.6S+1.0L	0.018	0.001
B130	Story4	W21X44	0.072 = 0.026 + 0.022 + 0.024	1.2D+1.6S+1.0L	0.02	0.002
B131	Story4	W16X31	0.261 = 0.013 + 0.153 + 0.094	1.2D+1.6S+1.0L	0.097	0.006
B153	Story4	W16X31	0.074 = 0.015 + 0.056 + 0.003	1.2D+1.6S+1.0L	0.096	0.0004737

Table 4.3 - Steel Beam Envelope (Part 1 of 2, continued)

Label	Story	Section	Moment Interaction Check	PMM Combo	V22 Ratio	V33 Ratio
B154	Story4	W21X44	0.049 = 0.013 + 0.029 + 0.007	1.2D+1.6S+1.0L	0.013	0.001
B155	Story4	W21X44	0.061 = 0.001 + 0.044 + 0.017	1.2D+1.6S+1.0L	0.012	0.001
B156	Story4	W21X44	0.1 = 0.014 + 0.084 + 0.001	1.2D+1.6S+1.0L	0.013	0.0004752
B158	Story4	W21X44	0.316 = 0.003 + 0.304 + 0.008	1.2D+1.6S+1.0L	0.061	0.001
B159	Story4	W21X44	0.331 = 0.002 + 0.32 + 0.009	1.2D+1.6S+1.0L	0.063	0.001
B160	Story4	W21X44	0.325 = 0.002 + 0.312 + 0.011	1.2D+1.6S+1.0L	0.062	0.001
B161	Story4	W21X44	0.308 = 0.003 + 0.296 + 0.01	1.2D+1.6S+1.0L	0.059	0.001
B162	Story4	W21X44	0.292 = 0.003 + 0.281 + 0.008	1.2D+1.6S+1.0L	0.057	0.001
B163	Story4	W21X44	0.277 = 0.004 + 0.269 + 0.004	1.2D+1.6S+1.0L	0.055	0.0004874
B164	Story4	W21X44	0.256 = 0.003 + 0.25 + 0.003	1.2D+1.6S+1.0L	0.05	0.0002962
B165	Story4	W21X44	0.18 = 0.012 + 0.156 + 0.012	1.2D+1.6S+1.0L	0.036	0.002
B166	Story4	W21X44	0.156 = 0.02 + 0.097 + 0.039	1.2D+1.6S+1.0L	0.026	0.004
B167	Story4	W12X35	0.094 = 0.043 + 0.017 + 0.034	1.2D+1.6S+1.0L	0.018	0.003
B169	Story4	W21X44	0.087 = 0.008 + 0.034 + 0.046	1.2D+1.6S+1.0L	0.013	0.004
B170	Story4	W21X44	0.074 = 0.016 + 0.027 + 0.031	1.2D+1.6S+1.0L	0.014	0.003
B171	Story4	W21X44	0.058 = 0.015 + 0.036 + 0.007	1.2D+1.6S+1.0L	0.015	0.0002093
B172	Story4	W16X31	0.208 = 0.006 + 0.183 + 0.018	1.2D+1.6S+1.0L	0.037	0.002
B200	Story4	W16X26	0.021 = 0.02 + 0.001 + 0	1.2D+1.6S+1.0L	0.002	0
B202	Story4	W16X26	0.293 = 0.02 + 0.252 + 0.021	1.2D+1.6S+1.0L	0.107	0.001
B210	Story4	W16X26	0.337 = 0.001 + 0.284 + 0.053	1.2D+1.6S+1.0L	0.123	0.012
B224	Story4	W12X35	0.126 = 0.034 + 0.068 + 0.024	1.2D+1.6S+1.0L	0.079	0.002
B300	Story4	W24X117	0.304 = 0.005 + 0.258 + 0.041	1.2D+1.6S+1.0L	0.109	0.006
B302	Story4	W24X117	0.306 = 0.005 + 0.255 + 0.046	1.2D+1.6S+1.0L	0.108	0.007
B4	Story4	W16X26	0.259 = 0.001 + 0.228 + 0.03	1.2D+1.6S+1.0L	0.105	0.004
B61	Story3	W8X21	0.011 = 0.01 + 0.002 + 0	1.2D+1.6S+1.0L	0.001	0
B65	Story3	W8X21	0.01 = 0.01 + 3.575E-04 + 0	1.2D+1.6S+1.0L	0.001	0
B101	Story3	W16X45	0.021 = 0.001 + 0.021 + 0	1.2D+1.6L+0.5S	0.012	0
B103	Story3	W16X45	0.021 = 0.001 + 0.021 + 0	1.2D+1.6L+0.5S	0.012	0
B112	Story3	W8X21	0.036 = 0 + 0.032 + 0.003	1.2D+1.6L+0.5S	0.053	0.001
B132	Story3	W8X18	0.397 = 0.001 + 0.397 + 0	1.2D+1.6L+0.5S	0.084	0
B149	Story3	W8X18	0.384 = 1.844E-04 + 0.384 + 0	1.2D+1.6L+0.5S	0.081	0
B168	Story3	W8X21	0.071 = 1.251E-04 + 0.069 + 0.003	1.2D+1.6L+0.5S	0.064	0.001
B177	Story3	W8X18	0.544 = 0.001 + 0.543 + 1.863E-04	1.2D+1.6L+0.5S	0.061	0
B190	Story3	W8X18	2.206E-04 = 2.206E-04 + 0 + 0	1.2D+1.6S+1.0L	0	0
B193	Story3	W8X21	0.002 = 0.002 + 0 + 0	1.2D+1.6S+1.0L	0	0
B203	Story3	W8X18	0.06 = 0.008 + 0.052 + 2.316E-04	1.2D+1.6L+0.5S	0.038	0
B206	Story3	W12X79	0.01 = 0.007 + 0.003 + 0	1.2D+1.6S+1.0L	0.005	0
B209	Story3	W12X79	0.013 = 0.01 + 0.003 + 0	1.2D+1.6S+1.0L	0.005	0
B211	Story3	W8X18	0.071 = 0 + 0.071 + 0	1.2D+1.6L+0.5S	0.042	0
B212	Story3	W8X18	0.408 = 0 + 0.408 + 0	1.2D+1.6L+0.5S	0.076	0
B215	Story3	W8X18	0.071 = 0 + 0.071 + 0	1.2D+1.6L+0.5S	0.042	0
B216	Story3	W8X18	0.408 = 0 + 0.408 + 0	1.2D+1.6L+0.5S	0.076	0
B220	Story3	W8X18	0.071 = 0 + 0.071 + 0	1.2D+1.6L+0.5S	0.042	0
B221	Story3	W8X18	0.408 = 0 + 0.407 + 0	1.2D+1.6L+0.5S	0.076	0
B229	Story3	W8X18	0.077 = 1.995E-04 + 0.076 + 0	1.2D+1.6L+0.5S	0.045	0

Table 4.3 - Steel Beam Envelope (Part 1 of 2, continued)

Label	Story	Section	Moment Interaction Check	PMM Combo	V22 Ratio	V33 Ratio
B230	Story3	W8X18	0.436 = 2.148E-04 + 0.436 + 0	1.2D+1.6L+0.5S	0.082	0
B234	Story3	W30X90	0.233 = 0.001 + 0.232 + 1.039E-04	1.2D+1.6S+1.0L	0.168	0
B243	Story3	W10X68	0.208 = 0.001 + 0.207 + 0.001	1.2D+1.6S+1.0L	0.067	0.0004818
B244	Story3	W18X46	0.275 = 0.001 + 0.273 + 0.001	1.2D+1.6S+1.0L	0.072	0.0001141
B245	Story3	W12X35	0.081 = 0.001 + 0.08 + 0.001	1.2D+1.6S+1.0L	0.068	0
B23	Story3	W8X21	0.041 = 3.556E-04 + 0.04 + 0.001	1.2D+1.6L+0.5S	0.054	0.0002451
B25	Story3	W8X21	0.062 = 3.861E-04 + 0.059 + 0.002	1.2D+1.6L+0.5S	0.06	0.021
B28	Story3	W8X21	0.008 = 0.004 + 0.004 + 0	1.2D+1.6S+1.0L	0.005	0
B20	Story3	W18X46	0.382 = 0.001 + 0.381 + 0	1.2D+1.6S+1.0L	0.097	0
B21	Story3	W8X18	0.466 = 1.881E-04 + 0.465 + 0	1.2D+1.6L+0.5S	0.087	0
B24	Story3	W8X18	0.082 = 1.757E-04 + 0.082 + 0	1.2D+1.6L+0.5S	0.048	0
B6	Story2	W27X129	0.279 = 3.16E-04 + 0.279 + 0	1.2D+1.6S+1.0L	0.13	0
B8	Story2	W12X26	0.066 = 0 + 0.066 + 0	1.2D+1.6L+0.5S	0.038	0
B13	Story2	W27X129	0.376 = 0 + 0.376 + 0	1.2D+1.6S+1.0L	0.064	0
B64	Story2	W27X129	0.506 = 0.001 + 0.505 + 0.001	1.2D+1.6S+1.0L	0.117	0
B67	Story2	W21X166	0.039 = 0 + 0.038 + 0	1.2D+1.6S+1.0L	0.018	0
B68	Story2	W27X129	0.07 = 0 + 0.07 + 1.167E-04	1.2D+1.6S+1.0L	0.022	0
B69	Story2	W27X129	0.07 = 0 + 0.07 + 0	1.2D+1.6S+1.0L	0.023	0
B70	Story2	W12X26	0.057 = 1.07E-04 + 0.057 + 0	1.2D+1.6L+0.5S	0.032	0
B73	Story2	W27X129	0.186 = 1.969E-04 + 0.186 + 1.684E-04	1.2D+1.6S+1.0L	0.055	0
B74	Story2	W27X146	0.484 = 0.001 + 0.483 + 4.206E-04	1.2D+1.6S+1.0L	0.205	0.0001415
B75	Story2	W16X67	0.421 = 2.403E-04 + 0.421 + 1.895E-04	1.2D+1.6L+0.5S	0.129	0.0001044
B105	Story2	W27X129	0.667 = 1.202E-04 + 0.666 + 2.397E-04	1.2D+1.6S+1.0L	0.089	0
B144	Story2	W27X84	0.76 = 2.482E-04 + 0.759 + 1.249E-04	1.2D+1.6S+1.0L	0.049	0
B186	Story2	W27X102	0.494 = 0.001 + 0.493 + 2.596E-04	1.2D+1.6S+1.0L	0.042	0
B191	Story2	W12X26	1.253E-04 = 1.253E-04 + 0 + 0	1.2D+1.6S+1.0L	0	0
B192	Story2	W12X26	2.665E-04 = 2.665E-04 + 0 + 0	1.2D+1.6S+1.0L	0	0
B195	Story2	W27X129	0.309 = 1.201E-04 + 0.309 + 0	1.2D+1.6S+1.0L	0.073	0
B199	Story2	W27X129	0.3 = 2.744E-04 + 0.3 + 0	1.2D+1.6S+1.0L	0.137	0
B201	Story2	W12X26	0.068 = 0.002 + 0.066 + 0	1.2D+1.6L+0.5S	0.038	0
B207	Story2	W27X102	0.454 = 0 + 0.454 + 0	1.2D+1.6S+1.0L	0.075	0.0001625
B254	Story2	W27X129	0.288 = 2.046E-04 + 0.288 + 1.556E-04	1.2D+1.6S+1.0L	0.069	0
B257	Story2	W27X129	0.137 = 1.238E-04 + 0.136 + 0	1.2D+1.6S+1.0L	0.031	0
B258	Story2	W21X166	0.082 = 0 + 0.082 + 1.006E-04	1.2D+1.6S+1.0L	0.032	0
B259	Story2	W27X129	0.137 = 0 + 0.136 + 1.481E-04	1.2D+1.6S+1.0L	0.037	0
B263	Story2	W27X129	0.142 = 1.625E-04 + 0.141 + 1.846E-04	1.2D+1.6S+1.0L	0.038	0
B268	Story2	W27X129	0.091 = 0 + 0.091 + 0	1.2D+1.6S+1.0L	0.024	0
B271	Story2	W27X129	0.142 = 0.001 + 0.141 + 0	1.2D+1.6S+1.0L	0.032	0
B273	Story2	W27X129	0.088 = 2.714E-04 + 0.088 + 0	1.2D+1.6S+1.0L	0.022	0
B277	Story2	W27X129	0.091 = 0 + 0.091 + 0	1.2D+1.6S+1.0L	0.023	0
B278	Story2	W21X166	0.053 = 0 + 0.053 + 0	1.2D+1.6S+1.0L	0.022	0
B279	Story2	W27X129	0.091 = 0 + 0.091 + 1.186E-04	1.2D+1.6S+1.0L	0.026	0
B280	Story2	W12X26	0.093 = 4.893E-04 + 0.092 + 0	1.2D+1.6L+0.5S	0.051	0
B281	Story2	W12X26	0.076 = 3.778E-04 + 0.076 + 0	1.2D+1.6L+0.5S	0.042	0
B282	Story2	W12X26	0.063 = 0 + 0.062 + 0	1.2D+1.6L+0.5S	0.035	0

Table 4.3 - Steel Beam Envelope (Part 1 of 2, continued)

Label	Story	Section	Moment Interaction Check	PMM Combo	V22 Ratio	V33 Ratio
B283	Story2	W12X26	0.074 = 2.52E-04 + 0.073 + 0	1.2D+1.6L+0.5S	0.041	0
B284	Story2	W12X26	0.093 = 2.689E-04 + 0.092 + 0	1.2D+1.6L+0.5S	0.051	0
B295	Story2	W27X129	0.324 = 3.288E-04 + 0.323 + 3.271E-04	1.2D+1.6S+1.0L	0.036	0
B296	Story2	W27X84	0.556 = 0 + 0.556 + 0	1.2D+1.6S+1.0L	0.038	0
B303	Story2	W21X166	0.084 = 1.759E-04 + 0.084 + 0	1.2D+1.6S+1.0L	0.088	0
B304	Story2	W27X129	0.088 = 1.547E-04 + 0.088 + 0	1.2D+1.6S+1.0L	0.025	0
B2	Story2	W27X129	0.049 = 0 + 0.049 + 0	1.2D+1.6S+1.0L	0.042	0.0001332
B19	Story2	W27X129	0.013 = 0.001 + 0.012 + 0.001	1.2D+1.6S+1.0L	0.014	0

Table 4.3 - Steel Beam Envelope (Part 2 of 2)

Label	Story	Class	Conn. V I-End kip	Conn. V J-End kip
B62	Story5	Seismic HD	0.749	0.579
B102	Story5	Seismic MD	15.502	13.151
B104	Story5	Seismic MD	12.605	15.887
B139	Story5	Seismic MD	12.931	8.078
B140	Story5	Seismic MD	14.464	8.365
B145	Story5	Seismic HD	2.886	2.886
B146	Story5	Seismic HD	10.171	10.171
B147	Story5	Seismic HD	2.613	2.613
B173	Story5	Seismic MD	12.771	12.769
B174	Story5	Seismic MD	12.505	12.503
B183	Story5	Seismic HD	2.886	2.886
B185	Story5	Seismic HD	10.181	10.181
B187	Story5	Seismic HD	2.613	2.613
B204	Story5	Seismic MD	11.375	11.913
B205	Story5	Seismic MD	4.643	4.628
B208	Story5	Seismic MD	11.248	10.809
B213	Story5	Seismic HD	5.159	5.159
B214	Story5	Seismic HD	9.397	9.397
B217	Story5	Seismic HD	5.159	5.159
B218	Story5	Seismic HD	9.408	9.408
B222	Story5	Seismic HD	5.159	5.159
B223	Story5	Seismic HD	9.408	9.408
B231	Story5	Seismic HD	5.159	5.159
B232	Story5	Seismic HD	9.407	9.407
B233	Story5	Seismic HD	4.859	4.859
B235	Story5	Seismic HD	9.11	9.11
B236	Story5	Seismic HD	4.299	4.299
B238	Story5	Seismic HD	7.84	7.84
B148	Story5	Seismic HD	0	0
B176	Story5	Seismic HD	0	0
B5	Story5	Seismic HD	0	0
B22	Story5	Seismic HD	0	0
B1	Story5	Seismic MD	10.959	10.959

Table 4.3 - Steel Beam Envelope (Part 2 of 2, continued)

Label	Story	Class	Conn. V I-End kip	Conn. V J-End kip
B29	Story5	Seismic MD	2.47	0
B30	Story5	Seismic MD	19.262	19.265
B31	Story5	Seismic MD	4.266	0
B3	Story5	Seismic MD	28.472	28.473
B32	Story5	Seismic MD	6.161	5.703
B7	Story4	Seismic MD	0.249	0.249
B9	Story4	Seismic MD	11.16	10.426
B10	Story4	Seismic HD	0.249	0.249
B12	Story4	Seismic MD	12.187	12.123
B14	Story4	Seismic MD	0.249	0.249
B15	Story4	Seismic MD	9.521	7.393
B33	Story4	Seismic HD	0	0
B34	Story4	Seismic HD	0	0
B35	Story4	Seismic HD	0	0
B36	Story4	Seismic HD	0	0
B37	Story4	Seismic HD	0	0
B38	Story4	Seismic HD	0	0
B39	Story4	Seismic HD	0	0
B40	Story4	Seismic HD	0	0
B41	Story4	Seismic HD	0	0
B42	Story4	Seismic HD	0	0
B43	Story4	Seismic HD	0	0
B44	Story4	Seismic HD	0	0
B45	Story4	Seismic HD	0	0
B46	Story4	Seismic HD	0	12.468
B47	Story4	Seismic HD	0	8.626
B48	Story4	Seismic HD	0	7.074
B49	Story4	Seismic HD	0	8.066
B50	Story4	Seismic HD	0	6.94
B51	Story4	Seismic HD	0	8.723
B52	Story4	Seismic HD	0	13.413
B53	Story4	Seismic HD	0	0
B54	Story4	Seismic HD	0	0
B55	Story4	Seismic HD	0	0
B56	Story4	Seismic HD	0	0
B61	Story4	Seismic MD	0	0
B63	Story4	Seismic MD	10.023	9.995
B65	Story4	Seismic MD	0	0
B77	Story4	Seismic HD	0	0
B78	Story4	Seismic HD	0	7.534
B79	Story4	Seismic HD	0	9.096
B80	Story4	Seismic HD	0	15.39
B81	Story4	Seismic HD	0	0
B82	Story4	Seismic HD	0	0
B83	Story4	Seismic HD	0	0

Table 4.3 - Steel Beam Envelope (Part 2 of 2, continued)

Label	Story	Class	Conn. V I-End kip	Conn. V J-End kip
B84	Story4	Seismic HD	0	0
B85	Story4	Seismic HD	0	0
B86	Story4	Seismic HD	0	0
B87	Story4	Seismic HD	0	0
B88	Story4	Seismic HD	0	0
B89	Story4	Seismic HD	0	0
B90	Story4	Seismic HD	0.726	1.916
B91	Story4	Seismic HD	2.706	0.497
B92	Story4	Seismic HD	0	6.253
B93	Story4	Seismic HD	0	3.519
B94	Story4	Seismic HD	0	2.541
B95	Story4	Seismic HD	0	18.898
B100	Story4	Seismic MD	0	13.957
B113	Story4	Seismic HD	0	0
B114	Story4	Seismic HD	0	4.451
B115	Story4	Seismic HD	0	6.43
B116	Story4	Seismic MD	0	10.386
B117	Story4	Seismic HD	0	0
B118	Story4	Seismic HD	0	0
B119	Story4	Seismic HD	0	0
B120	Story4	Seismic HD	0	0
B121	Story4	Seismic HD	0	0
B122	Story4	Seismic HD	0	0
B123	Story4	Seismic HD	0	0
B124	Story4	Seismic HD	0	0
B125	Story4	Seismic HD	0	0
B126	Story4	Seismic HD	0	1.801
B127	Story4	Seismic HD	2.595	0.826
B128	Story4	Seismic HD	0	5.464
B129	Story4	Seismic HD	0	4.016
B130	Story4	Seismic HD	0	4.36
B131	Story4	Seismic HD	0	12.762
B153	Story4	Seismic HD	0	0
B154	Story4	Seismic HD	0	0
B155	Story4	Seismic HD	0	0
B156	Story4	Seismic HD	0	0
B158	Story4	Seismic HD	0	0
B159	Story4	Seismic HD	0	0
B160	Story4	Seismic HD	0	0
B161	Story4	Seismic HD	0	0
B162	Story4	Seismic HD	0	0
B163	Story4	Seismic HD	0	0
B164	Story4	Seismic HD	0	0
B165	Story4	Seismic HD	0	0
B166	Story4	Seismic HD	0	0

Table 4.3 - Steel Beam Envelope (Part 2 of 2, continued)

Label	Story	Class	Conn. V I-End kip	Conn. V J-End kip
B167	Story4	Seismic HD	0	0
B169	Story4	Seismic HD	0	0
B170	Story4	Seismic HD	0	0
B171	Story4	Seismic HD	0	0
B172	Story4	Seismic HD	0	0
B200	Story4	Seismic MD	0.249	0.249
B202	Story4	Seismic MD	11.373	0
B210	Story4	Seismic MD	0	0
B224	Story4	Seismic HD	0	2.182
B300	Story4	Seismic MD	11.021	12.623
B302	Story4	Seismic MD	6.588	13.298
B4	Story4	Seismic MD	11.133	7.308
B61	Story3	Seismic HD	0	0
B65	Story3	Seismic HD	0	0
B101	Story3	Seismic HD	0	1.968
B103	Story3	Seismic HD	1.968	0
B112	Story3	Seismic HD	0	0
B132	Story3	Seismic MD	4.221	4.222
B149	Story3	Seismic MD	4.089	4.089
B168	Story3	Seismic HD	0	0
B177	Story3	Seismic MD	3.067	2.128
B190	Story3	Seismic MD	0	0
B193	Story3	Seismic HD	0	0
B203	Story3	Seismic MD	0	0
B206	Story3	Seismic MD	0	0
B209	Story3	Seismic MD	0	0
B211	Story3	Seismic MD	2.094	2.094
B212	Story3	Seismic MD	3.819	3.819
B215	Story3	Seismic MD	2.094	2.094
B216	Story3	Seismic MD	3.819	3.819
B220	Story3	Seismic MD	2.094	2.094
B221	Story3	Seismic MD	3.819	3.819
B229	Story3	Seismic MD	2.244	2.244
B230	Story3	Seismic MD	4.092	4.092
B234	Story3	Seismic MD	37.32	60.393
B243	Story3	Seismic HD	0	0
B244	Story3	Seismic HD	0	0
B245	Story3	Seismic HD	0	0
B23	Story3	Seismic HD	0	0
B25	Story3	Seismic HD	0	0
B28	Story3	Seismic HD	0	0
B20	Story3	Seismic HD	0	13.395
B21	Story3	Seismic MD	4.365	4.365
B24	Story3	Seismic MD	2.394	2.394
B6	Story2	Seismic HD	65.561	20.497

Table 4.3 - Steel Beam Envelope (Part 2 of 2, continued)

Label	Story	Class	Conn. V I-End kip	Conn. V J-End kip
B8	Story2	Seismic MD	3.185	3.185
B13	Story2	Seismic HD	3.594	0
B64	Story2	Seismic HD	21.588	25.821
B67	Story2	Seismic HD	3.433	0
B68	Story2	Seismic HD	0	11.267
B69	Story2	Seismic HD	11.672	3.989
B70	Story2	Seismic MD	2.652	2.652
B73	Story2	Seismic HD	0	0
B74	Story2	Seismic HD	95.735	102.09
B75	Story2	Seismic MD	25.012	24.786
B105	Story2	Seismic HD	7.436	0
B144	Story2	Seismic MD	3.311	10.321
B186	Story2	Seismic HD	4.378	9.401
B191	Story2	Seismic MD	0	0
B192	Story2	Seismic MD	0	0
B195	Story2	Seismic HD	0	37.03
B199	Story2	Seismic HD	69.161	19.153
B201	Story2	Seismic MD	3.185	3.185
B207	Story2	Seismic HD	1.051	0
B254	Story2	Seismic HD	0	34.739
B257	Story2	Seismic HD	15.783	3.955
B258	Story2	Seismic HD	10.132	0
B259	Story2	Seismic HD	0	18.723
B263	Story2	Seismic HD	10.659	19.25
B268	Story2	Seismic HD	12.139	3.679
B271	Story2	Seismic HD	16.091	3.836
B273	Story2	Seismic HD	11.279	2.889
B277	Story2	Seismic HD	11.671	3.112
B278	Story2	Seismic HD	6.06	0
B279	Story2	Seismic HD	0	13.136
B280	Story2	Seismic MD	4.294	4.294
B281	Story2	Seismic MD	3.536	3.536
B282	Story2	Seismic MD	2.905	2.905
B283	Story2	Seismic MD	3.41	3.41
B284	Story2	Seismic MD	4.294	4.294
B295	Story2	Seismic HD	4.893	9.353
B296	Story2	Seismic MD	3.529	7.04
B303	Story2	Seismic HD	6.67	44.768
B304	Story2	Seismic HD	5.883	12.706
B2	Story2	Seismic HD	0	0
B19	Story2	Seismic HD	0	0

Table 4.4 - Steel Brace Envelope (Part 1 of 2)

Label	Story	Section	Moment Interaction Check	PMM Combo	V22 Ratio	V33 Ratio	Class
D29	Story5	HSS3-1/2X3-1/2X1/4	0.037 = 0.037 + 0 + 0	1.2D+1.6S+1.0L	0	0	Seismic HD
D30	Story5	HSS3-1/2X3-1/2X1/4	0.066 = 0.066 + 0 + 0	1.2D+1.6S+1.0L	0	0	Seismic HD
D31	Story5	HSS3-1/2X3-1/2X1/4	0.006 = 0.006 + 0 + 0	1.2D+1.6S+1.0L	0	0	Seismic HD
D32	Story5	HSS3-1/2X3-1/2X1/4	0.272 = 0.272 + 0 + 0	1.2D+1.6S+1.0L	0	0	Seismic HD
D33	Story5	HSS3-1/2X3-1/2X1/4	0.004 = 0.004 + 0 + 0	1.2D+1.6S+1.0L	0	0	Seismic HD
D34	Story5	HSS3-1/2X3-1/2X1/4	0.061 = 0.061 + 0 + 0	1.2D+1.6S+1.0L	0	0	Seismic HD
D35	Story5	HSS3-1/2X3-1/2X1/4	0.014 = 0.014 + 0 + 0	1.2D+1.6S+1.0L	0	0	Seismic HD
D72	Story5	HSS3X3X1/4	0.461 = 0.461 + 0 + 0	1.2D+1.6S+1.0L	0	0	Seismic HD
D74	Story5	HSS3X3X1/4	0.006 = 0.006 + 0 + 0	1.2D+1.6S+1.0L	0	0	Seismic HD
D79	Story5	HSS6X6X3/8	0.016 = 0.011 + 0.005 + 0	1.2D+1.6S+1.0L	0.000255	0	Seismic MD
D52	Story5	HSS6X6X3/8	0.017 = 0.012 + 0.005 + 0	1.2D+1.6S+1.0L	0.0002423	0	Seismic MD
D77	Story5	HSS6X6X3/8	0.013 = 0.013 + 0 + 0	1.2D+1.6S+1.0L	0	0	Seismic MD
D78	Story5	HSS2-1/2X2-1/2X3/16	0.012 = 0.012 + 0 + 0	1.2D+1.6S+1.0L	0	0	Seismic HD
D81	Story5	HSS2-1/2X2-1/2X3/16	0.078 = 0.078 + 0 + 0	1.2D+1.6S+1.0L	0	0	Seismic HD
D46	Story5	HSS6X6X1/4	0.022 = 0.022 + 0 + 1.356E-04	1.2D+1.6S+1.0L	0	0	Compact
D1	Story4	W16X31	0.168 = 0.012 + 0.145 + 0.011	1.2D+1.6S+1.0L	0.073	0.001	Compact
D2	Story4	W21X44	0.101 = 0.005 + 0.08 + 0.016	1.2D+1.6S+1.0L	0.028	0.002	Compact
D3	Story4	W21X44	0.12 = 0.003 + 0.097 + 0.021	1.2D+1.6S+1.0L	0.032	0.003	Compact
D4	Story4	W21X44	0.188 = 0.01 + 0.174 + 0.004	1.2D+1.6S+1.0L	0.053	0.001	Compact
D5	Story4	W21X44	0.253 = 0.011 + 0.231 + 0.011	1.2D+1.6S+1.0L	0.069	0.001	Compact
D6	Story4	W21X44	0.27 = 0.005 + 0.253 + 0.012	1.2D+1.6S+1.0L	0.075	0.002	Compact
D7	Story4	W21X44	0.266 = 0.005 + 0.247 + 0.014	1.2D+1.6S+1.0L	0.073	0.002	Compact
D8	Story4	W21X44	0.252 = 0.006 + 0.235 + 0.012	1.2D+1.6S+1.0L	0.07	0.002	Compact
D9	Story4	W21X44	0.237 = 0.007 + 0.222 + 0.008	1.2D+1.6S+1.0L	0.067	0.001	Compact
D10	Story4	W21X44	0.22 = 0.008 + 0.211 + 0.001	1.2D+1.6S+1.0L	0.064	0.0001146	Compact
D11	Story4	W21X44	0.212 = 0.008 + 0.197 + 0.006	1.2D+1.6S+1.0L	0.06	0.001	Compact
D12	Story4	W21X44	0.164 = 0.017 + 0.118 + 0.029	1.2D+1.6S+1.0L	0.039	0.005	Compact
D13	Story4	W21X44	0.17 = 0.019 + 0.081 + 0.07	1.2D+1.6S+1.0L	0.03	0.01	Compact
D14	Story4	W21X44	0.207 = 0.022 + 0.141 + 0.044	1.2D+1.6S+1.0L	0.045	0.006	Compact
D15	Story4	W21X44	0.083 = 0.003 + 0.078 + 0.002	1.2D+1.6S+1.0L	0.029	0.001	Compact
D16	Story4	W21X44	0.065 = 0.007 + 0.052 + 0.005	1.2D+1.6S+1.0L	0.022	0.001	Compact
D17	Story4	W21X44	0.074 = 0.001 + 0.069 + 0.004	1.2D+1.6S+1.0L	0.027	0.001	Compact
D18	Story4	W21X44	0.062 = 0.009 + 0.05 + 0.004	1.2D+1.6S+1.0L	0.022	0.001	Compact
D19	Story4	W21X44	0.091 = 0.002 + 0.08 + 0.009	1.2D+1.6S+1.0L	0.029	0.001	Compact
D20	Story4	W21X44	0.229 = 0.029 + 0.16 + 0.04	1.2D+1.6S+1.0L	0.05	0.006	Compact
D21	Story4	W21X44	0.16 = 0.011 + 0.06 + 0.089	1.2D+1.6S+1.0L	0.023	0.013	Compact
D22	Story4	W21X44	0.097 = 0.018 + 0.025 + 0.055	1.2D+1.6S+1.0L	0.013	0.008	Compact
D23	Story4	W21X44	0.06 = 0.028 + 0.004 + 0.028	1.2D+1.6S+1.0L	0.009	0.002	Compact
D24	Story4	W16X31	0.523 = 0.011 + 0.37 + 0.143	1.2D+1.6S+1.0L	0.128	0.011	Compact
D39	Story4	HSS2X2X1/4	0.042 = 0.042 + 0 + 0	1.2D+1.6S+1.0L	0	0	Seismic HD
D43	Story4	HSS2X2X1/4	0.027 = 0.027 + 0 + 0	1.2D+1.6S+1.0L	0	0	Seismic HD
D48	Story4	W16X31	0.071 = 0.014 + 0.056 + 0.001	1.2D+1.6S+1.0L	0.05	0.002	Compact
D49	Story4	W21X44	0.051 = 0.009 + 0.029 + 0.012	1.2D+1.6S+1.0L	0.016	0.003	Compact
D50	Story4	W21X44	0.07 = 0.002 + 0.046 + 0.021	1.2D+1.6S+1.0L	0.023	0.004	Compact
D51	Story4	W21X44	0.092 = 0.008 + 0.076 + 0.008	1.2D+1.6S+1.0L	0.037	0.003	Compact
D53	Story4	W21X44	0.187 = 0.009 + 0.169 + 0.009	1.2D+1.6S+1.0L	0.073	0.002	Compact

Table 4.4 - Steel Brace Envelope (Part 1 of 2, continued)

Label	Story	Section	Moment Interaction Check	PMM Combo	V22 Ratio	V33 Ratio	Class
D54	Story4	W21X44	0.201 = 0.006 + 0.178 + 0.016	1.2D+1.6S+1.0L	0.077	0.004	Compact
D55	Story4	W21X44	0.198 = 0.005 + 0.174 + 0.019	1.2D+1.6S+1.0L	0.075	0.004	Compact
D56	Story4	W21X44	0.188 = 0.006 + 0.166 + 0.016	1.2D+1.6S+1.0L	0.072	0.004	Compact
D57	Story4	W21X44	0.176 = 0.006 + 0.158 + 0.012	1.2D+1.6S+1.0L	0.069	0.003	Compact
D58	Story4	W21X44	0.162 = 0.006 + 0.152 + 0.004	1.2D+1.6S+1.0L	0.066	0.001	Compact
D59	Story4	W21X44	0.153 = 0.004 + 0.145 + 0.003	1.2D+1.6S+1.0L	0.064	0.0003189	Compact
D60	Story4	W21X44	0.116 = 0.01 + 0.093 + 0.013	1.2D+1.6S+1.0L	0.043	0.004	Compact
D61	Story4	W21X44	0.132 = 0.014 + 0.062 + 0.057	1.2D+1.6S+1.0L	0.03	0.012	Compact
D62	Story4	W12X35	0.091 = 0.01 + 0.006 + 0.075	1.2D+1.6S+1.0L	0.062	0.009	Compact
D63	Story4	W12X35	0.09 = 0.02 + 0.044 + 0.026	1.2D+1.6S+1.0L	0.023	0.006	Compact
D64	Story4	HSS3X3X1/4	0.011 = 0.011 + 0 + 0	1.2D+1.6S+1.0L	0	0	Seismic HD
D65	Story4	W21X44	0.094 = 0.008 + 0.037 + 0.049	1.2D+1.6S+1.0L	0.019	0.011	Compact
D66	Story4	W21X44	0.063 = 0.008 + 0.027 + 0.027	1.2D+1.6S+1.0L	0.016	0.007	Compact
D67	Story4	W21X44	0.042 = 0.007 + 0.032 + 0.004	1.2D+1.6S+1.0L	0.018	0.001	Compact
D68	Story4	W16X31	0.178 = 0.001 + 0.161 + 0.017	1.2D+1.6S+1.0L	0.084	0.002	Compact
D69	Story4	HSS3X3X1/4	0.039 = 0.015 + 0.003 + 0.021	1.2D+1.6S+1.0L	0.0002334	0.002	Seismic HD
D45	Story4	HSS3X3X1/4	0.073 = 0.073 + 0 + 0	1.2D+1.6S+1.0L	0	0	Seismic HD
D28	Story4	HSS2X2X1/4	0.05 = 0.05 + 0 + 0	1.2D+1.6S+1.0L	0	0	Seismic HD
D25	Story4	HSS2X2X1/4	0.023 = 0.023 + 0 + 0	1.2D+1.6S+1.0L	0	0	Seismic HD
D26	Story4	HSS3X3X1/4	0.073 = 0.073 + 0 + 0	1.2D+1.6S+1.0L	0	0	Seismic HD
D40	Story3	HSS3X3X1/4	0.002 = 0.002 + 0 + 0	1.2D+1.6S+1.0L	0	0	Seismic HD
D42	Story3	HSS3X3X1/4	0.082 = 0.082 + 0 + 0	1.2D+1.6S+1.0L	0	0	Seismic HD
D47	Story3	HSS3X3X1/4	0.053 = 0.053 + 0 + 0	1.2D+1.6S+1.0L	0	0	Seismic HD
D70	Story3	HSS3X3X1/4	0.065 = 0.065 + 0 + 0	1.2D+1.6S+1.0L	0	0	Seismic HD
D71	Story3	HSS3X3X1/4	0.017 = 0.017 + 0 + 0	1.2D+1.6S+1.0L	0	0	Seismic HD
D73	Story3	HSS3X3X1/4	0.042 = 0.042 + 0 + 0	1.2D+1.6S+1.0L	0	0	Seismic HD
D75	Story3	HSS4X0.250	0.268 = 0.258 + 0.005 + 0.009	1.2D+1.6S+1.0L	0.0004082	0.0003804	Seismic HD
D76	Story3	HSS4X0.250	0.089 = 0.079 + 0.003 + 0.009	1.2D+1.6S+1.0L	0.0003294	0.0003419	Seismic HD
D27	Story3	HSS2X2X1/4	0.349 = 0.349 + 0 + 0	1.2D+1.6S+1.0L	0	0	Seismic HD
D36	Story3	HSS2X2X1/4	0.526 = 0.526 + 0 + 0	1.2D+1.6S+1.0L	0	0	Seismic HD
D80	Story3	HSS3-1/2X3-1/2X1/4	0.054 = 0.054 + 0 + 0	1.2D+1.6S+1.0L	0	0	Seismic HD
D82	Story3	HSS3-1/2X3-1/2X1/4	0.02 = 0.02 + 0 + 0	1.2D+1.6S+1.0L	0	0	Seismic HD
D41	Story2	HSS4X0.250	2.566 = 2.56 + 0.004 + 0.004	1.2D+1.6S+1.0L	0	0	Seismic HD
D44	Story2	HSS4X0.250	2.736 = 2.731 + 0.004 + 0.004	1.2D+1.6S+1.0L	0	0	Seismic HD

Table 4.4 - Steel Brace Envelope (Part 2 of 2)

Label	Story	Conn. P I-End kip	Conn. P J-End kip
D29	Story5	-8.399	-8.399
D30	Story5	-14.967	-14.967
D31	Story5	1.466	1.466
D32	Story5	35.574	35.574
D33	Story5	0.973	0.973
D34	Story5	-13.819	-13.819
D35	Story5	3.73	3.73

D41 AND D44 HAVE BEEN DESIGN AS TENSION ONLY BRACES

Table 4.4 - Steel Brace Envelope (Part 2 of 2, continued)

Label	Story	Conn. P I-End kip	Conn. P J-End kip
D72	Story5	-16.961	-16.961
D74	Story5	1.359	1.359
D79	Story5	-5.008	-5.008
D52	Story5	-5.604	-5.604
D77	Story5	-6.153	-6.153
D78	Story5	1.669	1.669
D81	Story5	-1.541	-1.541
D46	Story5	-7.252	-7.252
D1	Story4	-5.741	-6.815
D2	Story4	-3.353	-3.931
D3	Story4	-3.058	-2.432
D4	Story4	4.983	12.237
D5	Story4	-10.04	-9.172
D6	Story4	-5.637	-4.359
D7	Story4	-4.68	-3.919
D8	Story4	-5.114	-4.68
D9	Story4	-5.828	-5.784
D10	Story4	-5.935	-6.492
D11	Story4	-5.776	-6.441
D12	Story4	-6.846	-14.06
D13	Story4	-6.316	-16.14
D14	Story4	7.533	25.961
D15	Story4	1.905	3.047
D16	Story4	-1.56	-5.867
D17	Story4	-0.152	1.053
D18	Story4	-1.671	-7.185
D19	Story4	2.56	2.336
D20	Story4	10.583	33.364
D21	Story4	-3.044	-9.219
D22	Story4	-6.015	-14.674
D23	Story4	-9.297	-23.657
D24	Story4	-2.743	8.773
D39	Story4	-3.452	-3.452
D43	Story4	3.606	3.606
D48	Story4	-11.274	-9.577
D49	Story4	-6.337	-8.513
D50	Story4	-2.561	-2.288
D51	Story4	4.567	9.012
D53	Story4	-9.772	-8.178
D54	Story4	-6.633	-5.503
D55	Story4	-5.409	-4.986
D56	Story4	-5.711	-5.413
D57	Story4	-6.288	-6.067
D58	Story4	-6.348	-6.047
D59	Story4	-5.87	-4.163

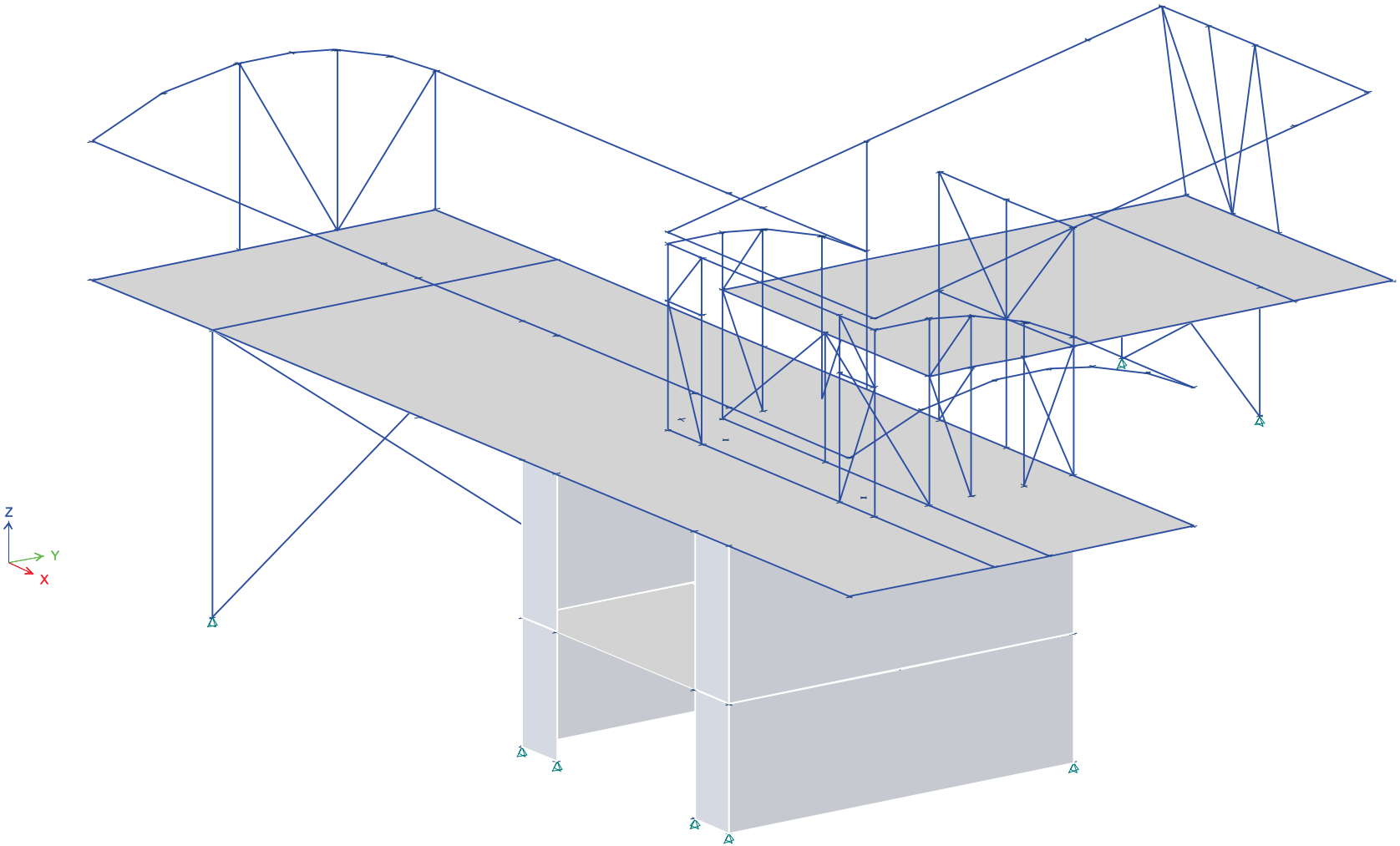
Table 4.4 - Steel Brace Envelope (Part 2 of 2, continued)

Label	Story	Conn. P I-End kip	Conn. P J-End kip
D60	Story4	-6.138	-9.004
D61	Story4	-6.756	-13.148
D62	Story4	9.034	21.571
D63	Story4	8.565	18.682
D64	Story4	2.436	2.436
D65	Story4	-4.275	-7.161
D66	Story4	-3.081	-7.514
D67	Story4	-3.472	-6.101
D68	Story4	-3.908	-0.716
D69	Story4	3.195	3.195
D45	Story4	16.036	16.036
D28	Story4	-3.405	-3.405
D25	Story4	-1.569	-1.569
D26	Story4	16.063	16.063
D40	Story3	0.497	0.497
D42	Story3	-13.577	-13.577
D47	Story3	-8.662	-8.662
D70	Story3	-10.752	-10.752
D71	Story3	-1.156	-1.156
D73	Story3	-2.85	-2.85
D75	Story3	-5.89	-5.907
D76	Story3	-3.596	-3.615
D27	Story3	-6.587	-6.587
D36	Story3	-9.921	-9.921
D80	Story3	-6.292	-6.292
D82	Story3	-2.272	-2.272
D41	Story2	-16.654	-16.654
D44	Story2	-17.765	-17.765

Blackwell
Structural Engineers

LATERAL SYSTEM

Designed using ETABS



Blackwell

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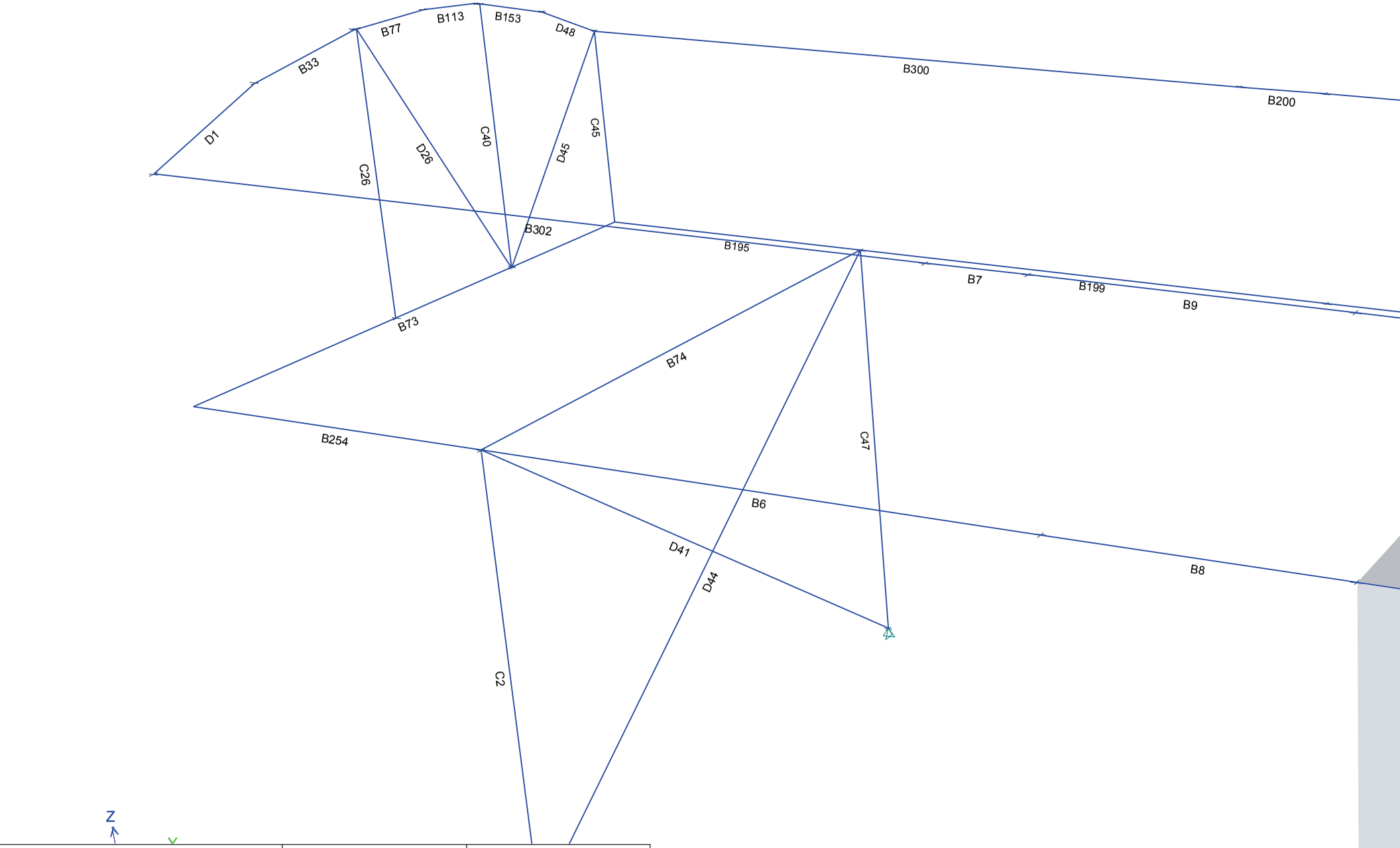
	LATERAL SYSTEM ISO	170950
		Designer: MSC
		Checked by: TJ

Toronto 416.593.5300 | Waterloo 519.616.0895 | Victoria 778.817.1010 | Halifax 902.593.0125 | blackwell.ca



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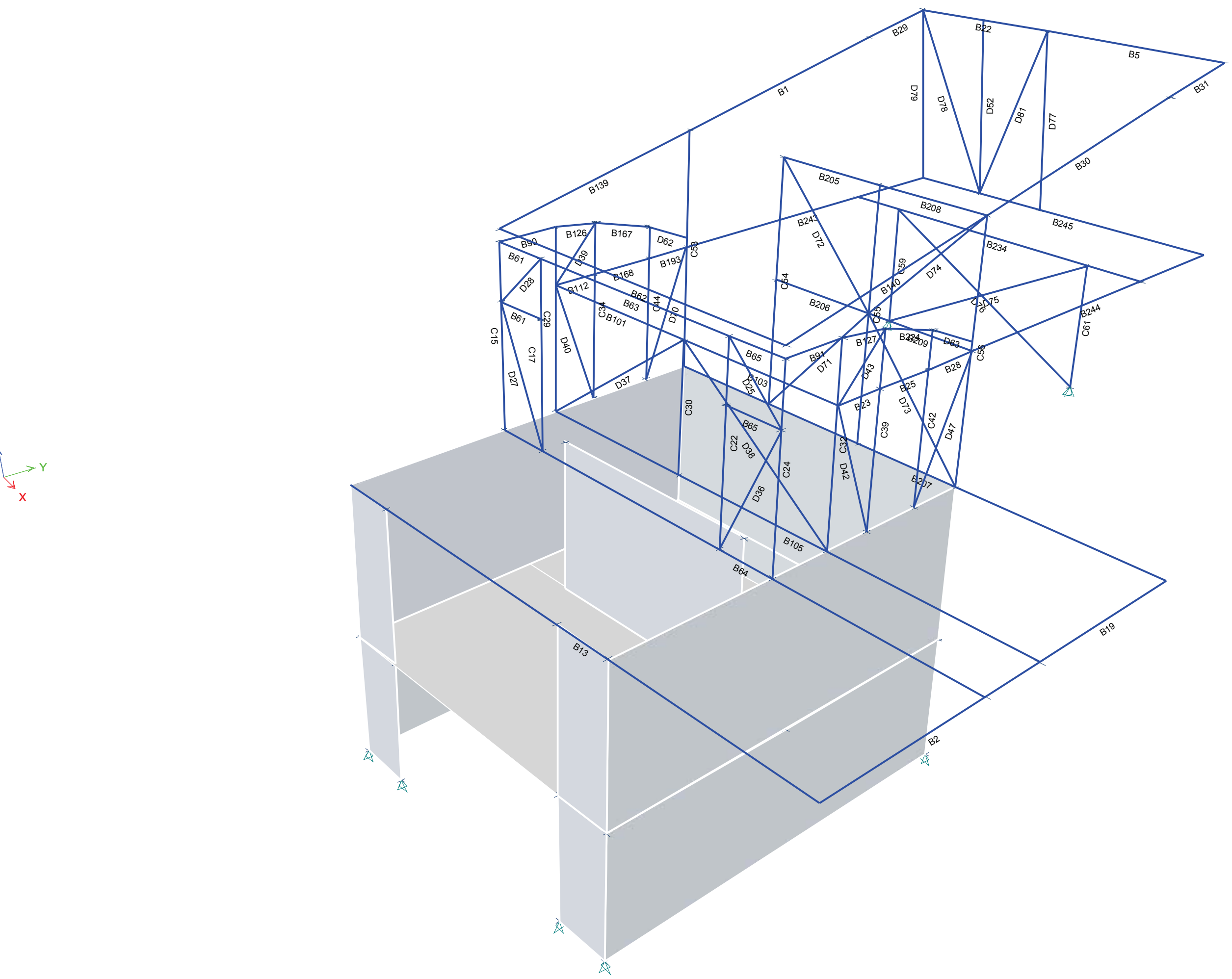
Designer MSC	Scale N.T.S.
Checked by TJ	Sheet #



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B234
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B126
B167
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C58
B61
D39
B193
B168
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D27
D37
B103
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C55
C30
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D73
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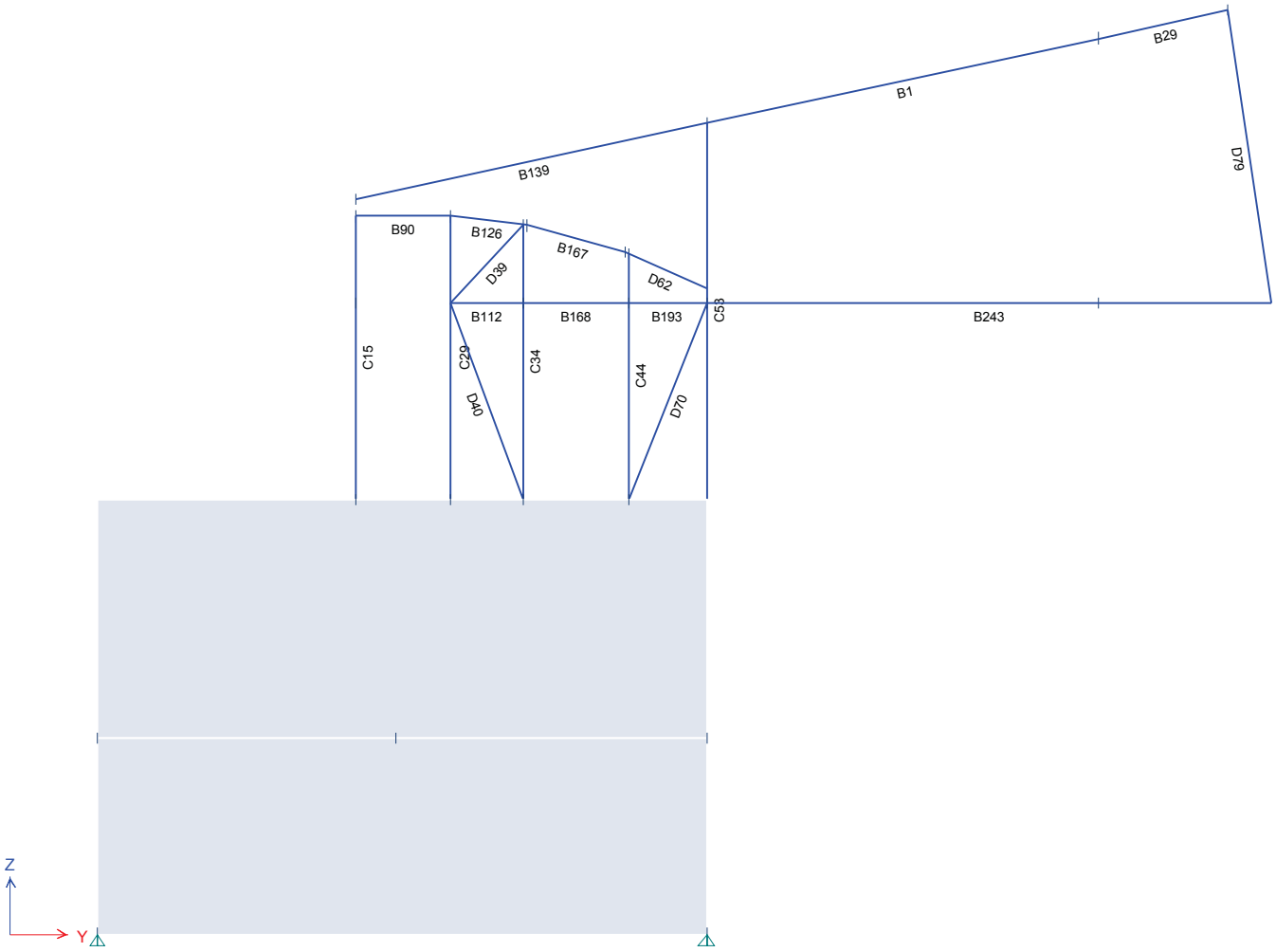
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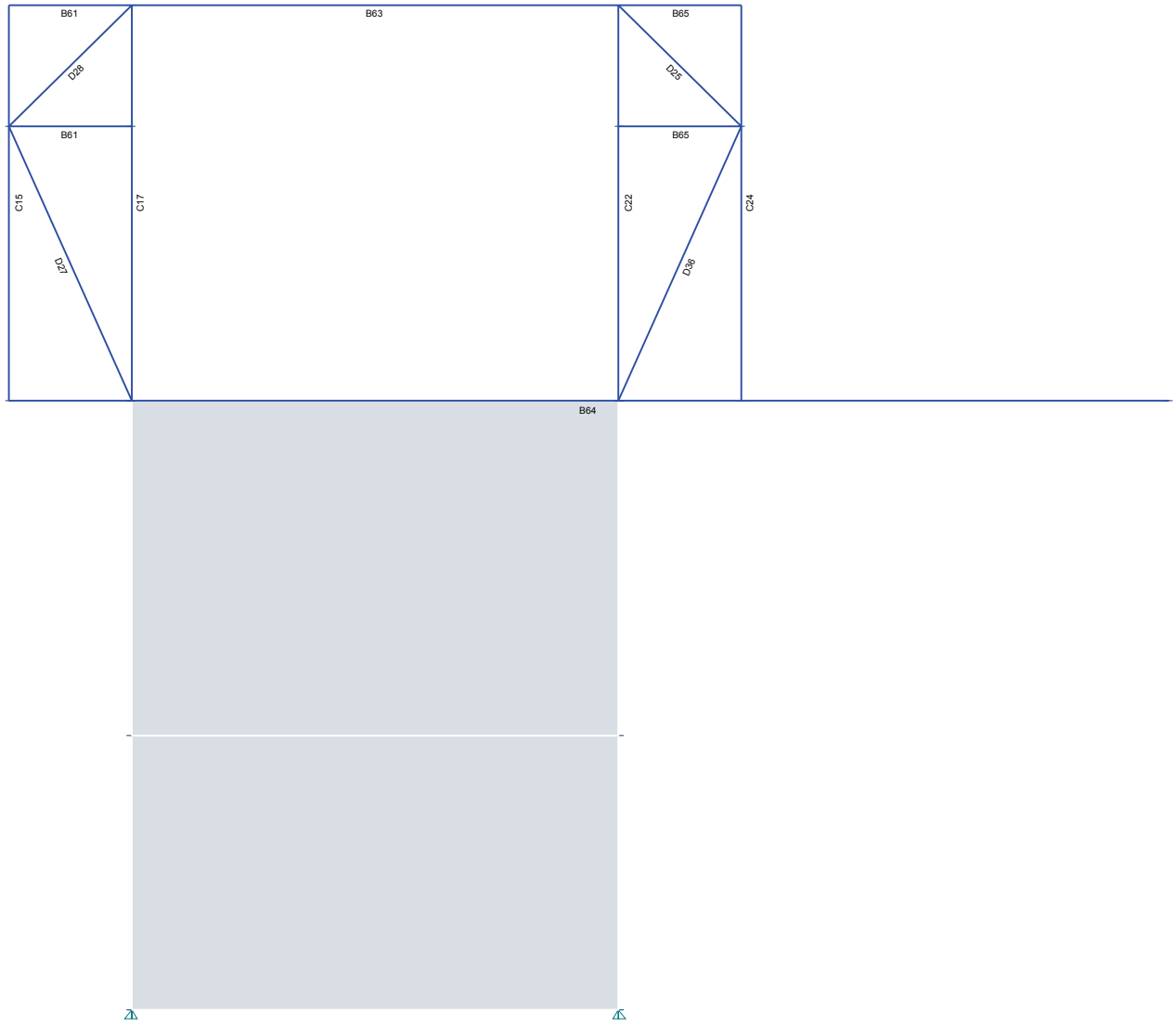
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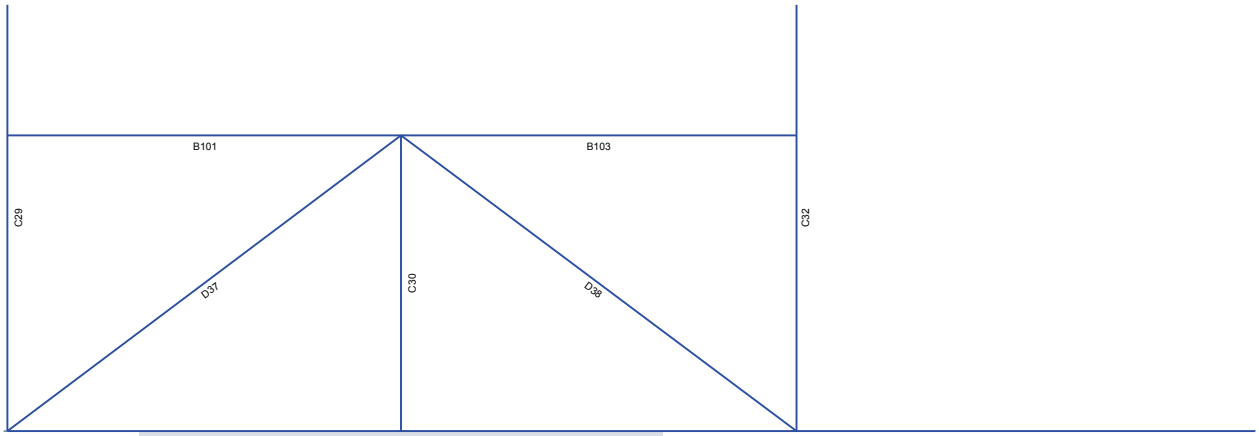
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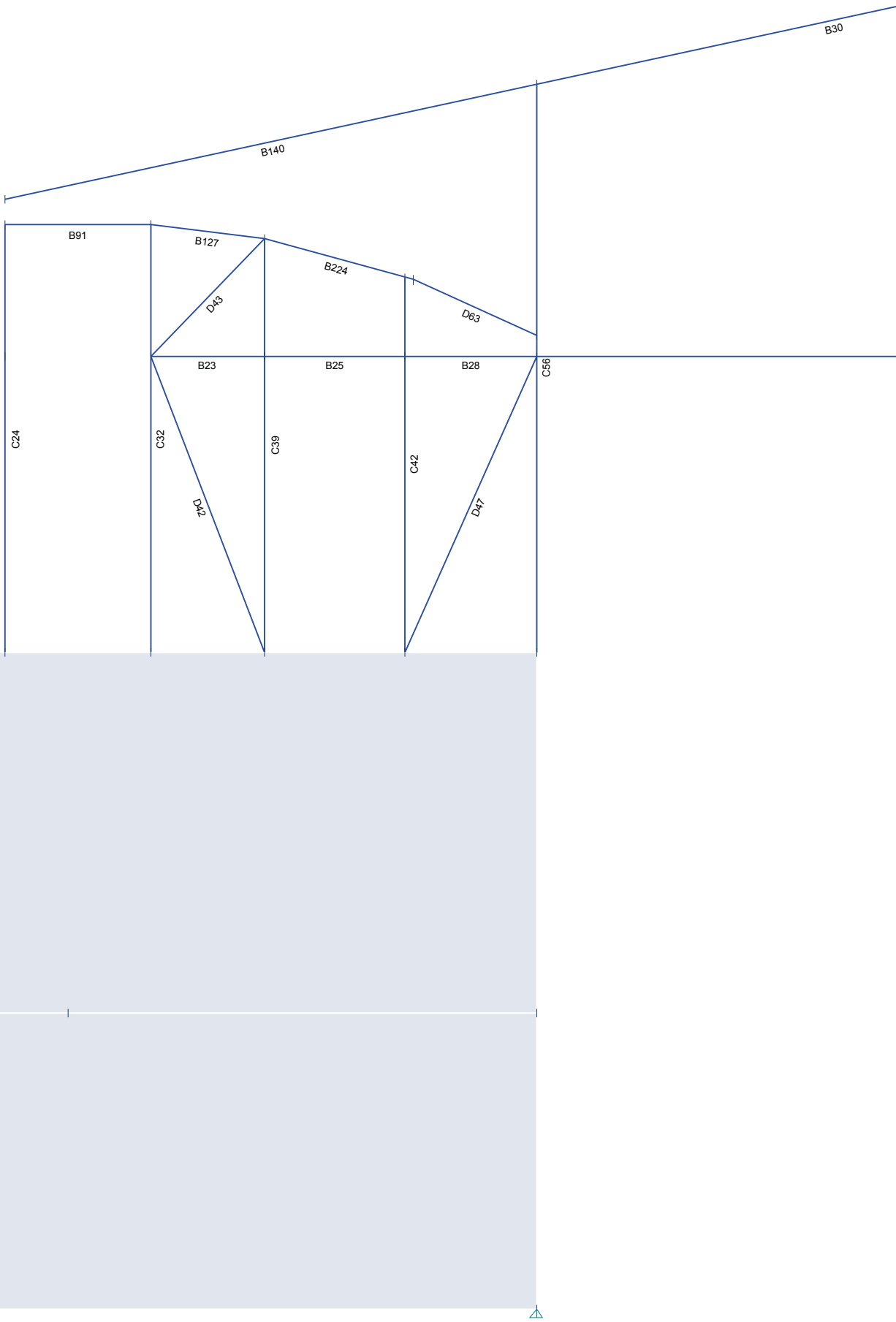
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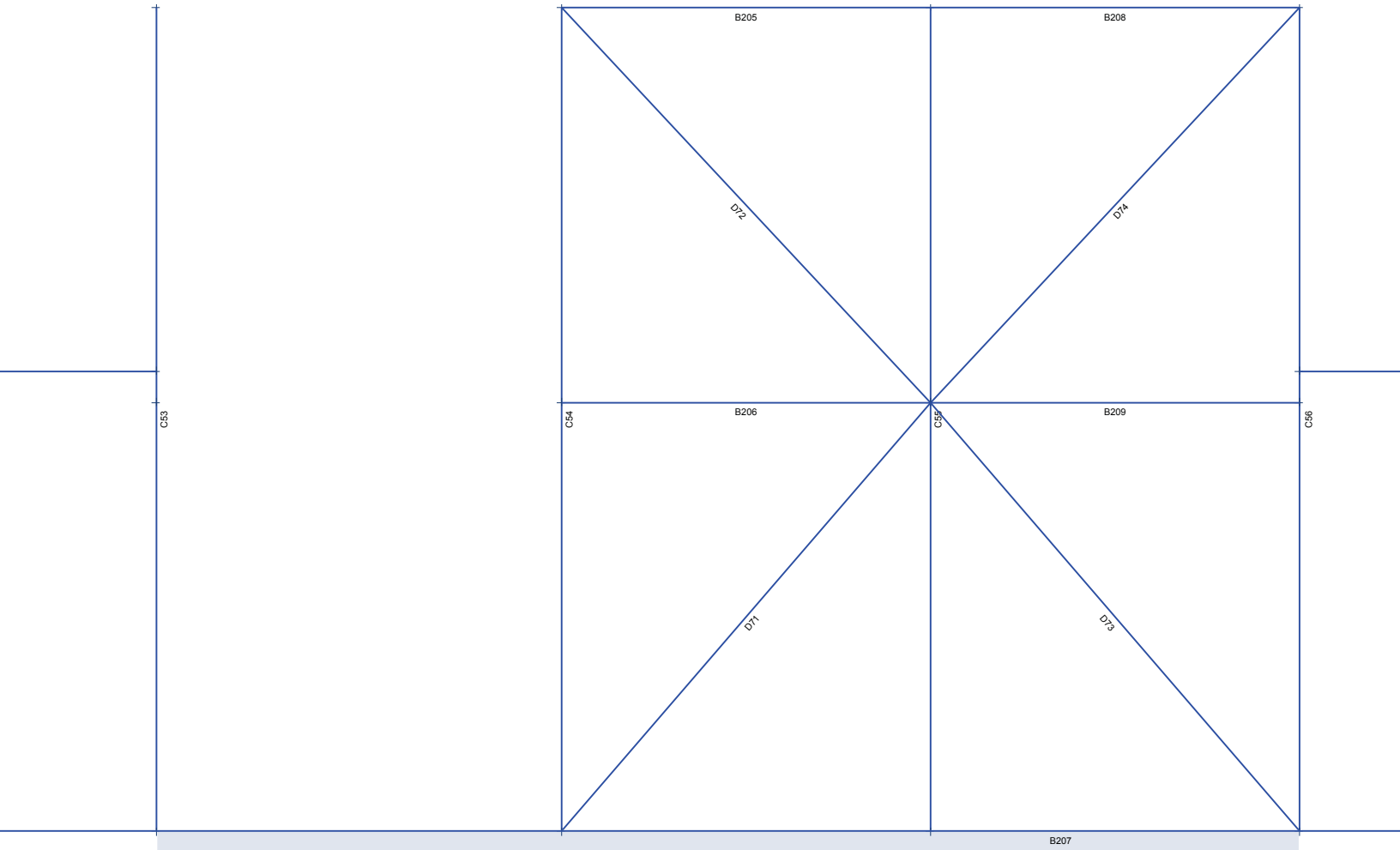
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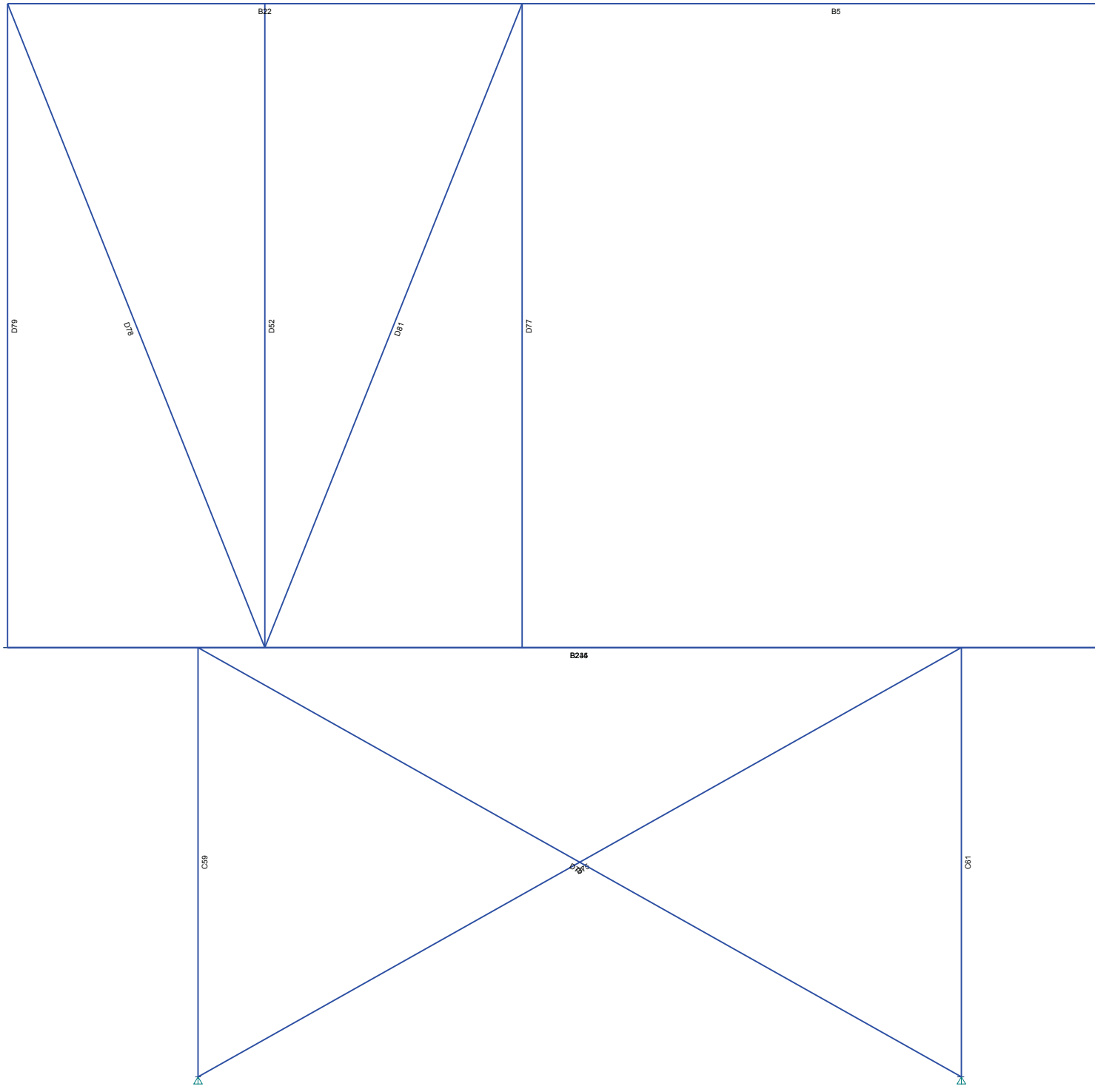
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D81
D77
B2
C59
C61

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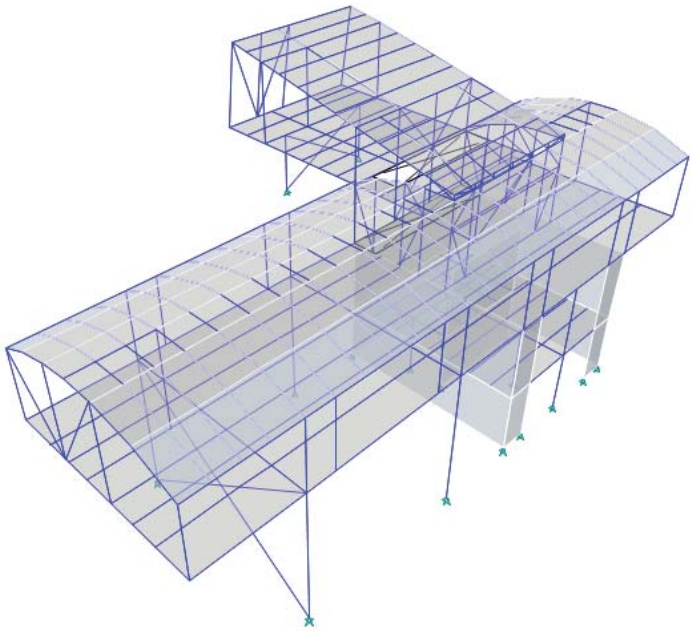

Lateral System

Lot 14R

Model File: ETABS Model, Revision 0

2018-07-13

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1 Properties

This chapter provides property information for materials, frame sections, shell sections, and links.

1.1 Materials

Table 1.1 - Material Properties - Summary

Name	Type	E lb/in²	v	Unit Weight lb/ft³	Design Strengths
4000Psi	Concrete	3604997	0.2	150	Fc=4000 lb/in²
A416Gr270	Tendon	28500000	0	490	Fy=245100 lb/in², Fu=270000 lb/in²
A615Gr60	Rebar	29000000	0	490	Fy=60000 lb/in², Fu=90000 lb/in²
A992Fy50	Steel	29000000	0.3	490	Fy=50000 lb/in², Fu=65000 lb/in²

1.2 Frame Sections

Table 1.2 - Frame Sections - Summary

Name	Material	Shape
C10X15.3	A992Fy50	Steel Channel
ConcBm	4000Psi	Concrete Rectangular
ConcCol	4000Psi	Concrete Rectangular
HSS2-1/2X2-1/2X3/16	A992Fy50	Steel Tube
HSS2X2X1/4	A992Fy50	Steel Tube
HSS3-1/2X3-1/2X1/4	A992Fy50	Steel Tube
HSS3X3X1/4	A992Fy50	Steel Tube
HSS3X3X5/16	A992Fy50	Steel Tube
HSS4X0.250	A992Fy50	Steel Pipe
HSS6X6X1/2	A992Fy50	Steel Tube
HSS6X6X1/4	A992Fy50	Steel Tube
HSS6X6X3/8	A992Fy50	Steel Tube
W10X22	A992Fy50	Steel I/Wide Flange
W10X39	A992Fy50	Steel I/Wide Flange
W10X45	A992Fy50	Steel I/Wide Flange
W10X49	A992Fy50	Steel I/Wide Flange
W10X54	A992Fy50	Steel I/Wide Flange
W10X68	A992Fy50	Steel I/Wide Flange
W12X26	A992Fy50	Steel I/Wide Flange
W12X35	A992Fy50	Steel I/Wide Flange
W12X79	A992Fy50	Steel I/Wide Flange
W16X26	A992Fy50	Steel I/Wide Flange
W16X31	A992Fy50	Steel I/Wide Flange
W16X40	A992Fy50	Steel I/Wide Flange
W16X45	A992Fy50	Steel I/Wide Flange
W16X67	A992Fy50	Steel I/Wide Flange
W18X46	A992Fy50	Steel I/Wide Flange
W21X166	A992Fy50	Steel I/Wide Flange
W21X44	A992Fy50	Steel I/Wide Flange
W21X68	A992Fy50	Steel I/Wide Flange
W24X117	A992Fy50	Steel I/Wide Flange

Table 1.2 - Frame Sections - Summary (continued)

Name	Material	Shape
W27X102	A992Fy50	Steel I/Wide Flange
W27X129	A992Fy50	Steel I/Wide Flange
W27X146	A992Fy50	Steel I/Wide Flange
W27X84	A992Fy50	Steel I/Wide Flange
W30X90	A992Fy50	Steel I/Wide Flange
W6X25	A992Fy50	Steel I/Wide Flange
W8X18	A992Fy50	Steel I/Wide Flange
W8X21	A992Fy50	Steel I/Wide Flange
W8x28	A992Fy50	Steel I/Wide Flange

1.3 Shell Sections

Table 1.3 - Shell Sections - Summary

Name	Design Type	Element Type	Material	Total Thickness in	Deck Material	Deck Depth in
Floors	Deck	Membrane	4000Psi	4	A992Fy50	1.5
Roof	Deck	Membrane	Not Applicable	1.5	A992Fy50	1.5
Wall1	Wall	Shell-Thin	4000Psi	10		

2 Assignments

This chapter provides a listing of the assignments applied to the model.

2.1 Frame Assignments

Table 2.1 - Frame Assignments - Summary (Part 1 of 2)

Story	Label	Unique Name	Design Type	Length in	Analysis Section	Design Section	Axis Angle deg	Max Station Spacing in
Story5	C53	3 E-7	Column	207.5664	HSS6X6X1/2	HSS6X6X1/2	90	
Story5	C54	3 E-8(+)	Column	207.5673	HSS6X6X1/2	HSS6X6X1/2	90	
Story5	C55	3 E-9(-)	Column	207.5664	HSS6X6X1/2	HSS6X6X1/2	90	
Story5	C56	3 E-10	Column	207.5664	HSS6X6X1/2	HSS6X6X1/2	90	
Story4	C15	3 H-7	Column	156	HSS6X6X1/2	HSS6X6X1/2	90	
Story4	C17	3 H-8	Column	156	HSS6X6X1/2	HSS6X6X1/2	90	
Story4	C22	3 H-9	Column	156	HSS6X6X1/2	HSS6X6X1/2	90	
Story4	C24	3 H-10	Column	156	HSS6X6X1/2	HSS6X6X1/2	90	
Story4	C26	3 H-2	Column	156	HSS6X6X1/2	HSS6X6X1/2	90	
Story4	C29	3 G-7	Column	156	HSS6X6X1/2	HSS6X6X1/2	90	
Story4	C32	3 G-10	Column	156	HSS6X6X1/2	HSS6X6X1/2	90	
Story4	C34	3 G(-)-7	Column	151.2386	HSS6X6X1/2	HSS6X6X1/2	90	
Story4	C39	3 G(-)-10	Column	151	HSS6X6X1/2	HSS6X6X1/2	90	
Story4	C40	3 F+-2	Column	150.1667	HSS6X6X1/2	HSS6X6X1/2	90	
Story4	C42	3 F-10	Column	136.8333	HSS6X6X1/2	HSS6X6X1/2	90	
Story4	C44	3 F-7	Column	135.1093	HSS6X6X1/2	HSS6X6X1/2	90	
Story4	C45	3 E-2	Column	116	HSS6X6X1/2	HSS6X6X1/2	90	
Story3	C30	3 G-8(+)	Column	108	HSS6X6X1/2	HSS6X6X1/2	90	
Story3	C59	2 C-8	Column	108	W10X45	W10X45	90	
Story3	C61	2 C-9	Column	108	W10X45	W10X45	90	
Story2	C2	1 I-3	Column	240	W10X49	W10X49	90	
Story2	C47	1E-3	Column	240	W10X49	W10X49	90	
Story5	B62	RB11-1 HIGH	Beam	288	HSS3-1/2X3-1/2X1/4	HSS3-1/2X3-1/2X1/4		24
Story5	B139	RB8-1	Beam	198.5103	W10X22	W10X22		
Story5	B140	RB8-2	Beam	198.5103	W10X22	W10X22		
Story5	B205	RB10-3	Beam	93	W16X26	W16X26		24
Story5	B208	RB10-4	Beam	93	W16X26	W16X26		24
Story5	B5	RB9-19	Beam	158.4996	C10X15.3	C10X15.3		24
Story5	B22	RB18-1	Beam	129.5004	W16X31	W16X31		24
Story5	B1	RB12-1	Beam	221.0172	W10X39	W10X39		
Story5	B29	RB19-1	Beam	73.6724	W10X22	W10X22		
Story5	B30	RB12-2	Beam	221.0172	W10X39	W10X39		
Story5	B31	RB19-2	Beam	73.6724	W10X22	W10X22		
Story4	B7	RB4-1	Beam	48	W16X26	W16X26		24
Story4	B9	RB5-1	Beam	144	W16X26	W16X26		24
Story4	B10	RB4-3	Beam	48	W16X40	W16X40		24
Story4	B12	RB6-1	Beam	192	W16X26	W16X26		24
Story4	B14	RB4-4	Beam	48	W16X26	W16X26		24
Story4	B15	RB5-3	Beam	168	W16X26	W16X26		24

Table 2.1 - Frame Assignments - Summary (Part 1 of 2, continued)

Story	Label	Unique Name	Design Type	Length in	Analysis Section	Design Section	Axis Angle deg	Max Station Spacing in
Story4	B33	RB2-1b	Beam	72.9892	W16X31	W16X31		
Story4	B56	RB2-3b	Beam	72.9892	W16X31	W16X31		
Story4	B61	RB10-1	Beam	48	W16X26	W16X26		24
Story4	B63	RB11-1	Beam	192	W16X26	W16X26		24
Story4	B65	RB10-2	Beam	48	W16X26	W16X26		24
Story4	B77	RB2-2a	Beam	53.004	W16X31	W16X31		24
Story4	B90	60	Beam	53.004	W12X35	W12X35		24
Story4	B91	201	Beam	53.004	W12X35	W12X35		24
Story4	B95	RB2-3c	Beam	53.004	W16X31	W16X31		24
Story4	B113	RB2-2b	Beam	42.2966	W16X31	W16X31		
Story4	B126	284	Beam	42.2966	W12X35	W12X35		
Story4	B127	323	Beam	42.2966	W12X35	W12X35		
Story4	B131	RB2-4a	Beam	42.2966	W16X31	W16X31		
Story4	B153	RB2-2c	Beam	56.0446	W16X31	W16X31		
Story4	B167	285	Beam	56.0446	W12X35	W12X35		
Story4	B172	RB2-4b	Beam	56.0446	W16X31	W16X31		
Story4	B200	RB4-2	Beam	48	W16X26	W16X26		24
Story4	B202	RB5-2	Beam	144	W16X26	W16X26		24
Story4	B210	RB3-1	Beam	168	W16X26	W16X26		24
Story4	B224	168	Beam	56.0446	W12X35	W12X35		
Story4	B300	RB16-2	Beam	408	W24X117	W24X117		24
Story4	B302	RB16-1	Beam	408	W24X117	W24X117		24
Story3	B61	24	Beam	48	W8X21	W8X21		24
Story3	B65	34	Beam	48	W8X21	W8X21		24
Story3	B101	3B15-1	Beam	144	W16X45	W16X45		24
Story3	B103	3B15-2	Beam	144	W16X45	W16X45		24
Story3	B112	3B3-1	Beam	39.996	W8X21	W8X21		24
Story3	B168	3B3-2	Beam	58.008	W8X21	W8X21		24
Story3	B193	3B3-3	Beam	42.996	W8X21	W8X21		24
Story3	B206	3B2-1	Beam	93	W12X79	W12X79		24
Story3	B209	3B2-2	Beam	93	W12X79	W12X79		24
Story3	B234	3B10-1	Beam	288	W30X90	W30X90		24
Story3	B243	3B9-1	Beam	312	W10X68	W10X68		24
Story3	B244	3B8-1	Beam	312	W18X46	W18X46		24
Story3	B245	3B4-1	Beam	288	W12X35	W12X35		24
Story3	B23	3B3-4	Beam	42	W8X21	W8X21		24
Story3	B25	3B4-5	Beam	51	W8X21	W8X21		24
Story3	B28	3B3-6	Beam	48	W8X21	W8X21		24
Story2	B6	2B4-1	Beam	288	W27X129	W27X129		24
Story2	B8	2B1-1	Beam	144	W12X26	W12X26		24
Story2	B13	2B9-R-1	Beam	456	W27X129	W27X129		24
Story2	B64	2B5-R-1	Beam	456	W27X129	W27X129		24
Story2	B73	2B2-1	Beam	336	W27X129	W27X129		24
Story2	B74	2B7-1	Beam	336	W27X146	W27X146		24

Table 2.1 - Frame Assignments - Summary (Part 1 of 2, continued)

Story	Label	Unique Name	Design Type	Length in	Analysis Section	Design Section	Axis Angle deg	Max Station Spacing in
Story2	B105	2B5-R-2	Beam	456	W27X129	W27X129		24
Story2	B195	2B4-4C	Beam	168	W27X129	W27X129		24
Story2	B199	2B4-4	Beam	288	W27X129	W27X129		24
Story2	B201	2B1-8	Beam	144	W12X26	W12X26		24
Story2	B207	2B4-R-2	Beam	456	W27X102	W27X102		24
Story2	B254	2B4-1C	Beam	168	W27X129	W27X129		24
Story2	B2	2B2-2	Beam	195	W27X129	W27X129		24
Story2	B19	2B2-3	Beam	141	W27X129	W27X129		24
Story5	D72	9	Brace	136.2448	HSS3X3X1/4	HSS3X3X1/4		
Story5	D74	11	Brace	136.2442	HSS3X3X1/4	HSS3X3X1/4		
Story5	D79	4 A(+)-7	Brace	163.7681	HSS6X6X3/8	HSS6X6X3/8	90	
Story5	D52	4 A(+)-8(+)	Brace	163.7681	HSS6X6X3/8	HSS6X6X3/8	90	
Story5	D77	4 A(+)-9(-)	Brace	163.7681	HSS6X6X3/8	HSS6X6X3/8	90	
Story5	D78	20	Brace	176.1038	HSS2-1/2X2-1/2X3/16	HSS2-1/2X2-1/2X3/16		
Story5	D81	21	Brace	176.104	HSS2-1/2X2-1/2X3/16	HSS2-1/2X2-1/2X3/16		
Story4	D1	RB2-1a	Brace	75.3923	W16X31	W16X31		
Story4	D24	RB2-3a	Brace	75.3923	W16X31	W16X31		
Story4	D39	138	Brace	58.9004	HSS2X2X1/4	HSS2X2X1/4		
Story4	D43	146	Brace	60.1082	HSS2X2X1/4	HSS2X2X1/4		
Story4	D48	RB2-2d	Brace	49.2443	W16X31	W16X31		
Story4	D62	286	Brace	49.2443	W12X35	W12X35		
Story4	D63	325	Brace	49.2443	W12X35	W12X35		
Story4	D68	RB2-4c	Brace	49.2443	W16X31	W16X31		
Story4	D45	6	Brace	150.5722	HSS3X3X1/4	HSS3X3X1/4		
Story4	D28	37	Brace	67.8823	HSS2X2X1/4	HSS2X2X1/4		
Story4	D25	45	Brace	67.8823	HSS2X2X1/4	HSS2X2X1/4		
Story4	D26	13	Brace	183.1721	HSS3X3X1/4	HSS3X3X1/4		
Story3	D40	87	Brace	115.1681	HSS3X3X1/4	HSS3X3X1/4		
Story3	D42	136	Brace	115.8792	HSS3X3X1/4	HSS3X3X1/4		
Story3	D47	91	Brace	118.1863	HSS3X3X1/4	HSS3X3X1/4		
Story3	D70	90	Brace	116.244	HSS3X3X1/4	HSS3X3X1/4		
Story3	D71	4	Brace	142.5237	HSS3X3X1/4	HSS3X3X1/4		
Story3	D73	2	Brace	142.5237	HSS3X3X1/4	HSS3X3X1/4		
Story3	D75	456	Brace	220.2907	HSS4X0.250	HSS4X0.250		
Story3	D76	455	Brace	220.2907	HSS4X0.250	HSS4X0.250		
Story3	D27	36	Brace	118.1863	HSS2X2X1/4	HSS2X2X1/4		
Story3	D36	44	Brace	118.1863	HSS2X2X1/4	HSS2X2X1/4		
Story2	D41	15	Brace	412.9116	HSS4X0.250	HSS4X0.250		
Story2	D44	16	Brace	412.9116	HSS4X0.250	HSS4X0.250		

Table 2.1 - Frame Assignments - Summary (Part 2 of 2)

Story	Label	Unique Name	Min Number Stations	Releases	T/C Limits
Story5	C53	3 E-7	3	Yes	No
Story5	C54	3 E-8(+)	3	Yes	No
Story5	C55	3 E-9(-)	3	Yes	No
Story5	C56	3 E-10	3	Yes	No
Story4	C15	3 H-7	3	Yes	No
Story4	C17	3 H-8	3	Yes	No
Story4	C22	3 H-9	3	Yes	No
Story4	C24	3 H-10	3	Yes	No
Story4	C26	3 H-2	3	Yes	No
Story4	C29	3 G-7	3	Yes	No
Story4	C32	3 G-10	3	Yes	No
Story4	C34	3 G(-)-7	3	Yes	No
Story4	C39	3 G(-)-10	3	Yes	No
Story4	C40	3 F+-2	3	Yes	No
Story4	C42	3 F-10	3	Yes	No
Story4	C44	3 F-7	3	Yes	No
Story4	C45	3 E-2	3	Yes	No
Story3	C30	3 G-8(+)	3	Yes	No
Story3	C59	2 C-8	3	Yes	No
Story3	C61	2 C-9	3	Yes	No
Story2	C2	1 I-3	3	Yes	No
Story2	C47	1E-3	3	Yes	No
Story5	B62	RB11-1 HIGH		Yes	No
Story5	B139	RB8-1	3	Yes	No
Story5	B140	RB8-2	3	Yes	No
Story5	B205	RB10-3		Yes	No
Story5	B208	RB10-4		Yes	No
Story5	B5	RB9-19		Yes	No
Story5	B22	RB18-1		Yes	No
Story5	B1	RB12-1	3	Yes	No
Story5	B29	RB19-1	3	Yes	No
Story5	B30	RB12-2	3	Yes	No
Story5	B31	RB19-2	3	Yes	No
Story4	B7	RB4-1		Yes	No
Story4	B9	RB5-1		Yes	No
Story4	B10	RB4-3		Yes	No
Story4	B12	RB6-1		Yes	No
Story4	B14	RB4-4		Yes	No
Story4	B15	RB5-3		Yes	No
Story4	B33	RB2-1b	3	Yes	No
Story4	B56	RB2-3b	3	No	No
Story4	B61	RB10-1		Yes	No
Story4	B63	RB11-1		Yes	No
Story4	B65	RB10-2		Yes	No
Story4	B77	RB2-2a		No	No

Table 2.1 - Frame Assignments - Summary (Part 2 of 2, continued)

Story	Label	Unique Name	Min Number Stations	Releases	T/C Limits
Story4	B90	60		Yes	No
Story4	B91	201		Yes	No
Story4	B95	RB2-3c		Yes	No
Story4	B113	RB2-2b	3	No	No
Story4	B126	284	3	No	No
Story4	B127	323	3	No	No
Story4	B131	RB2-4a	3	Yes	No
Story4	B153	RB2-2c	3	No	No
Story4	B167	285	3	No	No
Story4	B172	RB2-4b	3	No	No
Story4	B200	RB4-2		Yes	No
Story4	B202	RB5-2		Yes	No
Story4	B210	RB3-1		No	No
Story4	B224	168	3	No	No
Story4	B300	RB16-2		Yes	No
Story4	B302	RB16-1		Yes	No
Story3	B61	24		Yes	No
Story3	B65	34		Yes	No
Story3	B101	3B15-1		Yes	No
Story3	B103	3B15-2		Yes	No
Story3	B112	3B3-1		Yes	No
Story3	B168	3B3-2		Yes	No
Story3	B193	3B3-3		Yes	No
Story3	B206	3B2-1		Yes	No
Story3	B209	3B2-2		Yes	No
Story3	B234	3B10-1		Yes	No
Story3	B243	3B9-1		Yes	No
Story3	B244	3B8-1		Yes	No
Story3	B245	3B4-1		Yes	No
Story3	B23	3B3-4		Yes	No
Story3	B25	3B4-5		Yes	No
Story3	B28	3B3-6		Yes	No
Story2	B6	2B4-1		Yes	No
Story2	B8	2B1-1		Yes	No
Story2	B13	2B9-R-1		Yes	No
Story2	B64	2B5-R-1		Yes	No
Story2	B73	2B2-1		Yes	No
Story2	B74	2B7-1		Yes	No
Story2	B105	2B5-R-2		Yes	No
Story2	B195	2B4-4C		No	No
Story2	B199	2B4-4		Yes	No
Story2	B201	2B1-8		Yes	No
Story2	B207	2B4-R-2		Yes	No

Table 2.1 - Frame Assignments - Summary (Part 2 of 2, continued)

Story	Label	Unique Name	Min Number Stations	Releases	T/C Limits
Story2	B254	2B4-1C		No	No
Story2	B2	2B2-2		Yes	No
Story2	B19	2B2-3		Yes	No
Story5	D72	9	3	Yes	No
Story5	D74	11	3	Yes	No
Story5	D79	4 A(+)-7	3	Yes	No
Story5	D52	4 A(+)-8(+)	3	Yes	No
Story5	D77	4 A(+)-9(-)	3	Yes	No
Story5	D78	20	3	Yes	No
Story5	D81	21	3	Yes	No
Story4	D1	RB2-1a	3	Yes	No
Story4	D24	RB2-3a	3	Yes	No
Story4	D39	138	3	Yes	No
Story4	D43	146	3	Yes	No
Story4	D48	RB2-2d	3	Yes	No
Story4	D62	286	3	Yes	No
Story4	D63	325	3	Yes	No
Story4	D68	RB2-4c	3	Yes	No
Story4	D45	6	3	Yes	No
Story4	D28	37	3	Yes	No
Story4	D25	45	3	Yes	No
Story4	D26	13	3	Yes	No
Story3	D40	87	3	Yes	No
Story3	D42	136	3	Yes	No
Story3	D47	91	3	Yes	No
Story3	D70	90	3	Yes	No
Story3	D71	4	3	Yes	No
Story3	D73	2	3	Yes	No
Story3	D75	456	3	Yes	Yes
Story3	D76	455	3	Yes	Yes
Story3	D27	36	3	Yes	No
Story3	D36	44	3	Yes	No
Story2	D41	15	3	Yes	Yes
Story2	D44	16	3	Yes	Yes

2.2 Shell Assignments

Table 2.2 - Shell Assignments - Summary

Story	Label	Unique Name	Section	Diaphragm	Axis Angle deg	Pier
Story2	W14	1	Wall1			P2
Story2	W20	5	Wall1			P5
Story2	W26	6	Wall1			P4
Story2	W27	2	Wall1			P1

Table 2.2 - Shell Assignments - Summary (continued)

Story	Label	Unique Name	Section	Diaphragm	Axis Angle deg	Pier
Story2	W28	4	Wall1			P6
Story2	W42	3	Wall1			P3
Story1	W14	14	Wall1			P2
Story1	W20	15	Wall1			P5
Story1	W26	7	Wall1			P4
Story1	W27	12	Wall1			P1
Story1	W28	13	Wall1			P6
Story1	W42	11	Wall1			P3
Story3	F88	24	Floors	D1	90	
Story2	F25	8	Floors	D1	90	
Story1	F1	19	Floors	D1	90	
Story1	F69	17	Floors	D1		

3 Loads

This chapter provides loading information as applied to the model.

3.1 Load Patterns

Table 3.1 - Load Patterns

Name	Type	Self Weight Multiplier
Dead	Dead	0
Live	Live	0
Snow	Snow	0

3.2 Applied Loads

3.2.1 Line Loads

Table 3.2 - Frame Loads - Distributed

Story	Label	Unique Name	Design Type	Load Pattern	LoadType	Direction	Relative Distance Start	Relative Distance End	Absolute Distance Start in	Absolute Distance End in	Force at Start kip/ft	Force at End kip/ft
Story5	B102	RB13-1	Beam	Dead	Force	Gravity Proj	0	1	0	144	0.085	0.085
Story5	B104	RB13-2	Beam	Dead	Force	Gravity Proj	0	1	0	144	0.085	0.085
Story5	B139	RB8-1	Beam	Dead	Force	Gravity Proj	0	1	0	198.5103	0.085	0.085
Story5	B140	RB8-2	Beam	Dead	Force	Gravity Proj	0	1	0	198.5103	0.085	0.085
Story5	B233	RB9-15	Beam	Dead	Force	Gravity Proj	0	1	0	102	0.085	0.085
Story5	B235	RB9-16	Beam	Dead	Force	Gravity Proj	0	1	0	186	0.085	0.085
Story5	B1	RB12-1	Beam	Dead	Force	Gravity Proj	0	1	0	221.0172	0.085	0.085
Story5	B29	RB19-1	Beam	Dead	Force	Gravity Proj	0	1	0	73.6724	0.085	0.085
Story5	B30	RB12-2	Beam	Dead	Force	Gravity Proj	0	1	0	221.0172	0.085	0.085
Story5	B31	RB19-2	Beam	Dead	Force	Gravity Proj	0	1	0	73.6724	0.085	0.085
Story4	B7	RB4-1	Beam	Dead	Force	Gravity Proj	0	1	0	48	0.108	0.108
Story4	B9	RB5-1	Beam	Dead	Force	Gravity Proj	0	1	0	144	0.108	0.108
Story4	B10	RB4-3	Beam	Dead	Force	Gravity Proj	0	1	0	48	0.108	0.108
Story4	B12	RB6-1	Beam	Dead	Force	Gravity Proj	0	1	0	192	0.108	0.108
Story4	B14	RB4-4	Beam	Dead	Force	Gravity Proj	0	1	0	48	0.108	0.108
Story4	B15	RB5-3	Beam	Dead	Force	Gravity Proj	0	1	0	168	0.108	0.108
Story4	B33	RB2-1b	Beam	Dead	Force	Gravity Proj	0	1	0	72.9892	0.148	0.148
Story4	B56	RB2-3b	Beam	Dead	Force	Gravity Proj	0	1	0	72.9892	0.148	0.148
Story4	B77	RB2-2a	Beam	Dead	Force	Gravity Proj	0	1	0	53.004	0.148	0.148
Story4	B95	RB2-3c	Beam	Dead	Force	Gravity Proj	0	1	0	53.004	0.148	0.148
Story4	B113	RB2-2b	Beam	Dead	Force	Gravity Proj	0	1	0	42.2966	0.148	0.148
Story4	B131	RB2-4a	Beam	Dead	Force	Gravity Proj	0	1	0	42.2966	0.148	0.148
Story4	B153	RB2-2c	Beam	Dead	Force	Gravity Proj	0	1	0	56.0446	0.148	0.148
Story4	B172	RB2-4b	Beam	Dead	Force	Gravity Proj	0	1	0	56.0446	0.148	0.148
Story4	B200	RB4-2	Beam	Dead	Force	Gravity Proj	0	1	0	48	0.108	0.108
Story4	B202	RB5-2	Beam	Dead	Force	Gravity Proj	0	1	0	144	0.108	0.108
Story4	B210	RB3-1	Beam	Dead	Force	Gravity Proj	0	1	0	168	0.108	0.108
Story4	B300	RB16-2	Beam	Dead	Force	Gravity Proj	0	0.294118	0	120	0.108	0.108
Story4	B300	RB16-2	Beam	Dead	Force	Gravity Proj	0.294118	0.411765	120	168	0.108	0.108

Table 3.2 - Frame Loads - Distributed (continued)

Story	Label	Unique Name	Design Type	Load Pattern	LoadType	Direction	Relative Distance Start	Relative Distance End	Absolute Distance Start in	Absolute Distance End in	Force at Start kip/ft	Force at End kip/ft
Story4	B300	RB16-2	Beam	Dead	Force	Gravity Proj	0.411765	0.529412	168	216	0.108	0.108
Story4	B300	RB16-2	Beam	Dead	Force	Gravity Proj	0.529412	1	216	408	0.108	0.108
Story4	B302	RB16-1	Beam	Dead	Force	Gravity Proj	0	0.411765	0	168	0.108	0.108
Story4	B302	RB16-1	Beam	Dead	Force	Gravity Proj	0.411765	0.529412	168	216	0.108	0.108
Story4	B302	RB16-1	Beam	Dead	Force	Gravity Proj	0.529412	1	216	408	0.108	0.108
Story3	B101	3B15-1	Beam	Dead	Force	Gravity Proj	0	1	0	144	0.128	0.128
Story3	B103	3B15-2	Beam	Dead	Force	Gravity Proj	0	1	0	144	0.128	0.128
Story3	B234	3B10-1	Beam	Dead	Force	Gravity Proj	0	1	0	288	0.128	0.128
Story3	B243	3B9-1	Beam	Dead	Force	Gravity Proj	0	1	0	312	0.128	0.128
Story3	B244	3B8-1	Beam	Dead	Force	Gravity Proj	0	1	0	312	0.128	0.128
Story3	B23	3B3-4	Beam	Dead	Force	Gravity Proj	0	1	0	42	0.128	0.128
Story3	B25	3B4-5	Beam	Dead	Force	Gravity Proj	0	1	0	51	0.128	0.128
Story3	B28	3B3-6	Beam	Dead	Force	Gravity Proj	0	1	0	48	0.128	0.128
Story2	B6	2B4-1	Beam	Dead	Force	Gravity	0	1	0	288	0.108	0.108
Story2	B8	2B1-1	Beam	Dead	Force	Gravity	0	1	0	144	0.108	0.108
Story2	B13	2B9-R-1	Beam	Dead	Force	Gravity	0	1	0	456	0.108	0.108
Story2	B73	2B2-1	Beam	Dead	Force	Gravity	0	0.428571	0	144	0.148	0.148
Story2	B73	2B2-1	Beam	Dead	Force	Gravity	0.428571	1	144	336	0.148	0.148
Story2	B75	2B8-1	Beam	Dead	Force	Gravity Proj	0	1	0	336	0.128	0.128
Story2	B195	2B4-4C	Beam	Dead	Force	Gravity	0	1	0	168	0.108	0.108
Story2	B199	2B4-4	Beam	Dead	Force	Gravity	0	1	0	288	0.108	0.108
Story2	B201	2B1-8	Beam	Dead	Force	Gravity	0	1	0	144	0.108	0.108
Story2	B207	2B4-R-2	Beam	Dead	Force	Gravity	0	1	0	456	0.108	0.108
Story2	B254	2B4-1C	Beam	Dead	Force	Gravity	0	0.714286	0	120	0.108	0.108
Story2	B254	2B4-1C	Beam	Dead	Force	Gravity	0.714286	1	120	168	0.108	0.108
Story2	B2	2B2-2	Beam	Dead	Force	Gravity	0	1	0	195	0.148	0.148
Story2	B19	2B2-3	Beam	Dead	Force	Gravity	0	1	0	141	0.148	0.148
Story4	B33	RB2-1b	Beam	Snow	Force	Gravity	0	1	0	72.9892	0.768	0.768
Story4	B56	RB2-3b	Beam	Snow	Force	Gravity	0	1	0	72.9892	0.768	0.768
Story4	B77	RB2-2a	Beam	Snow	Force	Gravity	0	1	0	53.004	0.768	0.768
Story4	B95	RB2-3c	Beam	Snow	Force	Gravity	0	1	0	53.004	0.768	0.768
Story4	B113	RB2-2b	Beam	Snow	Force	Gravity	0	1	0	42.2966	0.768	0.768
Story4	B131	RB2-4a	Beam	Snow	Force	Gravity	0	1	0	42.2966	0.768	0.768
Story4	B153	RB2-2c	Beam	Snow	Force	Gravity	0	1	0	56.0446	0.768	0.768
Story4	B172	RB2-4b	Beam	Snow	Force	Gravity	0	1	0	56.0446	0.768	0.768
Story2	B73	2B2-1	Beam	Snow	Force	Gravity	0	1	0	336	0.768	0.768
Story2	B2	2B2-2	Beam	Snow	Force	Gravity	0	1	0	195	0.768	0.768
Story2	B19	2B2-3	Beam	Snow	Force	Gravity	0	1	0	141	0.768	0.768
Story4	D1	RB2-1a	Brace	Dead	Force	Gravity Proj	0	1	0	75.3923	0.148	0.148
Story4	D24	RB2-3a	Brace	Dead	Force	Gravity Proj	0	1	0	75.3923	0.148	0.148
Story4	D48	RB2-2d	Brace	Dead	Force	Gravity Proj	0	1	0	49.2443	0.148	0.148
Story4	D68	RB2-4c	Brace	Dead	Force	Gravity Proj	0	1	0	49.2443	0.148	0.148
Story4	D1	RB2-1a	Brace	Snow	Force	Gravity	0	1	0	75.3923	0.768	0.768
Story4	D24	RB2-3a	Brace	Snow	Force	Gravity	0	1	0	75.3923	0.768	0.768

Table 3.2 - Frame Loads - Distributed (continued)

Story	Label	Unique Name	Design Type	Load Pattern	LoadType	Direction	Relative Distance Start	Relative Distance End	Absolute Distance Start in	Absolute Distance End in	Force at Start kip/ft	Force at End kip/ft
Story4	D48	RB2-2d	Brace	Snow	Force	Gravity	0	1	0	49.2443	0.768	0.768
Story4	D68	RB2-4c	Brace	Snow	Force	Gravity	0	1	0	49.2443	0.768	0.768

3.2.2 Area Loads

Table 3.3 - Shell Loads - Uniform

Story	Label	Unique Name	Load Pattern	Direction	Load lb/ft²
Story4	W1	21	Dead	Gravity	29
Story4	W2	25	Dead	Gravity	29
Story4	W3	27	Dead	Gravity	29
Story4	W4	28	Dead	Gravity	29
Story4	W5	29	Dead	Gravity	29
Story4	W6	30	Dead	Gravity	29
Story4	W7	31	Dead	Gravity	29
Story4	W8	32	Dead	Gravity	29
Story4	W9	33	Dead	Gravity	29
Story4	W10	34	Dead	Gravity	29
Story4	W11	35	Dead	Gravity	29
Story4	W12	36	Dead	Gravity	29
Story4	W13	37	Dead	Gravity	29
Story4	W15	38	Dead	Gravity	29
Story4	W16	39	Dead	Gravity	29
Story4	W17	42	Dead	Gravity	29
Story4	W18	43	Dead	Gravity	29
Story4	W19	44	Dead	Gravity	29
Story4	W21	45	Dead	Gravity	29
Story4	W22	46	Dead	Gravity	29
Story4	W23	47	Dead	Gravity	29
Story4	W24	48	Dead	Gravity	29
Story4	W25	49	Dead	Gravity	29
Story4	W29	108	Dead	Gravity	29
Story4	W30	109	Dead	Gravity	29
Story4	W31	110	Dead	Gravity	29
Story4	W32	111	Dead	Gravity	29
Story4	W33	112	Dead	Gravity	29
Story4	W34	113	Dead	Gravity	29
Story4	W35	114	Dead	Gravity	29
Story4	W36	115	Dead	Gravity	29
Story4	W37	116	Dead	Gravity	29
Story4	W38	117	Dead	Gravity	29
Story4	W39	118	Dead	Gravity	29
Story4	W40	119	Dead	Gravity	29
Story4	W41	120	Dead	Gravity	29
Story4	W43	56	Dead	Gravity	29

Table 3.3 - Shell Loads - Uniform (continued)

Story	Label	Unique Name	Load Pattern	Direction	Load lb/ft²
Story4	W44	57	Dead	Gravity	29
Story4	W45	58	Dead	Gravity	29
Story4	W46	59	Dead	Gravity	29
Story2	W14	1	Dead	Gravity	125
Story2	W20	5	Dead	Gravity	125
Story2	W26	6	Dead	Gravity	125
Story2	W27	2	Dead	Gravity	125
Story2	W28	4	Dead	Gravity	125
Story2	W42	3	Dead	Gravity	125
Story1	W14	14	Dead	Gravity	125
Story1	W20	15	Dead	Gravity	125
Story1	W26	7	Dead	Gravity	125
Story1	W27	12	Dead	Gravity	125
Story1	W28	13	Dead	Gravity	125
Story1	W42	11	Dead	Gravity	125
Story4	W1	21	Snow	Gravity Proj	189
Story4	W2	25	Snow	Gravity Proj	189
Story4	W3	27	Snow	Gravity Proj	189
Story4	W4	28	Snow	Gravity Proj	189
Story4	W5	29	Snow	Gravity Proj	189
Story4	W6	30	Snow	Gravity Proj	189
Story4	W7	31	Snow	Gravity Proj	189
Story4	W8	32	Snow	Gravity Proj	189
Story4	W9	33	Snow	Gravity Proj	189
Story4	W10	34	Snow	Gravity Proj	189
Story4	W11	35	Snow	Gravity Proj	189
Story4	W12	36	Snow	Gravity Proj	189
Story4	W13	37	Snow	Gravity Proj	189
Story4	W15	38	Snow	Gravity Proj	189
Story4	W16	39	Snow	Gravity Proj	189
Story4	W17	42	Snow	Gravity Proj	189
Story4	W18	43	Snow	Gravity Proj	189
Story4	W19	44	Snow	Gravity Proj	189
Story4	W21	45	Snow	Gravity Proj	189
Story4	W22	46	Snow	Gravity Proj	189
Story4	W23	47	Snow	Gravity Proj	189
Story4	W24	48	Snow	Gravity Proj	189
Story4	W25	49	Snow	Gravity Proj	189
Story4	W29	108	Snow	Gravity Proj	189
Story4	W30	109	Snow	Gravity Proj	189
Story4	W31	110	Snow	Gravity Proj	189
Story4	W32	111	Snow	Gravity Proj	189
Story4	W33	112	Snow	Gravity Proj	189
Story4	W34	113	Snow	Gravity Proj	189
Story4	W35	114	Snow	Gravity Proj	189

Table 3.3 - Shell Loads - Uniform (continued)

Story	Label	Unique Name	Load Pattern	Direction	Load lb/ft²
Story4	W36	115	Snow	Gravity Proj	189
Story4	W37	116	Snow	Gravity Proj	189
Story4	W38	117	Snow	Gravity Proj	189
Story4	W39	118	Snow	Gravity Proj	189
Story4	W40	119	Snow	Gravity Proj	189
Story4	W41	120	Snow	Gravity Proj	189
Story4	W43	56	Snow	Gravity Proj	189
Story4	W44	57	Snow	Gravity Proj	189
Story4	W45	58	Snow	Gravity Proj	189
Story4	W46	59	Snow	Gravity Proj	189
Story5	F27	9	Dead	Gravity Proj	29
Story5	F46	16	Dead	Gravity Proj	29
Story5	F47	87	Dead	Gravity Proj	29
Story5	F48	96	Dead	Gravity Proj	29
Story5	F66	99	Dead	Gravity Proj	29
Story5	F67	121	Dead	Gravity Proj	29
Story5	F68	123	Dead	Gravity Proj	29
Story5	F70	124	Dead	Gravity Proj	29
Story5	F71	125	Dead	Gravity Proj	29
Story5	F72	126	Dead	Gravity Proj	29
Story5	F73	127	Dead	Gravity Proj	29
Story5	F74	128	Dead	Gravity Proj	29
Story5	F75	130	Dead	Gravity Proj	29
Story5	F76	129	Dead	Gravity Proj	29
Story5	F78	131	Dead	Gravity Proj	29
Story5	F79	132	Dead	Gravity Proj	29
Story5	F80	133	Dead	Gravity Proj	29
Story5	F81	134	Dead	Gravity Proj	29
Story5	F82	136	Dead	Gravity Proj	29
Story5	F83	135	Dead	Gravity Proj	29
Story5	F84	137	Dead	Gravity Proj	29
Story5	F85	139	Dead	Gravity Proj	29
Story5	F86	138	Dead	Gravity Proj	29
Story5	F87	140	Dead	Gravity Proj	29
Story4	F2	18	Dead	Gravity	29
Story4	F3	22	Dead	Gravity	29
Story4	F4	23	Dead	Gravity	29
Story4	F5	26	Dead	Gravity	29
Story4	F6	60	Dead	Gravity	29
Story4	F7	61	Dead	Gravity	29
Story4	F8	62	Dead	Gravity	29
Story4	F9	63	Dead	Gravity	29
Story4	F10	64	Dead	Gravity	29
Story4	F11	65	Dead	Gravity	29
Story4	F12	66	Dead	Gravity	29

Table 3.3 - Shell Loads - Uniform (continued)

Story	Label	Unique Name	Load Pattern	Direction	Load lb/ft²
Story4	F13	67	Dead	Gravity	29
Story4	F14	68	Dead	Gravity	29
Story4	F15	69	Dead	Gravity	29
Story4	F16	70	Dead	Gravity	29
Story4	F17	71	Dead	Gravity	29
Story4	F18	72	Dead	Gravity	29
Story4	F19	73	Dead	Gravity	29
Story4	F20	74	Dead	Gravity	29
Story4	F21	75	Dead	Gravity	29
Story4	F22	76	Dead	Gravity	29
Story4	F23	77	Dead	Gravity	29
Story4	F24	78	Dead	Gravity	29
Story4	F26	10	Dead	Gravity	29
Story4	F28	20	Dead	Gravity	29
Story4	F29	79	Dead	Gravity	29
Story4	F30	80	Dead	Gravity	29
Story4	F31	81	Dead	Gravity	29
Story4	F32	82	Dead	Gravity	29
Story4	F33	83	Dead	Gravity	29
Story4	F34	84	Dead	Gravity	29
Story4	F35	85	Dead	Gravity	29
Story4	F36	86	Dead	Gravity	29
Story4	F37	88	Dead	Gravity	29
Story4	F38	89	Dead	Gravity	29
Story4	F39	90	Dead	Gravity	29
Story4	F40	91	Dead	Gravity	29
Story4	F41	92	Dead	Gravity	29
Story4	F42	40	Dead	Gravity	29
Story4	F43	41	Dead	Gravity	29
Story4	F44	50	Dead	Gravity	29
Story4	F45	51	Dead	Gravity	29
Story4	F49	93	Dead	Gravity	29
Story4	F50	94	Dead	Gravity	29
Story4	F51	95	Dead	Gravity	29
Story4	F52	97	Dead	Gravity	29
Story4	F53	98	Dead	Gravity	29
Story4	F54	100	Dead	Gravity	29
Story4	F55	101	Dead	Gravity	29
Story4	F56	102	Dead	Gravity	29
Story4	F57	103	Dead	Gravity	29
Story4	F58	104	Dead	Gravity	29
Story4	F59	105	Dead	Gravity	29
Story4	F60	106	Dead	Gravity	29
Story4	F61	107	Dead	Gravity	29
Story4	F62	52	Dead	Gravity	29

Table 3.3 - Shell Loads - Uniform (continued)

Story	Label	Unique Name	Load Pattern	Direction	Load lb/ft²
Story4	F63	53	Dead	Gravity	29
Story4	F64	54	Dead	Gravity	29
Story4	F65	55	Dead	Gravity	29
Story3	F88	24	Dead	Gravity	64
Story2	F25	8	Dead	Gravity	87
Story1	F1	19	Dead	Gravity Proj	57.3
Story1	F69	17	Dead	Gravity Proj	57.3
Story3	F88	24	Live	Gravity	40
Story2	F25	8	Live	Gravity	40
Story1	F1	19	Live	Gravity	40
Story1	F69	17	Live	Gravity	40
Story5	F27	9	Snow	Gravity Proj	189
Story5	F46	16	Snow	Gravity Proj	189
Story5	F47	87	Snow	Gravity Proj	189
Story5	F48	96	Snow	Gravity Proj	189
Story5	F66	99	Snow	Gravity Proj	189
Story5	F67	121	Snow	Gravity Proj	189
Story5	F68	123	Snow	Gravity Proj	189
Story5	F70	124	Snow	Gravity Proj	189
Story5	F71	125	Snow	Gravity Proj	189
Story5	F72	126	Snow	Gravity Proj	189
Story5	F73	127	Snow	Gravity Proj	189
Story5	F74	128	Snow	Gravity Proj	189
Story5	F75	130	Snow	Gravity Proj	189
Story5	F76	129	Snow	Gravity Proj	189
Story5	F78	131	Snow	Gravity Proj	189
Story5	F79	132	Snow	Gravity Proj	189
Story5	F80	133	Snow	Gravity Proj	189
Story5	F81	134	Snow	Gravity Proj	189
Story5	F82	136	Snow	Gravity Proj	189
Story5	F83	135	Snow	Gravity Proj	189
Story5	F84	137	Snow	Gravity Proj	189
Story5	F85	139	Snow	Gravity Proj	189
Story5	F86	138	Snow	Gravity Proj	189
Story5	F87	140	Snow	Gravity Proj	189
Story4	F2	18	Snow	Gravity Proj	189
Story4	F3	22	Snow	Gravity Proj	189
Story4	F4	23	Snow	Gravity Proj	189
Story4	F5	26	Snow	Gravity Proj	189
Story4	F6	60	Snow	Gravity Proj	189
Story4	F7	61	Snow	Gravity Proj	189
Story4	F8	62	Snow	Gravity Proj	189
Story4	F9	63	Snow	Gravity Proj	189
Story4	F10	64	Snow	Gravity Proj	189
Story4	F11	65	Snow	Gravity Proj	189

Table 3.3 - Shell Loads - Uniform (continued)

Story	Label	Unique Name	Load Pattern	Direction	Load lb/ft²
Story4	F12	66	Snow	Gravity Proj	189
Story4	F13	67	Snow	Gravity Proj	189
Story4	F14	68	Snow	Gravity Proj	189
Story4	F15	69	Snow	Gravity Proj	189
Story4	F16	70	Snow	Gravity Proj	189
Story4	F17	71	Snow	Gravity Proj	189
Story4	F18	72	Snow	Gravity Proj	189
Story4	F19	73	Snow	Gravity Proj	189
Story4	F20	74	Snow	Gravity Proj	189
Story4	F21	75	Snow	Gravity Proj	189
Story4	F22	76	Snow	Gravity Proj	189
Story4	F23	77	Snow	Gravity Proj	189
Story4	F24	78	Snow	Gravity Proj	189
Story4	F26	10	Snow	Gravity Proj	189
Story4	F28	20	Snow	Gravity Proj	189
Story4	F29	79	Snow	Gravity Proj	189
Story4	F30	80	Snow	Gravity Proj	189
Story4	F31	81	Snow	Gravity Proj	189
Story4	F32	82	Snow	Gravity Proj	189
Story4	F33	83	Snow	Gravity Proj	189
Story4	F34	84	Snow	Gravity Proj	189
Story4	F35	85	Snow	Gravity Proj	189
Story4	F36	86	Snow	Gravity Proj	189
Story4	F37	88	Snow	Gravity Proj	189
Story4	F38	89	Snow	Gravity Proj	189
Story4	F39	90	Snow	Gravity Proj	189
Story4	F40	91	Snow	Gravity Proj	189
Story4	F41	92	Snow	Gravity Proj	189
Story4	F42	40	Snow	Gravity Proj	189
Story4	F43	41	Snow	Gravity Proj	189
Story4	F44	50	Snow	Gravity Proj	189
Story4	F45	51	Snow	Gravity Proj	189
Story4	F49	93	Snow	Gravity Proj	189
Story4	F50	94	Snow	Gravity Proj	189
Story4	F51	95	Snow	Gravity Proj	189
Story4	F52	97	Snow	Gravity Proj	189
Story4	F53	98	Snow	Gravity Proj	189
Story4	F54	100	Snow	Gravity Proj	189
Story4	F55	101	Snow	Gravity Proj	189
Story4	F56	102	Snow	Gravity Proj	189
Story4	F57	103	Snow	Gravity Proj	189
Story4	F58	104	Snow	Gravity Proj	189
Story4	F59	105	Snow	Gravity Proj	189
Story4	F60	106	Snow	Gravity Proj	189
Story4	F61	107	Snow	Gravity Proj	189

Table 3.3 - Shell Loads - Uniform (continued)

Story	Label	Unique Name	Load Pattern	Direction	Load lb/ft²
Story4	F62	52	Snow	Gravity Proj	189
Story4	F63	53	Snow	Gravity Proj	189
Story4	F64	54	Snow	Gravity Proj	189
Story4	F65	55	Snow	Gravity Proj	189

3.3 Functions

3.3.1 Response Spectrum Functions

Table 3.4 - Response Spectrum Function - ASCE 7-10

Name	Period sec	Acceleration	Damping	Ss	S1	TL sec	Site Class	Fa	Fv	SDS	SD1
Response spectrum	0	0.25874	5	0.831	0.277	8	D	1.1676	1.846	0.64685	0.340895
Response spectrum	0.105	0.64685									
Response spectrum	0.527	0.64685									
Response spectrum	0.8	0.426118									
Response spectrum	1	0.340895									
Response spectrum	1.2	0.284079									
Response spectrum	1.4	0.243496									
Response spectrum	1.6	0.213059									
Response spectrum	1.8	0.189386									
Response spectrum	2	0.170447									
Response spectrum	2.5	0.136358									
Response spectrum	3	0.113632									
Response spectrum	3.5	0.097398									
Response spectrum	4	0.085224									
Response spectrum	4.5	0.075754									
Response spectrum	5	0.068179									
Response spectrum	5.5	0.061981									
Response spectrum	6	0.056816									
Response spectrum	6.5	0.052445									
Response spectrum	7	0.048699									
Response spectrum	7.5	0.045453									
Response spectrum	8	0.042612									
Response spectrum	8.5	0.037746									
Response spectrum	9	0.033669									
Response spectrum	9.5	0.030218									
Response spectrum	10	0.027272									

3.4 Load Cases

Table 3.5 - Load Cases - Summary

Name	Type
Seismic Weight	Linear Static
Dead	Linear Static
Live	Linear Static
Snow	Linear Static

Table 3.5 - Load Cases - Summary (continued)

Name	Type
RSX (R=MIXED)	Response Spectrum
RSY (R=MIXED)	Response Spectrum
~TorsionRSX (R=MIXED)	Linear Static
~TorsionRSY (R=MIXED)	Linear Static

3.5 Load Combinations

Table 3.6 - Load Combinations

Name	Load Case/Combo	Scale Factor	Type	Auto
(R=MIXED) D + L + S + RSX + rsy	Dead	1.32	Linear Add	No
(R=MIXED) D + L + S + RSX + rsy	Live	1		No
(R=MIXED) D + L + S + RSX + rsy	Snow	0.2		No
(R=MIXED) D + L + S + RSX + rsy	RSX (R=MIXED)	1		No
(R=MIXED) D + L + S + RSX + rsy	RSY (R=MIXED)	0.3		No
(R=MIXED) D + L + S + RSY + rsx	Dead	1.32	Linear Add	No
(R=MIXED) D + L + S + RSY + rsx	Live	1		No
(R=MIXED) D + L + S + RSY + rsx	Snow	0.2		No
(R=MIXED) D + L + S + RSY + rsx	RSY (R=MIXED)	1		No
(R=MIXED) D + L + S + RSY + rsx	RSX (R=MIXED)	0.3		No
(R=MIXED) D + RSX + rsy	Dead	0.78	Linear Add	No
(R=MIXED) D + RSX + rsy	RSX (R=MIXED)	1		No
(R=MIXED) D + RSX + rsy	RSY (R=MIXED)	0.3		No
(R=MIXED) D + RSY + rsx	Dead	0.78	Linear Add	No
(R=MIXED) D + RSY + rsx	RSX (R=MIXED)	0.3		No
(R=MIXED) D + RSY + rsx	RSY (R=MIXED)	1		No

Note: R=MIXED indicates combination of SFRS types. All braces above the main floor are SCBF. The two pairs of large braces below the main floor have been detailed as OCBF. Thus R=6 for upper floors and R=3.25 for the lower floors. Modal Response Spectrum results have been scaled as per ASCE 7-10 12.9.4. See APPENDIX D for the Equivalent Lateral Force procedure calculations used to scale the Modal Response Spectrum Results.

4 Analysis Results

This chapter provides analysis results.

4.1 Modal Results

Table 4.1 - Modal Periods and Frequencies

Case	Mode	Period sec	Frequency cyc/sec	Circular Frequency rad/sec	Eigenvalue rad²/sec²
Modal	1	0.418	2.391	15.02	225.6003
Modal	2	0.388	2.575	16.1796	261.7779
Modal	3	0.265	3.769	23.6806	560.7685
Modal	4	0.251	3.978	24.992	624.6
Modal	5	0.206	4.854	30.5008	930.2989
Modal	6	0.198	5.048	31.7204	1006.1829
Modal	7	0.188	5.313	33.3833	1114.4443
Modal	8	0.182	5.5	34.5563	1194.1347
Modal	9	0.173	5.776	36.2934	1317.212
Modal	10	0.169	5.9	37.0736	1374.4493
Modal	11	0.168	5.935	37.2902	1390.5555
Modal	12	0.167	5.979	37.5676	1411.3283
Modal	13	0.166	6.022	37.8369	1431.634
Modal	14	0.162	6.19	38.8935	1512.7045
Modal	15	0.152	6.578	41.3282	1708.019
Modal	16	0.145	6.899	43.3483	1879.0711
Modal	17	0.138	7.239	45.4868	2069.0509
Modal	18	0.138	7.26	45.6155	2080.7697
Modal	19	0.123	8.101	50.8997	2590.7829
Modal	20	0.119	8.424	52.9299	2801.5792
Modal	21	0.107	9.328	58.6099	3435.1262
Modal	22	0.105	9.531	59.8837	3586.0538
Modal	23	0.105	9.561	60.0715	3608.5906
Modal	24	0.103	9.745	61.2268	3748.7187
Modal	25	0.096	10.444	65.6217	4306.2093
Modal	26	0.094	10.646	66.8902	4474.3051
Modal	27	0.091	10.93	68.6726	4715.9231
Modal	28	0.091	11.035	69.3328	4807.0343
Modal	29	0.088	11.343	71.2718	5079.6642
Modal	30	0.077	13.037	81.9169	6710.3846
Modal	31	0.076	13.185	82.8466	6863.5509
Modal	32	0.075	13.393	84.1528	7081.6917
Modal	33	0.074	13.598	85.4416	7300.2585
Modal	34	0.073	13.732	86.2826	7444.6798
Modal	35	0.072	13.931	87.5315	7661.7685
Modal	36	0.071	14.129	88.7755	7881.0824
Modal	37	0.07	14.384	90.378	8168.179
Modal	38	0.069	14.543	91.3773	8349.8033
Modal	39	0.067	14.883	93.5114	8744.3757
Modal	40	0.067	14.997	94.2265	8878.638

Table 4.1 - Modal Periods and Frequencies (continued)

Case	Mode	Period sec	Frequency cyc/sec	Circular Frequency rad/sec	Eigenvalue rad²/sec²
Modal	41	0.064	15.505	97.4186	9490.3795
Modal	42	0.062	16.018	100.645	10129.4074
Modal	43	0.06	16.745	105.2113	11069.4168
Modal	44	0.058	17.262	108.4622	11764.052
Modal	45	0.057	17.456	109.6766	12028.9476
Modal	46	0.057	17.672	111.0381	12329.452
Modal	47	0.056	17.742	111.4743	12426.5155
Modal	48	0.055	18.298	114.9692	13217.9228
Modal	49	0.054	18.578	116.7293	13625.7212
Modal	50	0.053	18.973	119.2081	14210.5764
Modal	51	0.051	19.475	122.3642	14972.9966
Modal	52	0.051	19.8	124.4061	15476.8664
Modal	53	0.049	20.344	127.828	16340.0019
Modal	54	0.049	20.353	127.8839	16354.3009
Modal	55	0.049	20.4	128.1754	16428.9428
Modal	56	0.048	21.037	132.1803	17471.6432
Modal	57	0.047	21.497	135.0693	18243.7231
Modal	58	0.046	21.749	136.6547	18674.517
Modal	59	0.046	21.834	137.1881	18820.5704
Modal	60	0.046	21.892	137.553	18920.8349
Modal	61	0.045	22.201	139.4904	19457.5851
Modal	62	0.044	22.91	143.9471	20720.775
Modal	63	0.043	23.255	146.1154	21349.7166
Modal	64	0.043	23.391	146.9722	21600.8167
Modal	65	0.042	23.545	147.9396	21886.1282
Modal	66	0.042	23.773	149.371	22311.7104
Modal	67	0.041	24.127	151.5942	22980.7963
Modal	68	0.041	24.502	153.9486	23700.1602
Modal	69	0.04	25.03	157.2708	24734.0992
Modal	70	0.04	25.118	157.8186	24906.7014
Modal	71	0.04	25.216	158.4345	25101.4946
Modal	72	0.039	25.507	160.2678	25685.7541
Modal	73	0.039	25.801	162.1097	26279.5525
Modal	74	0.038	26.064	163.764	26818.6636
Modal	75	0.038	26.357	165.6072	27425.7407
Modal	76	0.038	26.388	165.7978	27488.9005
Modal	77	0.038	26.441	166.1306	27599.3691
Modal	78	0.037	26.703	167.7821	28150.838
Modal	79	0.037	27.019	169.7662	28820.5464
Modal	80	0.037	27.137	170.5058	29072.2295
Modal	81	0.037	27.261	171.2828	29337.8046
Modal	82	0.036	27.885	175.2056	30697.0047
Modal	83	0.036	28.052	176.2545	31065.657
Modal	84	0.035	28.227	177.3573	31455.6199
Modal	85	0.035	28.316	177.9174	31654.5858

Table 4.1 - Modal Periods and Frequencies (continued)

Case	Mode	Period sec	Frequency cyc/sec	Circular Frequency rad/sec	Eigenvalue rad²/sec²
Modal	86	0.035	28.438	178.6811	31926.9396
Modal	87	0.034	29.095	182.8122	33420.3066
Modal	88	0.034	29.327	184.2688	33955.006
Modal	89	0.034	29.416	184.8273	34161.121
Modal	90	0.034	29.504	185.3815	34366.3121
Modal	91	0.034	29.574	185.821	34529.4392
Modal	92	0.034	29.633	186.1901	34666.748
Modal	93	0.034	29.821	187.3704	35107.6787
Modal	94	0.033	29.918	187.979	35336.1171
Modal	95	0.033	30.064	188.8966	35681.9077
Modal	96	0.033	30.109	189.179	35788.677
Modal	97	0.033	30.536	191.8613	36810.7591
Modal	98	0.032	30.952	194.4768	37821.2335
Modal	99	0.032	31.296	196.6392	38666.9806
Modal	100	0.032	31.611	198.6181	39449.1407
Modal	101	0.031	31.979	200.9304	40373.0107
Modal	102	0.031	32.02	201.188	40476.6147
Modal	103	0.031	32.099	201.6829	40675.9927
Modal	104	0.031	32.584	204.7302	41914.4736
Modal	105	0.031	32.649	205.1366	42081.0281
Modal	106	0.031	32.775	205.932	42407.9905
Modal	107	0.03	33.401	209.8632	44042.5574
Modal	108	0.029	33.943	213.2675	45483.0336
Modal	109	0.029	33.945	213.2846	45490.3112
Modal	110	0.029	34.01	213.6893	45663.1106
Modal	111	0.029	34.171	214.7048	46098.1467
Modal	112	0.029	34.251	215.2074	46314.2218
Modal	113	0.029	34.553	217.1001	47132.4419
Modal	114	0.029	34.899	219.2752	48081.5945
Modal	115	0.028	35.132	220.744	48727.9114
Modal	116	0.028	35.156	220.8943	48794.2898
Modal	117	0.028	35.564	223.4548	49932.0566
Modal	118	0.028	35.774	224.7731	50522.9632
Modal	119	0.028	36.127	226.994	51526.2849
Modal	120	0.027	36.397	228.6899	52299.0652
Modal	121	0.027	36.772	231.0477	53383.0267
Modal	122	0.027	37.402	235.0037	55226.7333
Modal	123	0.026	38.329	240.8289	57998.5448
Modal	124	0.026	38.414	241.3616	58255.4122
Modal	125	0.026	38.699	243.1545	59124.1263
Modal	126	0.025	39.326	247.0951	61055.9873
Modal	127	0.025	39.796	250.048	62524.0001
Modal	128	0.025	40.135	252.1761	63592.7937
Modal	129	0.025	40.283	253.1078	64063.5762
Modal	130	0.025	40.381	253.7197	64373.7058

Table 4.1 - Modal Periods and Frequencies (continued)

Case	Mode	Period sec	Frequency cyc/sec	Circular Frequency rad/sec	Eigenvalue rad²/sec²
Modal	131	0.024	40.822	256.4947	65789.5507
Modal	132	0.024	40.954	257.3237	66215.4625
Modal	133	0.024	41.298	259.4805	67330.1125
Modal	134	0.024	41.458	260.4897	67854.9061
Modal	135	0.024	41.671	261.8271	68553.4325
Modal	136	0.024	41.851	262.9602	69148.0593
Modal	137	0.024	42.031	264.0871	69742.0179
Modal	138	0.024	42.236	265.3745	70423.6416
Modal	139	0.023	42.592	267.6132	71616.8138
Modal	140	0.023	42.786	268.8304	72269.7924
Modal	141	0.023	43.529	273.5025	74803.6048
Modal	142	0.023	43.711	274.6421	75428.2617
Modal	143	0.023	43.748	274.8778	75557.8242
Modal	144	0.023	44.125	277.2436	76864.0105
Modal	145	0.023	44.292	278.2922	77446.5537
Modal	146	0.022	45.036	282.9681	80070.9596
Modal	147	0.022	45.436	285.4826	81500.2959
Modal	148	0.022	45.493	285.8411	81705.1108
Modal	149	0.022	45.542	286.1458	81879.4107
Modal	150	0.022	45.73	287.3307	82558.916
Modal	151	0.022	45.761	287.5268	82671.6749
Modal	152	0.022	45.877	288.2559	83091.4884
Modal	153	0.021	47.178	296.4258	87868.246
Modal	154	0.021	47.585	298.983	89390.8513
Modal	155	0.021	47.815	300.4322	90259.5368
Modal	156	0.021	48.127	302.3898	91439.5783
Modal	157	0.021	48.516	304.8331	92923.24
Modal	158	0.021	48.732	306.1928	93754.0145
Modal	159	0.021	48.751	306.3135	93827.9639
Modal	160	0.02	48.93	307.4356	94516.6661
Modal	161	0.02	49.018	307.9909	94858.4146
Modal	162	0.02	49.445	310.6712	96516.5692
Modal	163	0.02	49.623	311.7908	97213.4887
Modal	164	0.02	50.073	314.6199	98985.6728
Modal	165	0.02	50.156	315.1401	99313.2635
Modal	166	0.02	50.385	316.5787	100222.0658
Modal	167	0.02	50.692	318.5046	101445.1626
Modal	168	0.02	51.04	320.6947	102845.0869
Modal	169	0.019	51.288	322.2526	103846.7525
Modal	170	0.019	51.974	326.5644	106644.2901

Table 4.2 - Modal Participating Mass Ratios (Part 1 of 2)

Case	Mode	Period sec	UX	UY	UZ	Sum UX	Sum UY	Sum UZ
Modal	1	0.418	4.311E-05	0.4242	1.223E-05	4.311E-05	0.4242	1.223E-05
Modal	2	0.388	0.096	0.0008	0.0002	0.096	0.4251	0.0003
Modal	3	0.265	0.0108	0.0004	0.0002	0.1069	0.4254	0.0005
Modal	4	0.251	0.2565	0.0003	1.121E-05	0.3634	0.4257	0.0005
Modal	5	0.206	0.0012	0	0.1583	0.3646	0.4257	0.1588
Modal	6	0.198	0.0332	0.0001	0.0133	0.3978	0.4258	0.1721
Modal	7	0.188	6.982E-06	3.623E-06	0.0125	0.3978	0.4258	0.1846
Modal	8	0.182	0.0109	2.799E-05	0.0334	0.4087	0.4258	0.218
Modal	9	0.173	0.0045	0.0003	0.0123	0.4132	0.4261	0.2303
Modal	10	0.169	0.0016	0.0005	0.008	0.4149	0.4266	0.2383
Modal	11	0.168	0.004	0.0002	0.004	0.4189	0.4268	0.2423
Modal	12	0.167	0	0	0.003	0.4189	0.4268	0.2453
Modal	13	0.166	0.0007	0.0014	0.0376	0.4195	0.4282	0.2829
Modal	14	0.162	3.103E-05	7.166E-06	0.0003	0.4196	0.4282	0.2832
Modal	15	0.152	4.446E-05	0.0002	0.0082	0.4196	0.4284	0.2914
Modal	16	0.145	0.0001	0.0088	0.0249	0.4196	0.4372	0.3163
Modal	17	0.138	0.0004	0.0035	0.0132	0.42	0.4407	0.3295
Modal	18	0.138	0.0003	0.0188	0.0442	0.4203	0.4595	0.3737
Modal	19	0.123	4.548E-05	1.541E-05	0.0053	0.4204	0.4595	0.3791
Modal	20	0.119	0.0004	0.0001	0.0007	0.4207	0.4596	0.3798
Modal	21	0.107	0.0089	0.0032	0.0002	0.4296	0.4628	0.38
Modal	22	0.105	0.0002	3.676E-05	3.219E-05	0.4298	0.4628	0.38
Modal	23	0.105	0.0049	0.0016	0.0003	0.4347	0.4645	0.3803
Modal	24	0.103	0.0161	0.0279	0.0005	0.4508	0.4923	0.3808
Modal	25	0.096	0.0008	0.0022	0.0021	0.4516	0.4945	0.3829
Modal	26	0.094	0.0009	2.366E-06	0.0022	0.4525	0.4945	0.3851
Modal	27	0.091	0.0007	7.493E-07	0.0156	0.4532	0.4945	0.4007
Modal	28	0.091	0.0045	0.0001	0.0012	0.4577	0.4946	0.4018
Modal	29	0.088	0.0001	0	0.0011	0.4579	0.4946	0.4029
Modal	30	0.077	0.0019	6.764E-06	0.0002	0.4597	0.4946	0.4032
Modal	31	0.076	0.0012	2.232E-05	0.0128	0.4609	0.4946	0.416
Modal	32	0.075	0.0006	0.0002	0.0249	0.4616	0.4948	0.4408
Modal	33	0.074	0.0081	0.0001	0.0003	0.4696	0.4949	0.4411
Modal	34	0.073	0.0003	0.0001	0.0036	0.4699	0.495	0.4448
Modal	35	0.072	0.0174	0.0001	0.0009	0.4873	0.4951	0.4457
Modal	36	0.071	0.0034	0.0002	0.001	0.4907	0.4953	0.4467
Modal	37	0.07	0.0039	0.0002	0.0019	0.4945	0.4956	0.4486
Modal	38	0.069	0.0151	0.0014	0.0003	0.5096	0.4969	0.4489
Modal	39	0.067	0.0005	3.728E-05	0.0133	0.5101	0.497	0.4621
Modal	40	0.067	0.0044	0.001	0.0001	0.5145	0.498	0.4622
Modal	41	0.064	0.0162	0.0013	0.0028	0.5307	0.4992	0.465
Modal	42	0.062	0.2444	0.0165	0.0004	0.7751	0.5158	0.4654
Modal	43	0.06	0.0382	0.0008	0.0002	0.8133	0.5166	0.4656
Modal	44	0.058	4.436E-05	1.57E-06	0.0005	0.8134	0.5166	0.4661
Modal	45	0.057	0.0004	0.0002	3.542E-05	0.8137	0.5168	0.4661

Table 4.2 - Modal Participating Mass Ratios (Part 1 of 2, continued)

Case	Mode	Period sec	UX	UY	UZ	Sum UX	Sum UY	Sum UZ
Modal	46	0.057	3.313E-05	0.0001	0.0001	0.8138	0.5169	0.4663
Modal	47	0.056	0.0043	0.0001	0.0006	0.8181	0.517	0.4668
Modal	48	0.055	3.005E-05	0	0.0007	0.8181	0.517	0.4675
Modal	49	0.054	0.0011	0.0001	0.001	0.8192	0.5172	0.4686
Modal	50	0.053	0.0008	0.0001	0.0013	0.8199	0.5173	0.4699
Modal	51	0.051	0.0026	0.0018	0.0003	0.8225	0.5191	0.4702
Modal	52	0.051	0.0013	0.003	4.909E-05	0.8238	0.5222	0.4702
Modal	53	0.049	0.0001	1.108E-05	0.0031	0.824	0.5222	0.4733
Modal	54	0.049	6.051E-06	0.0001	1.131E-05	0.824	0.5222	0.4733
Modal	55	0.049	0	0.0006	1.623E-05	0.824	0.5229	0.4733
Modal	56	0.048	0.0001	2.27E-05	0.0001	0.8241	0.5229	0.4734
Modal	57	0.047	4.36E-05	0.0003	6.461E-06	0.8241	0.5232	0.4734
Modal	58	0.046	2.499E-06	0.0001	0	0.8241	0.5233	0.4734
Modal	59	0.046	0.0011	0.071	8.551E-06	0.8252	0.5943	0.4734
Modal	60	0.046	0.001	0.0171	2.317E-05	0.8262	0.6114	0.4734
Modal	61	0.045	0.0001	0.0004	4.024E-05	0.8263	0.6118	0.4735
Modal	62	0.044	0	0	0.0002	0.8263	0.6118	0.4737
Modal	63	0.043	0.0001	1.989E-06	0.0006	0.8264	0.6118	0.4742
Modal	64	0.043	0.0005	3.309E-05	0.0098	0.8269	0.6118	0.484
Modal	65	0.042	0.0004	3.427E-05	0.0247	0.8273	0.6118	0.5087
Modal	66	0.042	0.0004	4.613E-05	0.0025	0.8276	0.6119	0.5112
Modal	67	0.041	0.0001	1.163E-05	0.0002	0.8277	0.6119	0.5114
Modal	68	0.041	5.039E-07	0.0005	0.0003	0.8277	0.6124	0.5117
Modal	69	0.04	3.491E-05	0	3.109E-05	0.8278	0.6124	0.5117
Modal	70	0.04	0	3.996E-05	0.0002	0.8278	0.6124	0.5118
Modal	71	0.04	0.0002	0.0003	0.0013	0.828	0.6127	0.5132
Modal	72	0.039	0.0007	0.0027	0.001	0.8286	0.6153	0.5142
Modal	73	0.039	2.349E-05	0.0001	0.0034	0.8286	0.6154	0.5176
Modal	74	0.038	0.0001	0.0001	0.0001	0.8287	0.6155	0.5177
Modal	75	0.038	0.0004	0.0034	1.514E-05	0.8291	0.6189	0.5177
Modal	76	0.038	0.0007	0.0045	0.0003	0.8298	0.6234	0.518
Modal	77	0.038	0.0002	0.0013	0.0011	0.83	0.6247	0.5191
Modal	78	0.037	0.0161	0.1047	2.074E-06	0.8461	0.7294	0.5191
Modal	79	0.037	0.0038	0.0096	0.0005	0.85	0.739	0.5197
Modal	80	0.037	0.0004	0.002	0.0002	0.8503	0.741	0.5199
Modal	81	0.037	0.0001	0.0004	0.0013	0.8504	0.7414	0.5213
Modal	82	0.036	0.0011	0.0101	0.0008	0.8515	0.7515	0.522
Modal	83	0.036	0.0002	0.0012	0.0001	0.8517	0.7527	0.5221
Modal	84	0.035	1.461E-05	0.0002	8.731E-06	0.8517	0.7528	0.5221
Modal	85	0.035	4.763E-06	0.0002	1.73E-05	0.8517	0.753	0.5221
Modal	86	0.035	3.144E-06	0.0001	0	0.8517	0.7531	0.5221
Modal	87	0.034	2.023E-06	1.004E-06	0.0041	0.8517	0.7531	0.5262
Modal	88	0.034	0.0008	0.0018	0.0047	0.8525	0.7549	0.5309
Modal	89	0.034	0.0057	0.0068	0.0013	0.8583	0.7617	0.5322

Table 4.2 - Modal Participating Mass Ratios (Part 1 of 2, continued)

Case	Mode	Period sec	UX	UY	UZ	Sum UX	Sum UY	Sum UZ
Modal	90	0.034	0.0003	0.001	0.0003	0.8586	0.7627	0.5325
Modal	91	0.034	0.0003	0.0001	0.0006	0.8589	0.7628	0.5332
Modal	92	0.034	8.574E-07	0.0006	0.0006	0.8589	0.7634	0.5338
Modal	93	0.034	0.0001	0	0.0001	0.859	0.7634	0.5338
Modal	94	0.033	2.684E-05	0	0.0028	0.8591	0.7634	0.5366
Modal	95	0.033	7.598E-07	1.044E-05	0.0001	0.8591	0.7634	0.5367
Modal	96	0.033	2.881E-05	0	0.0001	0.8591	0.7634	0.5369
Modal	97	0.033	0.0002	0.0002	0.0002	0.8593	0.7636	0.5371
Modal	98	0.032	3.251E-06	3.819E-05	0.0002	0.8593	0.7637	0.5372
Modal	99	0.032	0.0001	1.978E-05	0.0018	0.8594	0.7637	0.539
Modal	100	0.032	2.095E-06	0.0001	0.0005	0.8594	0.7638	0.5395
Modal	101	0.031	0	7.626E-06	0.0001	0.8594	0.7638	0.5396
Modal	102	0.031	2.128E-05	1.522E-05	0.0003	0.8594	0.7638	0.5399
Modal	103	0.031	5.933E-06	0.0002	0.0005	0.8594	0.764	0.5405
Modal	104	0.031	0.0003	0.0008	0.0094	0.8597	0.7647	0.5499
Modal	105	0.031	0.0001	0.0001	0.0017	0.8598	0.7648	0.5516
Modal	106	0.031	1.447E-05	0.0001	0.0141	0.8598	0.7649	0.5657
Modal	107	0.03	1.396E-05	0.0001	1.031E-05	0.8598	0.765	0.5657
Modal	108	0.029	0	0.0001	0.0019	0.8598	0.765	0.5676
Modal	109	0.029	1.362E-05	4.662E-05	0.0034	0.8598	0.7651	0.571
Modal	110	0.029	0.0003	0.0176	0.0016	0.8601	0.7827	0.5726
Modal	111	0.029	0.0006	0.0338	1.361E-05	0.8607	0.8165	0.5726
Modal	112	0.029	0	0	0.0033	0.8607	0.8165	0.576
Modal	113	0.029	0.0003	0.0187	0.0001	0.8609	0.8352	0.576
Modal	114	0.029	0	0	0	0.8609	0.8352	0.576
Modal	115	0.028	0.0001	0.0165	0.0001	0.8611	0.8516	0.5761
Modal	116	0.028	4.69E-05	0.0046	0.0006	0.8611	0.8563	0.5768
Modal	117	0.028	4.461E-05	0.0006	0.0012	0.8612	0.8569	0.578
Modal	118	0.028	1.496E-05	0.0005	0.0011	0.8612	0.8574	0.5791
Modal	119	0.028	2.504E-06	2.642E-05	4.47E-05	0.8612	0.8574	0.5792
Modal	120	0.027	0.0002	0.0001	2.751E-05	0.8614	0.8575	0.5792
Modal	121	0.027	4.366E-05	0.0002	3.992E-05	0.8614	0.8577	0.5793
Modal	122	0.027	0.0001	0.0003	0.0012	0.8615	0.858	0.5805
Modal	123	0.026	0	0.0001	0.0003	0.8615	0.8581	0.5808
Modal	124	0.026	0	4.168E-05	0.0001	0.8615	0.8581	0.5809
Modal	125	0.026	0	0.0005	0.0013	0.8615	0.8586	0.5822
Modal	126	0.025	2.544E-06	9.784E-07	0.0029	0.8615	0.8586	0.5852
Modal	127	0.025	3.474E-06	7.853E-06	0.001	0.8615	0.8586	0.5862
Modal	128	0.025	4.811E-05	0.0001	1.477E-05	0.8615	0.8587	0.5862
Modal	129	0.025	1.098E-05	0.0001	0.0017	0.8615	0.8588	0.5879
Modal	130	0.025	0.0108	0.0004	0.0001	0.8724	0.8591	0.5879
Modal	131	0.024	3.269E-05	0.0003	0.0068	0.8724	0.8594	0.5947
Modal	132	0.024	0	0.0001	0.0028	0.8724	0.8594	0.5975
Modal	133	0.024	1.211E-06	1.341E-05	0.0001	0.8724	0.8595	0.5976

Table 4.2 - Modal Participating Mass Ratios (Part 1 of 2, continued)

Case	Mode	Period sec	UX	UY	UZ	Sum UX	Sum UY	Sum UZ
Modal	134	0.024	7.185E-07	9.306E-07	0.0017	0.8724	0.8595	0.5992
Modal	135	0.024	0	3.652E-06	0.0013	0.8724	0.8595	0.6006
Modal	136	0.024	3.19E-06	0.0001	8.574E-06	0.8724	0.8595	0.6006
Modal	137	0.024	2.383E-06	8.027E-06	0.0012	0.8724	0.8595	0.6017
Modal	138	0.024	0.0001	4.66E-05	7.216E-07	0.8725	0.8596	0.6017
Modal	139	0.023	2.302E-05	7.206E-06	0.0002	0.8725	0.8596	0.6019
Modal	140	0.023	9.218E-07	8.571E-07	0.0003	0.8725	0.8596	0.6022
Modal	141	0.023	0.0001	0.0005	0.0049	0.8726	0.8601	0.6071
Modal	142	0.023	1.896E-06	1.655E-05	0.0019	0.8726	0.8601	0.609
Modal	143	0.023	1.117E-06	0.0001	0.0056	0.8726	0.8602	0.6146
Modal	144	0.023	0.0002	0.0026	0.0011	0.8728	0.8628	0.6157
Modal	145	0.023	8.507E-07	6.363E-06	0.0003	0.8728	0.8628	0.6159
Modal	146	0.022	4.172E-06	0.0001	3.005E-05	0.8728	0.8629	0.616
Modal	147	0.022	1.655E-06	3.393E-05	0.0003	0.8728	0.863	0.6163
Modal	148	0.022	9.362E-07	0.0001	0.0003	0.8728	0.8631	0.6166
Modal	149	0.022	2.557E-06	0.0001	0.0025	0.8728	0.8632	0.6191
Modal	150	0.022	0	9.79E-07	0.0001	0.8728	0.8632	0.6192
Modal	151	0.022	1.881E-06	3.983E-06	2.661E-05	0.8728	0.8632	0.6192
Modal	152	0.022	4.802E-06	0.0001	0.0002	0.8728	0.8632	0.6194
Modal	153	0.021	0	0.0006	1.255E-06	0.8728	0.8638	0.6194
Modal	154	0.021	1.135E-05	0.0005	0.0004	0.8728	0.8643	0.6199
Modal	155	0.021	0.0022	0.0307	0.0002	0.8751	0.8949	0.6201
Modal	156	0.021	1.561E-05	0.0002	3.056E-05	0.8751	0.8952	0.6201
Modal	157	0.021	0.0002	0.0001	0.0006	0.8753	0.8953	0.6207
Modal	158	0.021	0.0001	0.0001	0.0005	0.8754	0.8953	0.6212
Modal	159	0.021	0.0023	0.0001	0.0013	0.8778	0.8954	0.6225
Modal	160	0.02	0.0068	3.514E-05	0.0003	0.8846	0.8954	0.6228
Modal	161	0.02	1.188E-05	5.251E-06	0.0004	0.8846	0.8954	0.6233
Modal	162	0.02	0.0217	0.0264	0.0001	0.9063	0.9218	0.6233
Modal	163	0.02	0.0003	0.0002	0.0001	0.9066	0.9221	0.6234
Modal	164	0.02	7.494E-06	9.92E-06	0.0007	0.9066	0.9221	0.6241
Modal	165	0.02	2.97E-05	1.963E-05	0.0002	0.9066	0.9221	0.6243
Modal	166	0.02	1.774E-05	3.874E-05	1.197E-05	0.9067	0.9221	0.6243
Modal	167	0.02	4.036E-05	0.0002	0.0001	0.9067	0.9223	0.6244
Modal	168	0.02	2.744E-05	2.784E-05	0.0002	0.9067	0.9223	0.6246
Modal	169	0.019	2.204E-06	5.969E-07	0.0007	0.9067	0.9223	0.6253
Modal	170	0.019	2.723E-05	4.25E-06	2.79E-05	0.9068	0.9223	0.6253

Table 4.2 - Modal Participating Mass Ratios (Part 2 of 2)

Case	Mode	RX	RY	RZ	Sum RX	Sum RY	Sum RZ
Modal	1	0.2156	0.0003	0.0178	0.2156	0.0003	0.0178
Modal	2	0.0004	0.0109	0.3496	0.216	0.0112	0.3673
Modal	3	0.0006	0.0696	0.0011	0.2166	0.0808	0.3685
Modal	4	0.0003	0.0693	0.1142	0.217	0.1501	0.4827
Modal	5	0.0067	0.3615	0.0004	0.2237	0.5116	0.4831

Table 4.2 - Modal Participating Mass Ratios (Part 2 of 2, continued)

Case	Mode	RX	RY	RZ	Sum RX	Sum RY	Sum RZ
Modal	6	0.0007	0.0012	0.0128	0.2243	0.5128	0.4959
Modal	7	0.077	0.0034	5E-05	0.3014	0.5161	0.4959
Modal	8	0.0004	0.0554	0.0009	0.3018	0.5715	0.4968
Modal	9	0.0253	8.726E-06	0.0024	0.3271	0.5715	0.4992
Modal	10	0.0226	0.0028	0.0008	0.3497	0.5743	0.5
Modal	11	2.455E-06	0.0091	0.0037	0.3497	0.5834	0.5037
Modal	12	0.0005	0.0005	0	0.3502	0.5838	0.5037
Modal	13	0.0144	0.0401	0.0001	0.3646	0.6239	0.5039
Modal	14	0.0005	0.001	0.0002	0.365	0.6249	0.5041
Modal	15	0.0012	0.0318	0.0001	0.3662	0.6567	0.5041
Modal	16	0.0043	0.0067	0.0658	0.3705	0.6635	0.57
Modal	17	0.0001	0.0109	0.005	0.3706	0.6744	0.575
Modal	18	0.0128	0.0209	0.0767	0.3835	0.6953	0.6517
Modal	19	0.0096	0.0001	0.0001	0.393	0.6954	0.6518
Modal	20	0.0005	0.0001	0.0008	0.3936	0.6955	0.6527
Modal	21	0.0005	0.0001	0.0046	0.3941	0.6956	0.6572
Modal	22	0.001	5.882E-06	2.064E-05	0.395	0.6956	0.6573
Modal	23	1.83E-05	0.0017	2.161E-05	0.3951	0.6973	0.6573
Modal	24	0.0001	0.0018	0.1345	0.3951	0.6991	0.7918
Modal	25	1.517E-06	0.004	0.011	0.3951	0.7031	0.8028
Modal	26	0.0005	0.0004	0.0022	0.3957	0.7034	0.805
Modal	27	0.0068	0.0024	0.0015	0.4024	0.7058	0.8065
Modal	28	0.0021	0.001	0.0067	0.4045	0.7068	0.8131
Modal	29	0.0018	0.0002	0.0003	0.4063	0.7071	0.8134
Modal	30	0.0039	0.0014	0.0005	0.4102	0.7085	0.8139
Modal	31	0.069	0.0089	0.0002	0.4792	0.7174	0.8142
Modal	32	0.0009	0.0012	0.001	0.4801	0.7186	0.8151
Modal	33	0.0101	0.0015	0.0012	0.4902	0.7201	0.8163
Modal	34	0.0001	0.0003	0.0012	0.4903	0.7204	0.8175
Modal	35	0.0068	0.0025	3.07E-06	0.497	0.7229	0.8175
Modal	36	0.0048	0.0002	0.0012	0.5018	0.7231	0.8188
Modal	37	0.0001	0.0031	0.0004	0.502	0.7262	0.8192
Modal	38	0.0026	0.0002	0.0005	0.5045	0.7264	0.8197
Modal	39	0.0234	4.784E-06	7.166E-07	0.5279	0.7264	0.8197
Modal	40	0.0052	0.0012	0.0003	0.5331	0.7276	0.82
Modal	41	0.0004	0.0004	0.0005	0.5335	0.728	0.8205
Modal	42	0.0011	0.0056	0.0012	0.5346	0.7337	0.8217
Modal	43	2.972E-05	0.0008	0.0001	0.5347	0.7344	0.8218
Modal	44	0.0044	0.0002	0	0.5391	0.7346	0.8218
Modal	45	0.0052	4.567E-05	0.0001	0.5443	0.7347	0.8219
Modal	46	0.0103	1.43E-05	0.0007	0.5545	0.7347	0.8226
Modal	47	0.0123	0.0005	0.0009	0.5668	0.7352	0.8235
Modal	48	0.0014	0.0004	2.479E-06	0.5682	0.7356	0.8235
Modal	49	0.0002	0.0005	0.0003	0.5684	0.7362	0.8238
Modal	50	0.003	0.0002	2.122E-06	0.5714	0.7364	0.8238
Modal	51	0.0001	0.0002	0.0001	0.5715	0.7366	0.824

Table 4.2 - Modal Participating Mass Ratios (Part 2 of 2, continued)

Case	Mode	RX	RY	RZ	Sum RX	Sum RY	Sum RZ
Modal	52	0.0047	0.0024	0.0007	0.5762	0.7389	0.8246
Modal	53	0.0001	0.0008	0.0001	0.5763	0.7397	0.8247
Modal	54	4.997E-05	0.0001	0.0001	0.5763	0.7398	0.8247
Modal	55	0.0023	1.779E-05	0.001	0.5786	0.7398	0.8258
Modal	56	0.0011	1.043E-05	0	0.5797	0.7398	0.8258
Modal	57	0.0034	2.388E-06	1.339E-05	0.5831	0.7398	0.8258
Modal	58	2.106E-05	0.0002	1.641E-05	0.5831	0.74	0.8258
Modal	59	0.0104	0	0.0105	0.5936	0.74	0.8363
Modal	60	0.0059	0.0002	0.0036	0.5995	0.7402	0.8399
Modal	61	0.0008	2.309E-05	0.0001	0.6003	0.7402	0.8399
Modal	62	0.0007	0.0001	4.313E-05	0.601	0.7403	0.84
Modal	63	2.424E-05	0.0008	0.0001	0.601	0.7412	0.8401
Modal	64	0.0003	0.0056	0.0005	0.6013	0.7468	0.8406
Modal	65	0.001	0.0202	0.0001	0.6022	0.767	0.8408
Modal	66	0.0004	0.0005	0.0009	0.6026	0.7674	0.8417
Modal	67	0.0002	0	0.0001	0.6028	0.7674	0.8418
Modal	68	0.0013	0.0025	0.0001	0.6041	0.7699	0.8419
Modal	69	0.0018	1.396E-05	2.938E-05	0.6059	0.7699	0.8419
Modal	70	0.0001	0.0002	5.679E-06	0.606	0.7701	0.8419
Modal	71	0.0002	0.0001	0.0006	0.6062	0.7702	0.8425
Modal	72	0.0001	0.0006	0.0029	0.6063	0.7708	0.8454
Modal	73	0.0001	0.0003	4.663E-05	0.6065	0.7711	0.8455
Modal	74	0.0084	0.0004	0.0001	0.6149	0.7715	0.8456
Modal	75	0.0021	0.0005	0.002	0.6169	0.772	0.8476
Modal	76	0.0002	0.0011	0.0027	0.6171	0.7731	0.8503
Modal	77	0.0005	0.0017	0.0006	0.6176	0.7748	0.8509
Modal	78	0.0049	0.0001	0.0657	0.6225	0.7749	0.9166
Modal	79	0	0.0012	0.0071	0.6225	0.7761	0.9238
Modal	80	0.0007	0.0004	0.0006	0.6232	0.7764	0.9244
Modal	81	0.0001	2.031E-05	0.0002	0.6233	0.7765	0.9246
Modal	82	0.002	0.0024	0.0037	0.6253	0.7788	0.9284
Modal	83	0.0002	0.0004	0.0004	0.6255	0.7792	0.9287
Modal	84	0.0001	4.684E-05	0	0.6256	0.7793	0.9287
Modal	85	7.624E-06	0.0002	0.0002	0.6256	0.7795	0.929
Modal	86	1.122E-06	0.0008	1.55E-06	0.6256	0.7803	0.929
Modal	87	0.0011	0.0006	2.913E-06	0.6267	0.7808	0.929
Modal	88	0.003	0.0015	0.0015	0.6297	0.7824	0.9304
Modal	89	0.0035	0.0008	0.0059	0.6332	0.7832	0.9363
Modal	90	0.0028	0.0001	0.0004	0.6361	0.7833	0.9367
Modal	91	0.0037	2.175E-06	0.0002	0.6397	0.7833	0.9369
Modal	92	4.399E-05	0.0009	4.251E-06	0.6398	0.7842	0.9369
Modal	93	0.0004	0.0008	0.0001	0.6402	0.785	0.937
Modal	94	4.54E-06	0.0005	3.692E-06	0.6402	0.7855	0.937
Modal	95	0.0004	2.09E-05	1.404E-05	0.6406	0.7855	0.937
Modal	96	0.0002	0.0001	2.075E-05	0.6408	0.7856	0.937
Modal	97	0.0003	3.244E-06	0.0001	0.6411	0.7856	0.9372

Table 4.2 - Modal Participating Mass Ratios (Part 2 of 2, continued)

Case	Mode	RX	RY	RZ	Sum RX	Sum RY	Sum RZ
Modal	98	1.998E-05	0.0001	2.417E-06	0.6411	0.7857	0.9372
Modal	99	0.0001	2.365E-05	0.0001	0.6413	0.7857	0.9372
Modal	100	0	0.0004	1.457E-06	0.6413	0.7861	0.9373
Modal	101	0	0	0	0.6413	0.7861	0.9373
Modal	102	0.0001	0.0001	7.601E-06	0.6413	0.7862	0.9373
Modal	103	0.0001	0.0018	2.107E-06	0.6414	0.788	0.9373
Modal	104	0.0067	0.0012	0.0003	0.6481	0.7892	0.9376
Modal	105	0.0007	0.0002	0	0.6487	0.7893	0.9376
Modal	106	0.0002	0.0033	7.146E-07	0.6489	0.7927	0.9376
Modal	107	0.0003	0.0002	7.854E-06	0.6492	0.7929	0.9376
Modal	108	0.0034	0.0004	6.216E-07	0.6526	0.7933	0.9376
Modal	109	0.0105	7.869E-06	4.785E-05	0.6631	0.7933	0.9376
Modal	110	0.0006	0.0005	2.345E-05	0.6636	0.7938	0.9376
Modal	111	0.002	0.0003	0.0001	0.6657	0.794	0.9377
Modal	112	0.0001	0.0005	0	0.6657	0.7945	0.9377
Modal	113	0.0005	0.001	0.0008	0.6662	0.7955	0.9385
Modal	114	0	0.0001	0	0.6662	0.7956	0.9385
Modal	115	0.0119	0.0005	0.0003	0.6781	0.7961	0.9388
Modal	116	0.0057	0.0047	4.996E-05	0.6838	0.8008	0.9388
Modal	117	0.0003	6.066E-06	1.352E-05	0.6841	0.8008	0.9388
Modal	118	0.0062	0.0007	5.066E-06	0.6903	0.8015	0.9388
Modal	119	0.0001	1.744E-05	8.707E-06	0.6904	0.8015	0.9388
Modal	120	1.014E-05	0.0003	5.187E-07	0.6904	0.8018	0.9388
Modal	121	0.0003	0.0003	0	0.6906	0.8021	0.9388
Modal	122	7.687E-06	0.0008	0	0.6906	0.8029	0.9388
Modal	123	0.0019	3.559E-05	0	0.6926	0.8029	0.9388
Modal	124	0.0006	0.0001	0	0.6932	0.803	0.9388
Modal	125	0.001	1.036E-05	6.274E-06	0.6941	0.803	0.9389
Modal	126	3.513E-06	0.0022	0	0.6941	0.8052	0.9389
Modal	127	0.0001	0.0005	0	0.6943	0.8057	0.9389
Modal	128	0.0002	0.0008	1.639E-06	0.6945	0.8065	0.9389
Modal	129	0.0002	0.0003	1.026E-06	0.6947	0.8068	0.9389
Modal	130	2.499E-05	0.0051	0.0001	0.6947	0.8119	0.9389
Modal	131	0.0001	4.887E-05	7.565E-06	0.6949	0.812	0.9389
Modal	132	0.0011	0.0014	2.131E-06	0.696	0.8133	0.9389
Modal	133	0.0002	0.0006	8.487E-07	0.6962	0.8139	0.9389
Modal	134	6.128E-07	0.0001	0	0.6962	0.814	0.9389
Modal	135	0.0001	0.0018	1.96E-06	0.6962	0.8158	0.9389
Modal	136	5.488E-07	0.0002	0	0.6962	0.8161	0.9389
Modal	137	1.195E-05	0.0004	6.039E-06	0.6962	0.8165	0.9389
Modal	138	2.425E-05	0.0002	5.837E-06	0.6963	0.8167	0.9389
Modal	139	0.0007	4.055E-05	2.475E-06	0.697	0.8167	0.9389
Modal	140	0.0001	3.461E-05	1.891E-06	0.6971	0.8167	0.9389
Modal	141	1.939E-05	0.0037	0.0002	0.6971	0.8204	0.9391
Modal	142	0.0002	1.17E-05	3.383E-05	0.6973	0.8204	0.9391
Modal	143	0.0001	0.0039	0.0001	0.6974	0.8243	0.9393

Table 4.2 - Modal Participating Mass Ratios (Part 2 of 2, continued)

Case	Mode	RX	RY	RZ	Sum RX	Sum RY	Sum RZ
Modal	144	0.0006	0.0005	0.0012	0.698	0.8248	0.9404
Modal	145	0.0001	0.0001	9.378E-06	0.6981	0.8249	0.9404
Modal	146	4.251E-05	0.0003	7.874E-06	0.6981	0.8251	0.9404
Modal	147	0.0002	9.257E-06	0	0.6984	0.8251	0.9404
Modal	148	0.0006	0.0001	1.019E-05	0.6989	0.8252	0.9404
Modal	149	0.0002	0.001	1.974E-05	0.6991	0.8263	0.9405
Modal	150	3.381E-05	1.24E-06	1.881E-06	0.6992	0.8263	0.9405
Modal	151	1.403E-05	2.2E-05	1.48E-05	0.6992	0.8263	0.9405
Modal	152	0.0001	2.519E-05	1.016E-05	0.6993	0.8263	0.9405
Modal	153	0.0001	0.0001	0.0001	0.6994	0.8265	0.9406
Modal	154	0.0021	0.001	1.837E-05	0.7014	0.8275	0.9406
Modal	155	0.0081	0.0015	0.0081	0.7096	0.829	0.9487
Modal	156	0.0004	1.228E-05	0.0001	0.71	0.829	0.9487
Modal	157	0.0003	3.357E-05	2.417E-05	0.7103	0.829	0.9488
Modal	158	0.0001	0.0005	1.16E-05	0.7104	0.8295	0.9488
Modal	159	4.713E-05	0.0004	0.0003	0.7104	0.8299	0.949
Modal	160	2.526E-05	0.0019	0.0016	0.7105	0.8318	0.9506
Modal	161	0.0001	8.631E-06	4.858E-06	0.7106	0.8318	0.9506
Modal	162	0.0086	0.0081	0.003	0.7191	0.8399	0.9536
Modal	163	1.118E-05	0.0005	0.0001	0.7191	0.8405	0.9537
Modal	164	0.0002	1.516E-05	9.557E-07	0.7193	0.8405	0.9537
Modal	165	0.0001	0.0001	3.06E-05	0.7193	0.8406	0.9537
Modal	166	0	2.005E-05	0	0.7193	0.8406	0.9537
Modal	167	0.0004	0.0001	3.36E-05	0.7197	0.8407	0.9537
Modal	168	0.0014	2.61E-06	1.284E-05	0.7211	0.8407	0.9537
Modal	169	0.0012	1.19E-06	0.0001	0.7223	0.8407	0.9538
Modal	170	0.0002	0.0001	2.346E-05	0.7225	0.8408	0.9538

5 Design Data

This chapter provides design data and results.

5.1 Steel Frame Design

Table 5.1 - Steel Frame Preferences - AISC 360-10

Item	Value
Multi-Response Design	Step-by-Step - All
Frame Type	SCBF
Seismic Design Grade	D
Importance Factor	1
Design System Rho	1.3
Design System Sds	0.592
Design System R	1
Design System Omega0	2
Design System Cd	5
Design Provision	LRFD
Analysis Method	Direct Analysis
Second Order Method	General 2nd Order
Stiffness Reduction Method	Tau-b Fixed
Phi (Bending)	0.9
Phi (Compression)	0.9
Phi (Tension-Yielding)	0.9
Phi (Tension-Fracture)	0.75
Phi (Shear)	0.9
Phi (Shear-Short Webbed Rolled I)	1
Phi (Torsion)	0.9
Ignore Seismic Code?	No
Ignore Special Seismic Load?	No
Doubler Plate Plug-Welded?	Yes
HSS Welding Type	ERW
Reduced HSS Thickness	No
Consider Deflection?	Yes
DL Ratio	120
SDL+LL Ratio	120
LL Ratio	360
Total Ratio	240
Total Camber Limit	240
Pattern Live Load Factor	0.75
D/C Ratio Limit	0.95

Table 5.2 - Steel Column Envelope (Part 1 of 2)

Label	Story	Section	Moment Interaction Check	PMM Combo	
C16	Story5	HSS6X6X1/4	Section is not seismically compact for highly ductile members (AISC 341-10 Table D1.1)	(R=MIXED) D + RSY + rsx	
C18	Story5	HSS6X6X1/4	Section is not seismically compact for highly ductile members (AISC 341-10 Table D1.1)	1.2D+1.6S+1.0L	
C19	Story5	HSS6X6X1/4	Section is not seismically compact for highly ductile members (AISC 341-10 Table D1.1)	1.2D+1.6S+1.0L	
C20	Story5	HSS6X6X1/4	Section is not seismically compact for highly ductile members (AISC 341-10 Table D1.1)	1.2D+1.6S+1.0L	*
C21	Story5	HSS6X6X1/4	Section is not seismically compact for highly ductile members (AISC 341-10 Table D1.1)	1.2D+1.6S+1.0L	
C23	Story5	HSS6X6X1/4	Section is not seismically compact for highly ductile members (AISC 341-10 Table D1.1)	1.2D+1.6S+1.0L	
C25	Story5	HSS6X6X1/4	Section is not seismically compact for highly ductile members (AISC 341-10 Table D1.1)	(R=MIXED) D + RSY + rsx	
C31	Story5	HSS6X6X1/4	Section is not seismically compact for highly ductile members (AISC 341-10 Table D1.1)	1.2D+1.6S+1.0L	
C53	Story5	HSS6X6X1/2	0.675 = 0.675 + 0 + 0	(R=MIXED) D + L + S + RSY + rsx	
C54	Story5	HSS6X6X1/2	0.227 = 0.227 + 0 + 0	(R=MIXED) D + L + S + RSY + rsx	
C55	Story5	HSS6X6X1/2	0.1 = 0.031 + 0.06 + 0.009	(R=MIXED) D + L + S + RSY + rsx	
C56	Story5	HSS6X6X1/2	0.853 = 0.853 + 0 + 0	(R=MIXED) D + L + S + RSY + rsx	
C58	Story5	HSS6X6X1/4	Section is not seismically compact for highly ductile members (AISC 341-10 Table D1.1)	1.2D+1.6S+1.0L	
C60	Story5	HSS6X6X1/4	Section is not seismically compact for highly ductile members (AISC 341-10 Table D1.1)	1.2D+1.6S+1.0L	*
C62	Story5	HSS6X6X1/4	Section is not seismically compact for highly ductile members (AISC 341-10 Table D1.1)	1.2D+1.6S+1.0L	
C1	Story4	W6X25	0.021 = 0.021 + 0 + 0	(R=MIXED) D + RSY + rsx	
C3	Story4	W6X25	0.36 = 0.36 + 0 + 0	1.2D+1.6S+1.0L	
C4	Story4	W6X25	0.204 = 0.204 + 0 + 0	1.2D+1.6S+1.0L	
C5	Story4	W6X25	0.142 = 0.06 + 0 + 0.081	1.2D+1.6S+1.0L	
C7	Story4	W6X25	0.131 = 0.057 + 0 + 0.073	1.2D+1.6S+1.0L	
C8	Story4	W6X25	0.118 = 0.048 + 0 + 0.069	1.2D+1.6S+1.0L	
C9	Story4	HSS6X6X1/4	Section is not seismically compact for highly ductile members (AISC 341-10 Table D1.1)	1.2D+1.6S+1.0L	
C11	Story4	HSS6X6X1/4	Section is not seismically compact for highly ductile members (AISC 341-10 Table D1.1)	1.2D+1.6S+1.0L	*
C12	Story4	W6X25	0.112 = 0.048 + 0 + 0.063	1.2D+1.6S+1.0L	
C13	Story4	W6X25	0.055 = 0.055 + 0 + 0	1.2D+1.6S+1.0L	
C15	Story4	HSS6X6X1/2	0.101 = 0.062 + 0.026 + 0.013	1.2D+1.6S+1.0L	
C17	Story4	HSS6X6X1/2	0.103 = 0.02 + 0 + 0.083	(R=MIXED) D + L + S + RSX + rsy	
C22	Story4	HSS6X6X1/2	0.094 = 0.023 + 0 + 0.071	(R=MIXED) D + L + S + RSX + rsy	
C24	Story4	HSS6X6X1/2	0.099 = 0.06 + 0.023 + 0.015	1.2D+1.6S+1.0L	
C26	Story4	HSS6X6X1/2	0.257 = 0.257 + 0 + 0	(R=MIXED) D + L + S + RSY + rsx	
C28	Story4	HSS6X6X1/2	0.122 = 0.066 + 0.015 + 0.041	1.2D+1.6S+1.0L	
C29	Story4	HSS6X6X1/2	0.437 = 0.437 + 0 + 0	(R=MIXED) D + L + S + RSY + rsx	
C32	Story4	HSS6X6X1/2	0.308 = 0.308 + 0 + 0	(R=MIXED) D + RSY + rsx	

* Indicates members that are not part of the SFRS and therefore need not conform to the ductility requirements. See gravity system section.

Table 5.2 - Steel Column Envelope (Part 1 of 2, continued)

Label	Story	Section	Moment Interaction Check	PMM Combo	
C33	Story4	HSS6X6X1/4	Section is not seismically compact for highly ductile members (AISC 341-10 Table D1.1)	1.2D+1.6S+1.0L	*
C34	Story4	HSS6X6X1/2	0.117 = 0.023 + 0.066 + 0.028	(R=MIXED) D + L + S + RSY + rsx	
C39	Story4	HSS6X6X1/2	0.147 = 0.044 + 0.063 + 0.039	(R=MIXED) D + L + S + RSY + rsx	
C40	Story4	HSS6X6X1/2	0.036 = 0.013 + 0.023 + 0	(R=MIXED) D + L + S + RSY + rsx	
C42	Story4	HSS6X6X1/2	0.199 = 0.015 + 0.182 + 0.002	(R=MIXED) D + L + S + RSY + rsx	
C44	Story4	HSS6X6X1/2	0.169 = 0.007 + 0.156 + 0.006	(R=MIXED) D + L + S + RSY + rsx	
C45	Story4	HSS6X6X1/2	0.053 = 0.053 + 0 + 0	(R=MIXED) D + RSY + rsx	
C48	Story4	HSS6X6X1/4	Section is not seismically compact for highly ductile members (AISC 341-10 Table D1.1)	1.2D+1.6S+1.0L	
C49	Story4	HSS6X6X1/4	Section is not seismically compact for highly ductile members (AISC 341-10 Table D1.1)	1.2D+1.6S+1.0L	
C50	Story4	HSS6X6X1/4	Section is not seismically compact for highly ductile members (AISC 341-10 Table D1.1)	1.2D+1.6S+1.0L	*
C52	Story4	HSS6X6X1/4	Section is not seismically compact for highly ductile members (AISC 341-10 Table D1.1)	1.2D+1.6S+1.0L	
C57	Story4	HSS6X6X1/4	Section is not seismically compact for highly ductile members (AISC 341-10 Table D1.1)	1.2D+1.6S+1.0L	
C30	Story3	HSS6X6X1/2	0.065 = 0.047 + 0 + 0.018	1.2D+1.6S+1.0L	
C59	Story3	W10X45	0.205 = 0.205 + 0 + 0.001	1.2D+1.6S+1.0L	
C61	Story3	W10X45	0.099 = 0.098 + 0 + 0.001	1.2D+1.6S+1.0L	
C2	Story2	W10X49	W10x49 COLUMNS ARE PART OF THE LOWER OCBF SYSTEM AND THEREFORE NEED NOT MEET REQUIREMENTS FOR HIGHLY DUCTILE MEMBERS		
C6	Story2	W10X49	Section is not seismically compact for highly ductile members (AISC 341-10 Table D1.1)	1.2D+1.6S+1.0L	
C47	Story2	W10X49	Section is not seismically compact for highly ductile members (AISC 341-10 Table D1.1)	1.2D+1.6S+1.0L	
C51	Story2	W10X49	Section is not seismically compact for highly ductile members (AISC 341-10 Table D1.1)	(R=MIXED) D + L + S + RSY + rsx	
C14	Story1	HSS6X6X1/4	Section is not seismically compact for highly ductile members (AISC 341-10 Table D1.1)	1.2D+1.6L+0.5S	
C36	Story1	HSS6X6X1/4	Section is not seismically compact for highly ductile members (AISC 341-10 Table D1.1)	1.2D+1.6L+0.5S	
C37	Story1	HSS6X6X1/4	Section is not seismically compact for highly ductile members (AISC 341-10 Table D1.1)	1.2D+1.6L+0.5S	*
C38	Story1	HSS6X6X1/4	Section is not seismically compact for highly ductile members (AISC 341-10 Table D1.1)	1.2D+1.6L+0.5S	

Table 5.2 - Steel Column Envelope (Part 2 of 2)

Label	Story	V22 Ratio	V33 Ratio	Class	Cont. Plate in²	Dbl. Plate in	B/C Ratio Major	B/C Ratio Minor
C16	Story5	0.056	0.004	Compact			0	0
C18	Story5	0.011	0.028	Compact				
C19	Story5	0.005	0.069	Compact				
C20	Story5	0.015	0.013	Compact				
C21	Story5	0.004	0.085	Compact				

* Indicates members that are not part of the SFRS and therefore need not conform to the ductility requirements. See gravity system section.

Table 5.2 - Steel Column Envelope (Part 2 of 2, continued)

Label	Story	V22 Ratio	V33 Ratio	Class	Cont. Plate in²	Dbl. Plate in	B/C Ratio Major	B/C Ratio Minor
C23	Story5	0.009	0.025	Compact				
C25	Story5	0.058	0.003	Compact			0	0
C31	Story5	0	0.001	Compact				
C53	Story5	0.106	0.284	Seismic HD			0	0
C54	Story5	0.007	0.003	Seismic HD			0	0
C55	Story5	0.005	0.002	Seismic HD			0	0
C56	Story5	0.11	0.286	Seismic HD			0	0
C58	Story5	0.002	0.002	Compact				
C60	Story5	0.006	0.001	Compact				
C62	Story5	0.004	0.003	Compact				
C1	Story4	0	0	Seismic HD			0	0
C3	Story4	0	0	Seismic HD				
C4	Story4	0	0	Seismic HD				
C5	Story4	0	0.002	Seismic HD				
C7	Story4	0	0.002	Seismic HD				
C8	Story4	0	0.002	Seismic HD				
C9	Story4	0	0.005	Compact				
C11	Story4	0	0.005	Compact				
C12	Story4	0	0.002	Seismic HD				
C13	Story4	0	0	Seismic HD				
C15	Story4	0.002	0.002	Seismic HD				
C17	Story4	0.001	0.01	Seismic HD			0	0
C22	Story4	0.001	0.009	Seismic HD			0	0
C24	Story4	0.002	0.003	Seismic HD				
C26	Story4	0.002	0	Seismic HD			0	0
C28	Story4	0.001	0.002	Seismic HD				
C29	Story4	0.009	0.009	Seismic HD			0	0
C32	Story4	0.009	0.01	Seismic HD			0	0
C33	Story4	0.002	0	Compact				
C34	Story4	0.009	0.011	Seismic HD			0	0
C39	Story4	0.009	0.012	Seismic HD			0	0
C40	Story4	0.001	0	Seismic HD			0	0
C42	Story4	0.037	0.021	Seismic HD			0	0
C44	Story4	0.033	0.02	Seismic HD			0	0
C45	Story4	0.003	0	Seismic HD			0	0
C48	Story4	0.001	0	Compact				
C49	Story4	0.0001666	0	Compact				
C50	Story4	0	0.005	Compact				
C52	Story4	0	0.004	Compact				
C57	Story4	0	0	Compact				
C30	Story3	0	0.002	Seismic HD				
C59	Story3	0	0	Seismic HD				
C61	Story3	0	0	Seismic HD				
C2	Story2	0.019	0	Seismic MD				
C6	Story2	0.006	0.001	Seismic MD				

Table 5.2 - Steel Column Envelope (Part 2 of 2, continued)

Label	Story	V22 Ratio	V33 Ratio	Class	Cont. Plate in²	Dbl. Plate in	B/C Ratio Major	B/C Ratio Minor
C47	Story2	0.021	0	Seismic MD				
C51	Story2	0.005	0.001	Seismic MD			0	0
C14	Story1	0.0001402	0	Compact				
C36	Story1	0.0001935	0.001	Compact				
C37	Story1	0.0001935	0	Compact				
C38	Story1	0.0001935	0.001	Compact				

Table 5.3 - Steel Beam Envelope (Part 1 of 2)

Label	Story	Section	Moment Interaction Check	PMM Combo	V22 Ratio
B62	Story5	HSS3-1/2X3-1/2X1/4	0.422 = 0.039 + 0.327 + 0.056	1.2D+1.6S+1.0L	0.089
B102	Story5	W16X26	0.392 = 0.011 + 0.329 + 0.052	1.2D+1.6S+1.0L	0.146
B104	Story5	W16X26	0.373 = 0.013 + 0.309 + 0.051	1.2D+1.6S+1.0L	0.15
B139	Story5	W10X22	0.611 = 0.025 + 0.569 + 0.018	1.2D+1.6S+1.0L	0.196
B140	Story5	W10X22	0.661 = 0.015 + 0.637 + 0.009	1.2D+1.6S+1.0L	0.22
B145	Story5	C10X15.3	0.05 = 0.003 + 0.048 + 0	1.2D+1.6S+1.0L	0.045
B146	Story5	C10X15.3	0.723 = 0.015 + 0.666 + 0.042	1.2D+1.6S+1.0L	0.157
B147	Story5	C10X15.3	0.046 = 0.002 + 0.044 + 0	1.2D+1.6S+1.0L	0.04
B173	Story5	W10X22	0.595 = 0.008 + 0.544 + 0.042	1.2D+1.6S+1.0L	0.194
B174	Story5	W10X22	0.575 = 0.008 + 0.533 + 0.033	1.2D+1.6S+1.0L	0.19
B183	Story5	C10X15.3	0.048 = 3.712E-04 + 0.048 + 0	1.2D+1.6S+1.0L	0.045
B185	Story5	C10X15.3	0.677 = 0.009 + 0.668 + 0	1.2D+1.6S+1.0L	0.157
B187	Story5	C10X15.3	0.044 = 0 + 0.044 + 0	1.2D+1.6S+1.0L	0.04
B204	Story5	W16X26	0.243 = 0.011 + 0.219 + 0.014	1.2D+1.6S+1.0L	0.112
B205	Story5	W16X26	0.12 = 0.004 + 0.114 + 0.002	1.2D+1.6S+1.0L	0.044
B208	Story5	W16X26	0.203 = 0.002 + 0.19 + 0.011	1.2D+1.6S+1.0L	0.106
B213	Story5	C10X15.3	0.258 = 0 + 0.258 + 0	1.2D+1.6S+1.0L	0.08
B214	Story5	C10X15.3	0.659 = 0.002 + 0.612 + 0.045	1.2D+1.6S+1.0L	0.145
B217	Story5	C10X15.3	0.258 = 3.648E-04 + 0.258 + 0	1.2D+1.6S+1.0L	0.08
B218	Story5	C10X15.3	0.614 = 3.744E-04 + 0.614 + 0	1.2D+1.6S+1.0L	0.145
B222	Story5	C10X15.3	0.259 = 0.001 + 0.258 + 0	1.2D+1.6S+1.0L	0.08
B223	Story5	C10X15.3	0.614 = 0 + 0.614 + 0	1.2D+1.6S+1.0L	0.145
B231	Story5	C10X15.3	0.258 = 0.001 + 0.258 + 0	1.2D+1.6S+1.0L	0.08
B232	Story5	C10X15.3	0.614 = 1.626E-04 + 0.614 + 0	1.2D+1.6S+1.0L	0.145
B233	Story5	C10X15.3	0.225 = 1.635E-04 + 0.225 + 0	1.2D+1.6S+1.0L	0.075
B235	Story5	C10X15.3	0.576 = 0.001 + 0.575 + 0	1.2D+1.6S+1.0L	0.141
B236	Story5	C10X15.3	0.216 = 0.001 + 0.215 + 0	1.2D+1.6S+1.0L	0.066
B238	Story5	C10X15.3	0.512 = 2.532E-04 + 0.512 + 0	1.2D+1.6S+1.0L	0.121
B148	Story5	HSS3X3X5/16	0.042 = 0.042 + 0 + 0	1.2D+1.6S+1.0L	0
B176	Story5	HSS3X3X5/16	0.092 = 0.092 + 0 + 0	1.2D+1.6S+1.0L	0
B5	Story5	C10X15.3	0.184 = 0.002 + 0.182 + 0	1.2D+1.6S+1.0L	0.052
B22	Story5	W16X31	0.056 = 0.001 + 0.043 + 0.011	1.2D+1.6S+1.0L	0.033
B1	Story5	W10X39	0.33 = 0.001 + 0.326 + 0.002	1.2D+1.6S+1.0L	0.117
B29	Story5	W10X22	0.072 = 3.355E-04 + 0.069 + 0.002	1.2D+1.6S+1.0L	0.038
B30	Story5	W10X39	0.583 = 0.005 + 0.577 + 0.001	1.2D+1.6S+1.0L	0.206

Table 5.3 - Steel Beam Envelope (Part 1 of 2, continued)

Label	Story	Section	Moment Interaction Check	PMM Combo	V22 Ratio
B31	Story5	W10X22	0.127 = 0.001 + 0.122 + 0.005	1.2D+1.6S+1.0L	0.065
B3	Story5	W10X54	0.607 = 0 + 0.604 + 0.003	1.2D+1.6S+1.0L	0.254
B32	Story5	W10X22	0.188 = 0.002 + 0.182 + 0.003	1.2D+1.6S+1.0L	0.094
B7	Story4	W16X26	0.012 = 0.011 + 0.001 + 0	(R=MIXED) D + L + S + RSX + rsy	0.002
B9	Story4	W16X26	0.292 = 0.055 + 0.23 + 0.007	1.2D+1.6S+1.0L	0.105
B10	Story4	W16X40	0.049 = 0.048 + 0.001 + 0	1.2D+1.6S+1.0L	0.002
B12	Story4	W16X26	0.498 = 0.077 + 0.374 + 0.047	1.2D+1.6S+1.0L	0.115
B14	Story4	W16X26	0.098 = 0.097 + 0.001 + 0	1.2D+1.6S+1.0L	0.002
B15	Story4	W16X26	0.288 = 0.025 + 0.219 + 0.043	1.2D+1.6S+1.0L	0.09
B33	Story4	W16X31	0.162 = 0.013 + 0.145 + 0.003	1.2D+1.6S+1.0L	0.082
B34	Story4	W21X44	0.097 = 0.009 + 0.083 + 0.004	1.2D+1.6S+1.0L	0.02
B35	Story4	W21X44	0.113 = 0.002 + 0.108 + 0.003	1.2D+1.6S+1.0L	0.019
B36	Story4	W21X44	0.205 = 0.018 + 0.182 + 0.004	1.2D+1.6S+1.0L	0.023
B37	Story4	W21X44	0.36 = 0.006 + 0.349 + 0.005	1.2D+1.6S+1.0L	0.05
B38	Story4	W21X44	0.378 = 0 + 0.375 + 0.003	1.2D+1.6S+1.0L	0.051
B39	Story4	W21X44	0.372 = 1.02E-04 + 0.366 + 0.006	1.2D+1.6S+1.0L	0.05
B40	Story4	W21X44	0.353 = 0.002 + 0.347 + 0.004	1.2D+1.6S+1.0L	0.049
B41	Story4	W21X44	0.336 = 0.003 + 0.328 + 0.004	1.2D+1.6S+1.0L	0.047
B42	Story4	W21X44	0.32 = 0.005 + 0.313 + 0.002	1.2D+1.6S+1.0L	0.046
B43	Story4	W21X44	0.297 = 0.008 + 0.286 + 0.003	1.2D+1.6S+1.0L	0.042
B44	Story4	W21X44	0.205 = 0.022 + 0.174 + 0.008	1.2D+1.6S+1.0L	0.033
B45	Story4	W21X44	0.176 = 0.034 + 0.111 + 0.031	1.2D+1.6S+1.0L	0.025
B46	Story4	W21X44	0.189 = 0.039 + 0.141 + 0.009	1.2D+1.6S+1.0L	0.057
B47	Story4	W21X44	0.105 = 0.008 + 0.078 + 0.018	1.2D+1.6S+1.0L	0.04
B48	Story4	W21X44	0.066 = 0.007 + 0.052 + 0.007	1.2D+1.6S+1.0L	0.033
B49	Story4	W21X44	0.083 = 0.012 + 0.069 + 0.002	1.2D+1.6S+1.0L	0.037
B50	Story4	W21X44	0.068 = 0.008 + 0.05 + 0.01	1.2D+1.6S+1.0L	0.032
B51	Story4	W21X44	0.102 = 0.009 + 0.08 + 0.014	1.2D+1.6S+1.0L	0.04
B52	Story4	W21X44	0.224 = 0.047 + 0.16 + 0.017	1.2D+1.6S+1.0L	0.062
B53	Story4	W21X44	0.111 = 0.022 + 0.047 + 0.043	1.2D+1.6S+1.0L	0.02
B54	Story4	W21X44	0.084 = 0.029 + 0.021 + 0.033	1.2D+1.6S+1.0L	0.018
B55	Story4	W21X44	0.085 = 0.04 + 0.012 + 0.033	1.2D+1.6S+1.0L	0.017
B56	Story4	W16X31	0.491 = 0.017 + 0.395 + 0.08	1.2D+1.6S+1.0L	0.063
B61	Story4	W16X26	0.054 = 0.054 + 0 + 0	1.2D+1.6S+1.0L	0
B63	Story4	W16X26	0.397 = 0.083 + 0.255 + 0.058	1.2D+1.6S+1.0L	0.095
B65	Story4	W16X26	0.063 = 0.063 + 0 + 0	1.2D+1.6S+1.0L	0
B77	Story4	W16X31	0.175 = 0.02 + 0.149 + 0.006	1.2D+1.6S+1.0L	0.095
B78	Story4	W21X44	0.077 = 0.013 + 0.062 + 0.002	1.2D+1.6S+1.0L	0.035
B79	Story4	W21X44	0.087 = 0.002 + 0.082 + 0.003	1.2D+1.6S+1.0L	0.042
B80	Story4	W21X44	0.175 = 0.022 + 0.149 + 0.003	1.2D+1.6S+1.0L	0.071
B81	Story4	W21X44	0.363 = 0.002 + 0.359 + 0.002	1.2D+1.6S+1.0L	0.015
B82	Story4	W21X44	0.384 = 0.001 + 0.383 + 0.001	1.2D+1.6S+1.0L	0.014
B83	Story4	W21X44	0.374 = 3.036E-04 + 0.374 + 4.419E-04	1.2D+1.6S+1.0L	0.014
B84	Story4	W21X44	0.356 = 0.001 + 0.355 + 0	1.2D+1.6S+1.0L	0.014
B85	Story4	W21X44	0.34 = 0.003 + 0.337 + 3.896E-04	1.2D+1.6S+1.0L	0.014

Table 5.3 - Steel Beam Envelope (Part 1 of 2, continued)

Label	Story	Section	Moment Interaction Check	PMM Combo	V22 Ratio
B86	Story4	W21X44	0.327 = 0.004 + 0.321 + 0.001	1.2D+1.6S+1.0L	0.014
B87	Story4	W21X44	0.306 = 0.009 + 0.296 + 0.001	1.2D+1.6S+1.0L	0.015
B88	Story4	W21X44	0.212 = 0.022 + 0.185 + 0.005	1.2D+1.6S+1.0L	0.016
B89	Story4	W21X68	0.103 = 0.021 + 0.063 + 0.019	1.2D+1.6S+1.0L	0.013
B90	Story4	W12X35	0.178 = 0.05 + 0.106 + 0.022	(R=MIXED) D + L + S + RSY + rsx	0.049
B91	Story4	W12X35	0.236 = 0.053 + 0.165 + 0.018	(R=MIXED) D + L + S + RSY + rsx	0.074
B92	Story4	W21X44	0.083 = 0.019 + 0.046 + 0.018	1.2D+1.6S+1.0L	0.029
B93	Story4	W21X44	0.05 = 0.03 + 0.015 + 0.006	1.2D+1.6S+1.0L	0.016
B94	Story4	W21X44	0.057 = 0.036 + 0.001 + 0.02	1.2D+1.6S+1.0L	0.013
B95	Story4	W16X31	0.389 = 0.015 + 0.302 + 0.071	1.2D+1.6S+1.0L	0.144
B100	Story4	W16X26	0.265 = 0.001 + 0.259 + 0.005	1.2D+1.6S+1.0L	0.132
B113	Story4	W16X31	0.167 = 0.016 + 0.149 + 0.001	1.2D+1.6S+1.0L	0.098
B114	Story4	W21X44	0.04 = 0.014 + 0.025 + 0.001	1.2D+1.6S+1.0L	0.02
B115	Story4	W21X44	0.047 = 0.002 + 0.044 + 0.001	1.2D+1.6S+1.0L	0.03
B116	Story4	W10X22	0.325 = 0.037 + 0.287 + 0.001	1.2D+1.6S+1.0L	0.158
B117	Story4	W21X44	0.364 = 0.002 + 0.354 + 0.009	1.2D+1.6S+1.0L	0.034
B118	Story4	W21X44	0.38 = 3.537E-04 + 0.374 + 0.005	1.2D+1.6S+1.0L	0.036
B119	Story4	W21X44	0.371 = 0 + 0.365 + 0.006	1.2D+1.6S+1.0L	0.036
B120	Story4	W21X44	0.353 = 0.001 + 0.346 + 0.006	1.2D+1.6S+1.0L	0.034
B121	Story4	W21X44	0.336 = 0.002 + 0.328 + 0.005	1.2D+1.6S+1.0L	0.033
B122	Story4	W21X44	0.319 = 0.003 + 0.314 + 0.002	1.2D+1.6S+1.0L	0.032
B123	Story4	W21X44	0.301 = 0.006 + 0.288 + 0.007	1.2D+1.6S+1.0L	0.029
B124	Story4	W21X44	0.211 = 0.016 + 0.179 + 0.016	1.2D+1.6S+1.0L	0.022
B125	Story4	W21X44	0.175 = 0.025 + 0.112 + 0.037	1.2D+1.6S+1.0L	0.018
B126	Story4	W12X35	0.138 = 0.05 + 0.077 + 0.011	(R=MIXED) D + L + S + RSY + rsx	0.117
B127	Story4	W12X35	0.184 = 0.049 + 0.128 + 0.007	(R=MIXED) D + L + S + RSY + rsx	0.115
B128	Story4	W21X44	0.054 = 0.009 + 0.034 + 0.011	1.2D+1.6S+1.0L	0.025
B129	Story4	W21X44	0.063 = 0.021 + 0.02 + 0.021	1.2D+1.6S+1.0L	0.018
B130	Story4	W21X44	0.072 = 0.026 + 0.022 + 0.024	1.2D+1.6S+1.0L	0.02
B131	Story4	W16X31	0.261 = 0.013 + 0.153 + 0.094	1.2D+1.6S+1.0L	0.097
B153	Story4	W16X31	0.074 = 0.015 + 0.056 + 0.003	1.2D+1.6S+1.0L	0.096
B154	Story4	W21X44	0.049 = 0.013 + 0.029 + 0.007	1.2D+1.6S+1.0L	0.013
B155	Story4	W21X44	0.061 = 0.001 + 0.044 + 0.017	1.2D+1.6S+1.0L	0.012
B156	Story4	W21X44	0.1 = 0.014 + 0.084 + 0.001	1.2D+1.6S+1.0L	0.013
B158	Story4	W21X44	0.316 = 0.003 + 0.304 + 0.008	1.2D+1.6S+1.0L	0.061
B159	Story4	W21X44	0.331 = 0.002 + 0.32 + 0.009	1.2D+1.6S+1.0L	0.063
B160	Story4	W21X44	0.325 = 0.002 + 0.312 + 0.011	1.2D+1.6S+1.0L	0.062
B161	Story4	W21X44	0.308 = 0.003 + 0.296 + 0.01	1.2D+1.6S+1.0L	0.059
B162	Story4	W21X44	0.292 = 0.003 + 0.281 + 0.008	1.2D+1.6S+1.0L	0.057
B163	Story4	W21X44	0.277 = 0.004 + 0.269 + 0.004	1.2D+1.6S+1.0L	0.055
B164	Story4	W21X44	0.256 = 0.003 + 0.25 + 0.003	1.2D+1.6S+1.0L	0.05
B165	Story4	W21X44	0.18 = 0.012 + 0.156 + 0.012	1.2D+1.6S+1.0L	0.036
B166	Story4	W21X44	0.156 = 0.02 + 0.097 + 0.039	1.2D+1.6S+1.0L	0.026
B167	Story4	W12X35	0.165 = 0.043 + 0.104 + 0.018	(R=MIXED) D + L + S + RSY + rsx	0.066
B169	Story4	W21X44	0.087 = 0.008 + 0.034 + 0.046	1.2D+1.6S+1.0L	0.013

Table 5.3 - Steel Beam Envelope (Part 1 of 2, continued)

Label	Story	Section	Moment Interaction Check	PMM Combo	V22 Ratio
B170	Story4	W21X44	0.074 = 0.016 + 0.027 + 0.031	1.2D+1.6S+1.0L	0.014
B171	Story4	W21X44	0.058 = 0.015 + 0.036 + 0.007	1.2D+1.6S+1.0L	0.015
B172	Story4	W16X31	0.208 = 0.006 + 0.183 + 0.018	1.2D+1.6S+1.0L	0.037
B200	Story4	W16X26	0.032 = 0.031 + 0.001 + 0	(R=MIXED) D + RSX + rsy	0.002
B202	Story4	W16X26	0.293 = 0.02 + 0.252 + 0.021	1.2D+1.6S+1.0L	0.107
B210	Story4	W16X26	0.337 = 0.001 + 0.284 + 0.053	1.2D+1.6S+1.0L	0.123
B224	Story4	W12X35	0.197 = 0.047 + 0.134 + 0.017	(R=MIXED) D + L + S + RSY + rsx	0.101
B300	Story4	W24X117	0.304 = 0.005 + 0.258 + 0.041	1.2D+1.6S+1.0L	0.109
B302	Story4	W24X117	0.306 = 0.005 + 0.255 + 0.046	1.2D+1.6S+1.0L	0.108
B4	Story4	W16X26	0.259 = 0.001 + 0.228 + 0.03	1.2D+1.6S+1.0L	0.105
B61	Story3	W8X21	0.062 = 0.004 + 0.058 + 0	(R=MIXED) D + L + S + RSX + rsy	0.018
B65	Story3	W8X21	0.048 = 0.005 + 0.043 + 0	(R=MIXED) D + L + S + RSX + rsy	0.013
B101	Story3	W16X45	0.023 = 0.002 + 0.02 + 0	(R=MIXED) D + L + S + RSY + rsx	0.012
B103	Story3	W16X45	0.023 = 0.002 + 0.02 + 0	(R=MIXED) D + L + S + RSY + rsx	0.012
B112	Story3	W8X21	0.049 = 0.003 + 0.029 + 0.017	(R=MIXED) D + L + S + RSX + rsy	0.053
B132	Story3	W8X18	0.397 = 0.001 + 0.397 + 0	1.2D+1.6L+0.5S	0.084
B149	Story3	W8X18	0.384 = 1.844E-04 + 0.384 + 0	1.2D+1.6L+0.5S	0.081
B168	Story3	W8X21	0.09 = 0.004 + 0.062 + 0.025	(R=MIXED) D + L + S + RSX + rsy	0.064
B177	Story3	W8X18	0.57 = 0.082 + 0.484 + 0.005	(R=MIXED) D + L + S + RSX + rsy	0.061
B190	Story3	W8X18	0.017 = 0.017 + 0 + 0	(R=MIXED) D + L + S + RSX + rsy	0
B193	Story3	W8X21	0.022 = 0.022 + 0 + 0	(R=MIXED) D + RSX + rsy	0
B203	Story3	W8X18	0.084 = 0.019 + 0.046 + 0.019	(R=MIXED) D + L + S + RSX + rsy	0.038
B206	Story3	W12X79	0.01 = 0.007 + 0.003 + 0	1.2D+1.6S+1.0L	0.005
B209	Story3	W12X79	0.013 = 0.01 + 0.003 + 0	1.2D+1.6S+1.0L	0.005
B211	Story3	W8X18	0.071 = 0 + 0.071 + 0	1.2D+1.6L+0.5S	0.042
B212	Story3	W8X18	0.408 = 0 + 0.408 + 0	1.2D+1.6L+0.5S	0.076
B215	Story3	W8X18	0.071 = 0 + 0.071 + 0	1.2D+1.6L+0.5S	0.042
B216	Story3	W8X18	0.408 = 0 + 0.408 + 0	1.2D+1.6L+0.5S	0.076
B220	Story3	W8X18	0.071 = 0 + 0.071 + 0	1.2D+1.6L+0.5S	0.042
B221	Story3	W8X18	0.408 = 0 + 0.407 + 0	1.2D+1.6L+0.5S	0.076
B229	Story3	W8X18	0.077 = 1.995E-04 + 0.076 + 0	1.2D+1.6L+0.5S	0.045
B230	Story3	W8X18	0.436 = 2.148E-04 + 0.436 + 0	1.2D+1.6L+0.5S	0.082
B234	Story3	W30X90	0.233 = 0.001 + 0.232 + 1.039E-04	1.2D+1.6S+1.0L	0.168
B243	Story3	W10X68	0.208 = 0.001 + 0.207 + 0.001	1.2D+1.6S+1.0L	0.067
B244	Story3	W18X46	0.275 = 0.001 + 0.273 + 0.001	1.2D+1.6S+1.0L	0.072
B245	Story3	W12X35	0.081 = 0.001 + 0.08 + 0.001	1.2D+1.6S+1.0L	0.068
B23	Story3	W8X21	0.055 = 0.002 + 0.036 + 0.017	(R=MIXED) D + L + S + RSX + rsy	0.054
B25	Story3	W8X21	0.087 = 0.024 + 0.015 + 0.049	(R=MIXED) D + L + S + RSX + rsy	0.06
B28	Story3	W8X21	0.029 = 0.025 + 0.004 + 0	(R=MIXED) D + L + S + RSY + rsx	0.005
B20	Story3	W18X46	0.382 = 0.001 + 0.381 + 0	1.2D+1.6S+1.0L	0.097
B21	Story3	W8X18	0.466 = 1.881E-04 + 0.465 + 0	1.2D+1.6L+0.5S	0.087
B24	Story3	W8X18	0.082 = 1.757E-04 + 0.082 + 0	1.2D+1.6L+0.5S	0.048
B6	Story2	W27X129	0.279 = 3.16E-04 + 0.279 + 0	1.2D+1.6S+1.0L	0.13
B8	Story2	W12X26	0.081 = 0.017 + 0.064 + 0	(R=MIXED) D + L + S + RSY + rsx	0.038
B13	Story2	W27X129	0.376 = 0 + 0.376 + 0	1.2D+1.6S+1.0L	0.064

Table 5.3 - Steel Beam Envelope (Part 1 of 2, continued)

Label	Story	Section	Moment Interaction Check	PMM Combo	V22 Ratio
B64	Story2	W27X129	0.506 = 0.001 + 0.505 + 0.001	1.2D+1.6S+1.0L	0.117
B67	Story2	W21X166	0.039 = 2.534E-04 + 0.038 + 0.001	(R=MIXED) D + L + S + RSY + rsx	0.018
B68	Story2	W27X129	0.071 = 2.848E-04 + 0.069 + 0.001	(R=MIXED) D + L + S + RSY + rsx	0.023
B69	Story2	W27X129	0.071 = 0.001 + 0.07 + 1.138E-04	(R=MIXED) D + L + S + RSY + rsx	0.023
B70	Story2	W12X26	0.057 = 1.07E-04 + 0.057 + 0	1.2D+1.6L+0.5S	0.032
B73	Story2	W27X129	0.186 = 1.969E-04 + 0.186 + 1.684E-04	1.2D+1.6S+1.0L	0.055
B74	Story2	W27X146	0.484 = 0.001 + 0.483 + 4.206E-04	1.2D+1.6S+1.0L	0.205
B75	Story2	W16X67	0.447 = 0.001 + 0.445 + 0.001	(R=MIXED) D + L + S + RSX + rsy	0.146
B105	Story2	W27X129	0.667 = 1.202E-04 + 0.666 + 2.397E-04	1.2D+1.6S+1.0L	0.089
B144	Story2	W27X84	0.76 = 2.482E-04 + 0.759 + 1.249E-04	1.2D+1.6S+1.0L	0.049
B186	Story2	W27X102	0.494 = 0.001 + 0.493 + 2.596E-04	1.2D+1.6S+1.0L	0.042
B191	Story2	W12X26	0.004 = 0.004 + 0 + 0	(R=MIXED) D + RSY + rsx	0
B192	Story2	W12X26	0.004 = 0.004 + 0 + 0	(R=MIXED) D + L + S + RSY + rsx	0
B195	Story2	W27X129	0.309 = 1.201E-04 + 0.309 + 0	1.2D+1.6S+1.0L	0.073
B199	Story2	W27X129	0.3 = 2.744E-04 + 0.3 + 0	1.2D+1.6S+1.0L	0.137
B201	Story2	W12X26	0.085 = 0.021 + 0.064 + 0	(R=MIXED) D + L + S + RSY + rsx	0.038
B207	Story2	W27X102	0.454 = 0 + 0.454 + 0	1.2D+1.6S+1.0L	0.075
B254	Story2	W27X129	0.288 = 2.046E-04 + 0.288 + 1.556E-04	1.2D+1.6S+1.0L	0.069
B257	Story2	W27X129	0.137 = 1.238E-04 + 0.136 + 0	1.2D+1.6S+1.0L	0.031
B258	Story2	W21X166	0.082 = 0 + 0.082 + 1.006E-04	1.2D+1.6S+1.0L	0.032
B259	Story2	W27X129	0.137 = 0 + 0.136 + 1.481E-04	1.2D+1.6S+1.0L	0.037
B263	Story2	W27X129	0.142 = 1.625E-04 + 0.141 + 1.846E-04	1.2D+1.6S+1.0L	0.038
B268	Story2	W27X129	0.091 = 0 + 0.091 + 0	1.2D+1.6S+1.0L	0.024
B271	Story2	W27X129	0.142 = 0.001 + 0.141 + 0	1.2D+1.6S+1.0L	0.032
B273	Story2	W27X129	0.088 = 2.714E-04 + 0.088 + 0	1.2D+1.6S+1.0L	0.022
B277	Story2	W27X129	0.091 = 0 + 0.091 + 0	1.2D+1.6S+1.0L	0.023
B278	Story2	W21X166	0.053 = 0 + 0.053 + 0	1.2D+1.6S+1.0L	0.022
B279	Story2	W27X129	0.091 = 0 + 0.091 + 1.186E-04	1.2D+1.6S+1.0L	0.026
B280	Story2	W12X26	0.093 = 4.893E-04 + 0.092 + 0	1.2D+1.6L+0.5S	0.051
B281	Story2	W12X26	0.076 = 3.778E-04 + 0.076 + 0	1.2D+1.6L+0.5S	0.042
B282	Story2	W12X26	0.063 = 0 + 0.062 + 0	1.2D+1.6L+0.5S	0.035
B283	Story2	W12X26	0.074 = 2.52E-04 + 0.073 + 0	1.2D+1.6L+0.5S	0.041
B284	Story2	W12X26	0.093 = 0.008 + 0.085 + 0	(R=MIXED) D + L + S + RSY + rsx	0.051
B295	Story2	W27X129	0.324 = 3.288E-04 + 0.323 + 3.271E-04	1.2D+1.6S+1.0L	0.036
B296	Story2	W27X84	0.556 = 0 + 0.556 + 0	1.2D+1.6S+1.0L	0.038
B303	Story2	W21X166	0.084 = 1.759E-04 + 0.084 + 0	1.2D+1.6S+1.0L	0.088
B304	Story2	W27X129	0.088 = 1.547E-04 + 0.088 + 0	1.2D+1.6S+1.0L	0.025
B2	Story2	W27X129	0.049 = 0 + 0.049 + 0	1.2D+1.6S+1.0L	0.042
B19	Story2	W27X129	0.013 = 0.001 + 0.012 + 0.001	1.2D+1.6S+1.0L	0.014

Table 5.3 - Steel Beam Envelope (Part 2 of 2)

Label	Story	V33 Ratio	Class	Conn. V I-End kip	Conn. V J-End kip
B62	Story5	0.01	Seismic HD	0.749	0.579
B102	Story5	0.014	Seismic MD	15.502	13.151
B104	Story5	0.003	Seismic MD	12.605	15.887
B139	Story5	0.001	Seismic MD	12.931	8.078
B140	Story5	0.001	Seismic MD	14.464	8.365
B145	Story5	0	Seismic HD	2.886	2.886
B146	Story5	0.001	Seismic HD	10.171	10.171
B147	Story5	0	Seismic HD	2.613	2.613
B173	Story5	0.003	Seismic MD	12.771	12.769
B174	Story5	0.002	Seismic MD	12.505	12.503
B183	Story5	0	Seismic HD	2.886	2.886
B185	Story5	0	Seismic HD	10.181	10.181
B187	Story5	0	Seismic HD	2.613	2.613
B204	Story5	0.001	Seismic MD	11.375	11.913
B205	Story5	0.001	Seismic MD	4.643	4.628
B208	Story5	0.001	Seismic MD	11.248	10.809
B213	Story5	0	Seismic HD	5.159	5.159
B214	Story5	0.001	Seismic HD	9.397	9.397
B217	Story5	0	Seismic HD	5.159	5.159
B218	Story5	0	Seismic HD	9.408	9.408
B222	Story5	0	Seismic HD	5.159	5.159
B223	Story5	0	Seismic HD	9.408	9.408
B231	Story5	0	Seismic HD	5.159	5.159
B232	Story5	0	Seismic HD	9.407	9.407
B233	Story5	0	Seismic HD	4.859	4.859
B235	Story5	0	Seismic HD	9.11	9.11
B236	Story5	0	Seismic HD	4.299	4.299
B238	Story5	0	Seismic HD	7.84	7.84
B148	Story5	0	Seismic HD	0	0
B176	Story5	0	Seismic HD	0	0
B5	Story5	0	Seismic HD	0	0
B22	Story5	0.001	Seismic HD	0	0
B1	Story5	0.002	Seismic MD	10.959	10.959
B29	Story5	0.0001616	Seismic MD	2.47	0
B30	Story5	0.002	Seismic MD	19.262	19.265
B31	Story5	0.0003141	Seismic MD	4.266	0
B3	Story5	0.002	Seismic MD	28.472	28.473
B32	Story5	0.0002914	Seismic MD	6.161	5.703
B7	Story4	0	Seismic MD	0.249	0.249
B9	Story4	0.003	Seismic MD	11.16	10.426
B10	Story4	0	Seismic HD	0.249	0.249
B12	Story4	0.001	Seismic MD	12.187	12.123
B14	Story4	0	Seismic MD	0.249	0.249
B15	Story4	0.006	Seismic MD	9.521	7.393
B33	Story4	0.001	Seismic HD	0	0

Table 5.3 - Steel Beam Envelope (Part 2 of 2, continued)

Label	Story	V33 Ratio	Class	Conn. V I-End kip	Conn. V J-End kip
B34	Story4	0.001	Seismic HD	0	0
B35	Story4	0.001	Seismic HD	0	0
B36	Story4	0.001	Seismic HD	0	0
B37	Story4	0.001	Seismic HD	0	0
B38	Story4	0.0003615	Seismic HD	0	0
B39	Story4	0.0003966	Seismic HD	0	0
B40	Story4	0.0003713	Seismic HD	0	0
B41	Story4	0.0002924	Seismic HD	0	0
B42	Story4	0.000304	Seismic HD	0	0
B43	Story4	0.0004082	Seismic HD	0	0
B44	Story4	0.001	Seismic HD	0	0
B45	Story4	0.002	Seismic HD	0	0
B46	Story4	0.0003869	Seismic HD	0	12.468
B47	Story4	0.001	Seismic HD	0	8.626
B48	Story4	0.0002695	Seismic HD	0	7.074
B49	Story4	0.0001671	Seismic HD	0	8.066
B50	Story4	0.0003882	Seismic HD	0	6.94
B51	Story4	0.001	Seismic HD	0	8.723
B52	Story4	0.001	Seismic HD	0	13.413
B53	Story4	0.002	Seismic HD	0	0
B54	Story4	0.001	Seismic HD	0	0
B55	Story4	0.0003928	Seismic HD	0	0
B56	Story4	0.001	Seismic HD	0	0
B61	Story4	0	Seismic MD	0	0
B63	Story4	0.003	Seismic MD	10.023	9.995
B65	Story4	0	Seismic MD	0	0
B77	Story4	0.001	Seismic HD	0	0
B78	Story4	0.0002958	Seismic HD	0	7.534
B79	Story4	0.0002038	Seismic HD	0	9.096
B80	Story4	0.000343	Seismic HD	0	15.39
B81	Story4	0.001	Seismic HD	0	0
B82	Story4	0.0003529	Seismic HD	0	0
B83	Story4	0.0003292	Seismic HD	0	0
B84	Story4	0.0003932	Seismic HD	0	0
B85	Story4	0.0004853	Seismic HD	0	0
B86	Story4	0.001	Seismic HD	0	0
B87	Story4	0.001	Seismic HD	0	0
B88	Story4	0.001	Seismic HD	0	0
B89	Story4	0.002	Seismic HD	0	0
B90	Story4	0.003	Seismic HD	5.241	5.516
B91	Story4	0.002	Seismic HD	8.341	7.819
B92	Story4	0.001	Seismic HD	0	6.253
B93	Story4	0.0004782	Seismic HD	0	3.519
B94	Story4	0.001	Seismic HD	0	2.541
B95	Story4	0.003	Seismic HD	0	18.898

Table 5.3 - Steel Beam Envelope (Part 2 of 2, continued)

Label	Story	V33 Ratio	Class	Conn. V I-End kip	Conn. V J-End kip
B100	Story4	0.001	Seismic MD	0	13.957
B113	Story4	0.002	Seismic HD	0	0
B114	Story4	0.0004668	Seismic HD	0	4.451
B115	Story4	0.000303	Seismic HD	0	6.43
B116	Story4	0.001	Seismic MD	0	10.386
B117	Story4	0.001	Seismic HD	0	0
B118	Story4	0.001	Seismic HD	0	0
B119	Story4	0.001	Seismic HD	0	0
B120	Story4	0.001	Seismic HD	0	0
B121	Story4	0.001	Seismic HD	0	0
B122	Story4	0.001	Seismic HD	0	0
B123	Story4	0.001	Seismic HD	0	0
B124	Story4	0.003	Seismic HD	0	0
B125	Story4	0.004	Seismic HD	0	0
B126	Story4	0.001	Seismic HD	0	8.271
B127	Story4	0.002	Seismic HD	12.944	12.544
B128	Story4	0.001	Seismic HD	0	5.464
B129	Story4	0.001	Seismic HD	0	4.016
B130	Story4	0.002	Seismic HD	0	4.36
B131	Story4	0.006	Seismic HD	0	12.762
B153	Story4	0.001	Seismic HD	0	0
B154	Story4	0.002	Seismic HD	0	0
B155	Story4	0.001	Seismic HD	0	0
B156	Story4	0.001	Seismic HD	0	0
B158	Story4	0.001	Seismic HD	0	0
B159	Story4	0.001	Seismic HD	0	0
B160	Story4	0.001	Seismic HD	0	0
B161	Story4	0.001	Seismic HD	0	0
B162	Story4	0.001	Seismic HD	0	0
B163	Story4	0.001	Seismic HD	0	0
B164	Story4	0.001	Seismic HD	0	0
B165	Story4	0.002	Seismic HD	0	0
B166	Story4	0.004	Seismic HD	0	0
B167	Story4	0.003	Seismic HD	0	0
B169	Story4	0.004	Seismic HD	0	0
B170	Story4	0.003	Seismic HD	0	0
B171	Story4	0.001	Seismic HD	0	0
B172	Story4	0.002	Seismic HD	0	0
B200	Story4	0	Seismic MD	0.249	0.249
B202	Story4	0.001	Seismic MD	11.373	0
B210	Story4	0.012	Seismic MD	0	0
B224	Story4	0.002	Seismic HD	0	10.875
B300	Story4	0.006	Seismic MD	11.021	12.623
B302	Story4	0.007	Seismic MD	6.635	13.298
B4	Story4	0.004	Seismic MD	11.133	7.308

Table 5.3 - Steel Beam Envelope (Part 2 of 2, continued)

Label	Story	V33 Ratio	Class	Conn. V I-End kip	Conn. V J-End kip
B61	Story3	0	Seismic HD	0	0
B65	Story3	0	Seismic HD	0	0
B101	Story3	0	Seismic HD	0	1.968
B103	Story3	0	Seismic HD	1.968	0
B112	Story3	0.003	Seismic HD	0	0
B132	Story3	0	Seismic MD	4.221	4.222
B149	Story3	0	Seismic MD	4.089	4.089
B168	Story3	0.002	Seismic HD	0	0
B177	Story3	0.0001172	Seismic MD	3.067	2.128
B190	Story3	0	Seismic MD	0	0
B193	Story3	0	Seismic HD	0	0
B203	Story3	0.001	Seismic MD	0	0
B206	Story3	0	Seismic MD	0	0
B209	Story3	0	Seismic MD	0	0
B211	Story3	0	Seismic MD	2.094	2.094
B212	Story3	0	Seismic MD	3.819	3.819
B215	Story3	0	Seismic MD	2.094	2.094
B216	Story3	0	Seismic MD	3.819	3.819
B220	Story3	0	Seismic MD	2.094	2.094
B221	Story3	0	Seismic MD	3.819	3.819
B229	Story3	0	Seismic MD	2.244	2.244
B230	Story3	0	Seismic MD	4.092	4.092
B234	Story3	0.0002202	Seismic MD	37.32	60.393
B243	Story3	0.005	Seismic HD	0	0
B244	Story3	0.002	Seismic HD	0	0
B245	Story3	0	Seismic HD	0	0
B23	Story3	0.002	Seismic HD	0	0
B25	Story3	0.027	Seismic HD	0	0
B28	Story3	0	Seismic HD	0	0
B20	Story3	0.002	Seismic HD	0	13.395
B21	Story3	0	Seismic MD	4.365	4.365
B24	Story3	0	Seismic MD	2.394	2.394
B6	Story2	0	Seismic HD	65.561	20.497
B8	Story2	0	Seismic MD	3.185	3.185
B13	Story2	0	Seismic HD	5.152	0
B64	Story2	0.0001761	Seismic HD	21.588	25.821
B67	Story2	0	Seismic HD	3.433	0
B68	Story2	0	Seismic HD	0	11.545
B69	Story2	0	Seismic HD	11.672	4.709
B70	Story2	0	Seismic MD	2.652	2.652
B73	Story2	0.001	Seismic HD	0	0
B74	Story2	0.001	Seismic HD	95.735	102.09
B75	Story2	0.001	Seismic MD	28.205	26.66
B105	Story2	0	Seismic HD	7.436	0
B144	Story2	0	Seismic MD	3.915	10.321

Table 5.3 - Steel Beam Envelope (Part 2 of 2, continued)

Label	Story	V33 Ratio	Class	Conn. V I-End kip	Conn. V J-End kip
B186	Story2	0.0001546	Seismic HD	4.378	9.401
B191	Story2	0	Seismic MD	0	0
B192	Story2	0	Seismic MD	0	0
B195	Story2	0	Seismic HD	0	37.03
B199	Story2	0	Seismic HD	69.161	19.153
B201	Story2	0	Seismic MD	3.185	3.185
B207	Story2	0.001	Seismic HD	2.178	0
B254	Story2	0	Seismic HD	0	34.739
B257	Story2	0	Seismic HD	15.783	6.311
B258	Story2	0	Seismic HD	10.132	0
B259	Story2	0	Seismic HD	0	18.723
B263	Story2	0	Seismic HD	10.659	19.25
B268	Story2	0	Seismic HD	12.139	3.957
B271	Story2	0	Seismic HD	16.091	6.217
B273	Story2	0	Seismic HD	11.279	4.031
B277	Story2	0	Seismic HD	11.671	4.682
B278	Story2	0	Seismic HD	6.06	0
B279	Story2	0	Seismic HD	0	13.136
B280	Story2	0	Seismic MD	4.294	4.294
B281	Story2	0	Seismic MD	3.536	3.536
B282	Story2	0	Seismic MD	2.905	2.905
B283	Story2	0	Seismic MD	3.41	3.41
B284	Story2	0	Seismic MD	4.294	4.294
B295	Story2	0	Seismic HD	5.311	9.353
B296	Story2	0	Seismic MD	3.915	7.04
B303	Story2	0	Seismic HD	6.67	44.768
B304	Story2	0	Seismic HD	5.883	12.706
B2	Story2	0.001	Seismic HD	0	0
B19	Story2	0.0002448	Seismic HD	0	0

Table 5.4 - Steel Brace Envelope (Part 1 of 2)

Label	Story	Section	Moment Interaction Check
D29	Story5	HSS3-1/2X3-1/2X1/4	0.081 = 0.081 + 0 + 0
D30	Story5	HSS3-1/2X3-1/2X1/4	0.066 = 0.066 + 0 + 0
D31	Story5	HSS3-1/2X3-1/2X1/4	0.008 = 0.008 + 0 + 0
D32	Story5	HSS3-1/2X3-1/2X1/4	0.272 = 0.272 + 0 + 0
D33	Story5	HSS3-1/2X3-1/2X1/4	0.008 = 0.008 + 0 + 0
D34	Story5	HSS3-1/2X3-1/2X1/4	0.061 = 0.061 + 0 + 0
D35	Story5	HSS3-1/2X3-1/2X1/4	0.086 = 0.086 + 0 + 0
D72	Story5	HSS3X3X1/4	0.958 = 0.958 + 0 + 0
D74	Story5	HSS3X3X1/4	0.797 = 0.797 + 0 + 0
D79	Story5	HSS6X6X3/8	0.016 = 0.011 + 0.005 + 0
D52	Story5	HSS6X6X3/8	0.017 = 0.012 + 0.005 + 0
D77	Story5	HSS6X6X3/8	0.013 = 0.013 + 0 + 0

Table 5.4 - Steel Brace Envelope (Part 1 of 2, continued)

Label	Story	Section	Moment Interaction Check	
D78	Story5	HSS2-1/2X2-1/2X3/16	0.038 = 0.038 + 0 + 0	
D81	Story5	HSS2-1/2X2-1/2X3/16	0.328 = 0.328 + 0 + 0	
D46	Story5	HSS6X6X1/4	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	COLUMN, NOT A BRACE
D1	Story4	W16X31	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	BEAM, NOT A BRACE
D2	Story4	W21X44	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	
D3	Story4	W21X44	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	
D4	Story4	W21X44	0.188 = 0.01 + 0.174 + 0.004	
D5	Story4	W21X44	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	
D6	Story4	W21X44	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	
D7	Story4	W21X44	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	
D8	Story4	W21X44	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	
D9	Story4	W21X44	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	
D10	Story4	W21X44	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	*
D11	Story4	W21X44	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	
D12	Story4	W21X44	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	
D13	Story4	W21X44	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	
D14	Story4	W21X44	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	
D15	Story4	W21X44	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	
D16	Story4	W21X44	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	
D17	Story4	W21X44	0.074 = 0.001 + 0.069 + 0.004	
D18	Story4	W21X44	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	
D19	Story4	W21X44	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	
D20	Story4	W21X44	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	
D21	Story4	W21X44	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	
D22	Story4	W21X44	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	

* Indicates members that are stand-ins for manufactured curved steel trusses. Etabs automatically designates sloped members as braces and checks for ductility requirements. This can be disregarded for these members

Table 5.4 - Steel Brace Envelope (Part 1 of 2, continued)

Label	Story	Section	Moment Interaction Check	
D23	Story4	W21X44	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	
D24	Story4	W16X31	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	
D39	Story4	HSS2X2X1/4	0.386 = 0.386 + 0 + 0	
D43	Story4	HSS2X2X1/4	0.207 = 0.207 + 0 + 0	
D48	Story4	W16X31	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	
D49	Story4	W21X44	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	
D50	Story4	W21X44	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	
D51	Story4	W21X44	0.092 = 0.008 + 0.076 + 0.008	
D53	Story4	W21X44	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	
D54	Story4	W21X44	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	
D55	Story4	W21X44	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	
D56	Story4	W21X44	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	
D57	Story4	W21X44	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	
D58	Story4	W21X44	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	
D59	Story4	W21X44	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	
D60	Story4	W21X44	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	
D61	Story4	W21X44	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	
D62	Story4	W12X35	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	
D63	Story4	W12X35	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	
D64	Story4	HSS3X3X1/4	0.288 = 0.288 + 0 + 0	
D65	Story4	W21X44	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	
D66	Story4	W21X44	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	
D67	Story4	W21X44	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	
D68	Story4	W16X31	Section is not seismically compact for moderately ductile members (AISC 341-10 Table D1.1)	BEAM, NOT A BRACE
D69	Story4	HSS3X3X1/4	0.303 = 0.277 + 0.018 + 0.008	
D45	Story4	HSS3X3X1/4	0.621 = 0.621 + 0 + 0	
D28	Story4	HSS2X2X1/4	0.298 = 0.298 + 0 + 0	

Table 5.4 - Steel Brace Envelope (Part 1 of 2, continued)

Label	Story	Section	Moment Interaction Check	
D25	Story4	HSS2X2X1/4	0.29 = 0.29 + 0 + 0	
D26	Story4	HSS3X3X1/4	0.808 = 0.808 + 0 + 0	
D40	Story3	HSS3X3X1/4	0.786 = 0.786 + 0 + 0	
D42	Story3	HSS3X3X1/4	0.749 = 0.749 + 0 + 0	
D47	Story3	HSS3X3X1/4	0.932 = 0.932 + 0 + 0	
D70	Story3	HSS3X3X1/4	0.839 = 0.839 + 0 + 0	
D71	Story3	HSS3X3X1/4	0.67 = 0.67 + 0 + 0	
D73	Story3	HSS3X3X1/4	0.67 = 0.67 + 0 + 0	
D75	Story3	HSS4X0.250	1.169 = 1.153 + 0.016 + 0	D75 AND D76 HAVE BEEN DESIGNED AS TENSION ONLY BRACES
D76	Story3	HSS4X0.250	1.156 = 1.14 + 0.016 + 0	
D27	Story3	HSS2X2X1/4	0.836 = 0.836 + 0 + 0	
D36	Story3	HSS2X2X1/4	0.961 = 0.961 + 0 + 0	
D80	Story3	HSS3-1/2X3-1/2X1/4	0.337 = 0.337 + 0 + 0	
D82	Story3	HSS3-1/2X3-1/2X1/4	0.291 = 0.291 + 0 + 0	
D41	Story2	HSS4X0.250	2.566 = 2.56 + 0.004 + 0.004	D41 AND D44 HAVE BEEN DESIGNED AS TENSION ONLY BRACES
D44	Story2	HSS4X0.250	2.736 = 2.731 + 0.004 + 0.004	

Table 5.4 - Steel Brace Envelope (Part 2 of 2)

Label	Story	PMM Combo	V22 Ratio	V33 Ratio	Class	Conn. P I-End kip	Conn. P J-End kip
D29	Story5	(R=MIXED) D + L + S + RSX + rsy	0	0	Seismic HD	-50.718	-50.718
D30	Story5	1.2D+1.6S+1.0L	0	0	Seismic HD	-19.125	-19.125
D31	Story5	(R=MIXED) D + RSY + rsx	0	0	Seismic HD	-5.32	-5.32
D32	Story5	1.2D+1.6S+1.0L	0	0	Seismic HD	35.574	35.574
D33	Story5	(R=MIXED) D + RSX + rsy	0	0	Seismic HD	-5.287	-5.287
D34	Story5	1.2D+1.6S+1.0L	0	0	Seismic HD	-20.972	-20.972
D35	Story5	(R=MIXED) D + RSX + rsy	0	0	Seismic HD	55.906	55.906
D72	Story5	(R=MIXED) D + L + S + RSX + rsy	0	0	Seismic HD	-69.727	-69.727
D74	Story5	(R=MIXED) D + RSX + rsy	0	0	Seismic HD	65.813	65.813
D79	Story5	1.2D+1.6S+1.0L	0.000255	0	Seismic MD	-5.008	-5.008
D52	Story5	1.2D+1.6S+1.0L	0.0002423	0	Seismic MD	-5.604	-5.604
D77	Story5	1.2D+1.6S+1.0L	0	0	Seismic MD	-6.153	-6.153
D78	Story5	(R=MIXED) D + RSX + rsy	0	0	Seismic HD	2.335	2.335
D81	Story5	(R=MIXED) D + L + S + RSX + rsy	0	0	Seismic HD	-5.969	-5.969
D46	Story5	1.2D+1.6S+1.0L	0	0	Compact	-7.252	-7.252
D1	Story4	1.2D+1.6S+1.0L	0.073	0.001	Compact	-5.741	-6.815
D2	Story4	1.2D+1.6S+1.0L	0.028	0.002	Compact	-3.353	6.6
D3	Story4	1.2D+1.6S+1.0L	0.032	0.003	Compact	-3.058	-3.479
D4	Story4	1.2D+1.6S+1.0L	0.053	0.001	Compact	4.983	12.237
D5	Story4	1.2D+1.6S+1.0L	0.069	0.001	Compact	-10.04	-9.172
D6	Story4	1.2D+1.6S+1.0L	0.075	0.002	Compact	-5.637	-4.359
D7	Story4	1.2D+1.6S+1.0L	0.073	0.002	Compact	-4.68	-3.919
D8	Story4	1.2D+1.6S+1.0L	0.07	0.002	Compact	-5.114	-4.68
D9	Story4	1.2D+1.6S+1.0L	0.067	0.001	Compact	-5.828	-5.784
D10	Story4	1.2D+1.6S+1.0L	0.064	0.001	Compact	-5.935	-6.492

Table 5.4 - Steel Brace Envelope (Part 2 of 2, continued)

Label	Story	PMM Combo	V22 Ratio	V33 Ratio	Class	Conn. P I-End kip	Conn. P J-End kip
D11	Story4	1.2D+1.6S+1.0L	0.06	0.001	Compact	-5.776	-6.441
D12	Story4	1.2D+1.6S+1.0L	0.039	0.005	Compact	-6.846	-14.06
D13	Story4	1.2D+1.6S+1.0L	0.03	0.01	Compact	-6.316	-16.14
D14	Story4	1.2D+1.6S+1.0L	0.045	0.006	Compact	7.533	25.961
D15	Story4	1.2D+1.6S+1.0L	0.029	0.002	Compact	1.905	4.052
D16	Story4	1.2D+1.6S+1.0L	0.022	0.002	Compact	-1.56	-5.867
D17	Story4	1.2D+1.6S+1.0L	0.027	0.002	Compact	1.69	4.055
D18	Story4	1.2D+1.6S+1.0L	0.022	0.002	Compact	-1.671	-7.185
D19	Story4	1.2D+1.6S+1.0L	0.029	0.002	Compact	2.56	3.608
D20	Story4	1.2D+1.6S+1.0L	0.05	0.006	Compact	10.583	33.364
D21	Story4	1.2D+1.6S+1.0L	0.023	0.013	Compact	-3.044	-9.219
D22	Story4	1.2D+1.6S+1.0L	0.013	0.008	Compact	-6.015	-14.674
D23	Story4	1.2D+1.6S+1.0L	0.009	0.002	Compact	-9.297	-23.657
D24	Story4	1.2D+1.6S+1.0L	0.128	0.011	Compact	-2.743	8.773
D39	Story4	(R=MIXED) D + L + S + RSY + rsx	0	0	Seismic HD	-36.078	-36.078
D43	Story4	(R=MIXED) D + RSX + rsy	0	0	Seismic HD	27.602	27.602
D48	Story4	1.2D+1.6S+1.0L	0.05	0.003	Compact	-28.07	23.668
D49	Story4	1.2D+1.6S+1.0L	0.016	0.004	Compact	-6.337	-8.513
D50	Story4	1.2D+1.6S+1.0L	0.023	0.004	Compact	-2.561	-2.727
D51	Story4	1.2D+1.6S+1.0L	0.037	0.005	Compact	-5.375	-9.081
D53	Story4	1.2D+1.6S+1.0L	0.073	0.003	Compact	-9.772	-8.178
D54	Story4	1.2D+1.6S+1.0L	0.077	0.004	Compact	-6.633	-5.503
D55	Story4	1.2D+1.6S+1.0L	0.075	0.004	Compact	-5.409	-4.986
D56	Story4	1.2D+1.6S+1.0L	0.072	0.004	Compact	-5.711	-5.413
D57	Story4	1.2D+1.6S+1.0L	0.069	0.003	Compact	-6.288	-6.067
D58	Story4	1.2D+1.6S+1.0L	0.066	0.002	Compact	-6.348	-6.047
D59	Story4	1.2D+1.6S+1.0L	0.064	0.002	Compact	-5.87	-4.163
D60	Story4	1.2D+1.6S+1.0L	0.043	0.004	Compact	-6.138	-9.004
D61	Story4	1.2D+1.6S+1.0L	0.03	0.012	Compact	-6.756	-13.148
D62	Story4	(R=MIXED) D + L + S + RSY + rsx	0.062	0.009	Compact	29.339	83.214
D63	Story4	(R=MIXED) D + L + S + RSY + rsx	0.03	0.006	Compact	35.25	30.711
D64	Story4	(R=MIXED) D + RSY + rsx	0	0	Seismic HD	77.775	77.775
D65	Story4	1.2D+1.6S+1.0L	0.019	0.011	Compact	-4.275	-8.367
D66	Story4	1.2D+1.6S+1.0L	0.016	0.007	Compact	-3.081	-7.514
D67	Story4	1.2D+1.6S+1.0L	0.018	0.002	Compact	-3.472	-6.101
D68	Story4	1.2D+1.6S+1.0L	0.084	0.002	Compact	-3.908	-3.05
D69	Story4	(R=MIXED) D + RSY + rsx	0.002	0.002	Seismic HD	64.364	64.364
D45	Story4	(R=MIXED) D + RSY + rsx	0	0	Seismic HD	57.812	57.812
D28	Story4	(R=MIXED) D + L + S + RSX + rsy	0	0	Seismic HD	-20.623	-20.623
D25	Story4	(R=MIXED) D + RSX + rsy	0	0	Seismic HD	23.181	23.181
D26	Story4	(R=MIXED) D + RSY + rsx	0	0	Seismic HD	77.362	77.362
D40	Story3	(R=MIXED) D + L + S + RSY + rsx	0	0	Seismic HD	134.2	134.2
D42	Story3	(R=MIXED) D + L + S + RSY + rsx	0	0	Seismic HD	134.2	134.2
D47	Story3	(R=MIXED) D + L + S + RSY + rsx	0	0	Seismic HD	134.2	134.2
D70	Story3	(R=MIXED) D + L + S + RSY + rsx	0	0	Seismic HD	134.2	134.2

Table 5.4 - Steel Brace Envelope (Part 2 of 2, continued)

Label	Story	PMM Combo	V22 Ratio	V33 Ratio	Class	Conn. P I-End kip	Conn. P J-End kip
D71	Story3	(R=MIXED) D + L + S + RSX + rsy	0	0	Seismic HD	48.531	48.531
D73	Story3	(R=MIXED) D + L + S + RSX + rsy	0	0	Seismic HD	-46.729	-46.729
D75	Story3	(R=MIXED) D + L + S + RSX + rsy	0.001	0.0004826	Seismic HD	-53.697	-53.665
D76	Story3	(R=MIXED) D + L + S + RSX + rsy	0.001	0.0004461	Seismic HD	-53.89	-53.859
D27	Story3	(R=MIXED) D + L + S + RSX + rsy	0	0	Seismic HD	-30.148	-30.148
D36	Story3	(R=MIXED) D + L + S + RSX + rsy	0	0	Seismic HD	-33.594	-33.594
D80	Story3	(R=MIXED) D + L + S + RSX + rsy	0	0	Seismic HD	43.659	43.659
D82	Story3	(R=MIXED) D + RSX + rsy	0	0	Seismic HD	40.124	40.124
D41	Story2	1.2D+1.6S+1.0L	0	0	Seismic HD	-22.737	-22.736
D44	Story2	1.2D+1.6S+1.0L	0	0	Seismic HD	-23.32	-23.319

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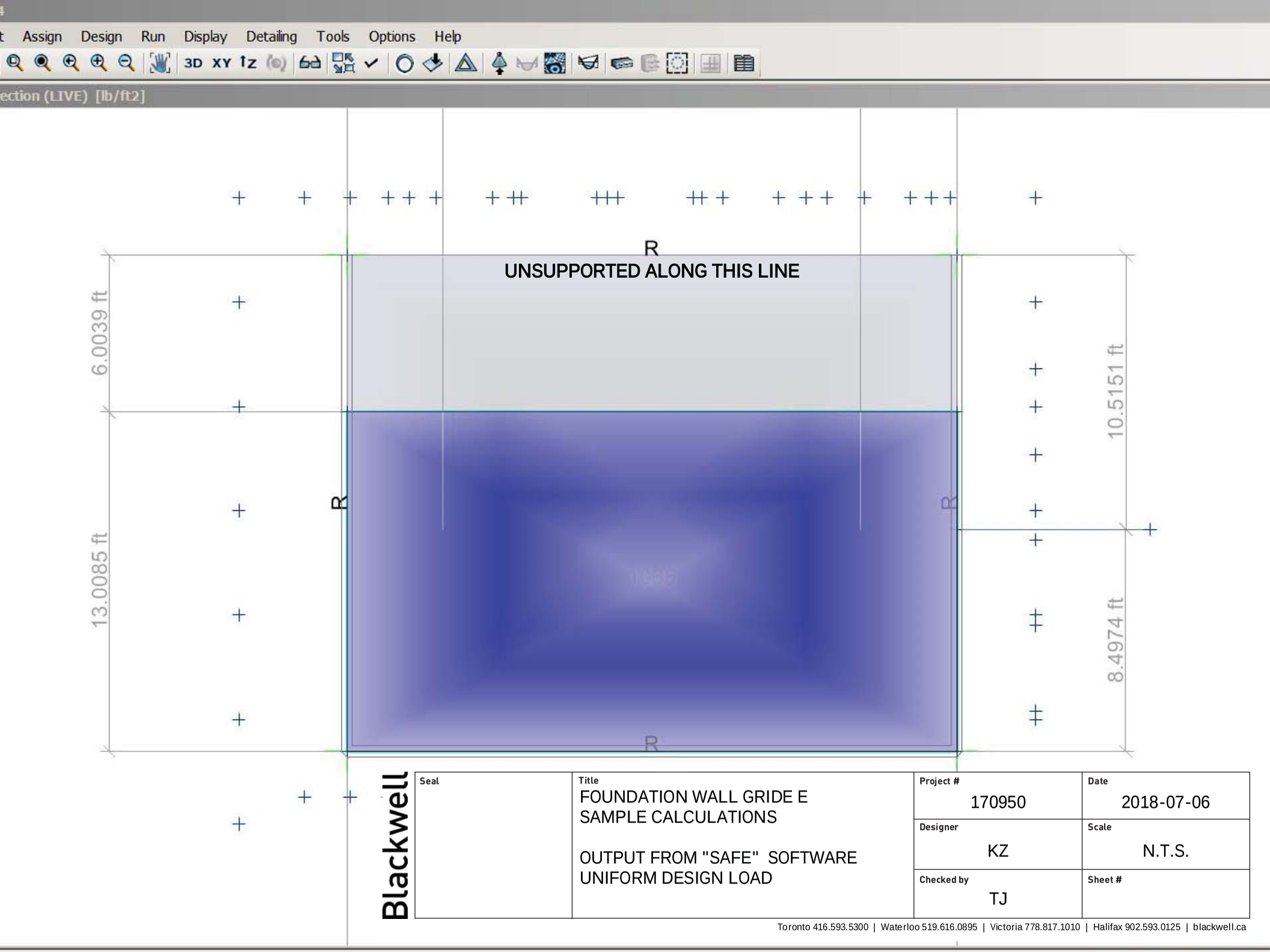
APPENDIX A

Concrete Shear Wall Design Sample



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Seal	Title	Project #	Date
	FOUNDATION WALL GRIDE E SAMPLE CALCULATIONS OUTPUT FROM "SAFE" SOFTWARE UNIFORM DESIGN LOAD	170950	2018-07-06
		Designer: KZ	Scale: N.T.S.
		Checked by: TJ	Sheet #

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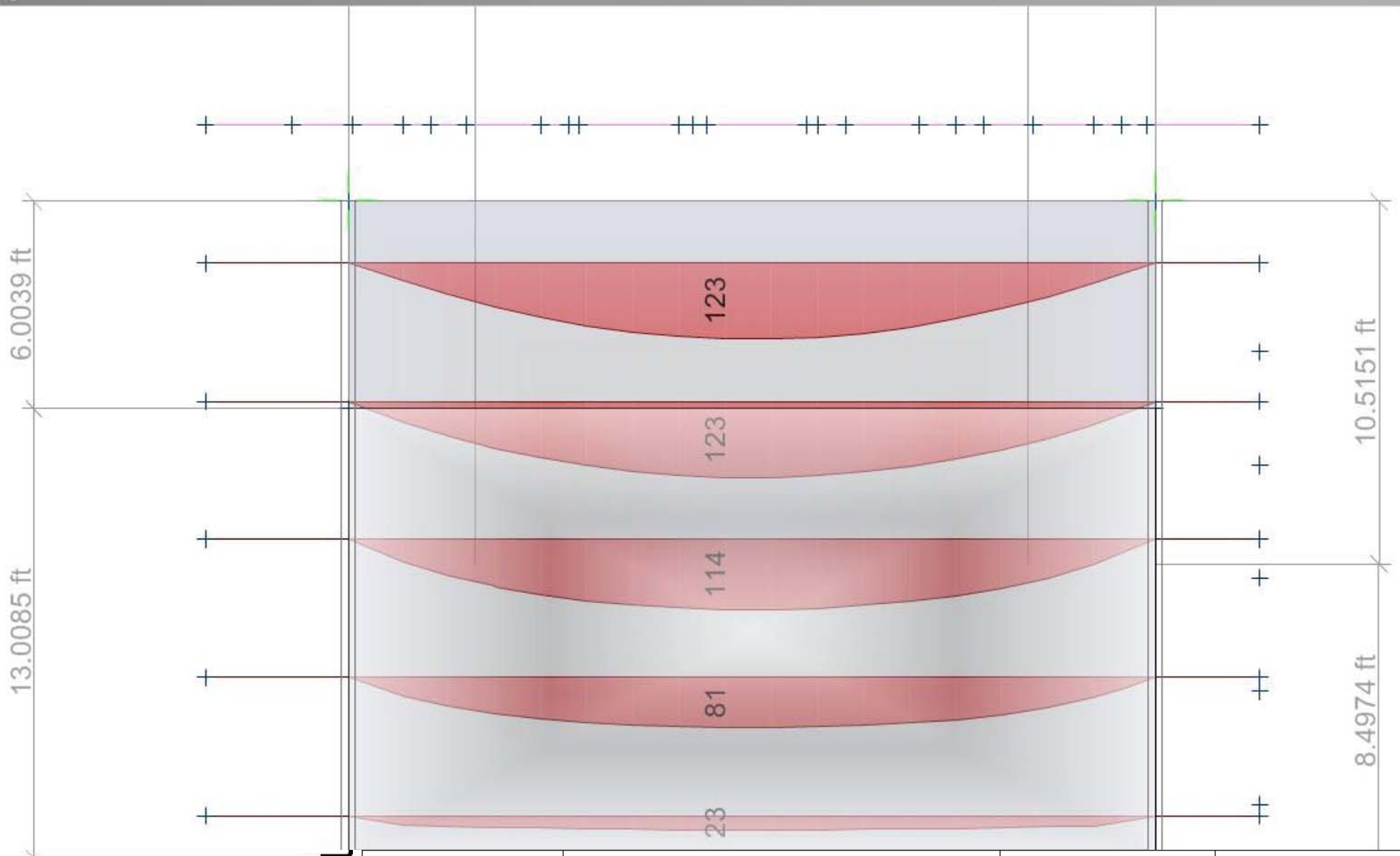
Wall_4

Select Assign Design Run Display Detailing Tools Options Help

3D XY 1Z

Earth+Water) [kip-ft]



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Seal	Title	Project #	Date
	FOUNDATION WALL GRIDE E SAMPLE CALCULATIONS OUTPUT FROM "SAFE" SOFTWARE APPLIED MOMENTS - HORIZONTAL	170950	2018-07-06
		Designer: KZ	Scale: N.T.S.
		Checked by: TJ	Sheet #

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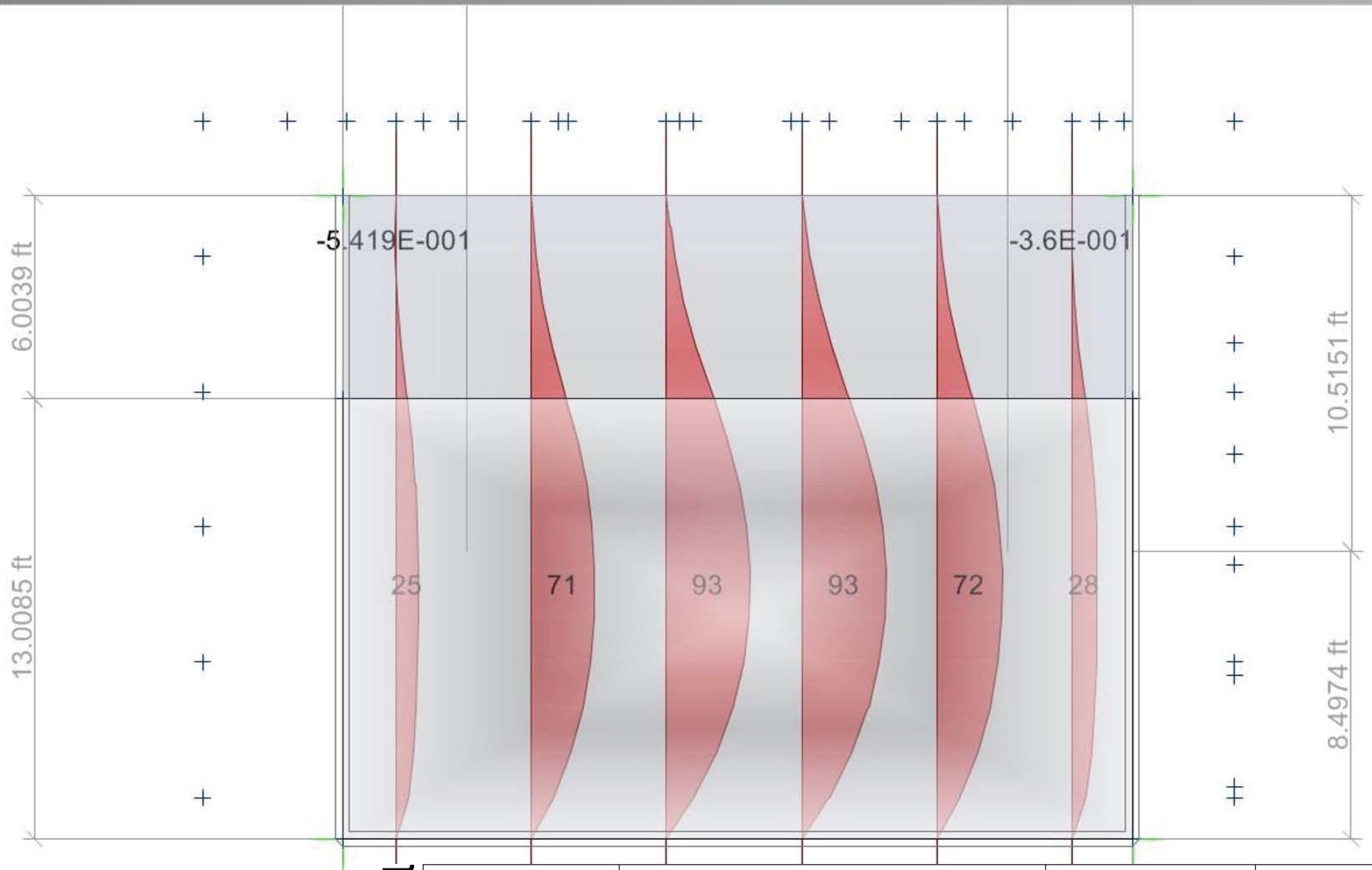
Assign Design Run Display Detailing Tools Options Help

ater) [kip-ft]



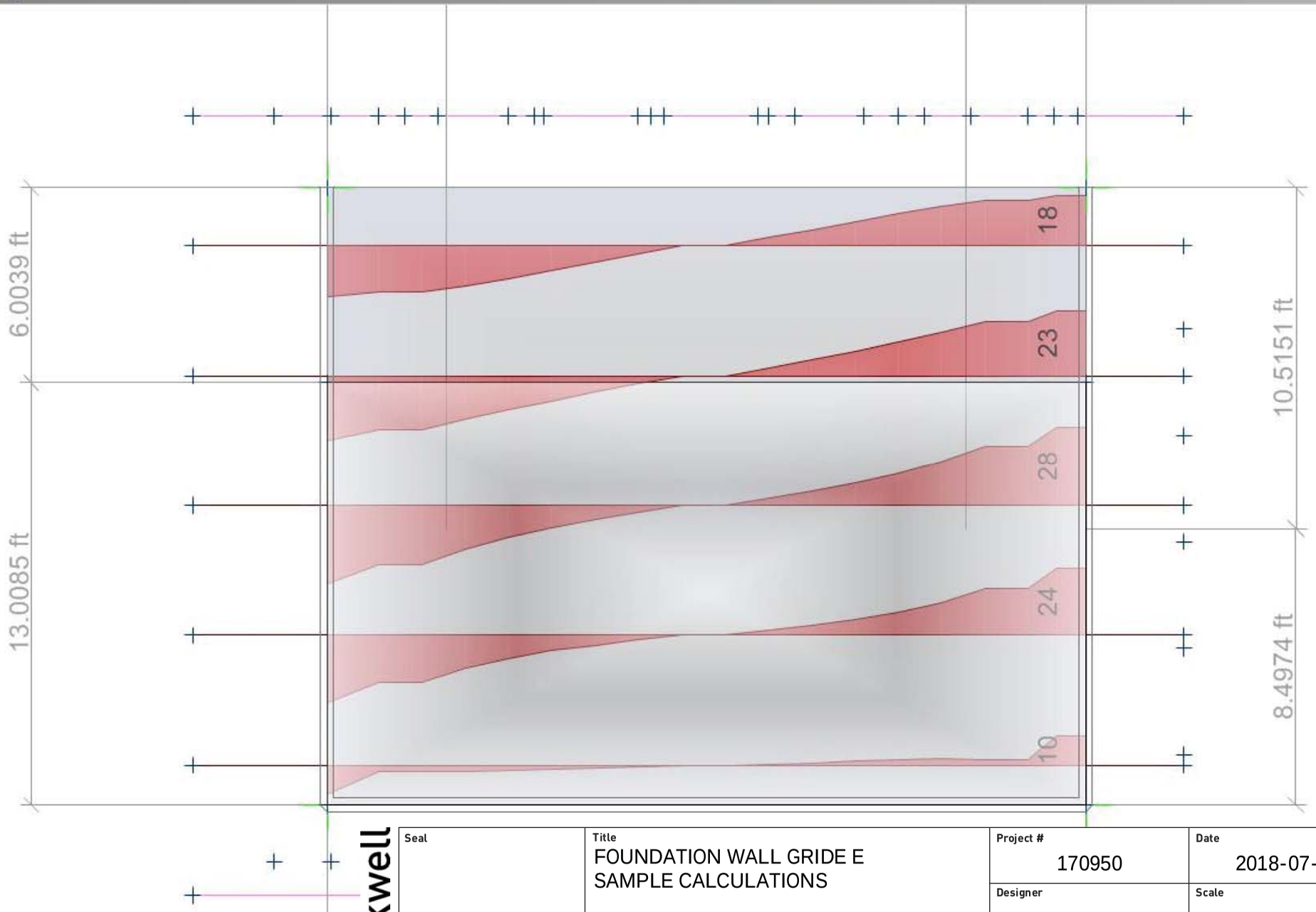
Blackwell

Seal	Title	Project #	Date
	FOUNDATION WALL GRIDE E SAMPLE CALCULATIONS OUTPUT FROM "SAFE" SOFTWARE APPLIED MOMENTS - VERTICAL	170950	2018-07-06
		Designer: KZ	Scale: N.T.S.
		Checked by: TJ	Sheet #

Assign Design Run Display Detailing Tools Options Help

3D XY 1Z

n+Water) [kip]



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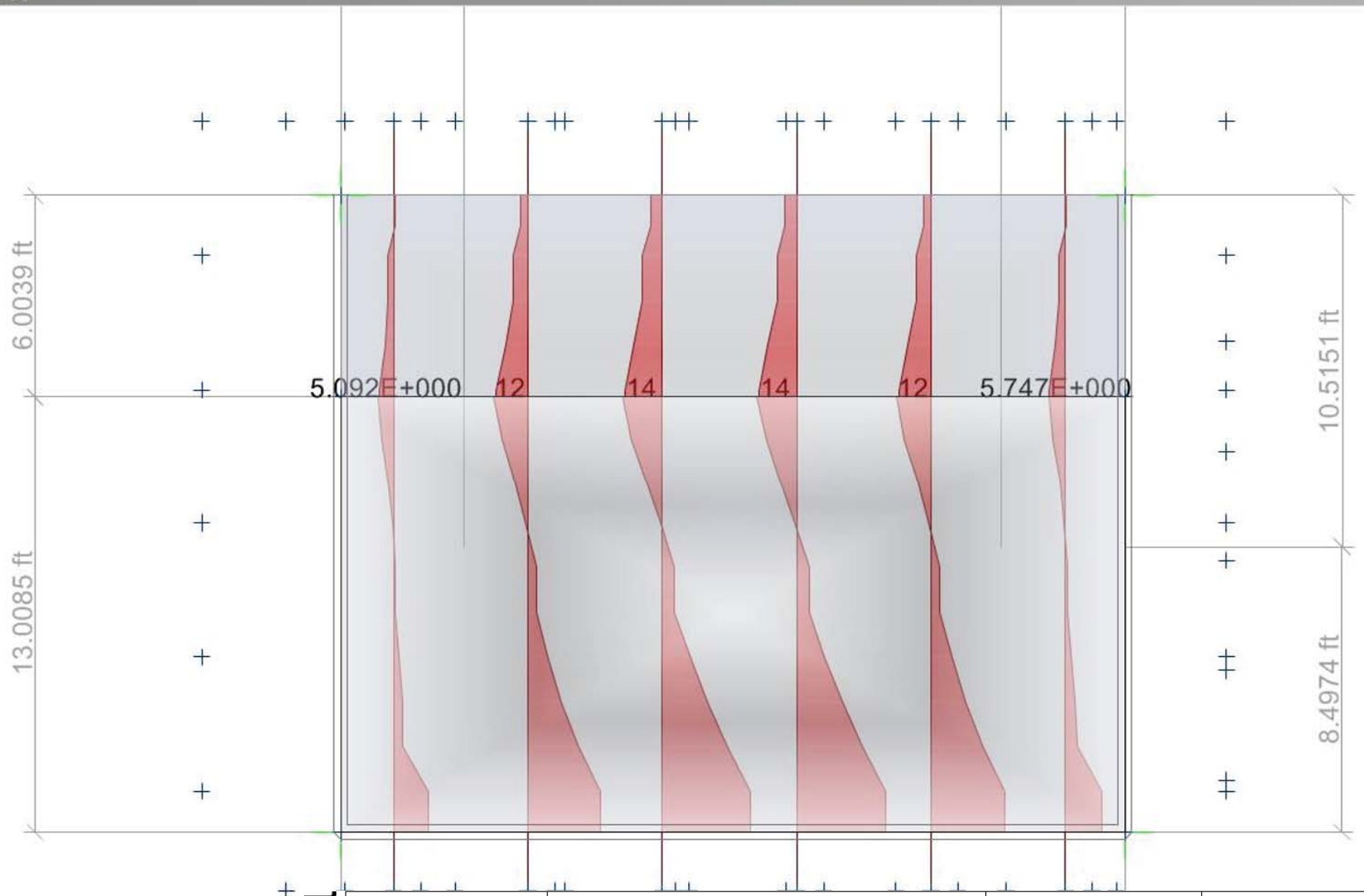
Seal	Title	Project #	Date
	FOUNDATION WALL GRIDE E SAMPLE CALCULATIONS OUTPUT FROM "SAFE" SOFTWARE APPLIED SHEAR - HORIZONTAL	170950	2018-07-06
		Designer: KZ	Scale: N.T.S.
		Checked by: TJ	Sheet #

tion Wall_4

aw Select Assign Design Run Display Detailing Tools Options Help

3D XY 1Z

m - (Earth+Water) [kip]



Blackwell

Seal	Title	Project #	Date
	FOUNDATION WALL GRIDE E SAMPLE CALCULATIONS OUTPUT FROM "SAFE" SOFTWARE APPLIED SHEAR - VERTICAL	170950	2018-07-06
		Designer KZ	Scale N.T.S.
		Checked by TJ	Sheet #

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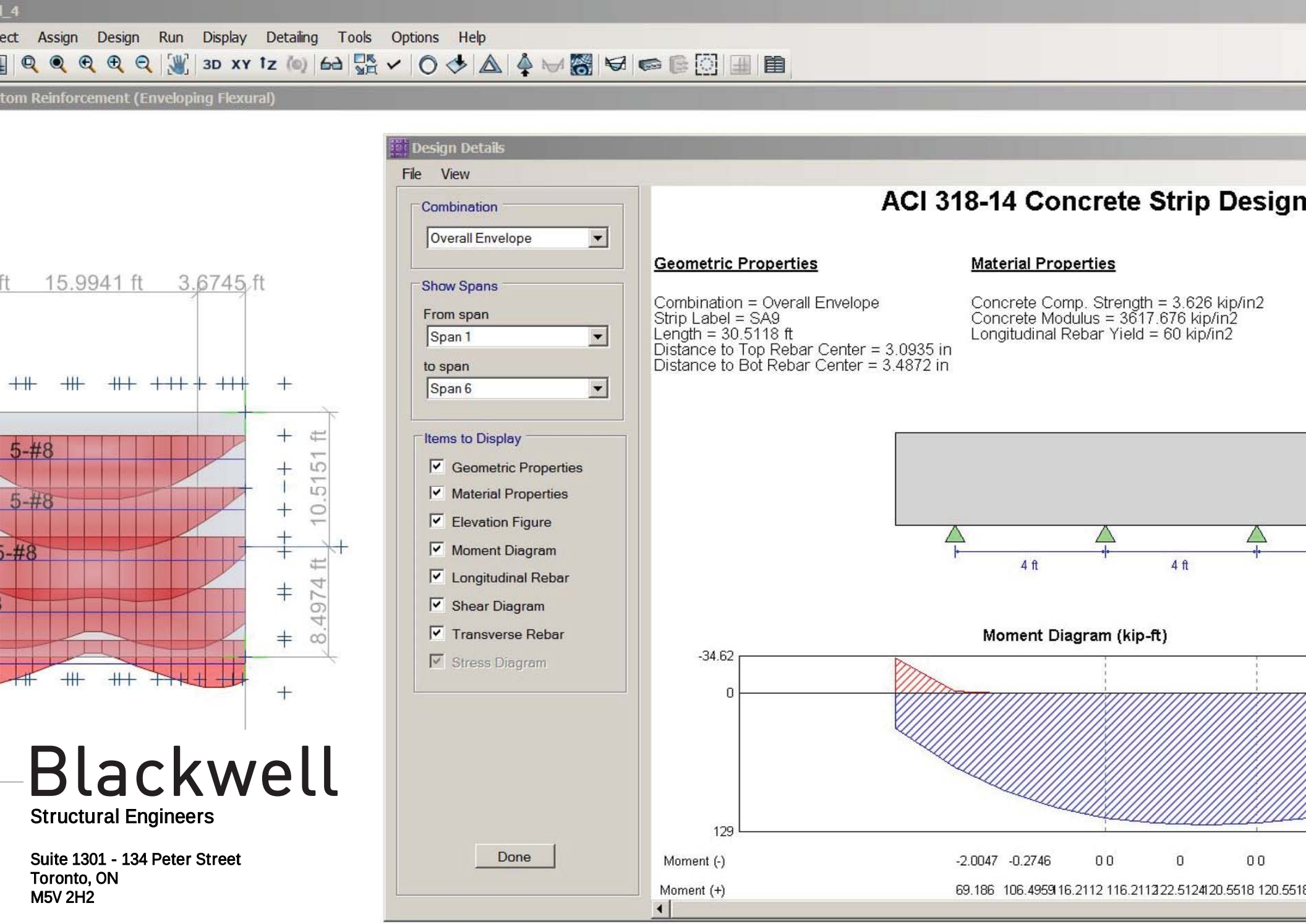
106 ft]; Min = -30 kip at [-50.5297 ft, -29.4191 ft]



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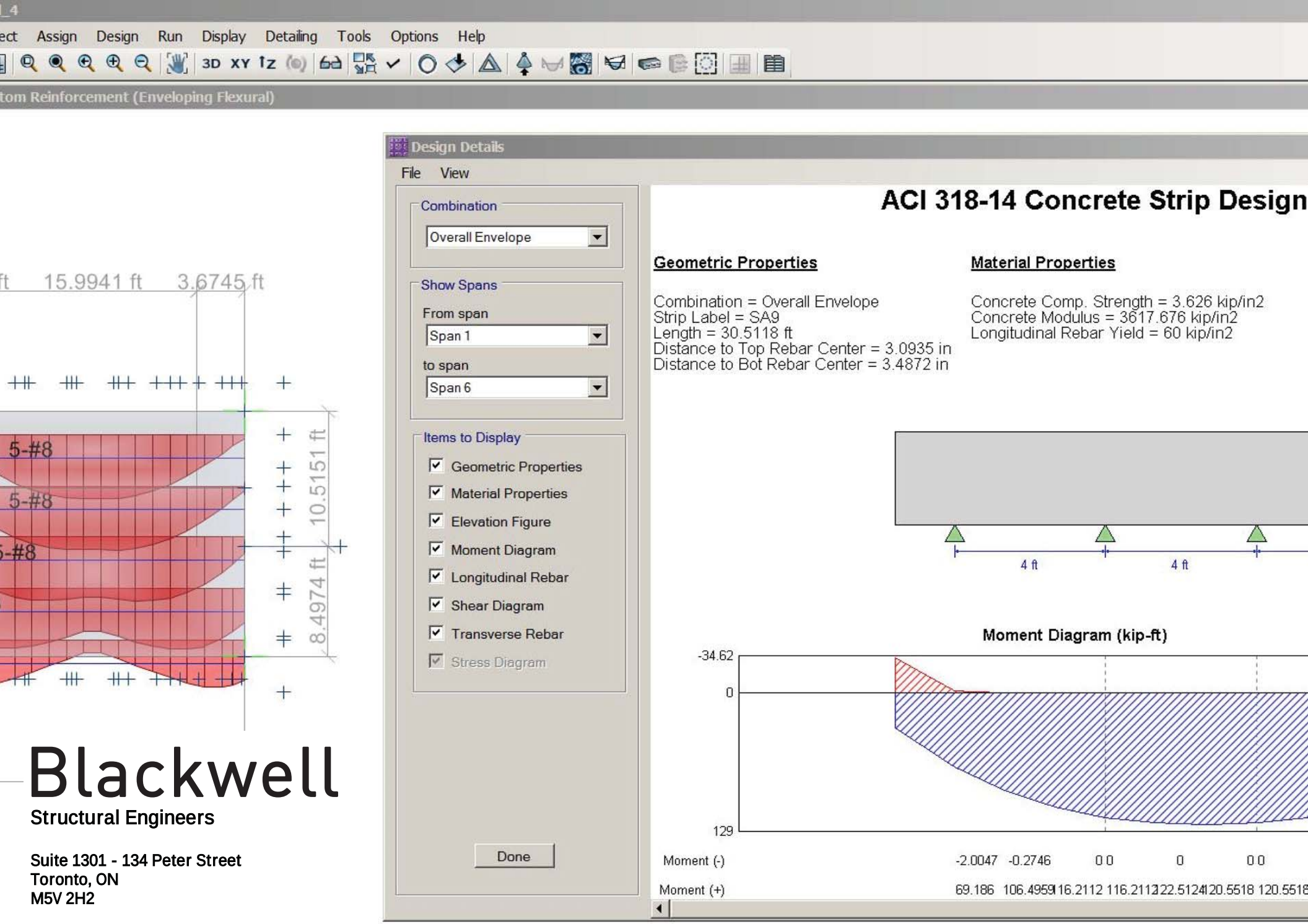

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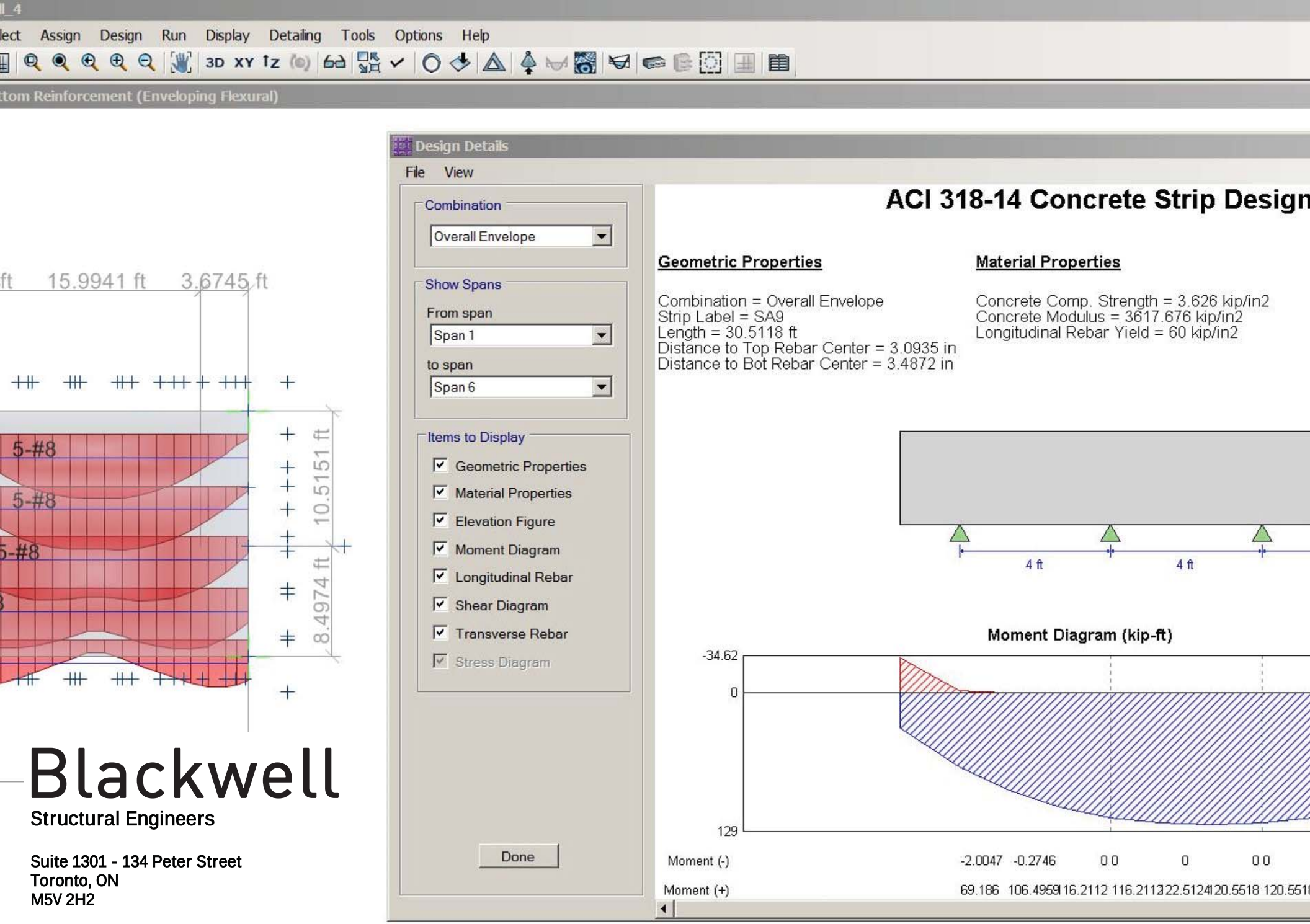

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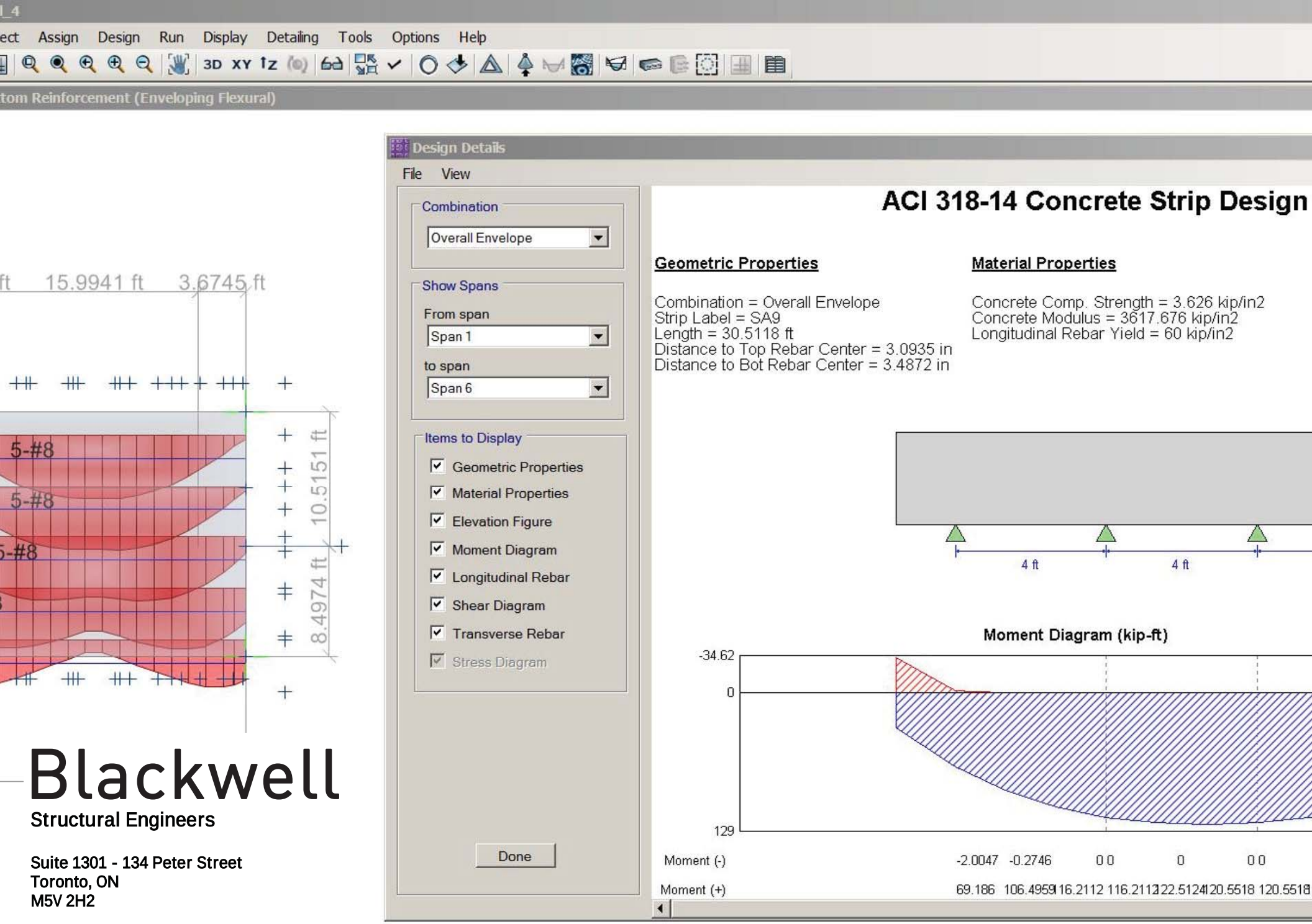

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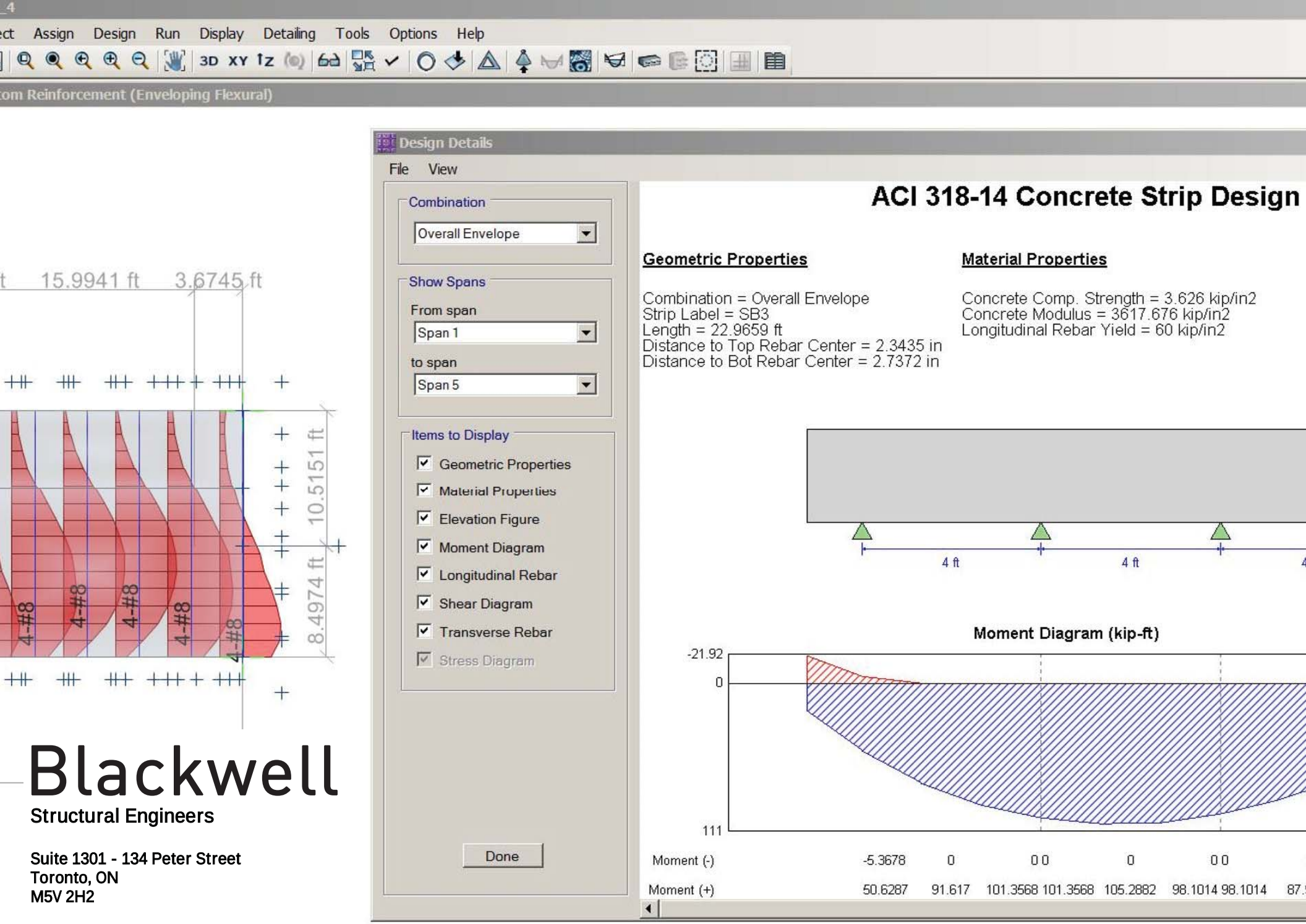

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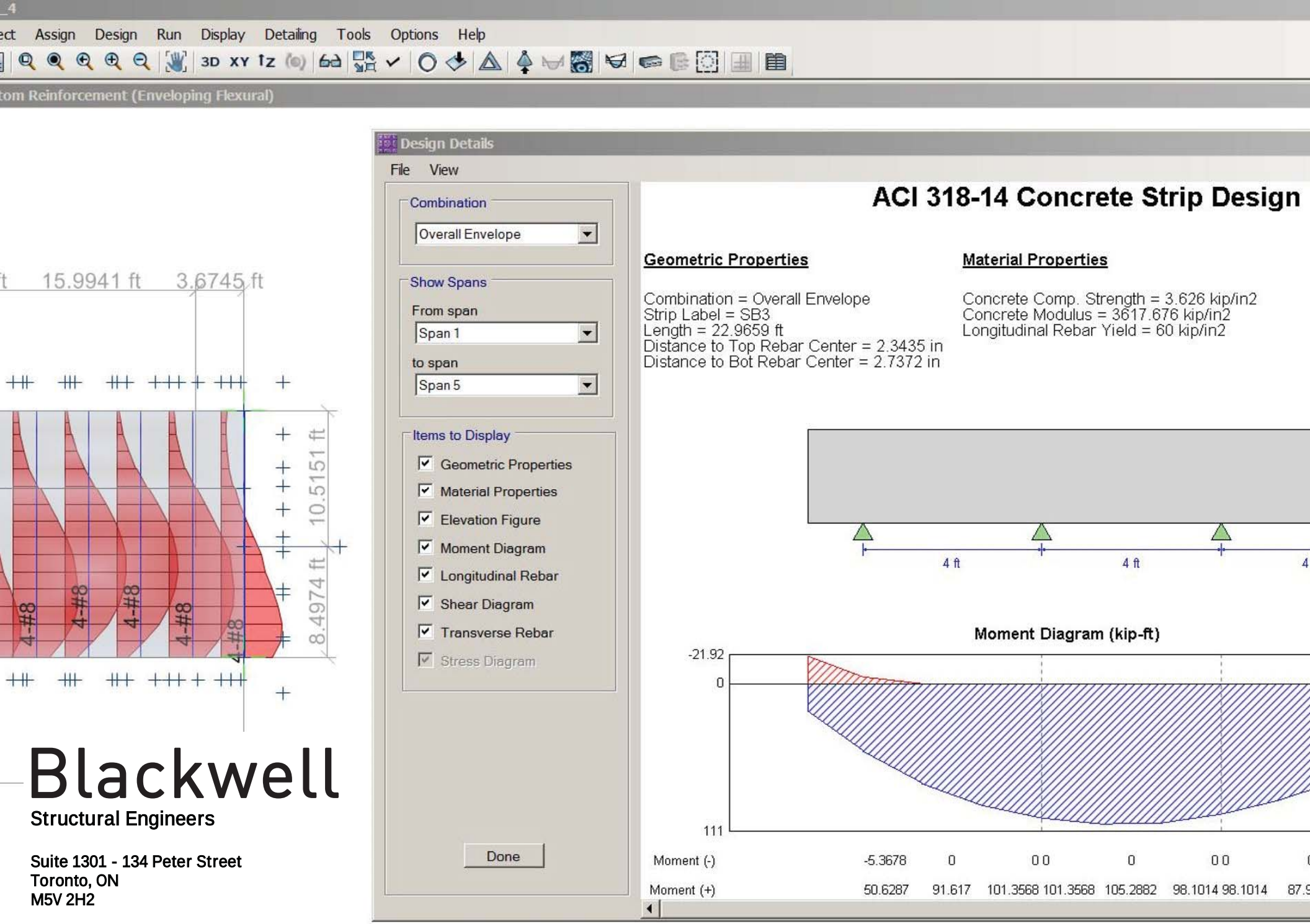

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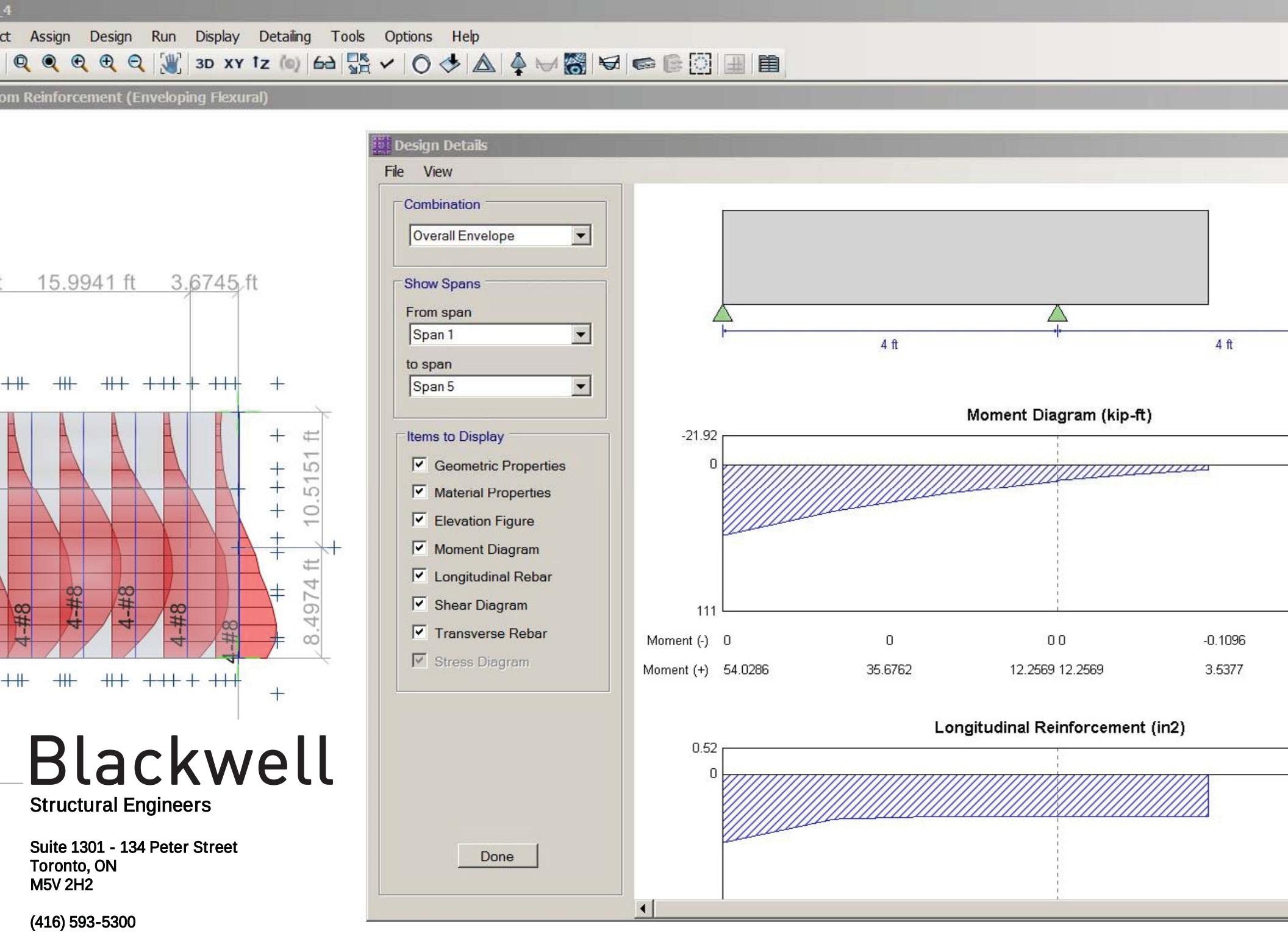

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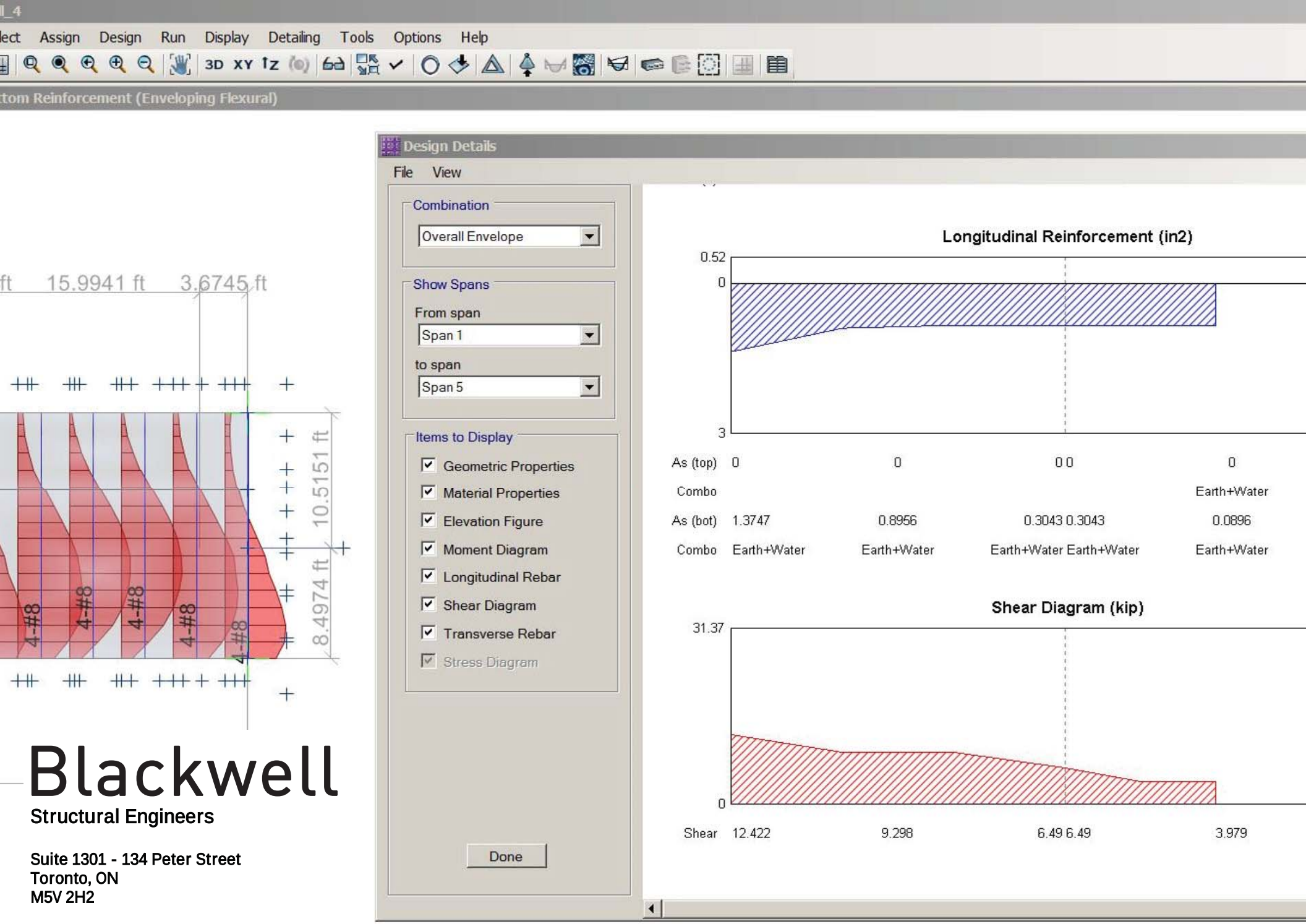

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APPENDIX B

Foundation Wall Grid E
Sample Calculations

Seal	Title	Project #	Date
	LOT 14 SAMPLE SHEAR WALL CALCULATION GRID 8	170950	2018-07-06
		Designer KZ	Scale N.T.S.
		Checked by TJ	Sheet #

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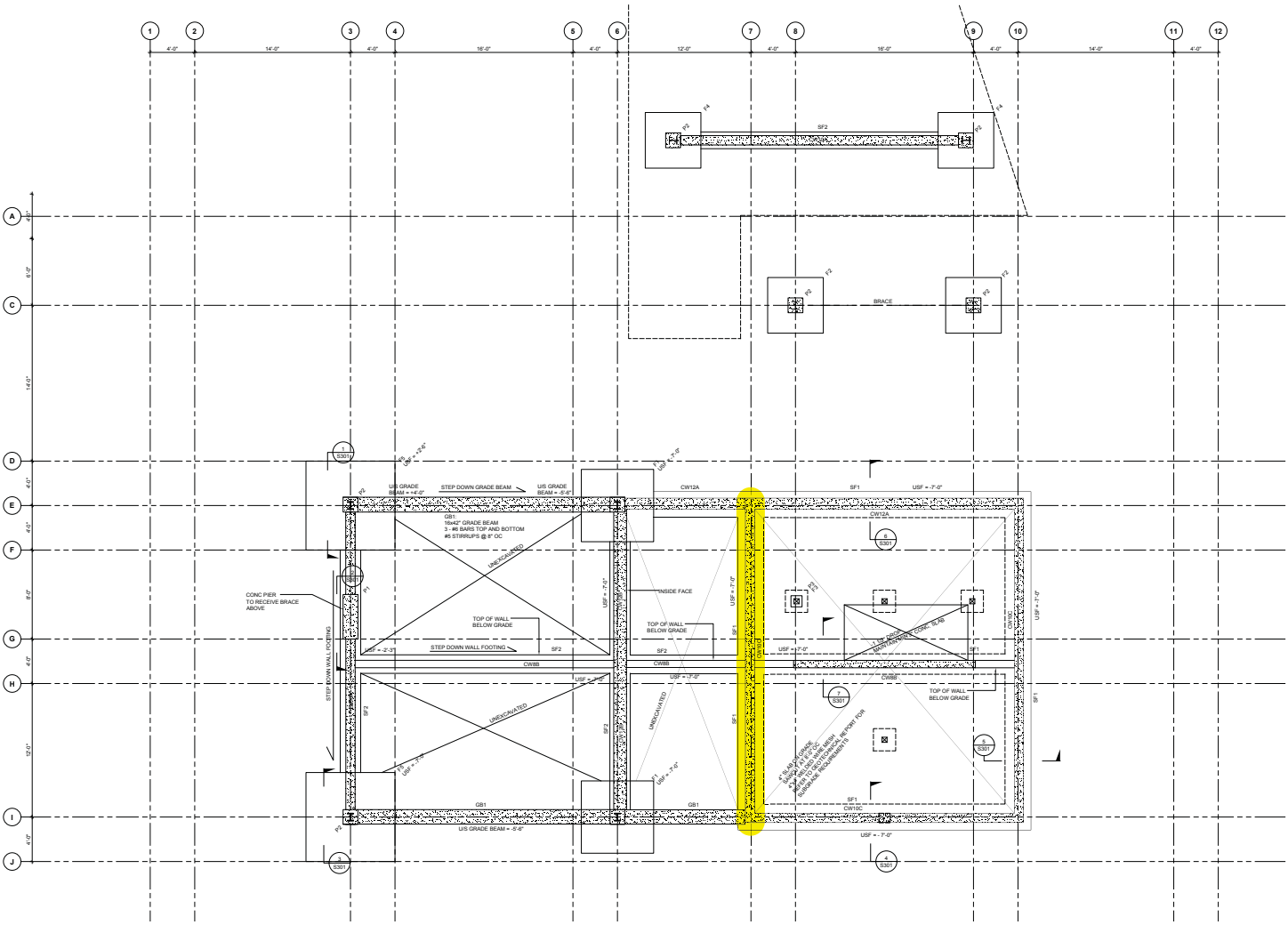

S-CONCRETE 11.1.7 **(c) S-FRAME Software Inc.**

File Name: C:\Jobs\170950_Tim\S-Concrete\P1_ACI.SCO

Section Name | **Consultant**
Concrete Section | Blackwell

Summary

Status	Acceptable
Maximum	1.000
V (shear) Util	0.284
N vs M Util	0.479

American Building Standards

ACI 318-11, "Building Code Requirements for Structural Concrete"

ACI 318-11, "Commentary for ACI 318-11"

Design Aids, Manuals, and Handbooks

The Reinforced Concrete Design Manual in Accordance with ACI 318-11

"ACI Detailing Manual - 1994", ACI Committee 315, American Concrete Institute, 1994

"Manual of Standard Practice", Concrete Reinforcing Steel Institute, 2003

Section Dimensions
I-Shape
L1 = 336.0 in
T1 = 10.0 in

Material Properties
fc' = 4000 psi
fy (panel vert) = 60.0 ksi
fy (panel horz) = 60.0 ksi
fy (zone vert) = 60.0 ksi
fy (zone horz) = 60.0 ksi
Wc = 150 pcf
Ws = 500 pcf
Poisson's Ratio = 0.2
hagg = 0.75 in
Es = 29000 ksi
Ec = 3834 ksi
Gc = 1598 ksi
fr = 474 psi

Gross Properties
Zbar = 0.0 in
Ybar = 0.0 in
Ag = 3360.0 sq.in.
Ig (y-y) = 31611xE3 in4
Ig (z-z) = 28000 in4
Ashear (Y) = 2800.0 sq.in.
Ashear (Z) = 2800.0 sq.in.
Jg = 109899 in4

Effective Properties
Ae = 3360.0 sq.in.
Ie (y-y) = 31611xE3 in4
Ie (z-z) = 28000 in4
Ase (Y) = 2800.0 sq.in.
Ase (Z) = 2800.0 sq.in.
Je = 109899 in4

Quantities (approx.)
Concrete = 3493 lb/ft
Steel = 53.5 lb/ft
Primary = 23.7 lb/ft
Secondary = 29.8 lb/ft

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Panel 1

22-15M @ 16.0" Vert

15M @ 12.0" Horz

Factored Design Loads

Load Case/Combo	N (kips)	T (k*ft)	Vz (kips)	My (k*ft)	Vy (kips)	Mz (k*ft)	Mres (k*ft)	Theta
1 (W)	65.7	10.5	-92.6	554.8	0.7	5.4	554.8	179º
2 (W)	84.8	4.7	-92.5	979.4	0.5	0.5	979.4	180º
3 (W)	47.1	7.2	-96.9	524.0	0.2	2.1	524.0	180º
4 (W)	53.2	1.9	-96.9	1024.1	0.2	0.2	1024.1	180º

5 (W)	-104.9	-1.2	-6.6	-92.4	-0.1	-0.6	92.4	360º
6 (W)	-134.9	-0.4	-6.6	-87.3	0.2	0.0	87.3	0º
7 (W)	-88.5	-1.0	-3.7	-45.7	-0.1	-0.2	45.7	360º
8 (W)	-118.9	-0.1	-3.7	-44.0	0.2	0.0	44.0	0º
9 (W)	-18.7	-0.3	-1.0	-3.5	0.0	-0.1	3.5	359º
10 (W)	-18.3	-0.1	-1.0	-2.5	0.0	0.0	2.5	0º
11 (W)	-54.4	-0.6	-9.7	-155.8	0.1	-1.3	155.8	360º
12 (W)	-53.2	-1.2	-9.8	-144.4	0.2	0.0	144.4	360º
13 (W)	62.9	5.2	21.8	-376.6	-0.1	-2.0	376.6	360º
14 (W)	82.9	-4.6	21.5	-543.1	0.2	-0.5	543.1	360º
15 (W)	19.8	-8.7	-116.9	535.0	0.0	0.8	535.0	180º
16 (W)	18.2	-0.6	-116.7	1132.6	-0.2	0.1	1132.6	180º
17 (W)	-88.6	-1.0	-3.5	-46.6	-0.1	-0.2	46.6	360º
18 (W)	-118.9	-0.1	-3.5	-45.8	0.2	0.0	45.8	0º
19 (W)	-88.6	-1.0	-3.5	-46.6	-0.1	-0.2	46.6	360º
20 (W)	-118.9	-0.1	-3.5	-45.8	0.2	0.0	45.8	0º
21 (W)	-107.3	-1.3	-4.6	-50.1	-0.1	-0.3	50.1	360º
22 (W)	-137.2	-0.1	-4.5	-47.9	0.2	0.0	47.9	0º
23 (W)	-107.3	-1.3	-4.6	-50.1	-0.1	-0.3	50.1	360º
24 (W)	-137.2	-0.1	-4.5	-47.9	0.2	0.0	47.9	0º
25 (W)	-212.0	-2.1	-18.8	-320.6	0.0	-2.5	320.6	360º
26 (W)	-245.6	-2.1	-18.9	-310.1	0.5	0.0	310.1	0º
27 (W)	-212.0	-2.1	-18.8	-320.6	0.0	-2.5	320.6	360º
28 (W)	-245.6	-2.1	-18.9	-310.1	0.5	0.0	310.1	0º
29 (W)	-11.0	2.5	-8.3	-283.0	-0.2	-2.0	283.0	360º
30 (W)	-18.6	-4.8	-8.6	-305.9	0.3	-0.5	305.9	360º
31 (W)	-11.0	2.5	-8.3	-283.0	-0.2	-2.0	283.0	360º
32 (W)	-18.6	-4.8	-8.6	-305.9	0.3	-0.5	305.9	360º
33 (W)	-23.4	9.0	74.6	-643.5	-0.2	-2.7	643.5	360º
34 (W)	-29.8	-4.4	74.2	-1082.2	0.5	-0.5	1082.2	360º
35 (W)	-23.4	9.0	74.6	-643.5	-0.2	-2.7	643.5	360º
36 (W)	-29.8	-4.4	74.2	-1082.2	0.5	-0.5	1082.2	360º
37 (W)	-40.4	-9.7	-130.5	432.5	-0.1	0.2	432.5	180º
38 (W)	-63.6	-2.2	-130.3	1056.8	0.0	0.0	1056.8	180º
39 (W)	-40.4	-9.7	-130.5	432.5	-0.1	0.2	432.5	180º
40 (W)	-63.6	-2.2	-130.3	1056.8	0.0	0.0	1056.8	180º
41 (W)	-77.9	-13.7	-152.2	685.2	-0.1	1.4	685.2	180º
42 (W)	-113.3	0.5	-151.8	1448.2	-0.2	0.3	1448.2	180º
43 (W)	-77.9	-13.7	-152.2	685.2	-0.1	1.4	685.2	180º
44 (W)	-113.3	0.5	-151.8	1448.2	-0.2	0.3	1448.2	180º
45 (W)	-77.7	1.7	-12.6	-338.4	-0.2	-2.5	338.4	360º
46 (W)	-97.3	-5.1	-12.8	-358.6	0.5	-0.5	358.6	360º
47 (W)	-77.7	1.7	-12.6	-338.4	-0.2	-2.5	338.4	360º
48 (W)	-97.3	-5.1	-12.8	-358.6	0.5	-0.5	358.6	360º
49 (W)	-90.1	8.2	70.5	-699.6	-0.2	-3.1	699.6	360º
50 (W)	-108.5	-4.7	70.1	-1136.2	0.6	-0.5	1136.2	360º
51 (W)	-90.1	8.2	70.5	-699.6	-0.2	-3.1	699.6	360º
52 (W)	-108.5	-4.7	70.1	-1136.2	0.6	-0.5	1136.2	360º
53 (W)	-107.1	-10.5	-134.8	378.1	-0.2	-0.3	378.1	180º
54 (W)	-142.3	-2.5	-134.6	1005.6	0.1	0.0	1005.6	180º

55 (W)	-107.1	-10.5	-134.8	378.1	-0.2	-0.3	378.1	180º
56 (W)	-142.3	-2.5	-134.6	1005.6	0.1	0.0	1005.6	180º
57 (W)	-144.6	-14.5	-156.5	631.0	-0.1	1.0	631.0	180º
58 (W)	-192.1	0.2	-156.2	1397.4	-0.1	0.3	1397.4	180º
59 (W)	-144.6	-14.5	-156.5	631.0	-0.1	1.0	631.0	180º
60 (W)	-192.1	0.2	-156.2	1397.4	-0.1	0.3	1397.4	180º
61 (W)	-202.9	-11.6	-85.2	504.6	-0.1	1.8	504.6	180º
62 (W)	-263.2	3.9	-84.8	947.7	-0.1	0.6	947.7	180º
63 (W)	-202.9	-11.6	-85.2	504.6	-0.1	1.8	504.6	180º
64 (W)	-263.2	3.9	-84.8	947.7	-0.1	0.6	947.7	180º
65 (W)	-215.3	-5.1	-2.3	143.4	-0.1	1.2	143.4	180º
66 (W)	-274.3	4.3	-2.0	170.5	0.1	0.6	170.5	180º
67 (W)	-215.3	-5.1	-2.3	143.4	-0.1	1.2	143.4	180º
68 (W)	-274.3	4.3	-2.0	170.5	0.1	0.6	170.5	180º
69 (W)	-148.4	11.1	141.8	-826.0	-0.2	-2.3	826.0	360º
70 (W)	-179.6	-1.0	141.5	-1586.0	0.6	-0.2	1586.0	360º
71 (W)	-148.4	11.1	141.8	-826.0	-0.2	-2.3	826.0	360º
72 (W)	-179.6	-1.0	141.5	-1586.0	0.6	-0.2	1586.0	360º
73 (W)	-186.0	7.2	120.0	-573.0	-0.1	-1.0	573.0	360º
74 (W)	-229.3	1.7	119.9	-1193.8	0.4	0.1	1193.8	0º
75 (W)	-186.0	7.2	120.0	-573.0	-0.1	-1.0	573.0	360º
76 (W)	-229.3	1.7	119.9	-1193.8	0.4	0.1	1193.8	0º
77 (W)	-136.0	-10.8	-80.9	559.6	0.0	2.2	559.6	180º
78 (W)	-184.3	4.2	-80.5	999.8	-0.2	0.6	999.8	180º
79 (W)	-136.0	-10.8	-80.9	559.6	0.0	2.2	559.6	180º
80 (W)	-184.3	4.2	-80.5	999.8	-0.2	0.6	999.8	180º
81 (W)	-148.4	-4.3	1.9	199.1	0.0	1.6	199.1	180º
82 (W)	-195.4	4.7	2.2	223.8	-0.1	0.5	223.8	180º
83 (W)	-148.4	-4.3	1.9	199.1	0.0	1.6	199.1	180º
84 (W)	-195.4	4.7	2.2	223.8	-0.1	0.5	223.8	180º
85 (W)	-81.5	11.9	145.9	-769.1	-0.1	-1.9	769.1	360º
86 (W)	-100.7	-0.7	145.6	-1530.8	0.5	-0.2	1530.8	360º
87 (W)	-81.5	11.9	145.9	-769.1	-0.1	-1.9	769.1	360º
88 (W)	-100.7	-0.7	145.6	-1530.8	0.5	-0.2	1530.8	360º
89 (W)	-119.0	7.9	124.1	-516.3	-0.1	-0.6	516.3	360º
90 (W)	-150.4	2.1	123.9	-1139.0	0.3	0.1	1139.0	0º
91 (W)	-119.0	7.9	124.1	-516.3	-0.1	-0.6	516.3	360º
92 (W)	-150.4	2.1	123.9	-1139.0	0.3	0.1	1139.0	0º
93 (W)	69.8	5.1	21.5	-410.7	1.1	-6.2	410.8	359º
94 (W)	92.8	-5.3	21.1	-588.6	0.0	-0.6	588.6	360º
95 (W)	70.9	5.6	24.5	-421.9	1.1	-6.2	422.0	359º
96 (W)	94.3	-5.4	24.1	-612.2	0.0	-0.6	612.2	360º
97 (W)	23.6	-7.7	-122.0	557.4	0.0	0.6	557.4	180º
98 (W)	22.6	-0.8	-123.5	1201.2	-0.1	0.1	1201.2	180º
99 (W)	22.8	-8.8	-129.8	580.9	0.0	0.7	580.9	180º
100 (W)	21.3	-0.8	-131.3	1255.1	-0.2	0.1	1255.1	180º
101 (W)	50.3	8.1	-70.9	425.0	0.6	4.1	425.0	179º
102 (W)	65.0	3.6	-70.9	750.2	0.4	0.4	750.2	180º
103 (W)	36.3	5.6	-74.7	403.3	0.2	1.6	403.3	180º
104 (W)	41.1	1.5	-74.8	788.4	0.2	0.2	788.4	180º

105 (E)	-42.7	14.8	-165.9	830.7	0.9	7.1	830.7	180º
106 (E)	-54.8	6.4	-165.9	1583.1	1.1	0.8	1583.1	180º
107 (E)	-250.2	-18.2	150.3	-1020.6	-1.2	-8.4	1020.6	360º
108 (E)	-316.9	-7.2	150.3	-1762.0	-0.5	-0.7	1762.0	360º
109 (E)	34.7	15.7	-161.0	890.0	1.0	7.6	890.0	180º
110 (E)	38.3	6.7	-161.0	1638.3	0.9	0.8	1638.3	180º
111 (E)	-172.8	-17.3	155.2	-961.3	-1.1	-7.9	961.3	360º
112 (E)	-223.8	-6.8	155.2	-1706.9	-0.7	-0.8	1706.9	360º
113 (E)	-59.6	11.8	-169.8	802.7	0.5	4.1	802.7	180º
114 (E)	-83.6	3.9	-169.8	1623.8	0.8	0.5	1623.8	180º
115 (E)	-233.4	-15.2	154.2	-992.6	-0.8	-5.4	992.6	360º
116 (E)	-288.1	-4.6	154.3	-1802.7	-0.2	-0.4	1802.7	360º
117 (W)	-90.1	8.2	70.5	-699.6	-0.2	-3.1	699.6	360º
118 (W)	-108.5	-4.7	70.1	-1136.2	0.6	-0.5	1136.2	360º
119 (W)	-148.4	11.1	141.8	-826.0	-0.2	-2.3	826.0	360º
120 (W)	-179.6	-1.0	141.5	-1586.0	0.6	-0.2	1586.0	360º
121 (E)	17.8	12.7	-164.9	862.0	0.5	4.6	862.0	180º
122 (E)	9.5	4.2	-164.9	1679.0	0.6	0.5	1679.0	180º
123 (E)	-155.9	-14.3	159.1	-933.2	-0.7	-4.9	933.2	360º
124 (E)	-195.0	-4.3	159.2	-1747.6	-0.4	-0.5	1747.6	360º
125 (W)	-77.7	1.7	-12.6	-338.4	-0.2	-2.5	338.4	360º
126 (W)	-97.3	-5.1	-12.8	-358.6	0.5	-0.5	358.6	360º
127 (W)	-107.1	-10.5	-134.8	378.1	-0.2	-0.3	378.1	180º
128 (W)	-142.3	-2.5	-134.6	1005.6	0.1	0.0	1005.6	180º
129 (W)	-144.6	-14.5	-156.5	631.0	-0.1	1.0	631.0	180º
130 (W)	-192.1	0.2	-156.2	1397.4	-0.1	0.3	1397.4	180º
131 (W)	-186.0	7.2	120.0	-573.0	-0.1	-1.0	573.0	360º
132 (W)	-229.3	1.7	119.9	-1193.8	0.4	0.1	1193.8	0º
133 (W)	-202.9	-11.6	-85.2	504.6	-0.1	1.8	504.6	180º
134 (W)	-263.2	3.9	-84.8	947.7	-0.1	0.6	947.7	180º
135 (W)	-215.3	-5.1	-2.3	143.4	-0.1	1.2	143.4	180º
136 (W)	-274.3	4.3	-2.0	170.5	0.1	0.6	170.5	180º
137 (W)	-11.0	2.5	-8.3	-283.0	-0.2	-2.0	283.0	360º
138 (W)	-18.6	-4.8	-8.6	-305.9	0.3	-0.5	305.9	360º
139 (W)	-23.4	9.0	74.6	-643.5	-0.2	-2.7	643.5	360º
140 (W)	-29.8	-4.4	74.2	-1082.2	0.5	-0.5	1082.2	360º
141 (W)	-136.0	-10.8	-80.9	559.6	0.0	2.2	559.6	180º
142 (W)	-184.3	4.2	-80.5	999.8	-0.2	0.6	999.8	180º
143 (W)	-148.4	-4.3	1.9	199.1	0.0	1.6	199.1	180º
144 (W)	-195.4	4.7	2.2	223.8	-0.1	0.5	223.8	180º
145 (W)	-40.4	-9.7	-130.5	432.5	-0.1	0.2	432.5	180º
146 (W)	-63.6	-2.2	-130.3	1056.8	0.0	0.0	1056.8	180º
147 (W)	-77.9	-13.7	-152.2	685.2	-0.1	1.4	685.2	180º
148 (W)	-113.3	0.5	-151.8	1448.2	-0.2	0.3	1448.2	180º
149 (W)	-81.5	11.9	145.9	-769.1	-0.1	-1.9	769.1	360º
150 (W)	-100.7	-0.7	145.6	-1530.8	0.5	-0.2	1530.8	360º
151 (W)	-119.0	7.9	124.1	-516.3	-0.1	-0.6	516.3	360º
152 (W)	-150.4	2.1	123.9	-1139.0	0.3	0.1	1139.0	0º
153 (W)	-11.0	11.9	-156.5	685.2	0.0	2.2	685.2	180º
154 (W)	-18.6	4.7	-156.2	1448.2	0.6	0.6	1448.2	180º

155 (W)	-215.3	-14.5	145.9	-826.0	-0.2	-3.1	826.0	360º
156 (W)	-274.3	-5.1	145.6	-1586.0	-0.2	-0.5	1586.0	360º
157 (W)	34.7	15.7	-169.8	890.0	1.0	7.6	890.0	180º
158 (W)	38.3	6.7	-169.8	1679.0	1.1	0.8	1679.0	180º
159 (W)	-250.2	-18.2	159.1	-1020.6	-1.2	-8.4	1020.6	360º
160 (W)	-316.9	-7.2	159.2	-1802.7	-0.7	-0.8	1802.7	360º
161 (W)	-124.0	-1.4	-5.2	-64.0	-0.2	-0.3	64.0	360º
162 (W)	-166.5	-0.1	-5.2	-61.6	0.2	0.1	61.6	0º
163 (W)	-163.4	-1.9	-10.9	-138.3	-0.1	-1.1	138.3	360º
164 (W)	-198.5	-0.8	-10.9	-129.0	0.3	0.0	129.0	0º
165 (W)	-212.1	-2.4	-21.0	-307.5	0.0	-2.5	307.5	360º
166 (W)	-246.0	-2.0	-21.1	-286.3	0.5	0.0	286.3	0º
167 (W)	-81.8	3.5	14.0	-470.6	-0.2	-2.6	470.6	360º
168 (W)	-100.5	-5.0	13.7	-631.6	0.5	-0.5	631.6	360º
169 (W)	-207.6	-6.9	-29.5	282.6	-0.1	1.3	282.6	180º
170 (W)	-266.4	4.3	-29.2	454.5	0.0	0.6	454.5	180º
171 (W)	-124.9	-10.4	-124.6	440.9	-0.2	0.1	440.9	180º
172 (W)	-165.3	-0.9	-124.4	1044.1	0.1	0.1	1044.1	180º
173 (W)	-164.5	7.0	109.1	-629.0	-0.1	-1.4	629.0	360º
174 (W)	-201.7	0.2	109.0	-1221.2	0.5	0.0	1221.2	360º
175 (W)	-73.8	3.9	13.7	-504.8	0.9	-6.8	504.8	359º
176 (W)	-89.2	-5.7	13.4	-677.2	0.3	-0.6	677.2	360º
177 (W)	-74.9	3.5	16.8	-516.0	0.9	-6.9	516.0	359º
178 (W)	-90.6	-5.7	16.4	-700.7	0.3	-0.6	700.7	360º
179 (W)	-214.5	-6.8	-32.2	327.9	-1.2	5.6	327.9	179º
180 (W)	-276.3	5.0	-31.9	523.6	0.3	0.7	523.6	180º
181 (W)	-215.6	-7.3	-29.2	316.7	-1.2	5.5	316.7	179º
182 (W)	-277.8	5.0	-28.8	500.1	0.3	0.7	500.1	180º
183 (W)	-121.1	-9.4	-137.6	486.8	-0.2	0.1	486.8	180º
184 (W)	-160.8	-1.2	-139.0	1166.6	0.1	0.1	1166.6	180º
185 (W)	-121.9	-10.5	-129.7	463.3	-0.2	-0.1	463.3	180º
186 (W)	-162.2	-1.2	-131.2	1112.7	0.1	0.1	1112.7	180º
187 (W)	-167.5	7.1	114.2	-651.4	-0.1	-1.2	651.4	360º
188 (W)	-204.8	0.5	115.8	-1289.7	0.5	0.0	1289.7	360º
189 (W)	-168.3	6.0	122.1	-674.9	-0.1	-1.3	674.9	360º
190 (W)	-206.1	0.4	123.6	-1343.7	0.4	0.0	1343.7	360º
191 (W)	-7.9	4.4	18.8	-413.1	-0.2	-2.2	413.1	360º
192 (W)	-12.2	-4.7	18.5	-578.2	0.4	-0.5	578.2	360º
193 (W)	-133.8	-6.0	-24.7	340.1	0.0	1.8	340.1	180º
194 (W)	-178.1	4.6	-24.4	507.9	-0.1	0.6	507.9	180º
195 (W)	-51.0	-9.5	-119.8	498.4	-0.1	0.6	498.4	180º
196 (W)	-76.9	-0.6	-119.6	1097.5	-0.1	0.1	1097.5	180º
197 (W)	-90.6	7.9	113.9	-571.5	-0.1	-1.0	571.5	360º
198 (W)	-113.3	0.5	113.7	-1167.8	0.3	-0.1	1167.8	360º
199 (W)	0.1	4.8	18.5	-447.3	1.0	-6.3	447.3	359º
200 (W)	-0.8	-5.4	18.2	-623.8	0.1	-0.6	623.8	360º
201 (W)	-1.0	4.3	21.5	-458.5	1.0	-6.4	458.5	359º
202 (W)	-2.3	-5.4	21.2	-647.3	0.1	-0.6	647.3	360º
203 (W)	-140.6	-6.0	-27.5	385.4	-1.2	6.0	385.4	179º
204 (W)	-188.0	5.3	-27.1	577.0	0.1	0.6	577.0	180º

205 (W)	-141.7	-6.4	-24.4	374.2	-1.2	6.0	374.2	179º
206 (W)	-189.4	5.3	-24.1	553.5	0.1	0.6	553.5	180º
207 (W)	-47.2	-8.5	-132.8	544.3	-0.1	0.5	544.3	180º
208 (W)	-72.5	-0.9	-134.3	1220.0	0.0	0.1	1220.0	180º
209 (W)	-48.1	-9.6	-124.9	520.8	-0.1	0.4	520.8	180º
210 (W)	-73.8	-0.9	-126.4	1166.0	-0.1	0.1	1166.0	180º
211 (W)	-93.6	8.0	119.0	-593.9	-0.1	-0.8	593.9	360º
212 (W)	-116.4	0.8	120.6	-1236.4	0.3	0.0	1236.4	360º
213 (W)	-94.4	6.9	126.8	-617.4	-0.1	-0.9	617.4	360º
214 (W)	-117.8	0.8	128.4	-1290.3	0.3	-0.1	1290.3	360º
215 (W)	-79.0	8.9	-100.3	460.8	0.6	4.7	460.8	179º
216 (W)	-98.7	4.3	-100.3	890.8	0.8	0.6	890.8	180º
217 (W)	-210.4	-12.2	84.8	-648.9	-0.9	-6.0	648.9	359º
218 (W)	-268.3	-5.0	84.8	-1067.9	-0.3	-0.5	1067.9	360º
219 (W)	-97.6	5.6	-104.6	430.0	0.1	1.4	430.0	180º
220 (W)	-130.3	1.5	-104.6	935.6	0.5	0.3	935.6	180º
221 (W)	-191.8	-8.9	89.1	-618.1	-0.4	-2.7	618.1	360º
222 (W)	-236.7	-2.3	89.2	-1112.6	0.0	-0.2	1112.6	360º
223 (W)	-5.2	9.7	-95.6	518.3	0.6	5.2	518.3	179º
224 (W)	-10.3	4.6	-95.5	944.2	0.7	0.6	944.2	180º
225 (W)	-136.5	-11.3	89.6	-591.4	-0.8	-5.5	591.4	359º
226 (W)	-179.9	-4.7	89.6	-1014.5	-0.4	-0.5	1014.5	360º
227 (W)	-23.7	6.4	-99.8	487.5	0.2	1.9	487.5	180º
228 (W)	-41.9	1.8	-99.8	988.9	0.4	0.3	988.9	180º
229 (W)	-118.0	-8.1	93.9	-560.6	-0.3	-2.2	560.6	360º
230 (W)	-148.3	-1.9	93.9	-1059.3	-0.1	-0.2	1059.3	360º
231 (W)	-88.5	-1.0	-3.7	-45.7	-0.1	-0.2	45.7	360º
232 (W)	-118.9	-0.1	-3.7	-44.0	0.2	0.0	44.0	0º
233 (W)	-107.3	-1.3	-4.7	-49.2	-0.1	-0.3	49.2	360º
234 (W)	-137.2	-0.1	-4.6	-46.5	0.2	0.0	46.5	0º
235 (W)	-85.3	8.1	-101.2	451.1	0.5	3.9	451.1	179º
236 (W)	-108.6	3.6	-101.1	897.3	0.7	0.5	897.3	180º
237 (W)	-207.7	-11.5	85.5	-641.0	-0.8	-5.2	641.0	360º
238 (W)	-263.1	-4.4	85.5	-1076.2	-0.2	-0.4	1076.2	360º
239 (W)	-95.1	6.4	-103.8	435.9	0.2	2.2	435.9	180º
240 (W)	-125.3	2.2	-103.8	924.0	0.6	0.3	924.0	180º
241 (W)	-197.9	-9.8	88.2	-625.8	-0.5	-3.5	625.8	360º
242 (W)	-246.4	-2.9	88.2	-1102.9	0.0	-0.2	1102.9	360º
243 (W)	-7.9	9.0	-96.2	510.4	0.5	4.4	510.4	180º
244 (W)	-15.5	4.0	-96.2	952.4	0.6	0.5	952.4	180º
245 (W)	-130.3	-10.6	90.5	-581.6	-0.7	-4.8	581.6	360º
246 (W)	-170.0	-4.1	90.4	-1021.0	-0.3	-0.4	1021.0	360º
247 (W)	-17.6	7.3	-98.9	495.2	0.3	2.6	495.2	180º
248 (W)	-32.2	2.5	-98.9	979.2	0.4	0.3	979.2	180º
249 (W)	-120.5	-8.9	93.1	-566.4	-0.4	-3.0	566.4	360º
250 (W)	-153.3	-2.6	93.2	-1047.7	-0.2	-0.3	1047.7	360º
251 (W)	-7.9	9.0	-103.8	510.4	0.5	4.4	510.4	180º
252 (W)	-15.5	4.0	-103.8	979.2	0.7	0.5	979.2	180º
253 (W)	-207.7	-11.5	93.1	-641.0	-0.8	-5.2	641.0	360º
254 (W)	-263.1	-4.4	93.2	-1102.9	-0.3	-0.4	1102.9	360º

255 (W)	-66.9	11.0	-129.2	614.9	0.7	5.3	614.9	180º
256 (W)	-85.4	4.8	-129.1	1193.3	0.9	0.6	1193.3	180º
257 (W)	-226.0	-14.4	113.5	-804.8	-1.0	-6.6	804.8	360º
258 (W)	-286.3	-5.6	113.5	-1372.2	-0.3	-0.6	1372.2	360º
259 (W)	-79.6	8.8	-132.6	595.1	0.3	3.0	595.1	180º
260 (W)	-107.1	2.9	-132.6	1228.1	0.7	0.4	1228.1	180º
261 (W)	-213.3	-12.2	117.0	-785.0	-0.6	-4.3	785.0	360º
262 (W)	-264.6	-3.7	117.1	-1406.9	-0.1	-0.3	1406.9	360º
263 (W)	10.5	11.9	-124.2	674.2	0.7	5.8	674.2	180º
264 (W)	7.7	5.2	-124.2	1248.5	0.7	0.6	1248.5	180º
265 (W)	-148.6	-13.5	118.5	-745.4	-0.9	-6.1	745.5	360º
266 (W)	-193.2	-5.3	118.4	-1317.1	-0.5	-0.6	1317.1	360º
267 (W)	-2.2	9.7	-127.7	654.4	0.4	3.5	654.4	180º
268 (W)	-14.0	3.2	-127.7	1283.2	0.5	0.4	1283.2	180º
269 (W)	-135.9	-11.3	121.9	-725.7	-0.6	-3.9	725.7	360º
270 (W)	-171.5	-3.3	122.0	-1351.8	-0.3	-0.4	1351.8	360º
271 (W)	-24.1	17.8	-194.5	997.1	1.1	8.5	997.1	180º
272 (W)	-31.3	7.6	-194.4	1884.1	1.2	1.0	1884.1	180º
273 (W)	-268.9	-21.2	178.9	-1187.0	-1.4	-9.8	1187.0	360º
274 (W)	-340.4	-8.4	178.9	-2062.9	-0.7	-0.9	2062.9	360º
275 (W)	-43.7	14.4	-199.9	966.7	0.6	5.0	966.7	180º
276 (W)	-64.7	4.7	-199.8	1937.5	0.9	0.6	1937.5	180º
277 (W)	-249.3	-17.8	184.2	-1156.6	-0.9	-6.3	1156.6	360º
278 (W)	-307.0	-5.4	184.3	-2116.3	-0.3	-0.5	2116.3	360º
279 (W)	53.3	18.7	-189.6	1056.4	1.1	9.0	1056.4	180º
280 (W)	61.8	8.0	-189.5	1939.2	1.0	1.0	1939.2	180º
281 (W)	-191.5	-20.3	183.8	-1127.6	-1.3	-9.3	1127.7	360º
282 (W)	-247.3	-8.1	183.8	-2007.8	-0.8	-0.9	2007.8	360º
283 (W)	33.8	15.3	-194.9	1026.0	0.6	5.5	1026.0	180º
284 (W)	28.4	5.0	-194.9	1992.6	0.7	0.6	1992.6	180º
285 (W)	-171.9	-16.9	189.2	-1097.3	-0.8	-5.8	1097.3	360º
286 (W)	-213.9	-5.1	189.2	-2061.2	-0.5	-0.6	2061.2	360º
287 (W)	10.5	11.9	-132.6	674.2	0.7	5.8	674.2	180º
288 (W)	7.7	5.2	-132.6	1283.2	0.9	0.6	1283.2	180º
289 (W)	-226.0	-14.4	121.9	-804.8	-1.0	-6.6	804.8	360º
290 (W)	-286.3	-5.6	122.0	-1406.9	-0.5	-0.6	1406.9	360º
291 (W)	53.3	18.7	-199.9	1056.4	1.1	9.0	1056.4	180º
292 (W)	61.8	8.0	-199.8	1992.6	1.2	1.0	1992.6	180º
293 (W)	-268.9	-21.2	189.2	-1187.0	-1.4	-9.8	1187.0	360º
294 (W)	-340.4	-8.4	189.2	-2116.3	-0.8	-0.9	2116.3	360º

N vs M Results

GLC	292
Status	Acceptable
Utilization	0.479
Maximum	1.000
Theta	180º

Axial Utilization

Nu = 61.8 kips

ØNn (max) = 368.3 kips

Utilization = 0.168

Moment Utilization

Mu = 1992.6 k*ft Mn = 4710.5 k*ft

ØMn = 4155.6 k*ft Mp = 6053.3 k*ft

Utilization = 0.479

Shear Utilization			**Shear Z-Direction**	**Shear Y-Direction**
GLC	292		Nu = 61.8 kips	Nu = 61.8 kips
Status	Acceptable		Mu (y-y) = 1992.6 k*ft	Mu (z-z) = 1.0 k*ft
Utilization	0.284	= Uz + Uy	Vuz = 199.8 kips	Vuy = 1.2 kips
Maximum	1.000		bw = 10.0 in	bw = 336.0 in
			d = 268.8 in	d = 5.0 in
			As (Tens) = 6.32 sq.in.	As (Tens) = 6.82 sq.in.
Torsion			Av = 0.31 sq.in.	Av = 0.0 sq.in.
Tu = 18.7 k*ft			Lambda = 1.00	Lambda = 1.00
T (limit) = 42.1 k*ft			ØVsz = 312.5 kips	ØVsy = 0.0 kips
Acceptable			ØVcz = 411.5 kips	ØVcy = 153.5 kips
			ØVnz = 724.0 kips	ØVny = 153.5 kips
			Util (Uz) = 0.276	Util (Uy) = 0.008

Panel 1 Reinforcing

15M@ 16.0" Vert	Vert Steel Ratio	Vert Bar Spacing	Number of Curtains
	Rho = 0.00194	S = 16.00 in	Curtains Specified = 1
	Rho (min) = 0.00150	S (min) = 2.76 in	Curtains Required = 1
	Rho (max) = 0.01000	S (max) = 18.00 in	Acceptable
	Acceptable	Acceptable	
15M@ 12.0" Horz	Horz Steel Ratio	Horz Bar Spacing	
	Rho = 0.00258	S = 12.00 in	
	Rho (min) = 0.00250	S (min) = 2.13 in	
	Acceptable	S (max) = 18.00 in	
		Acceptable	

Panel Vertical Reinf.		**Panel Horizontal Reinf.**		**Zone Vertical Reinf.**	
fy (min)	40.0 ksi	fy (min)	40.0 ksi	fy (min)	40.0 ksi
fy (vert)	60.0 ksi	fy (horz)	60.0 ksi	fy (vert)	60.0 ksi
fy (max)	80.0 ksi	fy (max)	60.0 ksi	fy (max)	80.0 ksi
Status	Acceptable	Status	Acceptable	Status	Acceptable

Concrete Strength		**Concrete Density**		**Zone Horizontal Reinf.**	
fc' (min)	2500.0 psi	Wc (min)	90.0 pcf	fy (min)	40.0 ksi
fc'	4000.0 psi	Wc	150.0 pcf	fy (horz)	60.0 ksi
fc' (max)	10000.0 psi	Wc (max)	160.0 pcf	fy (max)	100.0 ksi
Status	Acceptable	Status	Acceptable	Status	Acceptable

Canadian Reinforcing Bars

Index	Bar Designation	Diameter (in)	Area (sq.in.)
1	10M	0.445	0.155
2	15M	0.63	0.31

3	20M	0.768	0.465
4	25M	0.992	0.775
5	30M	1.177	1.085
6	35M	1.406	1.55
7	45M	1.72	2.325
8	55M	2.22	3.875

Wall Dimensions Lu (y-y) = 120.0 in, Lu (z-z) = 120.0 in, hw = 1200.0 in

Panel 1 Thickness

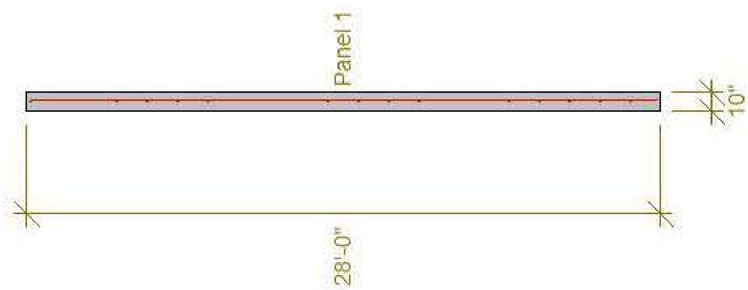
T = 10.0 in

T (min) = 4.8 in

Acceptable

List of Messages

No Messages...



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APPENDIX C

Steel Connection Calculation Sample

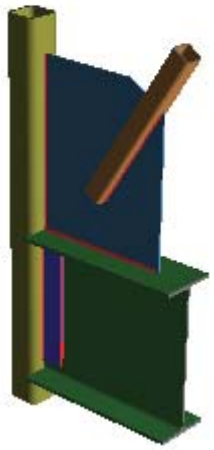
Global Parameters - Description:

Project Title	New Project
Company	
Designer	
Job Number	
Notes	

Global Parameters - Solution:

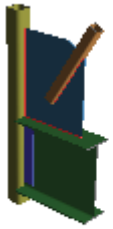
Design Method	AISC 14th (360-10): LRFD
Bolt Group Analysis Method	Center of Rotation
Weld Analysis Method	Center of Rotation
Consider Bold Hole Deformation?	No
Check Weld Filler Material Matching?	Yes
Check Rotational Ductility?	Yes
Full Shear Eccentricity Considered?	No
Plastic Panel-Zone Shear Deformation Considered?	No

Grid 2 Bottom: 3D View



Grid 2 Bottom: Summary Report

Vertical Brace Diagonal Connection



Material Properties:				
Beam	W27x84	A992	F_y = 50.00 ksi	F_u = 65.00 ksi
Column	HSS6x6x10	A500 Gr.B Rect	F_y = 46.00 ksi	F_u = 58.00 ksi
Plate	P0.38x4.00x22.00	A36	F_y = 36.00 ksi	F_u = 58.00 ksi
Top Brace	HSS3.5x3.5x4	A500 Gr.B Rect	F_y = 46.00 ksi	F_u = 58.00 ksi
Top Gusset	P0.38x30.00x24.09	A36	F_y = 36.00 ksi	F_u = 58.00 ksi

Input Data:		
Shear Load	80.00 kips	*User Input Shear Load*
Beam Story Force	-75.53 kips	*Design maximum beam story force*
Column Force	50.00 kips	*User Input Column Force*
Column Moment	0.00 kips-ft	*User Input Column Moment*
Top Brace Axial (Tension)	-187.40 kips	*Design tensile load in top brace*
Top Brace Axial(Compression)	107.41 kips	*Design compressive load in top brace*

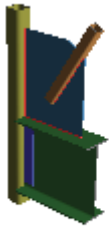
Seismic Input Data:		
Seismic System	SCBF	*User Input Seismic System*
L_{top}	120.00 in	*User Input Clear Span of Top Brace*
K_{top}	1.00	*User Input Effective Length Factor of Top Brace*
Ca Beam Ratio	0.25	*User-Input Ratio of Required Strength to Available Strength*
Gusset Hinge Line	8*t_p	*Gusset Hinge Line Method for Brace Buckling Check*

Note: Unless specified, all code references are from AISC 360-10

Connection	Required	Max Unity Check	Result
Beam/Column connection	Weld at Beam	**0.92**	**PASS**
Top Gusset/Beam connection	Beam Weld Strength	**0.49**	**PASS**
Top Gusset/Column connection	Column Weld Strength	**0.34**	**PASS**
Top Gusset/Brace connection	Gusset Plate Tensile Yield (Whitmore)	**0.99**	**PASS**
Seismic Calculations	Seismic Weld Strength at Beam (Top)	**0.70**	**PASS**

Grid 2 Bottom: Beam/Column Report

Vertical Brace Diagonal Connection



Material Properties:				
Beam	W27x84	A992	F_y = 50.00 ksi	F_u = 65.00 ksi
Column	HSS6x6x10	A500 Gr.B Rect	F_y = 46.00 ksi	F_u = 58.00 ksi
Plate	P0.38x4.00x22.00	A36	F_y = 36.00 ksi	F_u = 58.00 ksi
Top Brace	HSS3.5x3.5x4	A500 Gr.B Rect	F_y = 46.00 ksi	F_u = 58.00 ksi
Top Gusset	P0.38x30.00x24.09	A36	F_y = 36.00 ksi	F_u = 58.00 ksi

Input Data:		
Shear(Compression)	125.48 kips	*Calculated Shear due to Compression Brace Loading (SD3)*
Axial(Compression)	85.75 kips	*Calculated Axial due to Compression Brace Loading (SD3)*
Shear(Tension)	0.00 kips	*Calculated Shear due to Tension Brace Loading*
Axial(Tension)	-93.36 kips	*Calculated Axial due to Tension Brace Loading (SD1)*
Resultant Force	151.98 kips	*Calculated Maximum Resultant Force due to Brace Loading (SD3)*
Column Force	50.00 kips	*User Input Column Force*
Column Moment	0.00 kips-ft	*User Input Column Moment*

Note: Unless specified, all code references are from AISC 360-10

Limit State	Required	Available	Unity Check	Result
HSS Punching Shear				**PASS**
Check Column Slenderness	Pass	*(K1.3)*		
E	29000.00 ksi	*Modulus of elasticity*		
F_y	46.00 ksi	*Column yield strength*		
t	0.58 in	*Column wall thickness*		
B	6.00 in	*Column face width*		
(B - 3 * t) / t	7.33	*Column slenderness ratio for shear*		
$((B - 3 * t) / t)_{max}$	35.15	*Slender wall limit for shear (Table K1.2A)*		
Check Column Slenderness	Pass	*(K1.3)*		
B / t	10.33	*Column slenderness ratio for axial*		
$(B / t)_{max}$	40.00	*Slender wall limit for axial (Table K1.2A)*		
Check Column Material	Pass	*(K1.3)*		
F_y	46.00 ksi	*Column yield strength*		
$F_{y\text{-}max}$	52.00 ksi	*Column yield strength limit (Table K1.2A)*		
Check Column Ductility	Pass	*(Table K1.2A) Condition: $F_y / F_u <= 0.8$ or ASTM A500 Grade C*		
F_y	46.00 ksi	*Column yield strength*		
F_u	58.00 ksi	*Column tensile strength*		
Check Punching Shear	Pass	*(Eqn K1-3)*		
F_{yp}	36.00 ksi	*Plate yield strength*		
t_p	0.38 in	*Plate thickness*		
$t_{p\text{-}max}$	0.94 in	*Maximum allowed plate thickness*		

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Grid 2 Bottom: Beam/Column Report (continued):

Limit State	Required	Available	Unity Check	Result
Column Weld Limitations				**PASS**
Weld Max/Min Size, Length			(J2.2b)	
Check Weld Max Size	Pass			
D	0.25 in	*Weld size*		
D_{max}	0.31 in	*Max Size Allowed*		
t	0.38 in	*Min shelf dimension*		
Check Weld Min Size	Pass			
D	0.25 in	*Weld size*		
D_{min}	0.19 in	*Min size allowed per Table J2.4*		
t_{min}	0.38 in	*Controlling member thickness*		
Check Weld Min Length	Pass	*Condition: L_{min} >= 4*D per J2.2b*		
D	0.25 in	*Weld size*		
L_{min}	22.00 in	*Min weld segment length*		
Check Weld Max Length	Pass	*Condition: L_{max} <= 100*D*		
D	0.25 in	*Weld size*		
L_{max}	22.00 in	*Max weld segment length*		
Beam Weld Limitations				**PASS**
Weld Max/Min Size, Length			(J2.2b)	
Check Weld Max Size	Pass			
D	0.25 in	*Weld size*		
D_{max}	0.31 in	*Max Size Allowed*		
t	0.38 in	*Min shelf dimension*		
Check Weld Min Size	Pass			
D	0.25 in	*Weld size*		
D_{min}	0.19 in	*Min size allowed per Table J2.4*		
t_{min}	0.38 in	*Controlling member thickness*		
Check Weld Min Length	Pass	*Condition: L_{min} >= 4*D per J2.2b*		
D	0.25 in	*Weld size*		
L_{min}	4.00 in	*Min weld segment length*		
Check Weld Max Length	Pass	*Condition: L_{max} <= 100*D*		
D	0.25 in	*Weld size*		
L_{max}	22.00 in	*Max weld segment length*		
Beam Shear Yield	125.48 kips	368.46 kips	**0.34**	**PASS**
$R_n = 0.6 * F_y * A_{gv} * C_v$		**$\phi = 1.00$**	(G2-1)	
F_y	50.00 ksi	*Minimum yield stress of material*		
A_{gv}	12.28 in^2	*Gross area subject to shear*		
C_v	1.00	*Web shear coefficient (G2-2)*		
ϕR_n	368.46 kips	*Shear yield strength*		
Plate Shear Yield	125.48 kips	178.20 kips	**0.70**	**PASS**
$R_n = 0.6 * F_y * A_{gv}$		**$\phi = 1.00$**	(J4-3)	
F_y	36.00 ksi	*Minimum yield stress of material*		
A_{gv}	8.25 in^2	*Gross area subject to shear*		
ϕR_n	178.20 kips	*Shear yield strength*		
Beam Shear Rupture	125.48 kips	359.25 kips	**0.35**	**PASS**
$R_n = 0.6 * F_u * A_{nv}$		**$\phi = 0.75$**	(J4-4)	
F_u	65.00 ksi	*Minimum tensile stress of material*		

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Grid 2 Bottom: Beam/Column Report (continued):

Limit State	Required	Available	Unity Check	Result
A_{nv}	12.28 in^2	*Net area subject to shear*		
ϕR_n	359.25 kips	*Shear rupture strength*		
Plate Shear Rupture at Beam	125.48 kips	215.32 kips	**0.58**	**PASS**
$R_n = 0.6 * F_u * A_{nv}$		**ϕ = 0.75**	(J4-4)	
F_u	58.00 ksi	*Minimum tensile stress of material*		
A_{nv}	8.25 in^2	*Net area subject to shear*		
ϕR_n	215.32 kips	*Shear rupture strength*		
Beam Axial Yield	93.36 kips	1111.50 kips	**0.08**	**PASS**
$R_n = F_y * A_g$		**ϕ = 0.90**	(J4-1)	
F_y	50.00 ksi	*Minimum yield stress of material*		
A_g	24.70 in^2	*Gross area subject to tension*		
ϕR_n	1111.50 kips	*Tensile yield strength*		
Plate Axial Yield	93.36 kips	267.30 kips	**0.35**	**PASS**
$R_n = F_y * A_g$		**ϕ = 0.90**	(J4-1)	
F_y	36.00 ksi	*Minimum yield stress of material*		
A_g	8.25 in^2	*Gross area subject to tension*		
ϕR_n	267.30 kips	*Tensile yield strength*		
Beam Tension Rupture	93.36 kips	1204.13 kips	**0.08**	**PASS**
$R_n = F_u * A_n$		**ϕ = 0.75**	(J4-2)	
F_u	65.00 ksi	*Minimum tensile stress of material*		
A_n	24.70 in^2	*Net area subject to tension*		
ϕR_n	1204.13 kips	*Tensile rupture strength*		
Plate Tension Rupture	93.36 kips	358.88 kips	**0.26**	**PASS**
$R_n = F_u * A_n$		**ϕ = 0.75**	(J4-2)	
F_u	58.00 ksi	*Minimum tensile stress of material*		
A_n	8.25 in^2	*Net area subject to tension*		
ϕR_n	358.88 kips	*Tensile rupture strength*		
Compression Buckling of the Plate	85.75 kips	267.30 kips	**0.32**	**PASS**
$R_n = F_y * A_g$		**ϕ = 0.9**	(J4-6)	
K	1.00	*Effective length factor*		
L	0.00 in	*Unbraced length*		
r	0.11 in	*Radius of gyration*		
KL/r	0.00	*Plate slenderness*		
F_y	36.00 ksi	*Capacity = Minimum Yield stress for KL/r <= 25*		
A_g	8.25 in^2	*Gross area subject to compression*		
ϕR_n	267.30 kips	*Compressive strength*		
Plate Flexural Yield			**0.90**	**PASS**
$(V_r/V_c)^2 + (P_r/P_c + M_r/M_c)^2 <= 1$			(AISC 14th Eq.10-5)	
P_r	-93.36 kips	*Calculated axial load*		
V_r	125.48 kips	*Calculated shear load*		
F_y	36.00 ksi	*Minimum yield stress of material*		
A_g	8.25 in^2	*Gross area of the plate*		
Z_{pl}	45.38 in^3	*Plastic modulus of the shear plate*		

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Grid 2 Bottom: Beam/Column Report (continued):

Limit State	Required	Available	Unity Check	Result
P_c	267.30 kips	*Available tensile strength (see check 'Axial Yield')*		
V_c	178.20 kips	*Available shear strength (see check 'Shear Yield')*		
M_r	35.18 kips-ft	*Calculated moment*		
M_c	122.51 kips-ft	*Available moment $M_c=\varphi*(F_y* Z)$, $\varphi=0.90$*		
UC	0.90	*Unity check per interaction equation, $(V_r/V_c)^2 + (P_r/P_c + M_r/M_c)^2 <= 1$*		
Plate Flexural Rupture			**0.56**	**PASS**
$(V_r/V_c)^2 + (P_r/P_c + M_r/M_c)^2 <= 1$			(Eq.10-5)	
P_r	-93.36 kips	*Calculated axial load*		
V_r	125.48 kips	*Calculated shear load*		
F_u	58.00 ksi	*Minimum tensile stress of material*		
A_n	8.25 in^2	*Net area of the plate*		
Z_{net}	45.38 in^3	*Plastic modulus of net section*		
P_c	358.88 kips	*Available tensile strength (see check 'Tension Rupture')*		
V_c	215.32 kips	*Available shear strength (see check 'Shear Rupture')*		
M_r	35.18 kips-ft	*Calculated moment*		
M_c	164.48 kips-ft	*Available moment $M_c= \varphi*(F_u* Znet)$, $\varphi=0.75$*		
UC	0.56	*Unity check per interaction equation, $(V_r/V_c)^2 + (P_r/P_c + M_r/M_c)^2 <= 1$*		
Plate Flexural Buckling			**0.76**	**PASS**
$P / (P_n*\phi) + V / (V_n*\phi) <= 1.0$		**$\phi = 0.90$**	(AISC 14th Edition)	
P	85.75 kips	*Calculated axial load*		
V	125.48 kips	*Calculated shear load*		
L	0.00 in	*Length of connecting element (distance between the applied load and resisting element)*		
r	0.11 in	*Radius of gyration of the plate*		
KL/r	0.00	*Slenderness ratio*		
F_e	N/A	*Elastic critical buckling stress, per eqn E3-4, $F_e = (\pi^2*E)/(KL/r)^2$*		
F_y	36.00 ksi	*Minimum yield stress of material*		
F_{cr_Comp}	36.00 ksi	*Compression stress = F_y when KL/r <= 25, per J4.4*		
A_g	8.25 in^2	*Gross area of the plate*		
λ	0.37	*Buckling factor (pg 9.9) (eqn 9-18)*		
Q	1.00	*Buckling factor (eqn 9-15 through 9-17)*		
F_{cr_Flex}	36.00 ksi	*Critical stress, per eqn 9-14, Fcr = Fy * Q*		
S_{net}	30.25 in^3	*Section modulus of net section*		
a	3.47 in	*Design eccentricity*		
P_n	297.00 kips	*Compressive capacity, per eqn J4-1, Pn = Fy * Ag*		
V_n	314.13 kips	*Plate flexural buckling, per eqn 9-6, Vn = (Fcr_Flex * Snet) /a*		
UC	0.76	*Unity check per interaction equation, P/(Pn*Φ) + V/(Vn*Φ) <= 1*		

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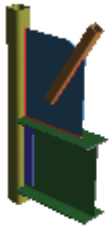
Grid 2 Bottom: Beam/Column Report (continued):

Limit State	Required	Available	Unity Check	Result
Weld at Column	151.98 kips	215.56 kips	**0.71**	**PASS**
$\phi Rn = 2 * C_1 * \alpha * 1.392 * D_{16} * L$				
Double Fillet				
$1.392 = \phi * 0.6 * F_{E70} * 2^{0.5}/2 * 1/16$, ϕ=0.75 (AISC 14th Eqn 8-2a)				
Governing Loading Direction SD3				
C_1	1.00	*Electrode strength coefficient (AISC 14th table 8-3)*		
α	0.88	*Base material proration factor (re-arrangement of AISC 14th Eqn 9-2)*		
D_{16}	4.00	*Weld fillet size in sixteenths of an inch*		
L	22.00 in	*Weld length*		
ϕRn	215.56 kips	*Weld strength*		
Weld at Beam	5.13 kips/in	5.57 kips/in	**0.92**	**PASS**
$\phi Rn = C_1 * \alpha * 1.392 * D_{16}$				
Single Fillet				
$1.392 = \phi * 0.6 * F_{E70} * 2^{0.5}/2 * 1/16$, ϕ=0.75 (AISC 14th Eqn 8-2a)				
Governing Loading Direction SD3				
C_1	1.00	*Electrode strength coefficient (AISC 14th table 8-3)*		
α	1.00	*Base material proration factor (re-arrangement of AISC 14th Eqn 9-2)*		
D_{16}	4.00	*Weld fillet size in sixteenths of an inch*		
r_u	5.13 kips/in	*Required weld stress per AISC 14th Eqn 8-11*		
ϕRn	5.57 kips/in	*Weld strength*		
HSS Transverse Plastification (compression)	93.36 kips	185.61 kips	**0.50**	**PASS**
$R_n = F_y * t^2 /(1-t_p/B) * (2l_b/B + 4 * Q_f * (1-t_p/B)^{0.5})$		**ϕ = 1.00**	(K1-12)	
Governing Loading Direction SD1				
F_y	46.00 ksi	*Column yield strength*		
t	0.58 in	*Column wall thickness*		
t_p	0.38 in	*Plate thickness*		
l_b	22.00 in	*Plate length*		
B	6.00 in	*Column width*		
Q_f	1.00	*User input column stress interaction parameter*		
ϕR_n	185.61 kips	*Transverse plastification*		

Grid 2 Bottom: Top Gusset/Beam Report

Vertical Brace Diagonal Connection



Material Properties:

Beam	W27x84	A992	F_y = 50.00 ksi	F_u = 65.00 ksi
Column	HSS6x6x10	A500 Gr.B Rect	F_y = 46.00 ksi	F_u = 58.00 ksi
Plate	P0.38x4.00x22.00	A36	F_y = 36.00 ksi	F_u = 58.00 ksi
Top Brace	HSS3.5x3.5x4	A500 Gr.B Rect	F_y = 46.00 ksi	F_u = 58.00 ksi
Top Gusset	P0.38x30.00x24.09	A36	F_y = 36.00 ksi	F_u = 58.00 ksi

Input Data:

Shear(Compression)	46.70 kips	*Calculated Shear due to Compression Brace Loading (SD3)*
Axial(Compression)	45.48 kips	*Calculated Axial due to Compression Brace Loading (SD3)*
Shear(Tension)	-81.48 kips	*Calculated Shear due to Tension Brace Loading (SD1)*
Axial(Tension)	-79.35 kips	*Calculated Axial due to Tension Brace Loading (SD1)*
Resultant Force	113.73 kips	*Calculated Maximum Resultant Force due to Brace Loading (SD1)*
Moment Load	-11.00 kips-ft	*Calculated Maximum Moment (SD1)*

Note: Unless specified, all code references are from AISC 360-10

Limit State	Required	Available	Unity Check	Result
Beam Weld Limitations				**PASS**
Weld Min Size, Length			(J2.2b)	
Check Weld Min Size	Pass			
D	0.38 in	*Weld size*		
D_{min}	0.19 in	*Min size allowed per Table J2.4*		
t_{min}	0.38 in	*Controlling member thickness*		
Check Weld Min Length	Pass	*Condition: L_{min} >= 4*D per J2.2b*		
D	0.38 in	*Weld size*		
L_{min}	24.09 in	*Min weld segment length*		
Plate Shear Yield	81.48 kips	195.11 kips	**0.42**	**PASS**
$R_n = 0.6 * F_y * A_{gv}$		**$\phi = 1.00$**	(J4-3)	
F_y	36.00 ksi	*Minimum yield stress of material*		
A_{gv}	9.03 in^2	*Gross area subject to shear*		
ϕR_n	195.11 kips	*Shear yield strength*		
Plate Shear Rupture	81.48 kips	235.76 kips	**0.35**	**PASS**
$R_n = 0.6 * F_u * A_{nv}$		**$\phi = 0.75$**	(J4-4)	
F_u	58.00 ksi	*Minimum tensile stress of material*		
A_{nv}	9.03 in^2	*Net area subject to shear*		
ϕR_n	235.76 kips	*Shear rupture strength*		

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Grid 2 Bottom: Top Gusset/Beam Report (continued):

Limit State	Required	Available	Unity Check	Result
Plate Axial Yield	79.35 kips	292.67 kips	**0.27**	**PASS**
$R_n = F_y * A_g$		**$\phi = 0.90$**	(J4-1)	
F_y	36.00 ksi	*Minimum yield stress of material*		
A_g	9.03 in^2	*Gross area subject to tension*		
ϕR_n	292.67 kips	*Tensile yield strength*		
Plate Tension Rupture	79.35 kips	392.94 kips	**0.20**	**PASS**
$R_n = F_u * A_n$		**$\phi = 0.75$**	(J4-2)	
F_u	58.00 ksi	*Minimum tensile stress of material*		
A_n	9.03 in^2	*Net area subject to tension*		
ϕR_n	392.94 kips	*Tensile rupture strength*		
Plate Flexural Yield			**0.29**	**PASS**
$(V_r/V_c)^2 + (P_r/P_c + M_r/M_c)^2 <= 1$			(AISC 14th Eq.10-5)	
P_r	-79.35 kips	*Calculated axial load*		
V_r	81.48 kips	*Calculated shear load*		
F_y	36.00 ksi	*Minimum yield stress of material*		
A_g	9.03 in^2	*Gross area of the plate*		
Z_{pl}	54.40 in^3	*Plastic modulus of the shear plate*		
P_c	292.67 kips	*Available tensile strength (see check 'Axial Yield')*		
V_c	195.11 kips	*Available shear strength (see check 'Shear Yield')*		
M_r	11.00 kips-ft	*Calculated moment*		
M_c	146.87 kips-ft	*Available moment $M_c = \varphi * (F_y * Z)$, $\varphi = 0.90$*		
UC	0.29	*Unity check per interaction equation, $(V_r/V_c)^2 + (P_r/P_c + M_r/M_c)^2 <= 1$*		
Plate Flexural Rupture			**0.19**	**PASS**
$(V_r/V_c)^2 + (P_r/P_c + M_r/M_c)^2 <= 1$			(Eq.10-5)	
P_r	-79.35 kips	*Calculated axial load*		
V_r	81.48 kips	*Calculated shear load*		
F_u	58.00 ksi	*Minimum tensile stress of material*		
A_n	9.03 in^2	*Net area of the plate*		
Z_{net}	54.40 in^3	*Plastic modulus of net section*		
P_c	392.94 kips	*Available tensile strength (see check 'Tension Rupture')*		
V_c	235.76 kips	*Available shear strength (see check 'Shear Rupture')*		
M_r	11.00 kips-ft	*Calculated moment*		
M_c	197.19 kips-ft	*Available moment $M_c = \varphi * (F_u * Znet)$, $\varphi = 0.75$*		
UC	0.19	*Unity check per interaction equation, $(V_r/V_c)^2 + (P_r/P_c + M_r/M_c)^2 <= 1$*		
Beam Weld Strength	113.73 kips	232.58 kips	**0.49**	**PASS**
$R_n = C_1 * \alpha * \beta * C * D_{16} * L$		**$\phi = 0.75$**		
Double Fillet **Governing Loading Direction SD1**				
V	81.48 kips	*Shear Load*		
P	-79.35 kips	*Axial Load*		
M	-11.00 kips-ft	*Moment*		

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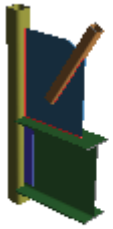
Grid 2 Bottom: Top Gusset/Beam Report (continued):

Limit State	Required	Available	Unity Check	Result
e_{eff}	1.16 in	*Effective eccentricity*		
C_1	1.00	*Electrode strength coefficient (AISC 14th table 8-3)*		
α	0.59	*Base material proration factor (re-arrangement of AISC 14th Eqn 9-2)*		
β	0.80	*Force redistribution adjustment factor*		
C	4.57	*Eccentricity modification factor (AISC 14th Eqn 8-13)*		
D_{16}	6.00	*Weld fillet size in sixteenths of an inch*		
L	24.09 in	*Weld length per side*		
ϕRn	232.58 kips	*Weld strength*		
Beam Web Yielding	79.35 kips	696.63 kips	**0.11**	**PASS**
$R_n = (5 * k + N) * F_y * t_w$		**ϕ = 1.00**	(J10-2)	
k	1.24 in	*Distance from outer face of the flange to the web toe of the fillet*		
N	24.09 in	*Length of bearing*		
F_y	50.00 ksi	*Minimum yield stress of beam*		
t_w	0.46 in	*Beam web thickness*		
$ϕR_n$	696.63 kips	*Beam web local yielding*		

Grid 2 Bottom: Top Gusset/Col Report

Vertical Brace Diagonal Connection



Material Properties:

Beam	W27x84	A992	F_y = 50.00 ksi	F_u = 65.00 ksi
Column	HSS6x6x10	A500 Gr.B Rect	F_y = 46.00 ksi	F_u = 58.00 ksi
Plate	P0.38x4.00x22.00	A36	F_y = 36.00 ksi	F_u = 58.00 ksi
Top Brace	HSS3.5x3.5x4	A500 Gr.B Rect	F_y = 46.00 ksi	F_u = 58.00 ksi
Top Gusset	P0.38x30.00x24.09	A36	F_y = 36.00 ksi	F_u = 58.00 ksi

Input Data:

Shear(Compression)	45.61 kips	*Calculated Shear due to Compression Brace Loading (SD3)*
Axial(Compression)	10.22 kips	*Calculated Axial due to Compression Brace Loading (SD3)*
Shear(Tension)	-79.58 kips	*Calculated Shear due to Tension Brace Loading (SD1)*
Axial(Tension)	-17.83 kips	*Calculated Axial due to Tension Brace Loading (SD1)*
Resultant Force	81.55 kips	*Calculated Maximum Resultant Force due to Brace Loading (SD1)*
Moment Load	2.40 kips-ft	*Calculated Maximum Moment (SD1)*

Note: Unless specified, all code references are from AISC 360-10

Limit State	Required	Available	Unity Check	Result
HSS Punching Shear				**PASS**
Check Column Slenderness	Pass	*(K1.3)*		
E	29000.00 ksi	*Modulus of elasticity*		
F_y	46.00 ksi	*Column yield strength*		
t	0.58 in	*Column wall thickness*		
B	6.00 in	*Column face width*		
(B - 3 * t) / t	7.33	*Column slenderness ratio for shear*		
$((B - 3 * t) / t)_{max}$	35.15	*Slender wall limit for shear (Table K1.2A)*		
Check Column Slenderness	Pass	*(K1.3)*		
B / t	10.33	*Column slenderness ratio for axial*		
$(B / t)_{max}$	40.00	*Slender wall limit for axial (Table K1.2A)*		
Check Column Material	Pass	*(K1.3)*		
F_y	46.00 ksi	*Column yield strength*		
$F_{y\text{-}max}$	52.00 ksi	*Column yield strength limit (Table K1.2A)*		
Check Column Ductility	Pass	*(Table K1.2A) Condition: $F_y / F_u <= 0.8$ or ASTM A500 Grade C*		
F_y	46.00 ksi	*Column yield strength*		
F_u	58.00 ksi	*Column tensile strength*		
Check Punching Shear	Pass	*(Eqn K1-3)*		
F_{yp}	36.00 ksi	*Plate yield strength*		
t_p	0.38 in	*Plate thickness*		
$t_{p\text{-}max}$	0.94 in	*Maximum allowed plate thickness*		

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Grid 2 Bottom: Top Gusset/Col Report (continued):

Limit State	Required	Available	Unity Check	Result
Column Weld Limitations				**PASS**
Weld Min Size, Length			(J2.2b)	
Check Weld Min Size	Pass			
D	0.38 in	*Weld size*		
D_{min}	0.19 in	*Min size allowed per Table J2.4*		
t_{min}	0.38 in	*Controlling member thickness*		
Check Weld Min Length	Pass	*Condition: L_{min} >= 4*D per J2.2b*		
D	0.38 in	*Weld size*		
L_{min}	30.00 in	*Min weld segment length*		
Plate Shear Yield	79.58 kips	243.00 kips	**0.33**	**PASS**
$R_n = 0.6 * F_y * A_{gv}$		**$\phi = 1.00$**	(J4-3)	
F_y	36.00 ksi	*Minimum yield stress of material*		
A_{gv}	11.25 in^2	*Gross area subject to shear*		
ϕR_n	243.00 kips	*Shear yield strength*		
Plate Shear Rupture	79.58 kips	293.63 kips	**0.27**	**PASS**
$R_n = 0.6 * F_u * A_{nv}$		**$\phi = 0.75$**	(J4-4)	
F_u	58.00 ksi	*Minimum tensile stress of material*		
A_{nv}	11.25 in^2	*Net area subject to shear*		
ϕR_n	293.63 kips	*Shear rupture strength*		
Plate Axial Yield	17.83 kips	364.50 kips	**0.05**	**PASS**
$R_n = F_y * A_g$		**$\phi = 0.90$**	(J4-1)	
F_y	36.00 ksi	*Minimum yield stress of material*		
A_g	11.25 in^2	*Gross area subject to tension*		
ϕR_n	364.50 kips	*Tensile yield strength*		
Plate Tension Rupture	17.83 kips	489.38 kips	**0.04**	**PASS**
$R_n = F_u * A_n$		**$\phi = 0.75$**	(J4-2)	
F_u	58.00 ksi	*Minimum tensile stress of material*		
A_n	11.25 in^2	*Net area subject to tension*		
ϕR_n	489.38 kips	*Tensile rupture strength*		
Plate Flexural Yield			**0.11**	**PASS**
$(V_r/V_c)^2 + (P_r/P_c + M_r/M_c)^2 <= 1$			(AISC 14th Eq.10-5)	
P_r	-17.83 kips	*Calculated axial load*		
V_r	79.58 kips	*Calculated shear load*		
F_y	36.00 ksi	*Minimum yield stress of material*		
A_g	11.25 in^2	*Gross area of the plate*		
Z_{pl}	84.38 in^3	*Plastic modulus of the shear plate*		
P_c	364.50 kips	*Available tensile strength (see check 'Axial Yield')*		
V_c	243.00 kips	*Available shear strength (see check 'Shear Yield')*		
M_r	2.40 kips-ft	*Calculated moment*		
M_c	227.81 kips-ft	*Available moment $M_c = \varphi * (F_y * Z)$, $\varphi = 0.90$*		
UC	0.11	*Unity check per interaction equation, $(V_r/V_c)^2 + (P_r/P_c + M_r/M_c)^2 <= 1$*		

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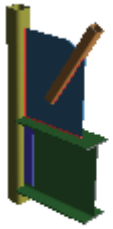
Grid 2 Bottom: Top Gusset/Col Report (continued):

Limit State	Required	Available	Unity Check	Result
Plate Flexural Rupture			**0.08**	**PASS**
$(V_r/V_c)^2 + (P_r/P_c + M_r/M_c)^2 <= 1$			(Eq.10-5)	
P_r	-17.83 kips	*Calculated axial load*		
V_r	79.58 kips	*Calculated shear load*		
F_u	58.00 ksi	*Minimum tensile stress of material*		
A_n	11.25 in^2	*Net area of the plate*		
Z_{net}	84.38 in^3	*Plastic modulus of net section*		
P_c	489.38 kips	*Available tensile strength (see check 'Tension Rupture')*		
V_c	293.63 kips	*Available shear strength (see check 'Shear Rupture')*		
M_r	2.40 kips-ft	*Calculated moment*		
M_c	305.86 kips-ft	*Available moment $M_c = \varphi * (F_u * Znet)$, $\varphi = 0.75$*		
UC	0.08	*Unity check per interaction equation, $(V_r/V_c)^2 + (P_r/P_c + M_r/M_c)^2 <= 1$*		
Column Weld Strength	81.55 kips	242.50 kips	**0.34**	**PASS**
$R_n = C_1 * \alpha * \beta * C * D_{16} * L$		**$\phi = 0.75$**		
Double Fillet **Governing Loading Direction SD1**				
V	79.58 kips	*Shear Load*		
P	-17.83 kips	*Axial Load*		
M	2.40 kips-ft	*Moment*		
e_{eff}	0.35 in	*Effective eccentricity*		
C_1	1.00	*Electrode strength coefficient (AISC 14^{th} table 8-3)*		
α	0.59	*Base material proration factor (re-arrangement of AISC 14^{th} Eqn 9-2)*		
β	0.80	*Force redistribution adjustment factor*		
C	3.83	*Eccentricity modification factor (AISC 14^{th} Eqn 8-13)*		
D_{16}	6.00	*Weld fillet size in sixteenths of an inch*		
L	30.00 in	*Weld length per side*		
ϕRn	242.50 kips	*Weld strength*		
HSS Transverse Plastification (compression)	17.83 kips	229.78 kips	**0.08**	**PASS**
$R_n = F_y * t^2 / (1-t_p/B) * (2l_b/B + 4*Q_f*(1-t_p/B)^{0.5})$		**$\phi = 1.00$**	(K1-12)	
Governing Loading Direction SD1				
F_y	46.00 ksi	*Column yield strength*		
t	0.58 in	*Column wall thickness*		
t_p	0.38 in	*Plate thickness*		
l_b	30.00 in	*Plate length*		
B	6.00 in	*Column width*		
Q_f	1.00	*User input column stress interaction parameter*		
ϕR_n	229.78 kips	*Transverse plastification*		

Grid 2 Bottom: Top Gusset/Brace Report

Vertical Brace Diagonal Connection



Material Properties:				
Beam	W27x84	A992	F_y = 50.00 ksi	F_u = 65.00 ksi
Column	HSS6x6x10	A500 Gr.B Rect	F_y = 46.00 ksi	F_u = 58.00 ksi
Plate	P0.38x4.00x22.00	A36	F_y = 36.00 ksi	F_u = 58.00 ksi
Top Brace	HSS3.5x3.5x4	A500 Gr.B Rect	F_y = 46.00 ksi	F_u = 58.00 ksi
Top Gusset	P0.38x30.00x24.09	A36	F_y = 36.00 ksi	F_u = 58.00 ksi

Input Data:		
Input Brace Tension	-40.00 kips	*User-input Tensile Load in Brace*
Input Brace Compression	40.00 kips	*User-input Compressive Load in Brace*
Brace Axial (Tension)	-187.40 kips	*Design Tensile Load in Brace*
Brace Axial(Compression)	107.41 kips	*Design Compressive Load in Brace*

Note: Unless specified, all code references are from AISC 360-10

Limit State	Required	Available	Unity Check	Result
Brace Weld Limitations				**PASS**
Weld Min Size, Length			(J2.2b)	
Check Weld Min Size	Pass			
D	0.25 in	*Weld size*		
D_{min}	0.13 in	*Min size allowed per Table J2.4*		
t_{min}	0.23 in	*Controlling member thickness*		
Check Weld Min Length	Pass	*Condition: L_{min} >= 4*D per J2.2b*		
D	0.25 in	*Weld size*		
L_{min}	20.86 in	*Min weld segment length*		
Check Weld Max Length	Pass	*Condition: L_{max} <= 100*D*		
D	0.25 in	*Weld size*		
L_{max}	20.86 in	*Max weld segment length*		
Gusset Plate Tensile Yield (Whitmore)	187.40 kips	188.84 kips	**0.99**	**PASS**
$R_n = F_y * A_g$		**ϕ = 0.9**	(J4-1)	
F_y	36.00 ksi	*Gusset plate yield stress*		
A_g	5.83 in^2	*Gross area of plate (Whitmore) $A_g=L_w*t$*		
L_w	15.54 in	*Whitmore tensile width*		
t	0.38 in	*Thickness of plate*		
ϕR_n	188.84 kips	*Plate tensile yield strength*		
Gusset Plate Tensile Rupture (Whitmore)	187.40 kips	253.54 kips	**0.74**	**PASS**
$R_n = F_u * A_n$		**ϕ = 0.75**	(J4-2)	
F_u	58.00 ksi	*Gusset plate tensile stress*		
A_n	5.83 in^2	*Net area of plate*		
L_w	15.54 in	*Whitmore tensile width*		
t	0.38 in	*Thickness of plate*		
ϕR_n	253.54 kips	*Plate tensile rupture strength*		

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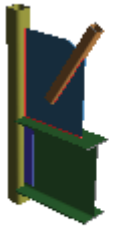
Grid 2 Bottom: Top Gusset/Brace Report (continued):

Limit State	Required	Available	Unity Check	Result
Gusset Plate Compression (Whitmore)	107.41 kips	164.79 kips	**0.65**	**PASS**
$P_n = F_{cr} * A_g$		**$\phi = 0.9$**	(E3-1)	
K	0.50	*Effective length factor*		
L	11.01 in	*Unbraced length*		
r	0.11 in	*Radius of gyration*		
KL/r	50.87	*Plate slenderness*		
F_{cr}	31.42 ksi	*Flexural buckling stress (E3-2)*		
A_g	5.83 in^2	*Gross area of plate (Whitmore section)*		
ϕP_n	164.79 kips	*Gusset plate compressive strength*		
Brace Tensile Yield	40.00 kips	120.47 kips	**0.33**	**PASS**
$R_n = F_y * A_g$		**$\phi = 0.90$**	(D2-1)	
F_y	46.00 ksi	*Minimum yield stress of material*		
A_g	2.91 in^2	*Gross area subject to tension*		
ϕR_n	120.47 kips	*Tensile yield strength*		
Brace Tensile Rupture	40.00 kips	109.12 kips	**0.37**	**PASS**
$R_n = F_u * A_e$		**$\phi = 0.75$**	(D2-2)	
F_u	58.00 ksi	*Minimum tensile stress of material*		
A_e	2.51 in^2	*Effective net area, $A_e = A_n * U$*		
A_n	2.68 in^2	*Net area subject to tension*		
$U_{D3.1}$	0.94	*Shear lag factor (table D3.1)*		
U_{Bound}	0.49	*Shear lag factor (lower bound)*		
U	0.94	*Governing shear lag factor, max($U_{D3.1}$, U_{Bound})*		
ϕR_n	109.12 kips	*Tensile rupture strength*		
Brace Weld Strength	187.40 kips	408.75 kips	**0.46**	**PASS**
$\phi Rn = 4 * C_1 * \alpha * 1.392 * D_{16} * L$				
Single Fillet				
$1.392 = \phi * 0.6 * F_{E70} * 2^{0.5}/2 * 1/16$, ϕ=0.75 (AISC 14^{th} Eqn 8-2a)				
C_1	1.00	*Electrode strength coefficient (AISC 14^{th} table 8-3)*		
α	0.88	*Base material proration factor (re-arrangement of AISC 14^{th} Eqn 9-2)*		
D_{16}	4.00	*Weld fillet size in sixteenths of an inch*		
L	20.86 in	*Weld length*		
ϕRn	408.75 kips	*Weld strength*		

Grid 2 Bottom: Seismic Report

Vertical Brace Diagonal Connection



Material Properties:				
Beam	W27x84	A992	F_y = 50.00 ksi	F_u = 65.00 ksi
Column	HSS6x6x10	A500 Gr.B Rect	F_y = 46.00 ksi	F_u = 58.00 ksi
Plate	P0.38x4.00x22.00	A36	F_y = 36.00 ksi	F_u = 58.00 ksi
Top Brace	HSS3.5x3.5x4	A500 Gr.B Rect	F_y = 46.00 ksi	F_u = 58.00 ksi
Top Gusset	P0.38x30.00x24.09	A36	F_y = 36.00 ksi	F_u = 58.00 ksi

Input Data:		
Seismic System	SCBF	*User Input Seismic System*
L_{top}	120.00 in	*User Input Clear Span of Top Brace*
K_{top}	1.00	*User Input Effective Length Factor of Top Brace*
Ca Beam Ratio	0.25	*User-Input Ratio of Required Strength to Available Strength*
Gusset Hinge Line	$8*t_p$	*Gusset Hinge Line Method for Brace Buckling Check*

Note: Unless specified, all code references are from AISC 360-10

Limit State	Required	Available	Unity Check	Result
Controlling Load Calculation				n/a
Top Brace Exp. Ten. Strength		*AISC 341-10 section F2.6c(1)*		
$F_{y\text{-}top}$	46.00 ksi	*Minimum yield stress of the top brace material*		
$R_{y\text{-}top}$	1.40	*Ratio of expected yield stress to minimum yield stress of the top brace material*		
$A_{br\text{-}top}$	2.91 in^2	*Area of the top brace*		
$P_{exp\text{-}t\text{-}top}$	187.40 kips	*Top brace expected strength in tension = $R_y*F_y*A_{br}$*		
Top Brace Exp. Comp. Strength		*AISC 341-10 section F2.3*		
Analysis Method (i)				
K_{top}	1.00	*Effective length factor of the top brace*		
L_{top}	120.00 in	*Length of the top brace*		
E_{top}	29000.00 ksi	*Elastic modulus of the top brace material*		
$r_{y\text{-}top}$	1.32 in	*Radius of gyration about the weak axis of the top brace*		
$F_{e\text{-}top}$	34.42 ksi	*Elastic buckling stress per AISC 360-10 eqn. (E3-4) = $(\pi^2*E)/((K*L)/r_y)^2$*		
$F_{cre\text{-}top}$	29.43 ksi	*Critical stress per AISC 360-10 eqn. (E3-2) = $R_y*F_y*(0.658^{((R_y*F_y)/F_e)})$*		
$P_{exp\text{-}ci\text{-}top}$	97.64 kips	*Top brace expected strength in compression = $min(R_y*F_y*A_{br}, 1.14*F_{cre}*A_{br})$*		
Analysis Method (ii)				
$P_{exp\text{-}cii\text{-}top}$	29.29 kips	*Post-buckling expected compressive strength = $0.3*P_{exp\text{-}ci\text{-}top}$*		
Governing Brace Strength in Tension		*AISC 341-10 section F2.6c(1)*		
$P_{br\text{-}t\text{-}top}$	-40.00 kips	*User input tensile axial load in top brace*		

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Grid 2 Bottom: Seismic Report (continued):

Limit State	Required	Available	Unity Check	Result
$P_{des\text{-}t\text{-}top}$	-187.40 kips	*Design tensile load in top brace member = $P_{exp\text{-}t\text{-}top}$ (negative for tension)*		
Governing Brace Strength in Compression		*AISC 341-10 section F2.6c(2)*		
$P_{br\text{-}c\text{-}top}$	40.00 kips	*User input compressive axial load in top brace*		
Analysis Method (i)				
$P_{des\text{-}ci\text{-}top}$	107.41 kips	*Design compressive load in top brace member = 1.1*$P_{exp\text{-}ci\text{-}top}$*		
Analysis Method (ii)				
$P_{des\text{-}cii\text{-}top}$	32.22 kips	*Design compressive load in top brace member = 1.1*$P_{exp\text{-}cii\text{-}top}$*		
Seismic Loading Directions				**n/a**
Loading Direction SD1		*Brace in tension, story force opposite in compression (i)*		
$P_{top\text{-}SD1}$	-187.40 kips	*Top brace design load per loading direction SD1*		
Loading Direction SD2		*Brace in tension, story force opposite in compression (ii)*		
$P_{top\text{-}SD2}$	-187.40 kips	*Top brace design load per loading direction SD2*		
Loading Direction SD3		*Brace in compression (i), story force opposite in tension*		
$P_{top\text{-}SD3}$	107.41 kips	*Top brace design load per loading direction SD3*		
Loading Direction SD4		*Brace in compression (ii), story force opposite in tension*		
$P_{top\text{-}SD4}$	32.22 kips	*Top brace design load per loading direction SD4*		
Seismic Load Distribution (Loading Direction SD1)				**n/a**
$P_{top\text{-}SD1}$	-187.40 kips	*Top brace load per loading direction SD1, see "Seismic Loading Directions"*		
V_{bm}	80.00 kips	*User-input shear force in beam*		
Beam Story Force:				
$G_{top\text{-}SD1}$	-187.40 kips	*Top brace expected strength in tension*		
$O_{top\text{-}SD1}$	97.64 kips	*Assumed opposite side top brace force*		
SF_{SD1}	-151.05 kips	*Story force at beam level for loading direction SD1 (Per AISC 341-10 example 5.3.5 methodology)*		
$P_{bm\text{-}SD1}$	-75.53 kips	*Axial force in beam at connection = SF_{SD1}/2 (Per AISC 341-10 example 5.3.5 methodology)*		
Top Gusset/Column Connection:				
$V_{colSD1\text{-}top}$	-79.58 kips	*Top gusset/column vertical load per AISC 14th, eqn. (13-2)*		
$H_{colSD1\text{-}top}$	-17.83 kips	*Top gusset/column horizontal load per AISC 14th, eqn. (13-3)*		
$M_{colSD1\text{-}top}$	2.40 kips-ft	*Top gusset/column moment per AISC 14th, p. 13-10*		
Top Gusset/Beam Connection:				
$V_{bmSD1\text{-}top}$	-79.35 kips	*Top gusset/beam vertical load per AISC 14th, eqn. (13-4)*		
$H_{bmSD1\text{-}top}$	-81.48 kips	*Top gusset/beam horizontal load per AISC 14th, eqn. (13-5)*		
$M_{bmSD1\text{-}top}$	-11.00 kips-ft	*Top gusset/beam moment per AISC 14th, p. 13-10*		
Beam /Column Connection:				
V_{bcSD1}	0.65 kips	*Beam/column vertical load per AISC 14th, page 13-5 = V_{bm} + $V_{bmSD1\text{-}top}$ - $V_{bmSD1\text{-}bot}$*		
H_{SD1}	-99.31 kips	*Horizontal component of brace design axial loads*		
H_{bcSD1}	-93.36 kips	*Beam/column horizontal load per AISC 14th, page 13-5 = $P_{bm\text{-}SD1}$ + (H_{SD1} - ($H_{bmSD1\text{-}top}$ + $H_{bmSD1\text{-}bot}$))*		
Seismic Load Distribution (Loading Direction SD2)				**n/a**

continued on next page...

Grid 2 Bottom: Seismic Report (continued):

Limit State	Required	Available	Unity Check	Result
$P_{top-SD2}$	-187.40 kips	*Top brace load per loading direction SD2, see "Seismic Loading Directions"*		
V_{bm}	80.00 kips	*User-input shear force in beam*		
Beam Story Force:				
$G_{top-SD2}$	-187.40 kips	*Top brace expected strength in tension*		
$O_{top-SD2}$	29.29 kips	*Assumed opposite side top brace force*		
SF_{SD2}	-114.83 kips	*Story force at beam level for loading direction SD2 (Per AISC 341-10 example 5.3.5 methodology)*		
P_{bm-SD2}	-57.42 kips	*Axial force in beam at connection = SF_{SD2}/2 (Per AISC 341-10 example 5.3.5 methodology)*		
Top Gusset/Column Connection:				
$V_{colSD2-top}$	-79.58 kips	*Top gusset/column vertical load per AISC 14th, eqn. (13-2)*		
$H_{colSD2-top}$	-17.83 kips	*Top gusset/column horizontal load per AISC 14th, eqn. (13-3)*		
$M_{colSD2-top}$	2.40 kips-ft	*Top gusset/column moment per AISC 14th, p. 13-10*		
Top Gusset/Beam Connection:				
$V_{bmSD2-top}$	-79.35 kips	*Top gusset/beam vertical load per AISC 14th, eqn. (13-4)*		
$H_{bmSD2-top}$	-81.48 kips	*Top gusset/beam horizontal load per AISC 14th, eqn. (13-5)*		
$M_{bmSD2-top}$	-11.00 kips-ft	*Top gusset/beam moment per AISC 14th, p. 13-10*		
Beam /Column Connection:				
V_{bcSD2}	0.65 kips	*Beam/column vertical load per AISC 14th, page 13-5 = V_{bm} + $V_{bmSD2-top}$ - $V_{bmSD2-bot}$*		
H_{SD2}	-99.31 kips	*Horizontal component of brace design axial loads*		
H_{bcSD2}	-75.25 kips	*Beam/column horizontal load per AISC 14th, page 13-5 = P_{bm-SD2} + (H_{SD2} - ($H_{bmSD2-top}$ + $H_{bmSD2-bot}$))*		
Seismic Load Distribution (Loading Direction SD3)				**n/a**
$P_{top-SD3}$	107.41 kips	*Top brace load per loading direction SD3, see "Seismic Loading Directions"*		
V_{bm}	80.00 kips	*User-input shear force in beam*		
Beam Story Force:				
$G_{top-SD3}$	97.64 kips	*Top brace expected strength in compression (i)*		
$O_{top-SD3}$	-187.40 kips	*Assumed opposite side top brace force*		
SF_{SD3}	151.05 kips	*Story force at beam level for loading direction SD3 (Per AISC 341-10 example 5.3.5 methodology)*		
P_{bm-SD3}	75.53 kips	*Axial force in beam at connection = SF_{SD3}/2 (Per AISC 341-10 example 5.3.5 methodology)*		
Top Gusset/Column Connection:				
$V_{colSD3-top}$	45.61 kips	*Top gusset/column vertical load per AISC 14th, eqn. (13-2)*		
$H_{colSD3-top}$	10.22 kips	*Top gusset/column horizontal load per AISC 14th, eqn. (13-3)*		
$M_{colSD3-top}$	-1.37 kips-ft	*Top gusset/column moment per AISC 14th, p. 13-10*		
Top Gusset/Beam Connection:				
$V_{bmSD3-top}$	45.48 kips	*Top gusset/beam vertical load per AISC 14th, eqn. (13-4)*		
$H_{bmSD3-top}$	46.70 kips	*Top gusset/beam horizontal load per AISC 14th, eqn. (13-5)*		
$M_{bmSD3-top}$	6.30 kips-ft	*Top gusset/beam moment per AISC 14th, p. 13-10*		
Beam /Column Connection:				
V_{bcSD3}	125.48 kips	*Beam/column vertical load per AISC 14th, page 13-5 = V_{bm} + $V_{bmSD3-top}$ - $V_{bmSD3-bot}$*		

continued on next page...

Grid 2 Bottom: Seismic Report (continued):

Limit State	Required	Available	Unity Check	Result
H_{SD3}	56.92 kips	*Horizontal component of brace design axial loads*		
H_{bcSD3}	85.75 kips	*Beam/column horizontal load per AISC 14th, page 13-5 = $P_{bm\text{-}SD3} + (H_{SD3} - (H_{bmSD3\text{-}top} + H_{bmSD3\text{-}bot}))$*		
Seismic Load Distribution (Loading Direction SD4)				**n/a**
$P_{top\text{-}SD4}$	32.22 kips	*Top brace load per loading direction SD4, see "Seismic Loading Directions"*		
V_{bm}	80.00 kips	*User-input shear force in beam*		
Beam Story Force:				
$G_{top\text{-}SD4}$	29.29 kips	*Top brace expected strength in compression (ii)*		
$O_{top\text{-}SD4}$	-187.40 kips	*Assumed opposite side top brace force*		
SF_{SD4}	114.83 kips	*Story force at beam level for loading direction SD4 (Per AISC 341-10 example 5.3.5 methodology)*		
$P_{bm\text{-}SD4}$	57.42 kips	*Axial force in beam at connection = $SF_{SD4}/2$ (Per AISC 341-10 example 5.3.5 methodology)*		
Top Gusset/Column Connection:				
$V_{colSD4\text{-}top}$	13.68 kips	*Top gusset/column vertical load per AISC 14th, eqn. (13-2)*		
$H_{colSD4\text{-}top}$	3.07 kips	*Top gusset/column horizontal load per AISC 14th, eqn. (13-3)*		
$M_{colSD4\text{-}top}$	-0.41 kips-ft	*Top gusset/column moment per AISC 14th, p. 13-10*		
Top Gusset/Beam Connection:				
$V_{bmSD4\text{-}top}$	13.64 kips	*Top gusset/beam vertical load per AISC 14th, eqn. (13-4)*		
$H_{bmSD4\text{-}top}$	14.01 kips	*Top gusset/beam horizontal load per AISC 14th, eqn. (13-5)*		
$M_{bmSD4\text{-}top}$	1.89 kips-ft	*Top gusset/beam moment per AISC 14th, p. 13-10*		
Beam /Column Connection:				
V_{bcSD4}	93.64 kips	*Beam/column vertical load per AISC 14th, page 13-5 = $V_{bm} + V_{bmSD4\text{-}top} - V_{bmSD4\text{-}bot}$*		
H_{SD4}	17.07 kips	*Horizontal component of brace design axial loads*		
H_{bcSD4}	60.48 kips	*Beam/column horizontal load per AISC 14th, page 13-5 = $P_{bm\text{-}SD4} + (H_{SD4} - (H_{bmSD4\text{-}top} + H_{bmSD4\text{-}bot}))$*		
Seismic Load Distribution (Governing)				**n/a**
Top Gusset/Column Connection:				
Shear (Compression)	45.61 kips	*Maximum compressive shear force (loading direction SD3 governs)*		
Axial (Compression)	10.22 kips	*Maximum compressive axial force (loading direction SD3 governs)*		
Shear (Tension)	-79.58 kips	*Maximum tension shear force (loading direction SD1 governs)*		
Axial (Tension)	-17.83 kips	*Maximum tension axial force (loading direction SD1 governs)*		
Resultant force	81.55 kips	*Maximum resultant shear force (loading direction SD1 governs)*		
Moment	2.40 kips-ft	*Maximum moment (loading direction SD1 governs)*		
Top Gusset/Beam Connection:				
Shear (Compression)	46.70 kips	*Maximum compressive shear force (loading direction SD3 governs)*		
Axial (Compression)	45.48 kips	*Maximum compressive axial force (loading direction SD3 governs)*		
Shear (Tension)	-81.48 kips	*Maximum tension shear force (loading direction SD1 governs)*		
Axial (Tension)	-79.35 kips	*Maximum tension axial force (loading direction SD1 governs)*		
Resultant force	113.73 kips	*Maximum resultant shear force (loading direction SD1 governs)*		

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Grid 2 Bottom: Seismic Report (continued):

Limit State	Required	Available	Unity Check	Result
Moment	-11.00 kips-ft	*Maximum moment (loading direction SD1 governs)*		
Beam/Column Connection:				
Shear (Compression)	125.48 kips	*Maximum compressive shear force (loading direction SD3 governs)*		
Axial (Compression)	85.75 kips	*Maximum compressive axial force (loading direction SD3 governs)*		
Shear (Tension)	0.00 kips	*Maximum tension shear force (no tension forse)*		
Axial (Tension)	-93.36 kips	*Maximum tension axial force (loading direction SD1 governs)*		
Resultant force	151.98 kips	*Maximum resultant shear force (loading direction SD3 governs)*		
Moment	35.18 kips-ft	*Maximum moment (loading direction SD3 governs)*		
Seismic Joint Fasteners				**PASS**
All column fasteners must be the same type, AISC 341-10 section D2.2(2)				
Top Gusset to Column Fastener	Welded			
Beam to Column Fastener	Welded			
Seismic Workpoint Limitations				**PASS**
Check Vertical Workpoint Ecc.	Pass	*Condition: D_{wv} <= d_{beam}/10*		
D_{wv}	0.00 in	*Distance from beam centerline to workpoint*		
d_{beam}	26.70 in	*Beam depth*		
Check Horizontal Workpoint Ecc.	Pass	*Condition: D_{wh} <= d_{beam}/10*		
D_{wh}	0.00 in	*Distance from column centerline to workpoint*		
d_{beam}	26.70 in	*Beam depth*		
Seismic Yield Stress Limitations				**PASS**
Check Max Yield Stress of the Beam	Pass	*Condition: F_y <= 50 ksi (345 Mpa) (AISC 341-10, A3.1)*		
$F_{y\text{-}bm}$	50.00 ksi	*Minimum yield stress of the beam material*		
Check Max Yield Stress of the Column	Pass	*Condition: F_y <= 65 ksi (450 Mpa) (AISC 341-10, A3.1)*		
$F_{y\text{-}col}$	46.00 ksi	*Minimum yield stress of the column material*		
Check Max Yield Stress of the Top Brace	Pass	*Condition: F_y <= 50 ksi (345 Mpa) (AISC 341-10, A3.1)*		
$F_{y\text{-}top}$	46.00 ksi	*Minimum yield stress of the top brace material*		
Seismic Brace Slenderness				**PASS**
Check Top Brace Slenderness	Pass	*Condition: KL/r <= 200 per AISC 341-10 section F2.5b*		
K_{top}	1.00	*Effective length factor of the top brace*		
L_{top}	120.00 in	*User-entered span of the top brace*		
$r_{y\text{-}top}$	1.32 in	*Weak axis radius of gyration of the top brace*		
$KL/r_{y\text{-}top}$	91.18	*Slenderness ratio of the top brace*		
Seismic Rotational Ductility				**PASS**
Check Beam/Col Rot. Ductility	Pass	*AISC 341-10 F2.6b(a)*		
$t_{b/c}$	0.38 in	*Thickness of beam to column connector*		
$t_{max\text{-}weld}$	0.66 in	*Max. plate thickness to avoid weld failure (AISC 14th p. 9-14)*		
$t_{max\text{-}plate}$	0.91 in	*Max. plate thickness to avoid plate rupture (AISC 14th p. 9-14)*		
Seismic Gusset Rotation Capacity/Clearance				**PASS**
Check Top Brace Buckling	Pass	*Condition: d_h >= 8*t_g (AISC 341-10 F2.6c(3)(b) & pg. 5-270)*		
$d_{h\text{-}top}$	3.00 in	*Distance from end of top brace to hinge line*		
$t_{g\text{-}top}$	0.38 in	*Thickness of top gusset plate*		
8*$t_{g\text{-}top}$	3.00 in	*Limiting thickness of the top gusset plate*		

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Grid 2 Bottom: Seismic Report (continued):

Limit State	Required	Available	Unity Check	Result
Seismic Column Width to Thickness Ratios				**PASS**
Limiting Width to Thickness Ratios (AISC 341-10, Table D1.1)				
Check Column	Pass	*Condition: Ratio <= Limit*		
b_c	4.84 in	*Inside dimension of column tube*		
t_c	0.58 in	*Column tube wall thickness*		
E_c	29000.00 ksi	*Elastic modulus of the column material*		
F_{yc}	46.00 ksi	*Minimum yield stress of the column material*		
Ratio	8.33	*Width to thickness ratio, b_c/t_c*		
Limit	13.81	*Limiting ratio, $0.55*(E_c/F_{yc})^{0.5}$*		
Seismic Beam Width to Thickness Ratios				**PASS**
Limiting Width to Thickness Ratios (AISC 341-10, Table D1.1)				
Check Beam Flange	Pass	*Condition: Ratio <= Limit*		
b_b	5.00 in	*Half of beam flange width*		
t_{bf}	0.64 in	*Beam flange thickness*		
E_b	29000.00 ksi	*Elastic modulus of the beam material*		
F_{yb}	50.00 ksi	*Minimum yield stress of the beam material*		
Ratio	7.81	*Width to thickness ratio, b_b/t_{bf}*		
Limit	9.15	*Limiting ratio, $0.38*(E_b/F_{yb})^{0.5}$*		
Check Beam Web	Pass	*Condition: Ratio <= Limit*		
h_b	25.42 in	*Clear distance between beam flanges*		
t_{bw}	0.46 in	*Beam web thickness*		
Ca_b	0.25	*User-input ratio of required strength to available strength*		
Ratio	55.26	*Width to thickness ratio, h_b/t_{bw}*		
Limit	56.10	*Limiting ratio, $max(1.12*(E_b/F_{yb})^{0.5}*(2.33-Ca_b),1.49*(E_b/F_{yb})^{0.5})$*		
Seismic Top Brace Width to Thickness Ratios				**PASS**
Limiting Width to Thickness Ratios (AISC 341-10, Table D1.1)				
Check Top Brace	Pass	*Condition: Ratio <= Limit*		
$b_{br\text{-}top}$	3.03 in	*Inside dimension of top brace tube*		
$t_{br\text{-}top}$	0.23 in	*Top brace tube wall thickness*		
$E_{br\text{-}top}$	29000.00 ksi	*Elastic modulus of the top brace material*		
$F_{ybr\text{-}top}$	46.00 ksi	*Minimum yield stress of the top brace material*		
Ratio	13.02	*Width to thickness ratio, $b_{br\text{-}top}/t_{br\text{-}top}$*		
Limit	13.81	*Limiting ratio, $0.55*(E_{br\text{-}top}/F_{ybr\text{-}top})^{0.5}$*		
Check Seismic Top Brace Area				**REINF REQ'D**
Additional brace reinforcement required, see A_{rn} below				
Check Area of Brace	Fail	*Condition: $A_e >= A_g$, AISC 341-10 section F2.5b(3)*		
t_p	0.38 in	*Thickness of gusset plate*		
gap	0.06 in	*Assumed gap on each side of the brace slot*		
t_{des}	0.23 in	*Brace wall thickness*		
L	20.86 in	*Length of brace to gusset connection*		
B	3.50 in	*Depth of brace member*		
H	3.50 in	*Width of brace member*		
d_r	0.00 in	*Depth of brace reinforcing bar*		

continued on next page...

Grid 2 Bottom: Seismic Report (continued):

Limit State	Required	Available	Unity Check	Result
A_r	0.00 in^2	*Area of brace reinforcing bars*		
x_bar	1.31 in	*Eccentricity of connection*		
U	0.94	*Shear lag factor per AISC 360-10 table D3.1 case 6*		
A_g	2.91 in^2	*Gross area of brace*		
A_n	2.68 in^2	*Net area with reinf bars =$(A_g+A_r)-2*(t_p+2*gap)*t_{des}$*		
A_{no}	2.68 in^2	*Net area without reinf bars =$A_g-2*(t_p+2*gap)*t_{des}$*		
A_e	2.51 in^2	*Effective net area of the brace = A_n * U*		
Req'd Reinf. Area of Brace		*Per AISC Seismic Design Manual page 5-150*		
U_a	0.75	*Assumed shear lag factor of reinforced brace*		
A_{rna}	1.18 in^2	*Assumed calculation of required area = A_g/U_a-A_{no}*		
d_r	0.88 in	*Required reinf. bar depth (assuming two square bars) = $(A_{rna}/2)^{0.5}$ rounded to nearest 1/8 inches*		
x_bar'	1.45 in	*Eccentricity of the composite section*		
U'	0.93	*Adjusted shear lag factor for composite section*		
A_n'	4.21 in^2	*Adjusted net area of the composite section*		
A_e'	3.92 in^2	*Adjusted effective net area of brace and reinforcement bars*		
A_{rn}	1.53 in^2	*Required area of reinforcement bars*		
Seismic Weld Limitations				**PASS**
All welds must be E70 or E80 per AISC 341-10, A3.4a				

Seismic Weld Strength at Beam (Top)	422.75 kips	603.51 kips	**0.70**	**PASS**
$\phi * R_n = \phi * 2 * 1.5 * 0.6 * F_{EXX} * 0.707 * w * L >= R_y * F_y * t_p * L$		**$\phi = 0.75$**	(AISC 341-10, page 5-293)	
F_{EXX}	70.00 ksi	*Filler metal classification strength*		
w	0.38 in	*Fillet weld size*		
R_y	1.30	*Ratio of expected yield stress to the specified minimum yield stress of the plate material*		
F_y	36.00 ksi	*Minimum yield stress of the plate material*		
t_p	0.38 in	*Gusset plate thickness*		
L	24.09 in	*Weld length*		
ϕR_n	603.51 kips	*Weld strength*		
Seismic Weld Strength at Column (Top)	526.50 kips	751.63 kips	**0.70**	**PASS**
$\phi * R_n = \phi * 2 * 1.5 * 0.6 * F_{EXX} * 0.707 * w * L >= R_y * F_y * t_p * L$		**$\phi = 0.75$**	(AISC 341-10, page 5-293)	
F_{EXX}	70.00 ksi	*Filler metal classification strength*		
w	0.38 in	*Fillet weld size*		
R_y	1.30	*Ratio of expected yield stress to the specified minimum yield stress of the plate material*		
F_y	36.00 ksi	*Minimum yield stress of the plate material*		
t_p	0.38 in	*Gusset plate thickness*		
L	30.00 in	*Weld length*		
ϕR_n	751.63 kips	*Weld strength*		

Grid 2 Bottom: Connection Properties

General

Connection	
Connection Title	Grid 2 Bottom
Connection Type	Vertical Brace Diagonal Connection
Seismic Detailing	
Seismic System	SCBF
Gusset Plate Clearance	8t Elliptical Offset
Top Brace Length	120.00 in
Top Brace K Factor	1.00
Ca Beam Ratio	0.25
Connection Category	
Braces	Above
Column Connection Type	Narrow
Loading (LRFD)	
Shear Load	80.00 kips
Column Force	50.00 kips
Column Moment	0.00 kips-ft
Top Brace Tensile Axial	-40.00 kips
Top Brace Compressive Axial	40.00 kips
Qf	1.00
Components	
Beam Section	W27x84
Material	A992
Column Section	HSS6x6x10
Material	A500 Gr.B Rect
Top Brace Section	HSS3.5x3.5x4
Material	A500 Gr.B Rect
Member Orientation	Long Side Vertical
Assembly	
Auto-Update Connections	Yes
Top Brace Angle from Vertical	32.00
Workpoint Location	Concentric

Beam

Beam-Column Connection Components	
Type	Shear Tab
Beam Fastener Type	Welded
Plate Section	P0.38x4.00x22.00
Material	A36
Thickness	0.38 in
Width	4.00 in
Depth	22.00 in
Column Weld	E70
Type	Double Fillet
Fillet Size	4.00 Sixteenths
Beam Weld	E70
Type	Fillet
Fillet Size	4.00 Sixteenths
Assembly	
Column/Beam Clearance	0.00 in
Plate Vertical Position	2.50 in

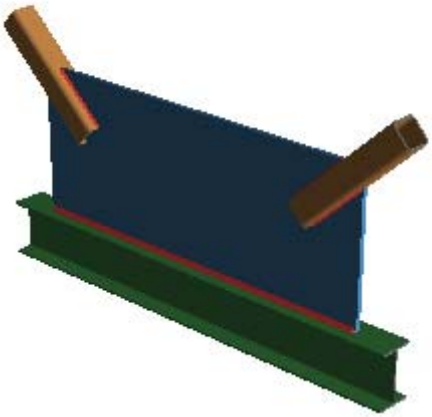
Top Brace

continued on next page...

Grid 2 Bottom: Connection Properties (continued):

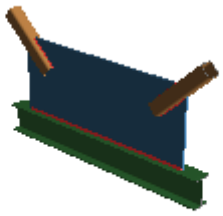
Components	
Top Gusset	P0.38x30.00x24.09
Material	A36
Tapered ?	No
Thickness	0.38 in
Width	30.00 in
Length	24.09 in
Width to Length Ratio	Unlimited
Top Gusset-Brace Connection	
Connection Type	Slotted Around Gusset
Brace Gusset Weld	E70
Type	Fillet
Fillet Size	4.00 Sixteenths
Top Gusset-Beam Connection	
Type	Direct Weld
Beam Weld	E70
Type	Double Fillet
Fillet Size	6.00 Sixteenths
Top Gusset-Column Connection	
Type	Direct Weld
Column Weld	E70
Type	Double Fillet
Fillet Size	6.00 Sixteenths
Assembly	
Brace Min Clearance	8.41 in
Brace WorkPoint Distance	26.76 in
Brace/Gusset Overlap	20.86 in
Gusset/Column Gap	0.00 in
Gusset/Beam Gap	0.00 in
Gusset Clip	
Vertical Clip	4.13 in
Horizontal Clip	6.61 in
Brace/Clip Edge Dist	3.86 in

Grid E Top: 3D View



Grid E Top: Summary Report

Vertical Brace Chevron Connection



Material Properties:				
Beam	W8x18	A992	F_y = 50.00 ksi	F_u = 65.00 ksi
Left Brace	HSS4x4x5	A500 Gr.B Rect	F_y = 46.00 ksi	F_u = 58.00 ksi
Right Brace	HSS4x4x5	A500 Gr.B Rect	F_y = 46.00 ksi	F_u = 58.00 ksi
Gusset	P0.75x22.00x56.00	A36	F_y = 36.00 ksi	F_u = 58.00 ksi

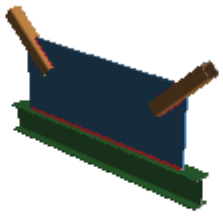
Input Data:		
Left Brace Axial (Tension)	-264.04 kips	*Design tensile load in left brace*
Left Brace Axial(Compression)	151.57 kips	*Design compressive load in left brace*
Right Brace Axial (Tension)	-264.04 kips	*Design tensile load in right brace*
Right Brace Axial (Compression)	151.57 kips	*Design compressive load in right brace*

Seismic Input Data:		
Seismic System	SCBF	*User Input Seismic System*
L_{left}	136.00 in	*User Input Clear Span of Left Brace*
L_{right}	136.00 in	*User Input Clear Span of Right Brace*
K_{left}	1.00	*User Input Effective Length Factor of Left Brace*
K_{right}	1.00	*User Input Effective Length Factor of Right Brace*
Ca Beam Ratio	0.10	*User-Input Ratio of Required Strength to Available Strength*

Note: Unless specified, all code references are from AISC 360-10

Connection	Required	Max Unity Check	Result
Gusset/Beam connection	Beam Weld Strength	**0.35**	**PASS**
Gusset/Left Brace connection	Brace Weld Strength	**0.94**	**PASS**
Gusset/Right Brace connection	Brace Weld Strength	**0.94**	**PASS**
Seismic Calculations	Seismic Weld Strength at Beam	**0.93**	**PASS**

Grid E Top: Gusset/Beam Report



Material Properties:				
Beam	W8x18	A992	F_y = 50.00 ksi	F_u = 65.00 ksi
Left Brace	HSS4x4x5	A500 Gr.B Rect	F_y = 46.00 ksi	F_u = 58.00 ksi
Right Brace	HSS4x4x5	A500 Gr.B Rect	F_y = 46.00 ksi	F_u = 58.00 ksi
Gusset	P0.75x22.00x56.00	A36	F_y = 36.00 ksi	F_u = 58.00 ksi

Input Data:		
Shear(Tension, Section a-a)	-303.96 kips	*Maximum shear due to tension at section a-a (SD1)*
Shear(Comp, Section a-a)	303.96 kips	*Maximum shear due to compression at section a-a (SD3)*
Axial(Tension, Section a-a)	-149.06 kips	*Maximum axial due to tension at section a-a (SD2)*
Axial(Comp, Section a-a)	0.00 kips	*Maximum axial due to compression at section a-a*
Moment Load (Section a-a)	103.09 kips-ft	*Maximum moment at section a-a (SD1)*
Shear(Tension, Section b-b)	-108.59 kips	*Maximum shear due to tension at section b-b (SD3)*
Shear(Comp, Section b-b)	108.59 kips	*Maximum shear due to compression at section b-b (SD1)*
Axial(Tension, Section b-b)	-79.93 kips	*Maximum axial due to tension at section b-b (SD4)*
Axial(Comp, Section b-b)	0.00 kips	*Maximum axial due to compression at section b-b*
Moment Load (Section b-b)	13.42 kips-ft	*Maximum moment at section b-b (SD4)*
Beam Moment	-103.09 kips-ft	*Maximum moment at beam (not used for design)*

Note: Unless specified, all code references are from AISC 360-10

Limit State	Required	Available	Unity Check	Result
Geometry Restrictions at Beam				**PASS**
Check Workpoint Horiz. Offset	Pass	*Condition: $-d_{beam} <= WP_h <= d_{beam}$*		
WP_h	0.00 in	*Horizontal brace workpoint offset*		
d_{beam}	8.14 in	*Depth of beam*		
Check Workpoint Vert. Offset	Pass	*Condition: $-d_{beam} <= WP_v <= 0.5*d_{beam}$*		
WP_v	-0.00 in	*Vertical brace workpoint offset*		
d_{beam}	8.14 in	*Depth of beam*		
Beam Weld Limitations				**PASS**
Weld Min Size, Length			(J2.2b)	
Check Weld Min Size	Pass			
D	0.56 in	*Weld size*		
D_{min}	0.19 in	*Min size allowed per Table J2.4*		
t_{min}	0.33 in	*Controlling member thickness*		
Check Weld Min Length	Pass	*Condition: L_{min} >= 4*D per J2.2b*		

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Grid E Top: Gusset/Beam Report (continued):

Limit State	Required	Available	Unity Check	Result
D	0.56 in	*Weld size*		
L_{min}	56.00 in	*Min weld segment length*		
Plate Shear Yield (Section a-a)	303.96 kips	907.20 kips	**0.34**	**PASS**
$R_n = 0.6 * F_y * A_{gv}$		**$\phi = 1.00$**	(J4-3)	
F_y	36.00 ksi	*Minimum yield stress of material*		
A_{gv}	42.00 in^2	*Gross area subject to shear*		
ϕR_n	907.20 kips	*Shear yield strength*		
Plate Shear Rupture (Section a-a)	303.96 kips	1096.20 kips	**0.28**	**PASS**
$R_n = 0.6 * F_u * A_{nv}$		**$\phi = 0.75$**	(J4-4)	
F_u	58.00 ksi	*Minimum tensile stress of material*		
A_{nv}	42.00 in^2	*Net area subject to shear*		
ϕR_n	1096.20 kips	*Shear rupture strength*		
Plate Axial Yield (Section a-a)	149.06 kips	1360.80 kips	**0.11**	**PASS**
$R_n = F_y * A_g$		**$\phi = 0.90$**	(J4-1)	
F_y	36.00 ksi	*Minimum yield stress of material*		
A_g	42.00 in^2	*Gross area subject to tension*		
ϕR_n	1360.80 kips	*Tensile yield strength*		
Plate Tension Rupture (Section a-a)	149.06 kips	1827.00 kips	**0.08**	**PASS**
$R_n = F_u * A_n$		**$\phi = 0.75$**	(J4-2)	
F_u	58.00 ksi	*Minimum tensile stress of material*		
A_n	42.00 in^2	*Net area subject to tension*		
ϕR_n	1827.00 kips	*Tensile rupture strength*		
Plate Flexural Yield (Section a-a)			**0.14**	**PASS**
$(V_r/V_c)^2 + (P_r/P_c + M_r/M_c)^2 <= 1$			(AISC 14^{th} Eq.10-5)	
P_r	-149.06 kips	*Calculated axial load*		
V_r	303.96 kips	*Calculated shear load*		
F_y	36.00 ksi	*Minimum yield stress of material*		
A_g	42.00 in^2	*Gross area of the plate*		
Z_{pl}	588.00 in^3	*Plastic modulus of the shear plate*		
P_c	1360.80 kips	*Available tensile strength (see check 'Axial Yield')*		
V_c	907.20 kips	*Available shear strength (see check 'Shear Yield')*		
M_r	103.09 kips-ft	*Calculated moment*		
M_c	1587.60 kips-ft	*Available moment $M_c = \varphi * (F_y * Z)$, $\varphi = 0.90$*		
UC	0.14	*Unity check per interaction equation, $(V_r/V_c)^2 + (P_r/P_c + M_r/M_c)^2 <= 1$*		
Plate Flexural Rupture (Section a-a)			**0.09**	**PASS**
$(V_r/V_c)^2 + (P_r/P_c + M_r/M_c)^2 <= 1$			(Eq.10-5)	
P_r	-149.06 kips	*Calculated axial load*		
V_r	303.96 kips	*Calculated shear load*		
F_u	58.00 ksi	*Minimum tensile stress of material*		
A_n	42.00 in^2	*Net area of the plate*		
Z_{net}	588.00 in^3	*Plastic modulus of net section*		

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Grid E Top: Gusset/Beam Report (continued):

Limit State	Required	Available	Unity Check	Result
P_c	1827.00 kips	*Available tensile strength (see check 'Tension Rupture')*		
V_c	1096.20 kips	*Available shear strength (see check 'Shear Rupture')*		
M_r	103.09 kips-ft	*Calculated moment*		
M_c	2131.50 kips-ft	*Available moment $M_c = \varphi*(F_u * Znet)$, $\varphi=0.75$*		
UC	0.09	*Unity check per interaction equation, $(V_r/V_c)^2 + (P_r/P_c + M_r/M_c)^2 <= 1$*		
Plate Shear Yield (Section b-b)	108.59 kips	356.40 kips	**0.30**	**PASS**
$R_n = 0.6 * F_y * A_{gv}$		**$\phi = 1.00$**	(J4-3)	
F_y	36.00 ksi	*Minimum yield stress of material*		
A_{gv}	16.50 in^2	*Gross area subject to shear*		
ϕR_n	356.40 kips	*Shear yield strength*		
Plate Shear Rupture (Section b-b)	108.59 kips	430.65 kips	**0.25**	**PASS**
$R_n = 0.6 * F_u * A_{nv}$		**$\phi = 0.75$**	(J4-4)	
F_u	58.00 ksi	*Minimum tensile stress of material*		
A_{nv}	16.50 in^2	*Net area subject to shear*		
ϕR_n	430.65 kips	*Shear rupture strength*		
Plate Axial Yield (Section b-b)	79.93 kips	534.60 kips	**0.15**	**PASS**
$R_n = F_y * A_g$		**$\phi = 0.90$**	(J4-1)	
F_y	36.00 ksi	*Minimum yield stress of material*		
A_g	16.50 in^2	*Gross area subject to tension*		
ϕR_n	534.60 kips	*Tensile yield strength*		
Plate Tension Rupture (Section b-b)	79.93 kips	717.75 kips	**0.11**	**PASS**
$R_n = F_u * A_n$		**$\phi = 0.75$**	(J4-2)	
F_u	58.00 ksi	*Minimum tensile stress of material*		
A_n	16.50 in^2	*Net area subject to tension*		
ϕR_n	717.75 kips	*Tensile rupture strength*		
Plate Flexural Yield (Section b-b)			**0.13**	**PASS**
$(V_r/V_c)^2 + (P_r/P_c + M_r/M_c)^2 <= 1$			(AISC 14th Eq.10-5)	
P_r	-79.93 kips	*Calculated axial load*		
V_r	108.59 kips	*Calculated shear load*		
F_y	36.00 ksi	*Minimum yield stress of material*		
A_g	16.50 in^2	*Gross area of the plate*		
Z_{pl}	90.75 in^3	*Plastic modulus of the shear plate*		
P_c	534.60 kips	*Available tensile strength (see check 'Axial Yield')*		
V_c	356.40 kips	*Available shear strength (see check 'Shear Yield')*		
M_r	13.42 kips-ft	*Calculated moment*		
M_c	245.03 kips-ft	*Available moment $M_c=\varphi*(F_y * Z)$, $\varphi=0.90$*		
UC	0.13	*Unity check per interaction equation, $(V_r/V_c)^2 + (P_r/P_c + M_r/M_c)^2 <= 1$*		
Plate Flexural Rupture (Section b-b)			**0.09**	**PASS**
$(V_r/V_c)^2 + (P_r/P_c + M_r/M_c)^2 <= 1$			(Eq.10-5)	
P_r	-79.93 kips	*Calculated axial load*		

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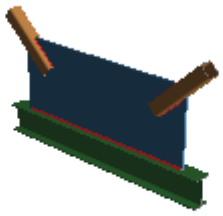
Grid E Top: Gusset/Beam Report (continued):

Limit State	Required	Available	Unity Check	Result
V_r	108.59 kips	*Calculated shear load*		
F_u	58.00 ksi	*Minimum tensile stress of material*		
A_n	16.50 in^2	*Net area of the plate*		
Z_{net}	90.75 in^3	*Plastic modulus of net section*		
P_c	717.75 kips	*Available tensile strength (see check 'Tension Rupture')*		
V_c	430.65 kips	*Available shear strength (see check 'Shear Rupture')*		
M_r	13.42 kips-ft	*Calculated moment*		
M_c	328.97 kips-ft	*Available moment $M_c = \varphi * (F_u * Znet)$, $\varphi = 0.75$*		
UC	0.09	*Unity check per interaction equation, $(V_r/V_c)^2 + (P_r/P_c + M_r/M_c)^2 <= 1$*		
Beam Weld Strength	313.49 kips	895.10 kips	**0.35**	**PASS**
$R_n = C_1 * \alpha * \beta * C * D_{16} * L$		**$\phi = 0.75$**		
Double Fillet **Governing Loading Direction SD1**				
V	303.96 kips	*Shear Load*		
P	-76.70 kips	*Axial Load*		
M	103.09 kips-ft	*Moment*		
e_{eff}	3.95 in	*Effective eccentricity*		
C_1	1.00	*Electrode strength coefficient (AISC 14th table 8-3)*		
α	0.77	*Base material proration factor (re-arrangement of AISC 14th Eqn 9-2)*		
β	0.80	*Force redistribution adjustment factor*		
C	3.84	*Eccentricity modification factor (AISC 14th Eqn 8-13)*		
D_{16}	9.00	*Weld fillet size in sixteenths of an inch*		
L	56.00 in	*Weld length per side*		
ϕRn	895.10 kips	*Weld strength*		
Beam Web Yielding	149.06 kips	680.23 kips	**0.22**	**PASS**
$R_n = (5 * k + N) * F_y * t_w$		**$\phi = 1.00$**	(J10-2)	
k	0.63 in	*Distance from outer face of the flange to the web toe of the fillet*		
N	56.00 in	*Length of bearing*		
F_y	50.00 ksi	*Minimum yield stress of beam*		
t_w	0.23 in	*Beam web thickness*		
ϕR_n	680.23 kips	*Beam web local yielding*		

Grid E Top: Gusset/Left Brace Report

Vertical Brace Chevron Connection



Material Properties:				
Beam	W8x18	A992	F_y = 50.00 ksi	F_u = 65.00 ksi
Left Brace	HSS4x4x5	A500 Gr.B Rect	F_y = 46.00 ksi	F_u = 58.00 ksi
Right Brace	HSS4x4x5	A500 Gr.B Rect	F_y = 46.00 ksi	F_u = 58.00 ksi
Gusset	P0.75x22.00x56.00	A36	F_y = 36.00 ksi	F_u = 58.00 ksi

Input Data:		
Input Brace Tension	-55.00 kips	*User-input Tensile Load in Brace*
Input Brace Compression	55.00 kips	*User-input Compressive Load in Brace*
Brace Axial (Tension)	-264.04 kips	*Design Tensile Load in Brace*
Brace Axial(Compression)	151.57 kips	*Design Compressive Load in Brace*

Note: Unless specified, all code references are from AISC 360-10

Limit State	Required	Available	Unity Check	Result
Brace Weld Limitations				**PASS**
Weld Min Size, Length			(J2.2b)	
Check Weld Min Size	Pass			
D	0.31 in	*Weld size*		
D_{min}	0.19 in	*Min size allowed per Table J2.4*		
t_{min}	0.29 in	*Controlling member thickness*		
Check Weld Min Length	Pass	*Condition: L_{min} >= 4*D per J2.2b*		
D	0.31 in	*Weld size*		
L_{min}	10.08 in	*Min weld segment length*		
Check Weld Max Length	Pass	*Condition: L_{max} <= 100*D*		
D	0.31 in	*Weld size*		
L_{max}	10.08 in	*Max weld segment length*		
Gusset Plate Tensile Yield (Whitmore)	264.04 kips	380.07 kips	**0.69**	**PASS**
$R_n = F_y * A_g$		**ϕ = 0.9**	(J4-1)	
F_y	36.00 ksi	*Gusset plate yield stress*		
A_g	11.73 in^2	*Gross area of plate (Whitmore) $A_g = L_w * t$*		
L_w	15.64 in	*Whitmore tensile width*		
t	0.75 in	*Thickness of plate*		
ϕR_n	380.07 kips	*Plate tensile yield strength*		
Gusset Plate Tensile Rupture (Whitmore)	264.04 kips	510.28 kips	**0.52**	**PASS**
$R_n = F_u * A_n$		**ϕ = 0.75**	(J4-2)	
F_u	58.00 ksi	*Gusset plate tensile stress*		
A_n	11.73 in^2	*Net area of plate*		
L_w	15.64 in	*Whitmore tensile width*		
t	0.75 in	*Thickness of plate*		
ϕR_n	510.28 kips	*Plate tensile rupture strength*		

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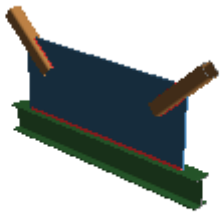
Grid E Top: Gusset/Left Brace Report (continued):

Limit State	Required	Available	Unity Check	Result
Gusset Plate Compression (Whitmore)	151.57 kips	198.62 kips	**0.76**	**PASS**
$P_n = F_{cr} * A_g$		**$\phi = 0.9$**	(E3-1)	
K	1.20	*Effective length factor*		
L	20.03 in	*Unbraced length*		
r	0.22 in	*Radius of gyration*		
KL/r	111.03	*Plate slenderness*		
F_{cr}	18.81 ksi	*Flexural buckling stress (E3-2)*		
A_g	11.73 in^2	*Gross area of plate (Whitmore section)*		
ϕP_n	198.62 kips	*Gusset plate compressive strength*		
Brace Tensile Yield	55.00 kips	169.74 kips	**0.32**	**PASS**
$R_n = F_y * A_g$		**$\phi = 0.90$**	(D2-1)	
F_y	46.00 ksi	*Minimum yield stress of material*		
A_g	4.10 in^2	*Gross area subject to tension*		
ϕR_n	169.74 kips	*Tensile yield strength*		
Brace Tensile Rupture	55.00 kips	132.96 kips	**0.41**	**PASS**
$R_n = F_u * A_e$		**$\phi = 0.75$**	(D2-2)	
F_u	58.00 ksi	*Minimum tensile stress of material*		
A_e	3.06 in^2	*Effective net area, $A_e = A_n * U$*		
A_n	3.59 in^2	*Net area subject to tension*		
$U_{D3.1}$	0.85	*Shear lag factor (table D3.1)*		
U_{Bound}	0.49	*Shear lag factor (lower bound)*		
U	0.85	*Governing shear lag factor, max($U_{D3.1}$, U_{Bound})*		
ϕR_n	132.96 kips	*Tensile rupture strength*		
Brace Weld Strength	264.04 kips	280.66 kips	**0.94**	**PASS**
$\phi Rn = 4 * C_1 * \alpha * 1.392 * D_{16} * L$				
Single Fillet				
$1.392 = \phi * 0.6 * F_{E70} * 2^{0.5}/2 * 1/16$, ϕ=0.75 (AISC 14^{th} Eqn 8-2a)				
C_1	1.00	*Electrode strength coefficient (AISC 14^{th} table 8-3)*		
α	1.00	*Base material proration factor (re-arrangement of AISC 14^{th} Eqn 9-2)*		
D_{16}	5.00	*Weld fillet size in sixteenths of an inch*		
L	10.08 in	*Weld length*		
ϕRn	280.66 kips	*Weld strength*		

Grid E Top: Gusset/Right Brace Report



Material Properties:

Beam	W8x18	A992	F_y = 50.00 ksi	F_u = 65.00 ksi
Left Brace	HSS4x4x5	A500 Gr.B Rect	F_y = 46.00 ksi	F_u = 58.00 ksi
Right Brace	HSS4x4x5	A500 Gr.B Rect	F_y = 46.00 ksi	F_u = 58.00 ksi
Gusset	P0.75x22.00x56.00	A36	F_y = 36.00 ksi	F_u = 58.00 ksi

Input Data:

Input Brace Tension	-55.00 kips	*User-input Tensile Load in Brace*
Input Brace Compression	55.00 kips	*User-input Compressive Load in Brace*
Brace Axial (Tension)	-264.04 kips	*Design Tensile Load in Brace*
Brace Axial(Compression)	151.57 kips	*Design Compressive Load in Brace*

Note: Unless specified, all code references are from AISC 360-10

Limit State	Required	Available	Unity Check	Result
Brace Weld Limitations				**PASS**
Weld Min Size, Length			(J2.2b)	
Check Weld Min Size	Pass			
D	0.31 in	*Weld size*		
D_{min}	0.19 in	*Min size allowed per Table J2.4*		
t_{min}	0.29 in	*Controlling member thickness*		
Check Weld Min Length	Pass	*Condition: L_{min} >= 4*D per J2.2b*		
D	0.31 in	*Weld size*		
L_{min}	10.08 in	*Min weld segment length*		
Check Weld Max Length	Pass	*Condition: L_{max} <= 100*D*		
D	0.31 in	*Weld size*		
L_{max}	10.08 in	*Max weld segment length*		
Gusset Plate Tensile Yield (Whitmore)	264.04 kips	380.07 kips	**0.69**	**PASS**
$R_n = F_y * A_g$		**ϕ = 0.9**	(J4-1)	
F_y	36.00 ksi	*Gusset plate yield stress*		
A_g	11.73 in^2	*Gross area of plate (Whitmore) $A_g = L_w * t$*		
L_w	15.64 in	*Whitmore tensile width*		
t	0.75 in	*Thickness of plate*		
ϕR_n	380.07 kips	*Plate tensile yield strength*		
Gusset Plate Tensile Rupture (Whitmore)	264.04 kips	510.28 kips	**0.52**	**PASS**
$R_n = F_u * A_n$		**ϕ = 0.75**	(J4-2)	
F_u	58.00 ksi	*Gusset plate tensile stress*		
A_n	11.73 in^2	*Net area of plate*		
L_w	15.64 in	*Whitmore tensile width*		
t	0.75 in	*Thickness of plate*		
ϕR_n	510.28 kips	*Plate tensile rupture strength*		

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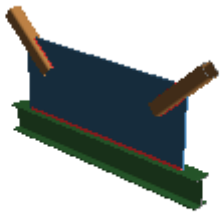
Grid E Top: Gusset/Right Brace Report (continued):

Limit State	Required	Available	Unity Check	Result
Gusset Plate Compression (Whitmore)	151.57 kips	198.62 kips	**0.76**	**PASS**
$P_n = F_{cr} * A_g$		**$\phi = 0.9$**	(E3-1)	
K	1.20	*Effective length factor*		
L	20.03 in	*Unbraced length*		
r	0.22 in	*Radius of gyration*		
KL/r	111.03	*Plate slenderness*		
F_{cr}	18.81 ksi	*Flexural buckling stress (E3-2)*		
A_g	11.73 in^2	*Gross area of plate (Whitmore section)*		
ϕP_n	198.62 kips	*Gusset plate compressive strength*		
Brace Tensile Yield	55.00 kips	169.74 kips	**0.32**	**PASS**
$R_n = F_y * A_g$		**$\phi = 0.90$**	(D2-1)	
F_y	46.00 ksi	*Minimum yield stress of material*		
A_g	4.10 in^2	*Gross area subject to tension*		
ϕR_n	169.74 kips	*Tensile yield strength*		
Brace Tensile Rupture	55.00 kips	132.96 kips	**0.41**	**PASS**
$R_n = F_u * A_e$		**$\phi = 0.75$**	(D2-2)	
F_u	58.00 ksi	*Minimum tensile stress of material*		
A_e	3.06 in^2	*Effective net area, $A_e = A_n * U$*		
A_n	3.59 in^2	*Net area subject to tension*		
$U_{D3.1}$	0.85	*Shear lag factor (table D3.1)*		
U_{Bound}	0.49	*Shear lag factor (lower bound)*		
U	0.85	*Governing shear lag factor, max($U_{D3.1}$, U_{Bound})*		
ϕR_n	132.96 kips	*Tensile rupture strength*		
Brace Weld Strength	264.04 kips	280.66 kips	**0.94**	**PASS**
$\phi Rn = 4 * C_1 * \alpha * 1.392 * D_{16} * L$				
Single Fillet				
$1.392 = \phi * 0.6 * F_{E70} * 2^{0.5}/2 * 1/16$, ϕ=0.75 (AISC 14^{th} Eqn 8-2a)				
C_1	1.00	*Electrode strength coefficient (AISC 14^{th} table 8-3)*		
α	1.00	*Base material proration factor (re-arrangement of AISC 14^{th} Eqn 9-2)*		
D_{16}	5.00	*Weld fillet size in sixteenths of an inch*		
L	10.08 in	*Weld length*		
ϕRn	280.66 kips	*Weld strength*		

Grid E Top: Seismic Report

Vertical Brace Chevron Connection



Material Properties:				
Beam	W8x18	A992	F_y = 50.00 ksi	F_u = 65.00 ksi
Left Brace	HSS4x4x5	A500 Gr.B Rect	F_y = 46.00 ksi	F_u = 58.00 ksi
Right Brace	HSS4x4x5	A500 Gr.B Rect	F_y = 46.00 ksi	F_u = 58.00 ksi
Gusset	P0.75x22.00x56.00	A36	F_y = 36.00 ksi	F_u = 58.00 ksi

Input Data:		
Seismic System	SCBF	*User Input Seismic System*
L_{left}	136.00 in	*User Input Clear Span of Left Brace*
L_{right}	136.00 in	*User Input Clear Span of Right Brace*
K_{left}	1.00	*User Input Effective Length Factor of Left Brace*
K_{right}	1.00	*User Input Effective Length Factor of Right Brace*
Ca Beam Ratio	0.10	*User-Input Ratio of Required Strength to Available Strength*

Note: Unless specified, all code references are from AISC 360-10

Limit State	Required	Available	Unity Check	Result
Controlling Load Calculation				n/a
Left Brace Exp. Ten. Strength		*AISC 341-10 section F2.6c(1)*		
$F_{y\text{-}left}$	46.00 ksi	*Minimum yield stress of the left brace material*		
$R_{y\text{-}left}$	1.40	*Ratio of expected yield stress to minimum yield stress of the left brace material*		
$A_{br\text{-}left}$	4.10 in^2	*Area of the left brace*		
$P_{exp\text{-}t\text{-}left}$	264.04 kips	*Left brace expected strength in tension = $R_y*F_y*A_{br}$*		
Right Brace Exp. Ten. Strength		*AISC 341-10 section F2.6c(1)*		
$F_{y\text{-}right}$	46.00 ksi	*Minimum yield stress of the right brace material*		
$R_{y\text{-}right}$	1.40	*Ratio of expected yield stress to minimum yield stress of the right brace material*		
$A_{br\text{-}right}$	4.10 in^2	*Area of the right brace*		
$P_{exp\text{-}t\text{-}right}$	264.04 kips	*Right brace expected strength in tension = $R_y*F_y*A_{br}$*		
Left Brace Exp. Comp. Strength		*AISC 341-10 section F2.3*		
Analysis Method (i)				
K_{left}	1.00	*Effective length factor of the left brace*		
L_{left}	136.00 in	*Length of the left brace*		
E_{left}	29000.00 ksi	*Elastic modulus of the left brace material*		
$r_{y\text{-}left}$	1.49 in	*Radius of gyration about the weak axis of the left brace*		
$F_{e\text{-}left}$	34.50 ksi	*Elastic buckling stress per AISC 360-10 eqn. (E3-4) = $(\pi^2*E)/((K*L)/r_y)^2$*		
$F_{cre\text{-}left}$	29.48 ksi	*Critical stress per AISC 360-10 eqn. (E3-2) = $R_y*F_y*(0.658^{((R_y*F_y)/F_e)})$*		

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Grid E Top: Seismic Report (continued):

Limit State	Required	Available	Unity Check	Result
$P_{exp\text{-}ci\text{-}left}$	137.80 kips	*Left brace expected strength in compression = min($R_y*F_y*A_{br}$, $1.14*F_{cre}*A_{br}$)*		
Analysis Method (ii)				
$P_{exp\text{-}cii\text{-}left}$	41.34 kips	*Post-buckling expected compressive strength = $0.3*P_{exp\text{-}ci\text{-}left}$*		
Right Brace Exp. Comp. Strength		*AISC 341-10 section F2.3*		
Analysis Method (i)				
K_{right}	1.00	*Effective length factor of the right brace*		
L_{right}	136.00 in	*Length of the right brace*		
E_{right}	29000.00 ksi	*Elastic modulus of the right brace material*		
$r_{y\text{-}right}$	1.49 in	*Radius of gyration about the weak axis of the right brace*		
$F_{e\text{-}right}$	34.50 ksi	*Elastic buckling stress per AISC 360-10 eqn. (E3-4) = $(\pi^2*E)/((K*L)/r_y)^2$*		
$F_{cre\text{-}right}$	29.48 ksi	*Critical stress per AISC 360-10 eqn. (E3-2) = $R_y*F_y*(0.658^{((R_y*F_y)/F_e)})$*		
$P_{exp\text{-}ci\text{-}right}$	137.80 kips	*Right brace expected strength in compression = min($R_y*F_y*A_{br}$, $1.14*F_{cre}*A_{br}$)*		
Analysis Method (ii)				
$P_{exp\text{-}cii\text{-}right}$	41.34 kips	*Post-buckling expected compressive strength = $0.3*P_{exp\text{-}ci\text{-}right}$*		
Governing Brace Strength in Tension		*AISC 341-10 section F2.6c(1)*		
$P_{br\text{-}t\text{-}left}$	-55.00 kips	*User input tensile axial load in left brace*		
$P_{br\text{-}t\text{-}right}$	-55.00 kips	*User input tensile axial load in right brace*		
$P_{des\text{-}t\text{-}left}$	-264.04 kips	*Design tensile load in left brace member = $P_{exp\text{-}t\text{-}left}$ (negative for tension)*		
$P_{des\text{-}t\text{-}right}$	-264.04 kips	*Design tensile load in right brace member = $P_{exp\text{-}t\text{-}right}$ (negative for tension)*		
Governing Brace Strength in Compression		*AISC 341-10 section F2.6c(2)*		
$P_{br\text{-}c\text{-}left}$	55.00 kips	*User input compressive axial load in left brace*		
$P_{br\text{-}c\text{-}right}$	55.00 kips	*User input compressive axial load in right brace*		
Analysis Method (i)				
$P_{des\text{-}ci\text{-}left}$	151.57 kips	*Design compressive load in left brace member = $1.1*P_{exp\text{-}ci\text{-}left}$*		
$P_{des\text{-}ci\text{-}right}$	151.57 kips	*Design compressive load in right brace member = $1.1*P_{exp\text{-}ci\text{-}right}$*		
Analysis Method (ii)				
$P_{des\text{-}cii\text{-}left}$	45.47 kips	*Design compressive load in left brace member = $1.1*P_{exp\text{-}cii\text{-}left}$*		
$P_{des\text{-}cii\text{-}right}$	45.47 kips	*Design compressive load in right brace member = $1.1*P_{exp\text{-}cii\text{-}right}$*		
Seismic Loading Directions				**n/a**
Loading Direction SD1		*Left brace in tension, right brace in compression (i)*		
$P_{left\text{-}SD1}$	-264.04 kips	*Left brace design load per loading direction SD1*		
$P_{right\text{-}SD1}$	151.57 kips	*Right brace design load per loading direction SD1*		
Loading Direction SD2		*Left brace in tension, right brace in compression (ii)*		
$P_{left\text{-}SD2}$	-264.04 kips	*Left brace design load per loading direction SD2*		
$P_{right\text{-}SD2}$	45.47 kips	*Right brace design load per loading direction SD2*		
Loading Direction SD3		*Left brace in compression (i), right brace in tension*		
$P_{left\text{-}SD3}$	151.57 kips	*Left brace design load per loading direction SD3*		

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Grid E Top: Seismic Report (continued):

Limit State	Required	Available	Unity Check	Result
$P_{right-SD3}$	-264.04 kips	*Right brace design load per loading direction SD3*		
Loading Direction SD4		*Left brace in compression (ii), right brace in tension*		
$P_{left-SD4}$	45.47 kips	*Left brace design load per loading direction SD4*		
$P_{right-SD4}$	-264.04 kips	*Right brace design load per loading direction SD4*		
Seismic Load Distribution (Loading Direction SD1)				n/a
Brace Centerline Eccentricities				
Δ_{left}	2.98 in	*Perpendicular eccentricity between left brace centerline and section a-a centerline*		
Δ_{right}	2.98 in	*Perpendicular eccentricity between right brace centerline and section a-a centerline*		
Δ'_{left}	11.02 in	*Perpendicular eccentricity between left brace centerline and section b-b centerline*		
Brace Force Components				
P_{left}	-264.04 kips	*Left brace design load per loading direction*		
P_{right}	151.57 kips	*Right brace design load per loading direction*		
P_{Vleft}	180.07 kips	*Vertical component of left brace*		
P_{Hleft}	-193.11 kips	*Horizontal component of left brace*		
P_{Vright}	-103.37 kips	*Vertical component of right brace*		
P_{Hright}	-110.85 kips	*Horizontal component of right brace*		
Section (a-a) Forces		*See Help file for reference equations*		
N_{aa}	-76.70 kips	*Axial force at section a-a*		
V_{aa}	-303.96 kips	*Shear force at section a-a*		
M_{aa}	103.09 kips-ft	*Moment at section a-a*		
S_g	392.00 in^3	*Elastic section modulus of the gusset plate*		
n_p	-1.37 kips/in	*Vertical force distribution due to axial force at section a-a*		
n_v	-5.43 kips/in	*Horizontal force distribution due to shear force at section a-a*		
n_m	2.37 kips/in	*Vertical force distribution due to moment at section a-a*		
Section (b-b) Forces		*See Help file for reference equations*		
N_{bb}	-41.13 kips	*Axial force at section b-b*		
V_{bb}	108.59 kips	*Shear force at section b-b*		
M_{bb}	6.91 kips-ft	*Moment at section b-b*		
Seismic Load Distribution (Loading Direction SD2)				n/a
Brace Centerline Eccentricities				
Δ_{left}	2.98 in	*Perpendicular eccentricity between left brace centerline and section a-a centerline*		
Δ_{right}	2.98 in	*Perpendicular eccentricity between right brace centerline and section a-a centerline*		
Δ'_{left}	11.02 in	*Perpendicular eccentricity between left brace centerline and section b-b centerline*		
Brace Force Components				
P_{left}	-264.04 kips	*Left brace design load per loading direction*		
P_{right}	45.47 kips	*Right brace design load per loading direction*		
P_{Vleft}	180.07 kips	*Vertical component of left brace*		
P_{Hleft}	-193.11 kips	*Horizontal component of left brace*		
P_{Vright}	-31.01 kips	*Vertical component of right brace*		

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Grid E Top: Seismic Report (continued):

Limit State	Required	Available	Unity Check	Result
P_{Hright}	-33.26 kips	*Horizontal component of right brace*		
Section (a-a) Forces		*See Help file for reference equations*		
N_{aa}	-149.06 kips	*Axial force at section a-a*		
V_{aa}	-226.36 kips	*Shear force at section a-a*		
M_{aa}	76.77 kips-ft	*Moment at section a-a*		
S_g	392.00 in^3	*Elastic section modulus of the gusset plate*		
n_p	-2.66 kips/in	*Vertical force distribution due to axial force at section a-a*		
n_v	-4.04 kips/in	*Horizontal force distribution due to shear force at section a-a*		
n_m	1.76 kips/in	*Vertical force distribution due to moment at section a-a*		
Section (b-b) Forces		*See Help file for reference equations*		
N_{bb}	-79.93 kips	*Axial force at section b-b*		
V_{bb}	80.87 kips	*Shear force at section b-b*		
M_{bb}	13.42 kips-ft	*Moment at section b-b*		
Seismic Load Distribution (Loading Direction SD3)				**n/a**
Brace Centerline Eccentricities				
Δ_{left}	2.98 in	*Perpendicular eccentricity between left brace centerline and section a-a centerline*		
Δ_{right}	2.98 in	*Perpendicular eccentricity between right brace centerline and section a-a centerline*		
Δ'_{left}	11.02 in	*Perpendicular eccentricity between left brace centerline and section b-b centerline*		
Brace Force Components				
P_{left}	151.57 kips	*Left brace design load per loading direction*		
P_{right}	-264.04 kips	*Right brace design load per loading direction*		
P_{Vleft}	-103.37 kips	*Vertical component of left brace*		
P_{Hleft}	110.85 kips	*Horizontal component of left brace*		
P_{Vright}	180.07 kips	*Vertical component of right brace*		
P_{Hright}	193.11 kips	*Horizontal component of right brace*		
Section (a-a) Forces		*See Help file for reference equations*		
N_{aa}	-76.70 kips	*Axial force at section a-a*		
V_{aa}	303.96 kips	*Shear force at section a-a*		
M_{aa}	-103.09 kips-ft	*Moment at section a-a*		
S_g	392.00 in^3	*Elastic section modulus of the gusset plate*		
n_p	-1.37 kips/in	*Vertical force distribution due to axial force at section a-a*		
n_v	5.43 kips/in	*Horizontal force distribution due to shear force at section a-a*		
n_m	-2.37 kips/in	*Vertical force distribution due to moment at section a-a*		
Section (b-b) Forces		*See Help file for reference equations*		
N_{bb}	-41.13 kips	*Axial force at section b-b*		
V_{bb}	-108.59 kips	*Shear force at section b-b*		
M_{bb}	6.91 kips-ft	*Moment at section b-b*		
Seismic Load Distribution (Loading Direction SD4)				**n/a**
Brace Centerline Eccentricities				
Δ_{left}	2.98 in	*Perpendicular eccentricity between left brace centerline and section a-a centerline*		

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Grid E Top: Seismic Report (continued):

Limit State	Required	Available	Unity Check	Result
Δ_{right}	2.98 in	*Perpendicular eccentricity between right brace centerline and section a-a centerline*		
Δ'_{left}	11.02 in	*Perpendicular eccentricity between left brace centerline and section b-b centerline*		
Brace Force Components				
P_{left}	45.47 kips	*Left brace design load per loading direction*		
P_{right}	-264.04 kips	*Right brace design load per loading direction*		
P_{Vleft}	-31.01 kips	*Vertical component of left brace*		
P_{Hleft}	33.26 kips	*Horizontal component of left brace*		
P_{Vright}	180.07 kips	*Vertical component of right brace*		
P_{Hright}	193.11 kips	*Horizontal component of right brace*		
Section (a-a) Forces		*See Help file for reference equations*		
N_{aa}	-149.06 kips	*Axial force at section a-a*		
V_{aa}	226.36 kips	*Shear force at section a-a*		
M_{aa}	-76.77 kips-ft	*Moment at section a-a*		
S_g	392.00 in^3	*Elastic section modulus of the gusset plate*		
n_p	-2.66 kips/in	*Vertical force distribution due to axial force at section a-a*		
n_v	4.04 kips/in	*Horizontal force distribution due to shear force at section a-a*		
n_m	-1.76 kips/in	*Vertical force distribution due to moment at section a-a*		
Section (b-b) Forces		*See Help file for reference equations*		
N_{bb}	-79.93 kips	*Axial force at section b-b*		
V_{bb}	-80.87 kips	*Shear force at section b-b*		
M_{bb}	13.42 kips-ft	*Moment at section b-b*		
Seismic Load Distribution (Governing)				**n/a**
Section (a-a) Forces				
Shear (Tension)	-303.96 kips	*Maximum tension shear force (loading direction SD1 governs)*		
Shear (Compression)	303.96 kips	*Maximum compressive shear force (loading direction SD3 governs)*		
Axial (Tension)	-149.06 kips	*Maximum tension axial force (loading direction SD2 governs)*		
Axial (Compression)	0.00 kips	*Maximum compressive axial force (no compressive forse)*		
Moment	103.09 kips-ft	*Maximum moment (loading direction SD1 governs)*		
Section (b-b) Forces				
Shear (Tension)	-108.59 kips	*Maximum tension shear force (loading direction SD3 governs)*		
Shear (Compression)	108.59 kips	*Maximum compressive shear force (loading direction SD1 governs)*		
Axial (Tension)	-79.93 kips	*Maximum tension axial force (loading direction SD4 governs)*		
Axial (Compression)	0.00 kips	*Maximum compressive axial force (no compressive forse)*		
Moment	13.42 kips-ft	*Maximum moment (loading direction SD4 governs)*		
Seismic Workpoint Limitations				**PASS**
Check Vertical Workpoint Ecc.	Pass	*Condition: $\|D_{wv}\| <= d_{beam}/10$*		
D_{wv}	0.00 in	*Workpoint vertical offset*		
d_{beam}	8.14 in	*Beam depth*		
Check Horizontal Workpoint Ecc.	Pass	*Condition: $\|D_{wh}\| <= d_{beam}/10$*		
D_{wh}	0.00 in	*Workpoint horizontal offset*		
d_{beam}	8.14 in	*Beam depth*		
Seismic Yield Stress Limitations				**PASS**
Check Max Yield Stress of the Beam	Pass	*Condition: $F_y <= 50$ ksi (345 Mpa) (AISC 341-10, A3.1)*		

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Grid E Top: Seismic Report (continued):

Limit State	Required	Available	Unity Check	Result
$F_{y\text{-}bm}$	50.00 ksi	*Minimum yield stress of the beam material*		
Check Max Yield Stress of the Left Brace	Pass	*Condition: F_y <= 50 ksi (345 Mpa) (AISC 341-10, A3.1)*		
$F_{y\text{-}left}$	46.00 ksi	*Minimum yield stress of the left brace material*		
Check Max Yield Stress of the Right Brace	Pass	*Condition: F_y <= 50 ksi (345 Mpa)*		
$F_{y\text{-}right}$	46.00 ksi	*Minimum yield stress of the right brace material*		
Seismic Brace Slenderness				**PASS**
Check Left Brace Slenderness	Pass	*Condition: KL/r <= 200 per AISC 341-10 section F2.5b*		
K_{left}	1.00	*Effective length factor of the left brace*		
L_{left}	136.00 in	*User-entered span of the left brace*		
$r_{y\text{-}left}$	1.49 in	*Weak axis radius of gyration of the left brace*		
$KL/r_{y\text{-}left}$	91.09	*Slenderness ratio of the left brace*		
Check Right Brace Slenderness	Pass	*Condition: KL/r <= 200 per AISC 341-10 section F2.5b*		
K_{right}	1.00	*Effective length factor of the right brace*		
L_{right}	136.00 in	*User-entered span of the right brace*		
$r_{y\text{-}right}$	1.49 in	*Weak axis radius of gyration of the right brace*		
$KL/r_{y\text{-}right}$	91.09	*Slenderness ratio of the right brace*		
Seismic Gusset Rotation Capacity/Clearance				**PASS**
Check Left Brace Buckling	Pass	*Condition: $2*t_g <= d_h <= 4*t_g$ (AISC 341-10 F2.6c(3)(b))*		
$d_{h\text{-}left}$	2.75 in	*Distance from end of left brace to hinge line*		
t_g	0.75 in	*Thickness of gusset plate*		
$2*t_g$	1.50 in	*Lower limiting thickness of the gusset plate*		
$4*t_g$	3.00 in	*Upper limiting thickness of the gusset plate*		
Check Right Brace Buckling	Pass	*Condition: $2*t_g <= d_h <= 4*t_g$ (AISC 341-10 F2.6c(3)(b))*		
$d_{h\text{-}right}$	2.75 in	*Distance from end of right brace to hinge line*		
Seismic Beam Width to Thickness Ratios				**PASS**
Limiting Width to Thickness Ratios (AISC 341-10, Table D1.1)				
Check Beam Flange	Pass	*Condition: Ratio <= Limit*		
b_b	2.63 in	*Half of beam flange width*		
t_{bf}	0.33 in	*Beam flange thickness*		
E_b	29000.00 ksi	*Elastic modulus of the beam material*		
F_{yb}	50.00 ksi	*Minimum yield stress of the beam material*		
Ratio	7.95	*Width to thickness ratio, b_b/t_{bf}*		
Limit	9.15	*Limiting ratio, $0.38*(E_b/F_{yb})^{0.5}$*		
Check Beam Web	Pass	*Condition: Ratio <= Limit*		
h_b	7.48 in	*Clear distance between beam flanges*		
t_{bw}	0.23 in	*Beam web thickness*		
Ca_b	0.10	*User-input ratio of required strength to available strength*		
Ratio	32.52	*Width to thickness ratio, h_b/t_{bw}*		
Limit	65.65	*Limiting ratio, $3.76*(E_b/F_{yb})^{0.5}*(1-2.75*Ca_b)$*		
Seismic Left Brace Width to Thickness Ratios				**PASS**
Limiting Width to Thickness Ratios (AISC 341-10, Table D1.1)				
Check Left Brace	Pass	*Condition: Ratio <= Limit*		

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Grid E Top: Seismic Report (continued):

Limit State	Required	Available	Unity Check	Result
$b_{br\text{-}left}$	3.42 in	*Inside dimension of left brace tube*		
$t_{br\text{-}left}$	0.29 in	*Left brace tube wall thickness*		
$E_{br\text{-}left}$	29000.00 ksi	*Elastic modulus of the left brace material*		
$F_{ybr\text{-}left}$	46.00 ksi	*Minimum yield stress of the left brace material*		
Ratio	11.75	*Width to thickness ratio,* $b_{br\text{-}left}/t_{br\text{-}left}$		
Limit	13.81	*Limiting ratio,* $0.55*(E_{br\text{-}left}/F_{ybr\text{-}left})^{0.5}$		
Seismic Right Brace Width to Thickness Ratios				**PASS**
Limiting Width to Thickness Ratios (AISC 341-10, Table D1.1)				
Check Right Brace	Pass	*Condition: Ratio <= Limit*		
$b_{br\text{-}right}$	3.42 in	*Inside dimension of right brace tube*		
$t_{br\text{-}right}$	0.29 in	*Right brace tube wall thickness*		
$E_{br\text{-}right}$	29000.00 ksi	*Elastic modulus of the right brace material*		
$F_{ybr\text{-}right}$	46.00 ksi	*Minimum yield stress of the right brace material*		
Ratio	11.75	*Width to thickness ratio,* $b_{br\text{-}right}/t_{br\text{-}right}$		
Limit	13.81	*Limiting ratio,* $0.55*(E_{br\text{-}right}/F_{ybr\text{-}right})^{0.5}$		
Check Seismic Left Brace Area				**REINF REQ'D**
Additional brace reinforcement required, see A_{rn} below				
Check Area of Brace	Fail	*Condition:* $A_e >= A_g$ *, AISC 341-10 section F2.5b(3)*		
t_p	0.75 in	*Thickness of gusset plate*		
gap	0.06 in	*Assumed gap on each side of the brace slot*		
t_{des}	0.29 in	*Brace wall thickness*		
L	10.08 in	*Length of brace to gusset connection*		
B	4.00 in	*Depth of brace member*		
H	4.00 in	*Width of brace member*		
d_r	0.00 in	*Depth of brace reinforcing bar*		
A_r	0.00 in^2	*Area of brace reinforcing bars*		
x_bar	1.50 in	*Eccentricity of connection*		
U	0.85	*Shear lag factor per AISC 360-10 table D3.1 case 6*		
A_g	4.10 in^2	*Gross area of brace*		
A_n	3.59 in^2	*Net area with reinf bars =*$(A_g+A_r)-2*(t_p+2*gap)*t_{des}$		
A_{no}	3.59 in^2	*Net area without reinf bars =*$A_g-2*(t_p+2*gap)*t_{des}$		
A_e	3.06 in^2	*Effective net area of the brace =* A_n * *U*		
Req'd Reinf. Area of Brace		*Per AISC Seismic Design Manual page 5-150*		
U_a	0.75	*Assumed shear lag factor of reinforced brace*		
A_{rna}	1.85 in^2	*Assumed calculation of required area =* A_g/U_a-A_{no}		
d_r	1.00 in	*Required reinf. bar depth (assuming two square bars) =* $(A_{rna}/2)^{0.5}$ *rounded to nearest 1/8 inches*		
x_bar'	1.65 in	*Eccentricity of the composite section*		
U'	0.84	*Adjusted shear lag factor for composite section*		
A_n'	5.59 in^2	*Adjusted net area of the composite section*		
A_e'	4.68 in^2	*Adjusted effective net area of brace and reinforcement bars*		
A_{rn}	2.00 in^2	*Required area of reinforcement bars*		

continued on next page...

Grid E Top: Seismic Report (continued):

Limit State	Required	Available	Unity Check	Result
Check Seismic Right Brace Area				**REINF REQ'D**
Additional brace reinforcement required, see A_{rn} below				
Check Area of Brace	Fail	*Condition: A_e >= A_g , AISC 341-10 section F2.5b(3)*		
t_p	0.75 in	*Thickness of gusset plate*		
gap	0.06 in	*Assumed gap on each side of the brace slot*		
t_{des}	0.29 in	*Brace wall thickness*		
L	10.08 in	*Length of brace to gusset connection*		
B	4.00 in	*Depth of brace member*		
H	4.00 in	*Width of brace member*		
d_r	0.00 in	*Depth of brace reinforcing bar*		
A_r	0.00 in^2	*Area of brace reinforcing bars*		
x_bar	1.50 in	*Eccentricity of connection*		
U	0.85	*Shear lag factor per AISC 360-10 table D3.1 case 6*		
A_g	4.10 in^2	*Gross area of brace*		
A_n	3.59 in^2	*Net area with reinf bars =(A_g+A_r)-2*(t_p+2*gap)*t_{des}*		
A_{no}	3.59 in^2	*Net area without reinf bars =A_g-2*(t_p+2*gap)*t_{des}*		
A_e	3.06 in^2	*Effective net area of the brace = A_n * U*		
Req'd Reinf. Area of Brace		*Per AISC Seismic Design Manual page 5-150*		
U_a	0.75	*Assumed shear lag factor of reinforced brace*		
A_{rna}	1.85 in^2	*Assumed calculation of required area = A_g/U_a-A_{no}*		
d_r	1.00 in	*Required reinf. bar depth (assuming two square bars) = $(A_{rna}/2)^{0.5}$ rounded to nearest 1/8 inches*		
x_bar'	1.65 in	*Eccentricity of the composite section*		
U'	0.84	*Adjusted shear lag factor for composite section*		
A_n'	5.59 in^2	*Adjusted net area of the composite section*		
A_e'	4.68 in^2	*Adjusted effective net area of brace and reinforcement bars*		
A_{rn}	2.00 in^2	*Required area of reinforcement bars*		
Seismic Weld Limitations				**PASS**
All welds must be E70 or E80 per AISC 341-10, A3.4a				

Seismic Weld Strength at Beam	1965.60 kips	2104.56 kips	**0.93**	**PASS**
$\phi * R_n = \phi * 2 * 1.5 * 0.6 * F_{EXX} * 0.707 * w * L >= R_y * F_y * t_p * L$		**$\phi = 0.75$**	(AISC 341-10, page 5-293)	
F_{EXX}	70.00 ksi	*Filler metal classification strength*		
w	0.56 in	*Fillet weld size*		
R_y	1.30	*Ratio of expected yield stress to the specified minimum yield stress of the plate material*		
F_y	36.00 ksi	*Minimum yield stress of the plate material*		
t_p	0.75 in	*Gusset plate thickness*		
L	56.00 in	*Weld length*		
ϕR_n	2104.56 kips	*Weld strength*		

Grid E Top: Connection Properties

Connection	
Connection Title	Grid E Top
Connection Type	Vertical Brace Chevron Connection
Seismic Detailing	
Seismic System	SCBF
Left Brace Length	136.00 in
Left Brace K Factor	1.00
Right Brace Length	136.00 in
Right Brace K Factor	1.00
Ca Beam Ratio	0.10
Connection Category	
Braces	Above
Workpoint Location	Concentric
Loading (LRFD)	
Left Brace Tensile Axial	-55.00 kips
Left Brace Compressive Axial	55.00 kips
Right Brace Tensile Axial	-55.00 kips
Right Brace Compressive Axial	55.00 kips
Components	
Left Brace Section	HSS4x4x5
Material	A500 Gr.B Rect
Member Orientation	Long Side Vertical
Right Brace Section	HSS4x4x5
Material	A500 Gr.B Rect
Member Orientation	Long Side Vertical
Beam Section	W8x18
Material	A992
Gusset	P0.75x22.00x56.00
Material	A36
Thickness	0.75 in
Width	22.00 in
Length	56.00 in
Left Brace-Gusset Connection	
Connection Type	Slotted Around Gusset
Brace Gusset Weld	E70
Type	Fillet
Fillet Size	5.00 Sixteenths
Right Brace-Gusset Connection	
Connection Type	Slotted Around Gusset
Brace Gusset Weld	E70
Type	Fillet
Fillet Size	5.00 Sixteenths
Gusset-Beam Connection	
Type	Direct Weld
Beam Weld	E70
Type	Double Fillet
Fillet Size	9.00 Sixteenths
Assembly	
Auto-Update Connection	Yes
Gusset/Beam Gap	0.00 in
Left Brace Clearance	12.20 in
Right Brace Clearance	12.20 in
Clearance between Braces	35.30 in

continued on next page...

Grid E Top: Connection Properties (continued):

Left Brace WorkPoint Distance	26.00 in
Right Brace WorkPoint Distance	26.00 in
Left Brace/Gusset Overlap	10.08 in
Right Brace/Gusset Overlap	10.08 in
Left Gusset Clip	
Vertical Clip	2.93 in
Horizontal Clip	2.73 in
Brace/Clip Edge Dist	-4.17 in
Right Gusset Clip	
Vertical Clip	2.93 in
Horizontal Clip	2.73 in
Brace/Clip Edge Dist	-4.17 in
Left Brace Angle from Vertical	47.00
Right Brace Angle from Vertical	47.00

Blackwell
Structural Engineers

APPENDIX D

ELF Method Calculations

Component	Snow (psf)	Dead (psf)	Length (ft)	Width (ft)	Area (ft^2)	Height (ft)	Perimeter (ft)	Seismic Weight (lbs)
Garage Roof	189	29	--	--	864	--	--	74044.8
Garage Walls		17	40	24.75		9.875	129.5	10869.90625
								84914.70625
Garage Walls		17	40	24.75		9.875	129.5	10869.90625
Garage Floor		63.8	--	--	864			55123.2
								65993.10625
Roof	189	29	--	--	2400	--	--	205680
Main Floor Walls		21.5	96	36		10	264	28380
								234060
Main Floor Walls		21.5	96	36		10	264	28380
Main Floor		87	96	28		--	--	233856
Lower Floor Walls		125	--	--		11	88	60500
								322736
Main Floor Walls		125	--	--		11	88	60500
Lower Floor		57.3	25	29		--	--	41542.5
Lower Floor Walls		125	--	--		9	88	49500
								151542.5
							Total	**859246.3125**

Seismic Distribution - Elastic Design Forces

Main House

Base	Seismic Weight w_x (lbs)	Height Below (ft)	Elev From Base h_x (ft)	$w_x h_x{}^k$	C_{vx}
Lower Floor	151542.5	9	9	1363882.5	0.06774294
Main Floor	322736	11	20	6454720	0.32060074
Garage Floor	65993.10625	9	29	1913800.081	0.09505691
Main Roof	234060	1.333	30.333	7099741.98	0.35263846
Garage Roof	84914.70625	8.542	38.875	3301059.205	0.16396095
Floor 6			0	0	0
Floor 7			0	0	0
Floor 8			0	0	0
Floor 9			0	0	0
Floor 10			0	0	0
SUM Σ	859246.3125			20133203.77	
V_{BASE*R}	508673.817				
$V_{BASE\ DESIGN}$	119456.2189				

Level 1

V_{BASE*R}	508673.817
C_{vx}	0.06774294
$V_{elastic}$	34459.062

Diaphragms @ Level	Sub Name	Length(ft) (z)	Width(ft) (x)	Weight (lbs)	% of $W_{x\text{-}TOT}$	$V_{DIA\text{-}elastic}$	R	V_{DESIGN}	Area	UDL
D1	Lower Floor			151542.5	1	34459.06202	3.25	10602.7883	608	17.4387966
						0				
						0				
				151542.5						

Diaphragms are to allow for disribution of seimic loads for variable weights in assemblies on same floor.
When designing base shear, designer needs to factor down $V_{DIA\text{-}elastic}$ for the appropriate ductility factor.

Level 2

V_{BASE*R}	508673.817
C_{vx}	0.320600739
$V_{elastic}$	163081.2015

Diaphragms @ Level	Sub Name	Length(ft) (z)	Width(ft) (x)	Weight (lbs)	% of $W_{i\text{-}TOT}$	$V_{DIA\text{-}elastic}$	R	V_{DESIGN}	Area	UDL
D1	Ground Floor	96	28	322736	100	163081.2015	3.25	50178.8312	2464	20.3647854
D2					0	0				
D3					0	0				
				322736						

Diaphragms are to allow for disribution of seimic loads for variable weights in assemblies on same floor.
When designing base shear, designer needs to factor down $V_{DIA\text{-}elastic}$ for the appropriate ductility factor.

Garage Floor

V_{BASE*R}	508673.817
C_{vx}	0.09505691
$V_{elastic}$	48352.9598

Diaphragms @ Level	Sub Name	Length(ft) (z)	Width(ft) (x)	Weight (lbs)	% of $W_{I\text{-}TOT}$	$V_{DIA\text{-}elastic}$	R	V_{DESIGN}	Area	UDL
D1	Garage Floor	24	36	65993.10625	100	48352.9598	3.25	14877.8338	864	17.219715
D2					0	0				
D3					0	0				
				65993.10625						

Diaphragms are to allow for disribution of seimic loads for variable weights in assemblies on same floor.
When designing base shear, designer needs to factor down $V_{DIA\text{-}elastic}$ for the appropriate ductility factor.

Level 3

V_{BASE*R}	508673.817
C_{vx}	0.35263846
$V_{elastic}$	179377.952

Diaphragms @ Level	Sub Name	Length(ft) (z)	Width(ft) (x)	Weight (lbs)	% of $W_{I\text{-}TOT}$	$V_{DIA\text{-}elastic}$	R	V_{DESIGN}	Area	UDL
D1	Full Roof	96	39	65993.10625	100	179377.9517	6	29896.3253	2176	13.7391201
D2					0	0				
D3					0	0				
				65993.10625						

Diaphragms are to allow for disribution of seimic loads for variable weights in assemblies on same floor.
When designing base shear, designer needs to factor down $V_{DIA\text{-}elastic}$ for the appropriate ductility factor.

Garage Floor

V_{BASE*R}	508673.817
C_{vx}	0.16396095
$V_{elastic}$	83402.642

Diaphragms @ Level	Sub Name	Length(ft) (z)	Width(ft) (x)	Weight (lbs)	% of $W_{I\text{-}TOT}$	$V_{DIA\text{-}elastic}$	R	V_{DESIGN}	Area	UDL
D1	Garage Roof			84914.70625	100	83402.64201	6	13900.4403	950	14.6320425
D2					0	0				
D3					0	0				
				84914.70625						

Diaphragms are to allow for disribution of seimic loads for variable weights in assemblies on same floor.
When designing base shear, designer needs to factor down $V_{DIA\text{-}elastic}$ for the appropriate ductility factor.