Empowering Villages Community Center

Kilimbi, Rwanda

In Partnership With:

Journeyman International

California Polytechnic State University

San Luis Obispo

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INTRODUCTION

For my Senior project I work with Journeyman International and Empowering Villages to provide the structural design for a Community center located in Kilimbi, Rwanda. I collaborated with an Architecture student and a Construction Management student here at CalPoly, so together we could provide a complete picture of the resources necessary for this building to be constructed, as well as to illustrate its potential. The project, as well as the organizations we worked with; have global, cultural, social, environmental and economic impacts; many of which that have been thoroughly considered by the organizations to purposely improve the community. I learned a lot from this project and am grateful to have had the opportunity to be a part of it.

Journeyman International (JI) is a non-profit organization that helps to bridge the gap between people in need and students who want to help. JI was founded by Daniel Weins, a former Construction Management Student here at CalPoly. After being inspired by his own Senior project, building a dental clinic in Belize, he decided to create JI to make it easier for more students to share this experience in the future.

JI empowers students by assembling a design team of ARCE students, a Construction Management student and an Architecture student, and pairs that team with a humanitarian project in need of a design. JI also provides guidance to its students allowing them to understand the context in which their design needs to fit within. JI projects help to provide safe and sustainable buildings for smaller humanitarian organizations that typically rely only on third world contractors, while also enabling students to make a global impact. Once the students have designed the project, the students' work is used to get funding for the project, and the design is eventually finalized by in country professionals and then is built.

I first became interested in JI after hearing their presentation at a SEAOC meeting during my sophomore year. I was inspired by their mission and decided on the spot that I wanted to work with them for my senior project. I thought it was a great opportunity for my project to have meaning and make a difference while also allowing me to gain lots of practical experience. I'm really grateful to JI for empowering and proving me with the opportunity to make a global impact.

For my project, JI teamed up with Empowering Villages which is a humanitarian organization that aims to provide holistic and sustainable community development by empowering, training, and building up the people in rural communities. They are partnered with EMPWR, a collection of multiple renewable energy companies based in East Africa, and together they spread sustainable development practices that allow for ownership of the advances within these communities. By providing energy access, economic development, and environmental sustainability; they provide the social and environmental infrastructure needed for the empowerment of these rural communities. In the case of my project, Empowering villages acted as our client, providing us with their goals and vision for the project.

THE TEAM

My Team included Rebecca Johnson who, as an Architecture student, provided the architectural design; and Chris Audi who, as a Construction management student, assessed and ensured the feasibility of the project. Rebecca's work on the project included cultural studies, providing architectural drawings and details, renderings and presentations that will be used to help get funding for the project. Chris created a cost estimate, hazard risk assessment, material take off, stormwater pollution prevention plan, and phasing plan.

I worked closely with Rebecca meeting every few weeks throughout the process going back and forth to understand each other's constraints and vision for the project to create a design that fit both of our needs. We also met up with Chris periodically so he could guide us in the right direction for cost effective material selection and overall constructability of the project.

THE PROJECT

The project I worked on is a community center located in a rural part of Kilimbi, Rwanda. Through the community center, Empowering Villages aims to promote a healthy community dynamic and sense of place for the members of the community. The community center is meant to provide space for assembly, social programs, skills trainings, and recreation. This includes Classrooms, a library, and outdoor learning areas. This also provides a flexible and unifying place that the community can make their own as they grow. It will be connected to a hydropower plant which will power the facilities, which was completed this past year through the efforts of EMPWR.

The structural design consists of typical wood framing as well as wood framed trusses for the gravity design. A concrete diaphragm, special concrete moment frame with non-participating infill, as well as special concrete cantilevered columns, for the lateral systems. The foundations consisted of concrete grade beams and concrete pad foundations, with a slab on grade.

I utilized Risa for the gravity analysis, Etabs for the lateral analysis, SP Column for the concrete beam and column design, and excel for the gravity design and special moment frame detailing. I then used Revit to create the set of structural drawings and details.

IMPACTS

This project and the organizations involved, have many global, cultural, social, environmental, and economic impacts. In fact, many of the goals of the organizations we worked with was to improve not only the small community but on a global scale.

Global

Through the work of JI, this project was able to have positive global impacts. JI is an international organization that helps connect people and organizations around the world all working towards the same goal of aiding humanitarian efforts in struggling communities. This also facilitates and encourages global interaction and builds connections. By joining the efforts of JI I hope to help spread their cause and spread their global impact.

Cultural

The global impacts of the project lead to cultural impacts. For example, the building of global connections also creates a cross cultural experience and exposure for everyone involved in the project. Additionally, one of Daniels missions is to set an example of a safe structure to the community through JI projects and hopefully, by providing more durable building designs this can improve how these countries build in the future.

Social

By providing safer and more durable buildings this allows the humanitarian organizations to be able to focus on their own efforts to make change in these communities rather than maintaining a poorly designed building or repairing structural damage. Providing an engineered structure provides piece of mind not only to those humanitarian organizations, but also to the community that is utilizing the building. In the case of a natural disaster it could possibly provide shelter to those in need.

The introduction of a community center in this rural community also causes social change. The community center will encourage more social interaction in a scattered community. What is more, it will provide education and self-development opportunities allowing the society to advance.

Environmental

Through the efforts of empowering villages this project not only helps to develop energy resources in communities like this one but utilizes green energy, providing a more sustainable future for these communities, preventing the sacrifice of their environment for their development. Additionally, my project utilizes solar panels as an additional clean energy resource. However, my design utilizes a lot of concrete for the structure, which is not a very sustainable building material. Unfortunately, this does create a negative impact on the local environment, but I believe the positive impacts it will have will outweigh the negative.

Economic

The cheaper we were able to make the project the more likely that it will be built, so this was a driving factor of many design decisions and the availability of materials ultimately drove the cost of the materials. For example, structural sheathing is very hard to come by and very expensive in Rwanda, which is why a concrete diaphragm and lateral system was used instead of a wood diaphragm or wood shear walls. Additionally, after discussing with Rebecca and Chris, we decided to go with non-participating masonry infill, which we thought would be easier and cheaper to construct than replacing mud bricks periodically or ensuring they were appropriately waterproofed. Because steel is not available locally it must be imported making it much more expensive and the largest driving factor of the final cost of the project. We believed that going with the non-participating infill option would also reduce the required reinforcement and decrease the overall cost.

In addition to economics playing a role in how the building was designed, the community center will have economic impacts on the community in which it is built. Training and educational resources of the community center can help stimulate the community and eventually the local economy by providing higher skilled job opportunities that are more profitable.

LEARNING ON MY OWN

This project also provided me with many learning opportunities. First, I gained a lot more experience with programs that I was introduced to at CalPoly. For example, I created excel spreadsheets, which I set up to import Risa and Etabs outputs and automatically update design loads. After re-designing several members a few times, I invested the time to update the spreadsheet to be a bit more automated. I then verified the result obtained from my spreadsheet with hand calculations. I also gained more experience with Etabs. I learned about its different functions and settings to obtain seismic forces and how to apply them appropriately to my project by reading through the help files and watching videos. Additionally, I learned about designing a special concrete MF. I did this by reading through the code and reading articles from Structural Magazine, as well as looking up design examples. I also learned about the detailing and designing considerations of participating and non-participating infill and tie beams by utilizing resources provided by JI. While working remotely during the pandemic, I also ran into many technical difficulties with my computer, most notably the graphics card, and was forced to learn how to fix all these problems on my own through online help files and trial and error.

CONCLUSION

Overall, this project not only created positive impact to the rural community in Kilimbi, Rwanda; but also made an impact on me. I am grateful to those who empowered me with this opportunity, those who worked alongside me, and those who guided me along the way. Thank you all for this unforgettable experience.

Structural Calculation Package

For

Empowering Villages
Kilimbi Community Center

a Journeyman International Project

By: Serena Reeves

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Gravity

Lateral

Foundations

Dead Load Take-off

Slope:	Rise	Run	Factor
	4.25	12	**1.061**

TRUSSED ROOF

Element	Calculations		Weight (psf)	Weight (N/m^2)
Solar Panels			3.00	0.060
Steel Roofing			1.00	0.020
Papyrus Roof sheets			1.00	0.020
Roof Battens (3x4 @ 12" OC)	weight of green pine = 61pcf =>61pcf*(2.5in*3.5in)/(144ft^2*1ft oc)		3.71	0.074
Misc	5%		0.44	0.009
Total to Battens	*Slope Factor		9.70	0.194
		USE	**10**	**0.200**
Beams 3x5	weight of green pine = 61pcf =>61pcf*(2.5in*4.5in)/(144ft^2*6.25ft oc)		0.76	0.015
Misc	5%		0.04	0.001
Total to Beams	*Slope Factor		10.55	0.211
		USE	**11**	**0.220**
Top & Bottom Chord M9, M10, M13 3x8	69.8 linear ft total =>{61pfs*70'*[(2.5"x7.25")/144]}/(trib area = 4'x24')		5.60	0.112
Web Members 3x3	32.9 linear ft total =>{61pfs*33'*[(2.5"x2.5")/144]}/(trib area = 4'x24')		0.91	0.018
Misc	5%		0.33	0.007
Total to Truss	*Slope Factor		17.80	0.356
		USE	**18.00**	**0.360**

FRAMED ROOF

Element	Calculations		Weight (psf)	Weight (N/m^2)
Solar Panels			3.00	0.060
Steel Roofing			1.00	0.020
Papyrus Roof sheets			1.00	0.020
Roof Battens (2x3 @ 12" OC)	weight of green pine = 61pcf =>61pcf*(1.5in*2.5in)/(144ft^2*1ft oc)		1.59	0.032
Misc	5%		0.33	0.007
Total to Battens	*Slope Factor		7.34	0.147
		USE	**8**	**0.160**
Girder 6x8	weight of green pine = 61pcf =>61pcf*(5.5in*7.5in)/(144ft^2*4ft oc)		4.37	0.087
Misc	5%		0.22	0.004
Total to Beams	*Slope Factor		12.21	0.244
		USE	**13**	**0.260**
Beam 8x10	weight of green pine = 61pcf =>61pcf*(7.5in*9.5in)/(144ft^2*4ft oc)		7.55	
Misc	5%		0.38	0.008
Total to Girders	*Slope Factor		20.61	0.412
		USE	**21**	**0.420**
Column 8x8	weight of green pine = 61pcf =>61pcf*(7.5in*7.5in)/(144ft^2*4ft oc)		5.96	
Misc	5%		0.30	0.006
Total to Columns	*Slope Factor		27.25	0.545
		USE	**28**	**0.560**

Reduced Live Load

	Battens	Beams
Trib Area (ft^2)	3	18.75
R1	1	1
R2	1	1
Reduced Live Load	**20**	**20**

Member Size Summary

		Element	Imperial Size Nominal	Imperial Size Actual	Imperial Spacing	Metric Size	Metric Spacing
Timber		Battens	2x3	1.5"x2.5"	12" o.c.	3.81cm x 6.35cm	30.48 cm
	Chords	M1 & M2	3x6	2.5"x5.5"	4' o.c.	6.35cm x 13.97cm	121.92 cm
	Webs	M9, M10, M13	3x6	2.5"x5.5"	4' o.c.	6.35cm x 6.35cm	121.92 cm
		M3 M4 M5, M7 M8 M6 M11 M12, M14	3x3	2.5"x2.5"	4' o.c.	6.35cm x 6.35cm	121.92 cm
	Posts	P1, P2	6x6	5.5"x5.5"	-	13.97cm x 13.97cm	-
		P3	8x8	7.5"x7.5"	-	19.05cm x 19.05cm	-
Concrete	Beams	B1, B2	16x12		-	40.64cm x 30.48cm	-
		B3, B4	16x10		-	40.64cm x 25.4cm	-
		B5	22x12		-	55.88cm x 30.48cm	-
	Columns	C1, C4	16x16		-	40.64cm x 40.64cm	-
		C2	22x16		-	55.88cm x 40.64cm	-
		C3	10x16		-	25.4cm x 40.64cm	-

Truss Point Loads

	Trib width	P Dead (k) w/o self weight	P Live (k)
N7	1.53125	-0.0674	-0.1225
N8	3.0625	-0.1348	-0.2485
N9	4.59375	-0.2021	-0.3727
N10	6.125	-0.2695	-0.4969
N11	6.125	-0.2695	-0.4969
N12	4.5625	-0.2008	-0.3702
N13	1.5	-0.0660	-0.1217

	Trib area		
Brace	39.0625	-0.7031	-0.7923
C1	35.625	-0.9975	-0.7226
C2	45.5	-1.2740	-0.9229
C3	54.25	-1.5190	-1.1004

	Trib width	w Dead (plf)	w Live (klf)
Lower Roof Beam	4	-0.052	-0.08
Upper Roof Beam	4	-0.052	-0.08
Girder 1	5	-0.065	-0.1
Girder 2	6.5	-0.0845	-0.13
Girder 3	7.5	-0.1575	-0.15

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Temp [F]
1	N1	0	-1	0
2	N2	6.125	-1	0
3	N3	12.25	-1	0
4	N4	18.375	-1	0
5	N5	21.4375	-1	0
6	N6	24.5	-1	0
7	N7	24.5	0	0
8	N8	21.4375	0.510417	0
9	N9	18.375	1.020833	0
10	N10	12.25	2.041667	0
11	N11	6.125	3.0625	0
12	N12	0	4.083333	0
13	N13	-3	4.583333	0
14	N14	0	-5	0
15	N15	10	-5	0
16	N16	12.75	-5	0
17	N17	10	-6	0
18	N18	19.5	-6	0
19	N19	21.5	-6	0
20	N20	0	-6	0
21	N21	0	-7	0
22	N22	6.25	-7	0
23	N23	14.25	-7	0
24	N24	18.25	-7	0
25	N25	7	-8	0
26	N26	0	-8	0
27	N27	21	-8	0
28	N28	35	-8	0
29	N29	42	-8	0

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Rotation[k-ft/rad]
1	N1		Reaction	
2	N6	Reaction	Reaction	
3	N14	Reaction	Reaction	
4	N15	Reaction	Reaction	
5	N20	Reaction	Reaction	
6	N17	Reaction	Reaction	
7	N18	Reaction	Reaction	
8	N21	Reaction	Reaction	
9	N22	Reaction	Reaction	
10	N23	Reaction	Reaction	
11	N26	Reaction	Reaction	
12	N25	Reaction	Reaction	
13	N27	Reaction	Reaction	
14	N28	Reaction	Reaction	
15	N29	Reaction	Reaction	
16	N16			
17	N19			

Joint Loads and Enforced Displacements (BLC 1 : Dead)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/f...
1	N7	L	Y	-.122
2	N8	L	Y	-.135
3	N9	L	Y	-.202
4	N10	L	Y	-.27
5	N11	L	Y	-.27
6	N12	L	Y	-.201
7	N13	L	Y	-.066
8	N7	L	Y	-.077

Joint Loads and Enforced Displacements (BLC 2 : Live)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/f...
1	N7	L	Y	-.122
2	N8	L	Y	-.248
3	N9	L	Y	-.373
4	N10	L	Y	-.497
5	N11	L	Y	-.497
6	N12	L	Y	-.37
7	N13	L	Y	-.122

Member Distributed Loads (BLC 1 : Dead)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
1	Bottom Chord 1	Y	-.0001	-.0001	0	0
2	Bottom Chord 2	Y	-.0001	-.0001	0	0
3	Bottom Chord 3	Y	-.0001	-.0001	0	0
4	Bottom Chord 4	Y	-.0001	-.0001	0	0
5	Bottom Chord 5	Y	-.0001	-.0001	0	0
6	Web 3	Y	-.0001	-.0001	0	0
7	Web 3	Y	-.0001	-.0001	0	0
8	Web 4	Y	-.0001	-.0001	0	0
9	Web 5	Y	-.0001	-.0001	0	0
10	Web 6	Y	-.0001	-.0001	0	0
11	Web7	Y	-.0001	-.0001	0	0
12	Web 8	Y	-.0001	-.0001	0	0
13	Web 9	Y	-.0001	-.0001	0	0
14	Web 10	Y	-.0001	-.0001	0	0
15	Web 11	Y	-.0001	-.0001	0	0
16	Web 12	Y	-.0001	-.0001	0	0
17	Web 13	Y	-.0001	-.0001	0	0
18	Web 14	Y	-.0001	-.0001	0	0
19	Top Chord 1	Y	-.0001	-.0001	0	0
20	Top Chord 2	Y	-.0001	-.0001	0	0
21	Top Chord 3	Y	-.0001	-.0001	0	0
22	Top Chord 4	Y	-.0001	-.0001	0	0
23	Top Chord 5	Y	-.0001	-.0001	0	0
24	Top Chord 6	Y	-.0001	-.0001	0	0
25	Lower Framed Roof Beam	Y	-.052	-.052	0	0
26	Upper Framed Roof Beam	Y	-.052	-.052	0	0
27	Girder 1	Y	-.065	-.065	0	0
28	Girder 2	Y	-.085	-.085	0	0

Company :
Designer :
Job Number :
Model Name :

Checked By:_____

Member Distributed Loads (BLC 2 : Live)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
1	Lower Framed Roof Beam	Y	-.08	-.08	0	0
2	Upper Framed Roof Beam	Y	-.08	-.08	0	0
3	Girder 1	Y	-.1	-.1	0	0
4	Girder 2	Y	-.13	-.13	0	0

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Joint	Point	Distributed
1	Dead	None			8		28
2	Live	None			7		4

Load Combinations

	Description	Sol...	PD...	SR...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...
1	ASD D+L	Yes			2	1	1	1																
2	D only	Yes			1	1																		
3	L only	Yes			2	1																		

Envelope Joint Reactions

	Joint		X [k]	LC	Y [k]	LC	Moment [k-ft]	LC
1	N1	max	0	3	1.938	1	0	3
2		min	0	1	.686	2	0	1
3	N6	max	0	3	1.645	1	0	3
4		min	0	1	.667	2	0	1
5	N14	max	0	3	.61	1	0	3
6		min	0	1	.24	2	0	1
7	N15	max	0	3	1.073	1	0	3
8		min	0	1	.423	2	0	1
9	N20	max	0	3	.509	1	0	3
10		min	0	1	.201	2	0	1
11	N17	max	0	3	1.568	1	0	3
12		min	0	1	.618	2	0	1
13	N18	max	0	3	.76	1	0	3
14		min	0	1	.3	2	0	1
15	N21	max	0	3	.4	1	0	3
16		min	0	1	.157	2	0	1
17	N22	max	0	3	1.217	1	0	3
18		min	0	1	.48	2	0	1
19	N23	max	0	3	1.394	1	0	3
20		min	0	1	.549	2	0	1
21	N26	max	0	3	.375	1	0	3
22		min	0	1	.148	2	0	1
23	N25	max	0	3	2.534	1	0	3
24		min	0	1	.998	2	0	1
25	N27	max	0	3	3.191	1	0	3
26		min	0	1	1.257	2	0	1
27	N28	max	0	3	2.534	1	0	3
28		min	0	1	.998	2	0	1
29	N29	max	0	3	.375	1	0	3

Envelope Joint Reactions (Continued)

	Joint		X [k]	LC	Y [k]	LC	Moment [k-ft]	LC
30		min	0	1	.148	2	0	1
31	Totals:	max	0	3	20.124	1		
32		min	0	1	7.869	2		

Envelope Joint Displacements

	Joint		X [in]	LC	Y [in]	LC	Rotation [rad]	LC
1	N1	max	-.015	2	0	3	0	3
2		min	-.042	1	0	1	0	1
3	N2	max	-.012	2	-.035	2	0	3
4		min	-.035	1	-.099	1	0	1
5	N3	max	-.008	2	-.057	2	0	3
6		min	-.021	1	-.16	1	0	1
7	N4	max	-.002	2	-.054	2	0	3
8		min	-.006	1	-.152	1	0	1
9	N5	max	0	3	-.032	2	0	3
10		min	0	1	-.091	1	0	1
11	N6	max	0	3	0	3	0	3
12		min	0	1	0	1	0	1
13	N7	max	-.007	2	-.001	2	0	3
14		min	-.019	1	-.004	1	0	1
15	N8	max	-.01	2	-.033	2	0	3
16		min	-.028	1	-.094	1	0	1
17	N9	max	-.011	2	-.054	2	0	3
18		min	-.03	1	-.154	1	0	1
19	N10	max	-.006	2	-.056	2	0	3
20		min	-.017	1	-.159	1	0	1
21	N11	max	.002	1	-.033	2	0	3
22		min	0	2	-.094	1	0	1
23	N12	max	.016	1	-.002	2	0	3
24		min	.006	2	-.006	1	0	1
25	N13	max	.022	1	.031	1	0	3
26		min	.008	2	.011	2	0	1
27	N14	max	0	3	0	3	0	3
28		min	0	1	0	1	0	1
29	N15	max	0	3	0	3	7.753e-03	1
30		min	0	1	0	1	3.054e-03	2
31	N16	max	0	3	.232	1	0	3
32		min	0	1	.091	2	0	1
33	N17	max	0	3	0	3	9.724e-04	1
34		min	0	1	0	1	3.831e-04	2
35	N18	max	0	3	0	3	3.039e-03	1
36		min	0	1	0	1	1.197e-03	2
37	N19	max	0	3	.066	1	0	3
38		min	0	1	.026	2	0	1
39	N20	max	0	3	0	3	0	3
40		min	0	1	0	1	0	1
41	N21	max	0	3	0	3	0	3
42		min	0	1	0	1	0	1
43	N22	max	0	3	0	3	3.386e-04	1
44		min	0	1	0	1	1.334e-04	2

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Rotation [rad]	LC
45	N23	max	0	3	0	3	-7.736e-04	2
46		min	0	1	0	1	-1.964e-03	1
47	N24	max	0	3	-.088	2	0	3
48		min	0	1	-.224	1	0	1
49	N25	max	0	3	0	3	-2.446e-03	2
50		min	0	1	0	1	-6.21e-03	1
51	N26	max	0	3	0	3	0	3
52		min	0	1	0	1	0	1
53	N27	max	0	3	0	3	0	3
54		min	0	1	0	1	0	1
55	N28	max	0	3	0	3	6.21e-03	1
56		min	0	1	0	1	2.446e-03	2
57	N29	max	0	3	0	3	0	3
58		min	0	1	0	1	0	1

Envelope Maximum Member Section Forces

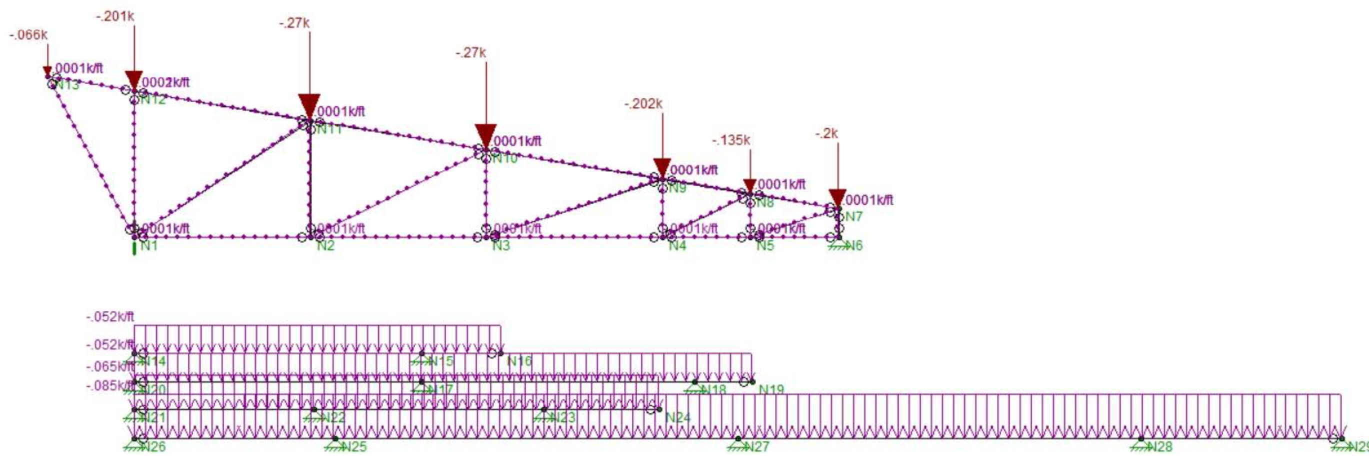
	Member		Axial[k]	Loc[ft]	LC	Shear[k]	Loc[ft]	LC	Moment[k-ft]	Loc[ft]	LC
1	Bottom Chord 1	max	-.578	0	2	0	0	1	0	0	1
2		min	-1.634	0	1	0	6.125	2	0	3.063	1
3	Top Chord 1	max	-.04	3.041	2	0	0	1	0	0	1
4		min	-.113	0	1	0	3.041	2	0	1.521	1
5	Web 3	max	.572	5.083	1	0	0	1	0	0	1
6		min	.201	0	2	0	0	1	0	0	1
7	Web 4	max	-.241	4.063	2	0	0	1	0	0	1
8		min	-.681	0	1	0	0	1	0	0	1
9	Web 5	max	-.05	3.042	2	0	0	1	0	0	1
10		min	-.14	0	1	0	0	1	0	0	1
11	Web 6	max	.366	2.021	1	0	0	1	0	0	1
12		min	.129	0	2	0	0	1	0	0	1
13	Web7	max	.875	0	1	0	0	1	0	0	1
14		min	.309	1.51	2	0	0	1	0	0	1
15	Web 8	max	1.645	1	1	0	0	1	0	0	1
16		min	.667	0	2	0	0	1	0	0	1
17	Web 9	max	2.094	0	1	0	0	2	0	0	1
18		min	.74	7.35	2	0	7.35	1	0	3.675	2
19	Web 10	max	1.528	6.839	1	0	6.839	1	0	3.419	2
20		min	.54	0	2	0	0	2	0	0	1
21	Web 11	max	.444	6.45	1	0	6.45	2	0	3.225	1
22		min	.157	0	2	0	0	1	0	0	1
23	Web 12	max	-.293	3.415	2	0	3.415	1	0	1.707	2
24		min	-.83	0	1	0	0	2	0	0	1
25	Web 13	max	-.997	3.222	2	0	3.222	1	0	1.611	2
26		min	-2.82	0	1	0	0	2	0	0	1
27	Web 14	max	.235	6.338	1	0	0	1	0	0	1
28		min	.083	0	2	0	6.338	2	0	3.169	1
29	Bottom Chord 2	max	-1.062	0	2	0	0	1	0	0	1
30		min	-3.003	0	1	0	6.125	2	0	3.063	1
31	Bottom Chord 3	max	-1.211	0	2	0	0	2	0	0	1
32		min	-3.425	0	1	0	6.125	1	0	3.063	2
33	Bottom Chord 4	max	-.948	0	2	0	0	2	0	0	1

Envelope Maximum Member Section Forces (Continued)

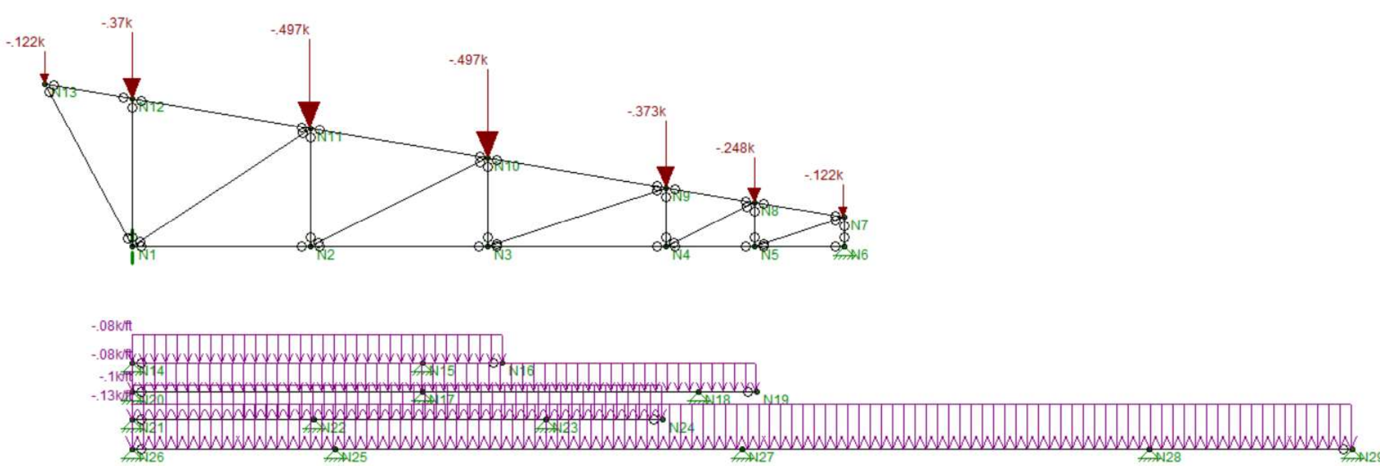
	Member		Axial[k]	Loc[ft]	LC	Shear[k]	Loc[ft]	LC	Moment[k-ft]	Loc[ft]	LC
34		min	-2.681	0	1	0	3.063	1	0	1.531	2
35	Bottom Chord 5	max	0	0	3	0	0	2	0	0	1
36		min	0	0	1	0	3.063	1	0	1.531	2
37	Top Chord 2	max	-.04	6.209	2	0	0	1	0	0	1
38		min	-.113	0	1	0	6.209	2	0	3.105	1
39	Top Chord 3	max	1.657	6.209	1	0	0	1	0	0	1
40		min	.586	0	2	0	6.209	2	0	3.105	1
41	Top Chord 4	max	3.044	6.209	1	0	0	1	0	0	1
42		min	1.076	0	2	0	6.209	2	0	3.105	1
43	Top Chord 5	max	3.472	3.105	1	0	0	1	0	0	1
44		min	1.227	0	2	0	3.105	2	0	1.552	1
45	Top Chord 6	max	2.718	3.105	1	0	0	2	0	0	1
46		min	.961	0	2	0	3.105	1	0	1.552	2
47	Lower Framed R...	max	0	0	3	.61	0	1	.472	9.961	1
48		min	0	0	1	-.705	9.961	1	-1.41	4.648	1
49	Upper Framed R...	max	0	0	3	.747	10.078	1	1.447	10.078	1
50		min	0	0	1	-.791	9.854	1	-.983	3.807	1
51	Girder 1	max	0	0	3	.659	14.258	1	1.315	14.258	1
52		min	0	0	1	-.704	14.068	1	-.483	2.471	1
53	Girder 2	max	0	0	3	1.595	21	1	3.94	21	1
54		min	0	0	1	-1.501	20.563	1	-1.992	13.563	1

TRUSS AND OTHER GRAVITY BEAMS

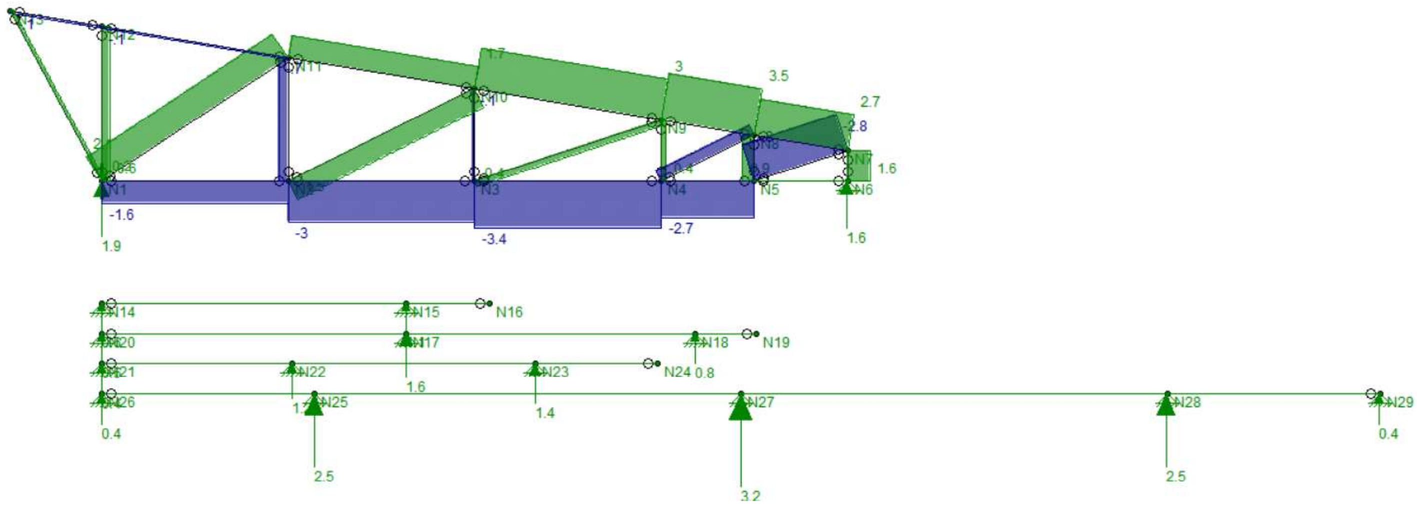
DEAD LOAD



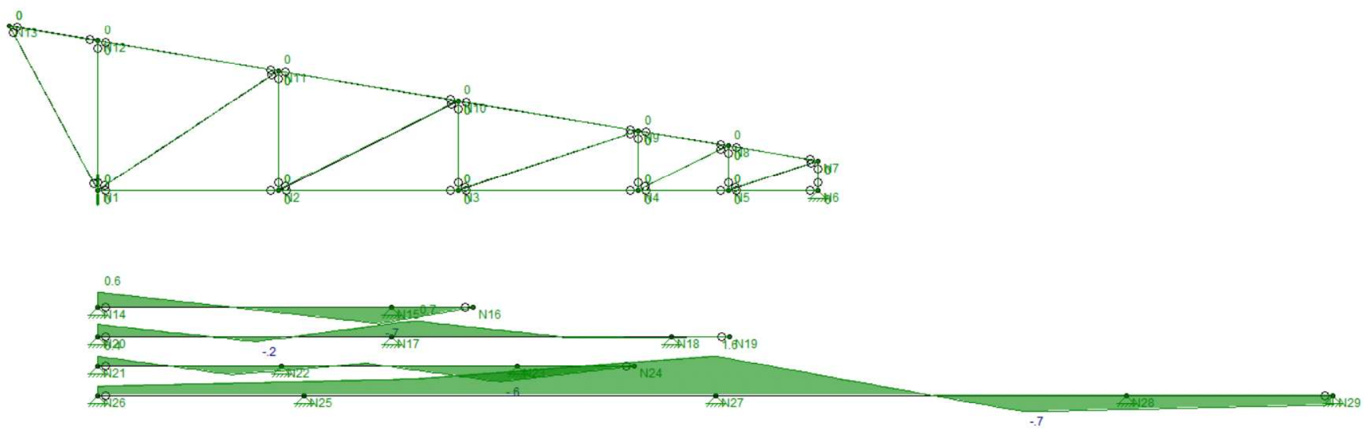
LIVE LOAD



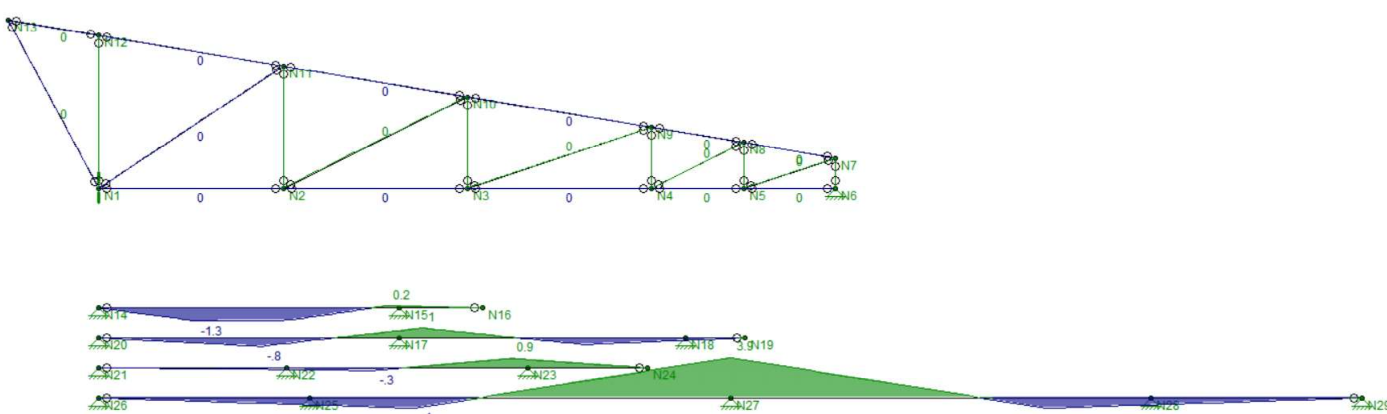
AXIAL



SHEAR



MOMENT



Compression and Tension Checks

Compression Check

Member	Size	Fc' (psi)	Cp	α	FcE (psi)	Fc* (psi)	c	le (ft)	lu (ft)	k	d or b (in)	le/d	Emin' (psi)	fc = C/A (psi)	C max (k)	A (in^2)	fc/Fc'	
Top Chord	3x8 @4'	240.2	0.3517	0.39	266.2	682.8	0.8	6.31	6.31	1	2.5	2.524	297000	191.6	3.472	18.13	0.7977	OK
Web 3 & 7	3x3 @4'	341.7	0.5004	0.60	410.1	682.8	0.8	5.08	5.08	1	2.5	2.033	297000	140.0	0.875	6.25	0.4097	OK
Web 6	3x3 @4'	640.8	0.9384	3.80	2594.3	682.8	0.8	2.02	2.02	1	2.5	0.808	297000	58.6	0.366	6.25	0.0914	OK
Web 8	3x3 @4'	673.7	0.9866	15.52	10596.1	682.8	0.8	1.00	1.00	1	2.5	0.400	297000	263.2	1.645	6.25	0.3907	OK
Web 9	3x6 @4'	182.1	0.2788	0.30	196.1	653.1	0.8	7.35	7.35	1	2.5	2.940	297000	152.3	2.094	13.75	0.8365	OK
Web 10	3x6 @4'	208.3	0.3050	0.33	226.5	682.8	0.8	6.84	6.84	1	2.5	2.736	297000	111.1	1.528	13.75	0.5336	OK
Web 11	3x3 @4'	231.1	0.3384	0.37	254.7	682.8	0.8	6.45	6.45	1	2.5	2.580	297000	71.0	0.444	6.25	0.3075	OK
Web 14	3x3 @4'	238.2	0.3489	0.39	263.8	682.8	0.8	6.34	6.34	1	2.5	2.535	297000	37.6	0.235	6.25	0.1578	OK
Brace	3x6	125.2	0.1834	0.19	130.8	682.8	0.8	9.00	9.00	1	2.5	3.600	297000	108.8	1.49544271	13.75	0.8687	OK
C1	6x6	453.6	0.6643	0.93	633.1	682.8	0.8	9.00	9.00	1	5.5	1.636	297000	56.9	1.72009375	30.25	0.1254	OK
C2	6x6	274.5	0.4020	0.46	311.4	682.8	0.8	10.50	10.50	1	4.5	2.333	297000	72.6	2.19689167	30.25	0.2646	OK
C3	8x8	350.1	0.5128	0.62	423.8	682.8	0.8	11.00	11.00	1	5.5	2.000	297000	46.6	2.61937083	56.25	0.1330	OK

Tension Check

Member	Size	Ft' (psi)	ft=T/A (psi)	T max (k)	A (in^2)	ft/Ft'	
Top Chord	3x8 @4'	225.0	6.2	0.113	18.13	0.0277	OK
Bottom Chord	3x8 @4'	243.8	189.0	3.425	18.13	0.7752	OK
Web 4 & 5	3x3 @4'	281.3	109.0	0.681	6.25	0.3874	OK
Web 13	3x6 @4'	243.8	205.1	2.820	13.75	0.8414	OK
Web 12	3x3 @4'	281.3	132.8	0.830	6.25	0.4722	OK

Bending, Deflection, and Shear Checks

Bending Check

Member	Size	Fb' (psi)	CL	α	FbE (psi)	Fb* (psi)	RB	le (distributed)	lu/d	lu (ft)	b (in)	d (in)	Emin' (psi)	fb = M/Sxx (psi)	M max (k-ft)	Sxx (in^3)	fb/Fb'	
Trussed Roof Batten	3x4 @1'	651.13	0.9922	7.31	4794	656	8.62	133	21.4	6.25	2.50	3.50	297000	344.7	0.1465	5.10	0.5293	OK
Trussed Roof Beam	3x5 @6.25'	609.21	0.9946	10.20	6245	613	7.55	79	10.7	4.00	2.50	4.50	297000	550.9	0.3875	8.44	0.9044	OK
Framed Roof Batten	2x3 @1'	649.43	0.9896	5.70	3741	656	9.76	86	19.2	4.00	1.50	2.50	297000	461.5	0.0600	1.56	0.7107	OK
Framed Roof Beam	6x8 @4'	435.96	0.9965	15.06	6591	438	7.35	218	16.0	10.00	5.50	7.50	297000	384.0	1.65	51.56	0.8809	OK
Girder 1	6x8	436.25	0.9971	18.36	8032	438	6.66	179	12.8	8.00	5.50	7.50	297000	306.0	1.32	51.56	0.7015	OK
Girder 2	6x10	436.02	0.9966	15.68	6860	438	7.21	165	8.8	7.00	5.50	9.50	297000	381.1	1.3138	41.36	0.8741	OK
Girder 3	8x10	436.73	0.9982	29.16	12757	438	5.29	165	8.8	7.00	7.50	9.50	297000	400.7	1.8834	56.41	0.9175	OK

Deflection Check

								L l/180		D + L l/120				
	Element	Emin' (psi)	I (in^4)	D (psf)	Live (psf)	Spacing (ft)	l (ft)	Δmax (in)	Δallow (in)	Δmax (in)	Δallow (in)	d/c		
Trussed Roof Batten	3x4 @1'	297000	8.93	10	20	1	6.25	0.2588	0.4167	0.3882	0.6250	0.6212	OK	
Trussed Roof Beam	3x5 @6.25'	297000	18.98	11	20	6.25	4.00	0.1277	0.2667	0.1979	0.4000	0.4948	OK	
Framed Roof Batten	2x3 @1'	297000	1.95	8	20	1	4.00	0.1986	0.2667	0.2780	0.4000	0.7447	OK	
Framed Roof Beam	6x8 @4'	297000	193.36	13	20	4	10.00	0.3134	0.6667	0.5172	1.0000	0.5172	OK	
Girder 1	6x8	297000	193.36	21	20	4	4.00	0.0770	0.2667	0.1579	0.4000	0.3948	OK	*cantilever portion
Girder 1	6x8	297000	193.36	21	20	4	8.00	0.1284	0.5333	0.2632	0.8000	0.3290	OK	*simply supported portion
Girder 2	6x10	297000	392.96	21	20	6.5	7.00	0.0602	0.4667	0.1234	0.7000	0.1762	OK	
Girder 3	8x10	297000	535.86	21	20	7.5	7.00	0.0509	0.4667	0.1044	0.7000	0.1491	OK	

Shear Check

	Member	Fv' (psi)	fv=3V/2db (psi)	V max (k)	b (in)	d (in)	fv/Fv'	
Trussed Roof Batten	3x4 @1'	163.69	12.5	0.0938	2.50	4.50	0.0764	OK
Trussed Roof Beam	3x5 @6.25'	163.69	51.7	0.3875	2.50	4.50	0.3156	OK
Framed Roof Batten	2x3 @1'	163.69	22.4	0.0560	1.50	2.50	0.1368	OK
Framed Roof Beam	6x8 @4'	163.69	24.0	0.6600	5.50	7.50	0.1466	OK
Girder 1	6x8	163.69	29.8	0.8200	5.50	7.50	0.1822	OK
Girder 2	6x10	163.69	26.8	0.9328	5.50	9.50	0.1636	OK
Girder 3	8x10	163.69	22.7	1.0763	7.50	9.50	0.1384	OK

BASE SHEAR FOR MAIN BUILDING (SCMF)

Seismic Design Values are Based on a Global Map showing Seismicity in Different Areas
The Seismicity at the Site in Kilimbi Rwanda are comparable to those located at 39.24 lat., -120.3 lon.

The design values for this comparable site are as given by the following OSSHPD Seismic Design Maps

Importance Factor (ASCE7-16 Sec. 1.5)

Occupancy Category: II		(Table 1.5-1)
Importance Factor, I =	1.0	(Table 1.5-2)

Calculation of Ts (ASCE7-16 Supplement 1 Sec 11.4)

Fv =	2.676	(Supplement 1 Table 11.4-2)
SM1 = Fv*S1	0.5914	(Eq. 11.4-2)
SD1 = (2/3)*SM1 =	0.3943	(Eq. 11.4-4)
SDS =	0.8580	(Seismic Design Maps)
Ts = SD1/SDS =	0.4595	(sec. 11.4.6)

Period Determination (ASCE7-16 Sec. 12.8.2)

Structure Type:	Concrete moment-resisting frames	(Table 12.8-2)
Ct =	0.0160	(Table 12.8-2)
x =	0.9	(Table 12.8-2)
hn =	23	(height above the base to the highest level of the structure)
T = Ta = Ct*hn^x =	0.2690	(Eq. 12.8-7)
TL =	6	(Seismic Design Maps)

Sec. 11.4.8 Exception 3:

if T	≤	Ts	and Equivalent Lateral Force Procedure is used

A ground motion hazard analysis is not required for structures other than seismically isolated structures and structures with damping systems

0.2690	≤	0.4595	Therefore, OK

Seismic Design Category, SDC (ASCE7-16 Sec. 11.6)

Based on S1:	N/A	(Sec 11.6)
Based on SDS:	D	(Table 11.6-1)
Based on SD1:	D	(Table 11.6-2)
SDC:	D	

Design Coefficients and Factors for Seismic Force-Resisting System (ASCE7-16 Sec. 12.2)

Seismic Force -Resisting System per ASCE 7 Table 12.2-1:
C5. Special reinforced concrete moment frames

Response Modification Coefficient, R:	8
System Overstrength Factor, Ω_o:	3
Deflection Amplification Factor, Cd:	5 1/2
System Limitations:	NL

Seismic Response Coefficient (ASCE7-16 Sec. 12.8.1)

rho =	1	(Sec. 12.3.4.2)	***confirm once MF are designed, change a beam to be pinned and confirm strength of remaining cantilevering columns >/= 0.33* initial MF strength
Cs = SDS/(R/I) =	0.1073	(Eq. 12.8-2)	
for T≤TL, Cs, max = SD1/(T*R/I) =	0.1832	(Eq. 12.8-3)	
for T>TL, Cs, max = SD1*TL/(T^2*R/I) =	N/A	(Eq. 12.8-4)	
Cs, min = 0.044*SDS*I ≥ 0.01	0.0378	(Eq. 12.8-5)	
for S1≥0.6, Cs, min =0.5*S1/(R/I) =	N/A	Eq. 12.8-6)	
Cs, control =	0.1073		
V = rho*Cs*W =	0.1073 *W	(Eq.12.8-1)	

Lateral Seismic Forces (ASCE7-16 Sec. 12.8.3)

Fx = Cvx*V =	0.1073 *W	(Eq. 12.8-11)
(For Single Story Structure) Cvx =	1	(Eq. 12.8-12)

Diaphragm Design Forces (ASCE7-16 Sec. 12.10.1.1)

(For Single Story Structure) Fpx = Fx =	0.1073 *W	(Eq. 12.10-1)
Fpx, min = 0.2*SDS*I*W =	0.1716 *W	(Eq. 12.10-2)
Fpx, max = 0.4*SDS*I*W =	0.3432 *W	(Eq. 12.10-3)
Fpx, control =	0.1716 *W	

Horizontal Irregularity Type 3 Requires a 25% Increase in Forces to: Collectors, their connections and connection from diaphragm to vertical elements Except when applying Ω_o (Table 12.3-1, Sec. 12.3.3.4)

BASE SHEAR FOR OFFICE/BATHROOM (CANTILEVER CONC. COLS.)

Seismic Design Values are Based on a Global Map showing Seismicity in Different Areas
The Seismicity at the Site in Kilimbi Rwanda are comparable to those located at 39.24 lat., -120.3 lon.

The design values for this comparable site are as given by the following OSSHPD Seismic Design Maps

Importance Factor (ASCE7-16 Sec. 1.5)

Occupancy Category: II		(Table 1.5-1)
Importance Factor, I =	1.0	(Table 1.5-2)

Calculation of Ts (ASCE7-16 Supplement 1 Sec 11.4)

Fv =	2.676	(Supplement 1 Table 11.4-2)
SM1 = Fv*S1	0.5914	(Eq. 11.4-2)
SD1 = (2/3)*SM1 =	0.3943	(Eq. 11.4-4)
SDS =	0.8580	(Seismic Design Maps)
Ts = SD1/SDS =	0.4595	(sec. 11.4.6)

Period Determination (ASCE7-16 Sec. 12.8.2)

Structure Type:	Concrete Cantilevered Columns	(Table 12.8-2)
Ct =	0.0200	(Table 12.8-2)
x =	0.75	(Table 12.8-2)
hn =	12	(height above the base to the highest level of the structure)
T = Ta = Ct*hn^x =	0.1289	(Eq. 12.8-7)
TL =	6	(Seismic Design Maps)

Sec. 11.4.8 Exception 3:

if T ≤ Ts and Equivalent Lateral Force Procedure is used

A ground motion hazard analysis is not required for structures other than seismically isolated structures and structures with damping systems

0.1289 ≤ 0.4595 Therefore, OK

Seismic Design Category, SDC (ASCE7-16 Sec. 11.6)

Based on S1:	N/A	(Sec 11.6)
Based on SDS:	D	(Table 11.6-1)
Based on SD1:	D	(Table 11.6-2)
SDC:	D	

Design Coefficients and Factors for Seismic Force-Resisting System (ASCE7-16 Sec. 12.2)

Seismic Force -Resisting System per ASCE 7 Table 12.2-1:

G3. CANTILEVERED COLUMN SYSTEMS DETAIL TO CONFORM TO THE REQUIREMENTS FOR: Special reinforced concrete moment frames

Response Modification Coefficient, R:	2 1/2
System Overstrength Factor, Ω_o:	1 1/4
Deflection Amplification Factor, Cd:	2 1/2
System Limitations:	35 ft

Seismic Response Coefficient (ASCE7-16 Sec. 12.8.1)

rho =	1		(Sec. 12.3.4.2)
Cs = SDS/(R/I) =	0.3432		(Eq. 12.8-2)
for T≤TL, Cs, max = SD1/(T*R/I) =	1.2230		(Eq. 12.8-3)
for T>TL, Cs, max = SD1*TL/(T^2*R/I) =	N/A		(Eq. 12.8-4)
Cs, min = 0.044*SDS*I ≥ 0.01	0.0378		(Eq. 12.8-5)
for S1≥0.6, Cs, min =0.5*S1/(R/I) =	N/A		Eq. 12.8-6)
Cs, control =	0.3432		
V = rho*Cs*W =	0.3432	*W	(Eq.12.8-1)

Lateral Seismic Forces (ASCE7-16 Sec. 12.8.3)

Fx = Cvx*V =	0.3432	*W	(Eq. 12.8-11)
(For Single Story Structure) Cvx =	1		(Eq. 12.8-12)

Diaphragm Design Forces (ASCE7-16 Sec. 12.10.1.1)

(For Single Story Structure) Fpx = Fx =	0.3432	*W	(Eq. 12.10-1)
Fpx, min = 0.2*SDS*I*W =	0.1716	*W	(Eq. 12.10-2)
Fpx, max = 0.4*SDS*I*W =	0.3432	*W	(Eq. 12.10-3)
Fpx, control =	0.3432	*W	

Horizontal Irregularity Type 3 Requires a 25% Increase in Forces (Table 12.3-1, Sec. 12.3.3.4)
to: Collectors, their connections and connection from diaphragm
to vertical elements Except when applying Ω_o

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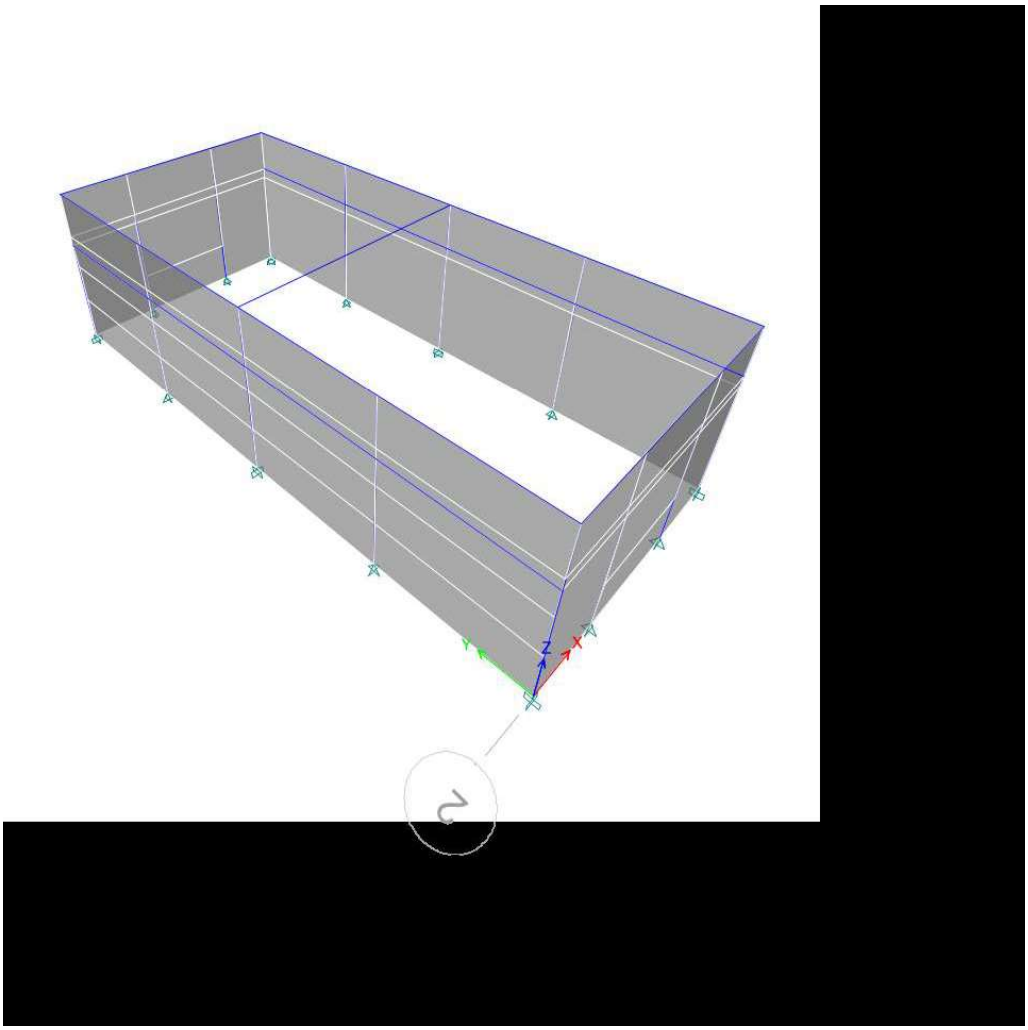

MAIN BUILDING LATERAL

Model File: Moment Frame Beam Forces, Revision 0
6/15/2020

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List of Tables

1 Structure Data

This chapter provides model geometry information, including items such as story levels, point coordinates, and element connectivity.

1.1 Story Data

Table 1.1 - Story Definitions

Tower	Name	Height ft	Master Story	Similar To	Splice Story	Color
T1	Story1	16.5	Yes	None	No	Green

1.2 Grid Data

Table 1.2 - Grid Definitions - General

Tower	Name	Type	Ux ft	Uy ft	Rz deg	Story Range	Bubble Size in	Color
T1	G1	Cartesian	0	0	0	Default	60	Gray6

Table 1.3 - Grid Definitions - Grid Lines

Name	Grid Line Type	Ordinate ft	Bubble Location	Visible
G1	X (Cartesian)	0	End	Yes
G1	X (Cartesian)	7.0833	End	Yes
G1	X (Cartesian)	17.4167	End	Yes
G1	X (Cartesian)	24.5	End	Yes
G1	Y (Cartesian)	0	Start	Yes
G1	Y (Cartesian)	14	Start	Yes
G1	Y (Cartesian)	28	Start	Yes
G1	Y (Cartesian)	42	Start	Yes
G1	Y (Cartesian)	56	Start	Yes

1.3 Point Coordinates

Table 1.4 - Point Bays

Label	Is Auto Point	X ft	Y ft	DZBelow ft
1	No	24.5	14	4.5
2	No	24.5	56	4.5
3	No	24.5	42	4.5
4	No	24.5	28	4.5
5	No	24.5	0	4.5
6	No	0	14	4.5
7	No	0	0	0
8	No	24.5	0	0
9	No	0	0	4.5
10	No	0	28	4.5
11	No	24.5	28	0
12	No	24.5	42	0
13	No	0	42	4.5

Table 1.4 - Point Bays (continued)

Label	Is Auto Point	X ft	Y ft	DZBelow ft
14	No	0	56	4.5
15	No	7.0833	56	4.5
16	No	17.4167	56	4.5
17	No	7.0833	0	4.5
18	No	17.4167	0	4.5
19	No	0	0	5.5
20	No	0	14	5.5
21	No	7.0833	0	0
22	No	17.4167	0	0
23	No	7.0833	56	0
24	No	17.4167	56	0
25	No	24.5	56	0
26	No	0	28	5.5
27	No	0	42	5.5
28	No	0	56	5.5
29	No	24.5	14	5.5
30	No	24.5	0	5.5
31	No	24.5	28	5.5
32	No	24.5	42	5.5
33	No	24.5	14	0
34	No	24.5	56	5.5
35	No	0	14	0
36	No	0	42	0
37	No	0	28	0
38	No	0	56	0
39	No	7.0833	56	5.5
40	No	17.4167	56	5.5
41	No	7.0833	0	5.5
42	No	17.4167	0	5.5
43	No	0	14	8
44	No	0	0	8
45	No	0	28	8
46	No	0	42	8
47	No	0	56	8
48	No	7.0833	56	12
49	No	17.4167	56	12
50	No	7.0833	0	12
51	No	17.4167	0	12
52	No	0	14	12
53	No	0	0	12
54	No	0	28	12
55	No	0	42	12
56	No	0	56	12

1.4 Line Connectivity

Table 1.5 - Column Bays

Label	PointBayI	PointBayJ	IEndStory
C57	33	33	Below
C58	11	11	Below
C59	12	12	Below
C60	35	35	Below
C61	36	36	Below
C62	37	37	Below
C63	7	7	Below
C64	8	8	Below
C65	38	38	Below
C66	25	25	Below
C67	21	21	Below
C68	22	22	Below
C69	23	23	Below
C70	24	24	Below

Table 1.6 - Beam Bays

Label	PointBayI	PointBayJ
B1	1	4
B2	4	3
B3	5	1
B4	3	2
B5	7	8
B6	19	20
B7	20	26
B8	26	27
B9	27	28
B10	37	11
B12	11	12
B30	33	11
B31	35	37
B32	37	36
B33	38	25
B34	8	33
B35	12	25
B36	7	35
B37	36	38

1.5 Area Connectivity

Table 1.7 - Null Area Bays

Label	NumPoints	PointNumber	PointBay	PointStory
A17	4	1	9	Same
A17		2	6	Same
A17		3	35	Same
A17		4	7	Same

Table 1.7 - Null Area Bays (continued)

Label	NumPoints	PointNumber	PointBay	PointStory
A22	4	1	6	Same
A22		2	10	Same
A22		3	37	Same
A22		4	35	Same
A24	4	1	10	Same
A24		2	13	Same
A24		3	36	Same
A24		4	37	Same
A26	4	1	13	Same
A26		2	14	Same
A26		3	38	Same
A26		4	36	Same
A29	4	1	5	Same
A29		2	1	Same
A29		3	33	Same
A29		4	8	Same
A31	4	1	1	Same
A31		2	4	Same
A31		3	11	Same
A31		4	33	Same
A32	4	1	4	Same
A32		2	3	Same
A32		3	12	Same
A32		4	11	Same
A36	4	1	3	Same
A36		2	2	Same
A36		3	25	Same
A36		4	12	Same
A38	4	1	14	Same
A38		2	15	Same
A38		3	23	Same
A38		4	38	Same
A44	4	1	15	Same
A44		2	16	Same
A44		3	24	Same
A44		4	23	Same
A46	4	1	16	Same
A46		2	2	Same
A46		3	25	Same
A46		4	24	Same
A48	4	1	9	Same
A48		2	17	Same
A48		3	21	Same
A48		4	7	Same
A50	4	1	17	Same
A50		2	18	Same

Table 1.7 - Null Area Bays (continued)

Label	NumPoints	PointNumber	PointBay	PointStory
A50		3	22	Same
A50		4	21	Same
A52	4	1	18	Same
A52		2	5	Same
A52		3	8	Same
A52		4	22	Same
A53	4	1	19	Same
A53		2	20	Same
A53		3	6	Same
A53		4	9	Same
A54	4	1	20	Same
A54		2	26	Same
A54		3	10	Same
A54		4	6	Same
A55	4	1	26	Same
A55		2	27	Same
A55		3	13	Same
A55		4	10	Same
A56	4	1	27	Same
A56		2	28	Same
A56		3	14	Same
A56		4	13	Same
A58	4	1	30	Same
A58		2	29	Same
A58		3	1	Same
A58		4	5	Same
A60	4	1	29	Same
A60		2	31	Same
A60		3	4	Same
A60		4	1	Same
A62	4	1	31	Same
A62		2	32	Same
A62		3	3	Same
A62		4	4	Same
A64	4	1	32	Same
A64		2	34	Same
A64		3	2	Same
A64		4	3	Same
A66	4	1	28	Same
A66		2	39	Same
A66		3	15	Same
A66		4	14	Same
A67	4	1	39	Same
A67		2	40	Same
A67		3	16	Same
A67		4	15	Same

Table 1.7 - Null Area Bays (continued)

Label	NumPoints	PointNumber	PointBay	PointStory
A69	4	1	40	Same
A69		2	34	Same
A69		3	2	Same
A69		4	16	Same
A71	4	1	19	Same
A71		2	41	Same
A71		3	17	Same
A71		4	9	Same
A72	4	1	41	Same
A72		2	42	Same
A72		3	18	Same
A72		4	17	Same
A74	4	1	42	Same
A74		2	30	Same
A74		3	5	Same
A74		4	18	Same
A92	4	1	44	Same
A92		2	43	Same
A92		3	20	Same
A92		4	19	Same
A94	4	1	43	Same
A94		2	45	Same
A94		3	26	Same
A94		4	20	Same
A96	4	1	45	Same
A96		2	46	Same
A96		3	27	Same
A96		4	26	Same
A98	4	1	46	Same
A98		2	47	Same
A98		3	28	Same
A98		4	27	Same
A99	4	1	8	Below
A99		2	33	Below
A99		3	29	Same
A99		4	30	Same
A100	4	1	33	Below
A100		2	11	Below
A100		3	31	Same
A100		4	29	Same
A101	4	1	11	Below
A101		2	12	Below
A101		3	32	Same
A101		4	31	Same
A102	4	1	12	Below
A102		2	25	Below

Table 1.7 - Null Area Bays (continued)

Label	NumPoints	PointNumber	PointBay	PointStory
A102		3	34	Same
A102		4	32	Same
A103	4	1	38	Below
A103		2	23	Below
A103		3	39	Same
A103		4	28	Same
A104	4	1	24	Below
A104		2	25	Below
A104		3	34	Same
A104		4	40	Same
A105	4	1	7	Below
A105		2	21	Below
A105		3	41	Same
A105		4	19	Same
A106	4	1	22	Below
A106		2	8	Below
A106		3	30	Same
A106		4	42	Same
A107	4	1	48	Same
A107		2	49	Same
A107		3	40	Same
A107		4	39	Same
A108	4	1	23	Below
A108		2	24	Below
A108		3	49	Same
A108		4	48	Same
A109	4	1	50	Same
A109		2	51	Same
A109		3	42	Same
A109		4	41	Same
A110	4	1	21	Below
A110		2	22	Below
A110		3	51	Same
A110		4	50	Same
A111	4	1	7	Below
A111		2	35	Below
A111		3	52	Same
A111		4	53	Same
A112	4	1	53	Same
A112		2	52	Same
A112		3	43	Same
A112		4	44	Same
A113	4	1	35	Below
A113		2	37	Below
A113		3	54	Same
A113		4	52	Same

Table 1.7 - Null Area Bays (continued)

Label	NumPoints	PointNumber	PointBay	PointStory
A114	4	1	52	Same
A114		2	54	Same
A114		3	45	Same
A114		4	43	Same
A115	4	1	37	Below
A115		2	36	Below
A115		3	55	Same
A115		4	54	Same
A116	4	1	54	Same
A116		2	55	Same
A116		3	46	Same
A116		4	45	Same
A117	4	1	36	Below
A117		2	38	Below
A117		3	56	Same
A117		4	55	Same
A118	4	1	55	Same
A118		2	56	Same
A118		3	47	Same
A118		4	46	Same

1.6 Mass

Table 1.8 - Mass Source Definition

Name	Is Default	Include Lateral Mass?	Include Vertical Mass?	Lump Mass?	Source Self Mass?	Source Added Mass?	Source Load Patterns?	Move Mass Centroid?	Load Pattern	Multiplier
MsSrc1	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Dead	1

Table 1.9 - Mass Summary by Story

Story	UX lb-s2/ft	UY lb-s2/ft	UZ lb-s2/ft
Story1	3620.69	3620.69	3796.15
Base	978.9	978.9	803.44

Table 1.10 - Mass Summary by Group

Group	Self Mass lb-s2/ft	Self Weight kip	Mass X lb-s2/ft	Mass Y lb-s2/ft	Mass Z lb-s2/ft
All	3193.18	0	10145.54	10145.54	10145.54

1.7 Groups

Table 1.11 - Group Definitions

Name	Color	Steel Design?	Concrete Design?	Composite Design?
All	Yellow	No	No	No

2 Properties

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

2.1 Materials

Table 2.1 - Material Properties - General

Material	Type	SymType	Grade	Color	Notes
3000Psi	Concrete	Isotropic	Unknown	Red	
3000psi weightless	Concrete	Isotropic	Unknown	Red	
4000Psi	Concrete	Isotropic	Unknown	Gray8Dark	
A416Gr270	Tendon	Uniaxial	Unknown	Green	
A615Gr40	Rebar	Uniaxial	Grade 40	Cyan	
A615Gr60	Rebar	Uniaxial	Unknown	Blue	
A992Fy50	Steel	Isotropic	Unknown	Yellow	

2.2 Frame Sections

Table 2.2 - Frame Section Property Definitions - Summary (Part 1 of 3)

Name	Material	Shape	Color	Area in2	J in4	I33 in4	I22 in4	As2 in2	As3 in2
12x28 Conc Column	3000Psi	Concrete Rectangular	Cyan	336	11785.68	21952	4032	280	280
16x10 Conc Gravity Col	3000Psi	Concrete Rectangular	Cyan	160	3260.04	3413.33	1333.33	133.33	133.33
16x12 Conc MF Beam	3000Psi	Concrete Rectangular	Magenta	192	4976.26	2304	4096	160	160
16x16 Conc MF Col	3000Psi	Concrete Rectangular	Gray8Dark	256	9229.65	5461.33	5461.33	213.33	213.33
16x22 Conc MF Col	3000Psi	Concrete Rectangular	Yellow	352	16595.63	14197.33	7509.33	293.33	293.33
16x8 Conc Gravity Beam	3000Psi	Concrete Rectangular	Magenta	128	1874.99	682.67	2730.67	106.67	106.67
18x18 Conc Col	3000Psi	Concrete Rectangular	Yellow	324	14784.12	8748	8748	270	270
22x12 Conc MF Beam	3000Psi	Concrete Rectangular	Green	264	8349.56	3168	10648	220	220
28x18 Conc MF Beam	3000Psi	Concrete Rectangular	Green	504	32700.79	32928	13608	420	420

Table 2.2 - Frame Section Property Definitions - Summary (Part 2 of 3)

S33Pos in3	S33Neg in3	S22Pos in3	S22Neg in3	Z33 in3	Z22 in3	R33 in	R22 in	CG Offset 3 in	CG Offset 2 in	PNA Offset 3 in	PNA Offset 2 in	Area Modifier
1568	1568	672	672	2352	1008	8.0829	3.4641	0	0	0	0	1
426.67	426.67	266.67	266.67	640	400	4.6188	2.8868	0	0	0	0	1
384	384	512	512	576	768	3.4641	4.6188	0	0	0	0	1
682.67	682.67	682.67	682.67	1024	1024	4.6188	4.6188	0	0	0	0	1
1290.67	1290.67	938.67	938.67	1936	1408	6.3509	4.6188	0	0	0	0	1
170.67	170.67	341.33	341.33	256	512	2.3094	4.6188	0	0	0	0	1
972	972	972	972	1458	1458	5.1962	5.1962	0	0	0	0	1
528	528	968	968	792	1452	3.4641	6.3509	0	0	0	0	1
2352	2352	1512	1512	3528	2268	8.0829	5.1962	0	0	0	0	1

Table 2.2 - Frame Section Property Definitions - Summary (Part 3 of 3)

As3 Modifier	J Modifier	I33 Modifier	I22 Modifier	Mass Modifier	Weight Modifier
1	1	0.7	0.7	1	1
1	1	0.7	0.7	1	1
1	1	0.35	0.35	1	1
1	1	0.7	0.7	1	1
1	1	0.7	0.7	1	1
1	1	0.35	0.35	1	1
1	1	0.7	0.7	1	1
1	1	0.35	0.35	1	1
1	1	0.3	0.3	1	1

2.3 Shell Sections

Table 2.3 - Area Section Property Definitions - Summary

Name	Type	Element Type	Material	Total Thickness in	Deck Material	Deck Depth in
Deck1	Deck	Membrane	4000Psi	6.5	A992Fy50	3
Plank1	Slab	Membrane	4000Psi	8		
Slab1	Slab	Shell-Thin	4000Psi	8		
Wall1	Wall	Shell-Thin	4000Psi	12		

2.4 Links

Table 2.4 - Link Property Definitions - Summary

Name	Type	Degrees of Freedom	Mass lb-s2/ft	Weight kip	Defined Length ft	Defined Area ft2
Link1	Linear	U1	0	0	1	1

3 Assignments

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

3.1 Joint Assignments

Table 3.1 - Joint Assignments - Summary

Story	Label	UniqueName	Diaphragm	Restraints
Story1	7	20	From Area	
Story1	8	22	From Area	
Story1	11	4	From Area	
Story1	12	5	From Area	
Story1	25	28	From Area	
Story1	33	3	From Area	
Story1	35	14	From Area	
Story1	36	16	From Area	
Story1	37	17	From Area	
Story1	38	26	From Area	
Story1	21	47	From Area	
Story1	22	48	From Area	
Story1	23	56	From Area	
Story1	24	58	From Area	
Story1	1	10	From Area	
Story1	2	49	From Area	
Story1	3	53	From Area	
Story1	4	55	From Area	
Story1	5	57	From Area	
Story1	6	1	From Area	
Story1	9	2	From Area	
Story1	10	11	From Area	
Story1	13	12	From Area	
Story1	14	13	From Area	
Story1	15	32	From Area	
Story1	16	34	From Area	
Story1	17	41	From Area	
Story1	18	46	From Area	
Story1	19	15	From Area	
Story1	20	23	From Area	
Story1	26	25	From Area	
Story1	27	27	From Area	
Story1	28	29	From Area	
Story1	29	35	From Area	
Story1	30	36	From Area	
Story1	31	37	From Area	
Story1	32	38	From Area	
Story1	34	39	From Area	
Story1	39	31	From Area	
Story1	40	33	From Area	
Story1	41	40	From Area	
Story1	42	44	From Area	

Table 3.1 - Joint Assignments - Summary (continued)

Story	Label	UniqueName	Diaphragm	Restraints
Story1	43	65	From Area	
Story1	44	66	From Area	
Story1	45	68	From Area	
Story1	46	70	From Area	
Story1	47	72	From Area	
Story1	48	54	From Area	
Story1	49	59	From Area	
Story1	50	60	From Area	
Story1	51	61	From Area	
Story1	52	63	From Area	
Story1	53	64	From Area	
Story1	54	67	From Area	
Story1	55	69	From Area	
Story1	56	71	From Area	
Base	7	19	From Area	UX; UY; UZ; RX; RY; RZ
Base	8	24	From Area	UX; UY; UZ; RX; RY; RZ
Base	11	8	From Area	UX; UY; UZ; RX; RY; RZ
Base	12	9	From Area	UX; UY; UZ
Base	25	43	From Area	UX; UY; UZ; RX; RY; RZ
Base	33	7	From Area	UX; UY; UZ
Base	35	18	From Area	UX; UY; UZ
Base	36	21	From Area	UX; UY; UZ
Base	37	6	From Area	UX; UY; UZ; RX; RY; RZ
Base	38	30	From Area	UX; UY; UZ; RX; RY; RZ
Base	21	42	From Area	UX; UY; UZ
Base	22	45	From Area	UX; UY; UZ
Base	23	50	From Area	UX; UY; UZ
Base	24	52	From Area	UX; UY; UZ

3.2 Frame Assignments

Table 3.2 - Frame Assignments - Summary (Part 1 of 2)

Story	Label	UniqueName	Design Type	Length ft	Analysis Section	Design Section	Axis Angle deg	Max Station Spacing ft
Story1	B5	19	Beam	24.5	16x12 Conc MF Beam	16x12 Conc MF Beam		2
Story1	B12	9	Beam	14	16x12 Conc MF Beam	16x12 Conc MF Beam		2
Story1	B30	8	Beam	14	16x12 Conc MF Beam	16x12 Conc MF Beam		2
Story1	B31	14	Beam	14	16x12 Conc MF Beam	16x12 Conc MF Beam		2
Story1	B32	15	Beam	14	16x12 Conc MF Beam	16x12 Conc MF Beam		2
Story1	B33	25	Beam	24.5	16x12 Conc MF Beam	16x12 Conc MF Beam		2
Story1	B34	1	Beam	14	16x12 Conc MF Beam	16x12 Conc MF Beam		2
Story1	B35	3	Beam	14	16x12 Conc MF Beam	16x12 Conc MF Beam		2
Story1	B36	17	Beam	14	16x12 Conc MF Beam	16x12 Conc MF Beam		2
Story1	B37	18	Beam	14	16x12 Conc MF Beam	16x12 Conc MF Beam		2
Story1	B1	10	Beam	14	16x8 Conc Gravity Beam	16x8 Conc Gravity Beam		2

Table 3.2 - Frame Assignments - Summary (Part 1 of 2, continued)

Story	Label	UniqueName	Design Type	Length ft	Analysis Section	Design Section	Axis Angle deg	Max Station Spacing ft
Story1	B2	11	Beam	14	16x8 Conc Gravity Beam	16x8 Conc Gravity Beam		2
Story1	B3	2	Beam	14	16x8 Conc Gravity Beam	16x8 Conc Gravity Beam		2
Story1	B4	4	Beam	14	16x8 Conc Gravity Beam	16x8 Conc Gravity Beam		2
Story1	B6	29	Beam	14	16x8 Conc Gravity Beam	16x8 Conc Gravity Beam		2
Story1	B7	30	Beam	14	16x8 Conc Gravity Beam	16x8 Conc Gravity Beam		2
Story1	B8	31	Beam	14	16x8 Conc Gravity Beam	16x8 Conc Gravity Beam		2
Story1	B9	32	Beam	14	16x8 Conc Gravity Beam	16x8 Conc Gravity Beam		2
Story1	B10	24	Beam	24.5	22x12 Conc MF Beam	22x12 Conc MF Beam		2
Story1	C57	5	Column	16.5	16x10 Conc Gravity Col	16x10 Conc Gravity Col		
Story1	C58	6	Column	16.5	16x22 Conc MF Col	16x22 Conc MF Col	90	
Story1	C59	7	Column	16.5	16x10 Conc Gravity Col	16x10 Conc Gravity Col		
Story1	C60	12	Column	16.5	16x10 Conc Gravity Col	16x10 Conc Gravity Col		
Story1	C61	13	Column	16.5	16x10 Conc Gravity Col	16x10 Conc Gravity Col		
Story1	C62	16	Column	16.5	16x22 Conc MF Col	16x22 Conc MF Col	90	
Story1	C63	20	Column	16.5	16x16 Conc MF Col	16x16 Conc MF Col		
Story1	C64	21	Column	16.5	16x16 Conc MF Col	16x16 Conc MF Col		
Story1	C65	22	Column	16.5	16x16 Conc MF Col	16x16 Conc MF Col		
Story1	C66	23	Column	16.5	16x16 Conc MF Col	16x16 Conc MF Col		
Story1	C67	26	Column	16.5	16x10 Conc Gravity Col	16x10 Conc Gravity Col	90	
Story1	C68	27	Column	16.5	16x10 Conc Gravity Col	16x10 Conc Gravity Col	90	
Story1	C69	28	Column	16.5	16x10 Conc Gravity Col	16x10 Conc Gravity Col	90	
Story1	C70	33	Column	16.5	16x10 Conc Gravity Col	16x10 Conc Gravity Col	90	

Table 3.2 - Frame Assignments - Summary (Part 2 of 2)

Min Number Stations	Releases
	Yes
	Yes
	Yes
	Yes
	Yes
	Yes
	Yes
	Yes
	Yes
	Yes
	Yes
	Yes
	Yes
	Yes
	Yes
	Yes
	Yes

Table 3.2 - Frame Assignments - Summary (Part 2 of 2, continued)

Min Number Stations	Releases
	Yes
	Yes
3	Yes
3	
3	Yes
3	Yes
3	Yes
3	
3	
3	
3	
3	
3	Yes
3	Yes
3	Yes
3	Yes

Table 3.3 - Frame Assignments - Section Properties

Story	Label	UniqueName	Shape	Auto Select List	Section Property
Story1	B5	19	Concrete Rectangular	N.A.	16x12 Conc MF Beam
Story1	B12	9	Concrete Rectangular	N.A.	16x12 Conc MF Beam
Story1	B30	8	Concrete Rectangular	N.A.	16x12 Conc MF Beam
Story1	B31	14	Concrete Rectangular	N.A.	16x12 Conc MF Beam
Story1	B32	15	Concrete Rectangular	N.A.	16x12 Conc MF Beam
Story1	B33	25	Concrete Rectangular	N.A.	16x12 Conc MF Beam
Story1	B34	1	Concrete Rectangular	N.A.	16x12 Conc MF Beam
Story1	B35	3	Concrete Rectangular	N.A.	16x12 Conc MF Beam
Story1	B36	17	Concrete Rectangular	N.A.	16x12 Conc MF Beam
Story1	B37	18	Concrete Rectangular	N.A.	16x12 Conc MF Beam
Story1	B1	10	Concrete Rectangular	N.A.	16x8 Conc Gravity Beam
Story1	B2	11	Concrete Rectangular	N.A.	16x8 Conc Gravity Beam
Story1	B3	2	Concrete Rectangular	N.A.	16x8 Conc Gravity Beam
Story1	B4	4	Concrete Rectangular	N.A.	16x8 Conc Gravity Beam
Story1	B6	29	Concrete Rectangular	N.A.	16x8 Conc Gravity Beam
Story1	B7	30	Concrete Rectangular	N.A.	16x8 Conc Gravity Beam
Story1	B8	31	Concrete Rectangular	N.A.	16x8 Conc Gravity Beam
Story1	B9	32	Concrete Rectangular	N.A.	16x8 Conc Gravity Beam
Story1	B10	24	Concrete Rectangular	N.A.	22x12 Conc MF Beam
Story1	C57	5	Concrete Rectangular	N.A.	16x10 Conc Gravity Col
Story1	C58	6	Concrete Rectangular	N.A.	16x22 Conc MF Col
Story1	C59	7	Concrete Rectangular	N.A.	16x10 Conc Gravity Col
Story1	C60	12	Concrete Rectangular	N.A.	16x10 Conc Gravity Col
Story1	C61	13	Concrete Rectangular	N.A.	16x10 Conc Gravity Col

Table 3.3 - Frame Assignments - Section Properties (continued)

Story	Label	UniqueName	Shape	Auto Select List	Section Property
Story1	C62	16	Concrete Rectangular	N.A.	16x22 Conc MF Col
Story1	C63	20	Concrete Rectangular	N.A.	16x16 Conc MF Col
Story1	C64	21	Concrete Rectangular	N.A.	16x16 Conc MF Col
Story1	C65	22	Concrete Rectangular	N.A.	16x16 Conc MF Col
Story1	C66	23	Concrete Rectangular	N.A.	16x16 Conc MF Col
Story1	C67	26	Concrete Rectangular	N.A.	16x10 Conc Gravity Col
Story1	C68	27	Concrete Rectangular	N.A.	16x10 Conc Gravity Col
Story1	C69	28	Concrete Rectangular	N.A.	16x10 Conc Gravity Col
Story1	C70	33	Concrete Rectangular	N.A.	16x10 Conc Gravity Col

3.3 Shell Assignments

Table 3.4 - Area Assignments - Summary

Story	Label	UniqueName	Section Property	Property Type
Story1	A17	7	None	Null
Story1	A22	10	None	Null
Story1	A24	13	None	Null
Story1	A26	16	None	Null
Story1	A29	24	None	Null
Story1	A31	25	None	Null
Story1	A32	26	None	Null
Story1	A36	33	None	Null
Story1	A38	14	None	Null
Story1	A44	27	None	Null
Story1	A46	36	None	Null
Story1	A48	40	None	Null
Story1	A50	44	None	Null
Story1	A52	48	None	Null
Story1	A53	6	None	Null
Story1	A54	9	None	Null
Story1	A55	12	None	Null
Story1	A56	15	None	Null
Story1	A58	20	None	Null
Story1	A60	23	None	Null
Story1	A62	29	None	Null
Story1	A64	32	None	Null
Story1	A66	11	None	Null
Story1	A67	21	None	Null
Story1	A69	35	None	Null
Story1	A71	39	None	Null
Story1	A72	43	None	Null
Story1	A74	47	None	Null
Story1	A92	58	None	Null
Story1	A94	62	None	Null

Table 3.4 - Area Assignments - Summary (continued)

Story	Label	UniqueName	Section Property	Property Type
Story1	A96	66	None	Null
Story1	A98	70	None	Null
Story1	A99	19	None	Null
Story1	A100	22	None	Null
Story1	A101	28	None	Null
Story1	A102	31	None	Null
Story1	A103	8	None	Null
Story1	A104	34	None	Null
Story1	A105	38	None	Null
Story1	A106	46	None	Null
Story1	A107	50	None	Null
Story1	A108	51	None	Null
Story1	A109	52	None	Null
Story1	A110	53	None	Null
Story1	A111	56	None	Null
Story1	A112	57	None	Null
Story1	A113	60	None	Null
Story1	A114	61	None	Null
Story1	A115	64	None	Null
Story1	A116	65	None	Null
Story1	A117	68	None	Null
Story1	A118	69	None	Null

4 Loads

This chapter provides loading information as applied to the model.

4.1 Load Patterns

Table 4.1 - Load Pattern Definitions

Name	Is Auto Load	Type	Self Weight Multiplier	Auto Load
~LLRF	Yes	Other	0	
Dead	No	Dead	0	
Lateral (E-W)	No	Seismic	0	ASCE 7-16
Lateral (N-S)	No	Seismic	0	ASCE 7-16
Roof Live	No	Roof Live	0	

4.2 Load Sets

Table 4.2 - Shell Uniform Load Sets

Name	Load Pattern	Load Value lb/ft2
6" Stone Infill	Dead	75
Brick Opening	Dead	105
Doors/Windows	Dead	8

4.3 Auto Seismic Loading

ASCE 7-16 Auto Seismic Load Calculation

This calculation presents the automatically generated lateral seismic loads for load pattern Lateral (N-S) according to ASCE 7-16, as calculated by ETABS.

Direction and Eccentricity

Direction = X

Structural Period

Period Calculation Method = Program Calculated

Coefficient, C_t [ASCE Table 12.8-2]		$C_t = 0.016ft$
Coefficient, x [ASCE Table 12.8-2]		$x = 0.9$
Structure Height Above Base, h_n		$h_n = 16.5\ ft$
Long-Period Transition Period, T_L [ASCE 11.4.5]		$T_L = 6\ sec$

Factors and Coefficients

Response Modification Factor, R [ASCE Table 12.2-1]		$R = 8$
System Overstrength Factor, Ω_0 [ASCE Table 12.2-1]		$\Omega_0 = 3$
Deflection Amplification Factor, C_d [ASCE Table 12.2-1]		$C_d = 5.5$
Importance Factor, I [ASCE Table 1.5-2]		$I = 1$

Ss and S1 Source = 0.9

Mapped MCE Spectral Response Acceleration, S_s [ASCE 11.4.2]		$S_s = 0.991g$
Mapped MCE Spectral Response Acceleration, S_1 [ASCE 11.4.2]		$S_1 = 0.331g$

Site Class [ASCE Table 20.3-1] = E - Soft Clay Soil

Site Coefficient, F_a [ASCE Table 11.4-1]		$F_a = 1.3$
Site Coefficient, F_v [ASCE Table 11.4-2]		$F_v = 2.676$

Seismic Response

MCE Spectral Response Acceleration, S_{MS} [ASCE 11.4.4, Eq. 11.4-1]	$S_{MS} = F_a S_S$	$S_{MS} = 1.2883g$
MCE Spectral Response Acceleration, S_{M1} [ASCE 11.4.4, Eq. 11.4-2]	$S_{M1} = F_v S_1$	$S_{M1} = 0.885756g$
Design Spectral Response Acceleration, S_{DS} [ASCE 11.4.5, Eq. 11.4-3]	$S_{DS} = \frac{2}{3} S_{MS}$	$S_{DS} = 0.858867g$
Design Spectral Response Acceleration, S_{D1} [ASCE 11.4.5, Eq. 11.4-4]	$S_{D1} = \frac{2}{3} S_{M1}$	$S_{D1} = 0.590504g$

Equivalent Lateral Forces

Seismic Response Coefficient, C_S [ASCE 12.8.1.1, Eq. 12.8-2]

$$C_S = \frac{S_{DS}}{(\frac{R}{I})}$$

[ASCE 12.8.1.1, Eq. 12.8-3]

$$C_{S,max} = \frac{S_{D1}}{T(\frac{R}{I})}$$

[ASCE 12.8.1.1, Eq. 12.8-5]

$$C_{S,min} = max\ (0.044\ S_{DS}\ I, 0.01\ ) = 0.03779$$

[ASCE 12.8.1.1, Eq. 12.8-6]

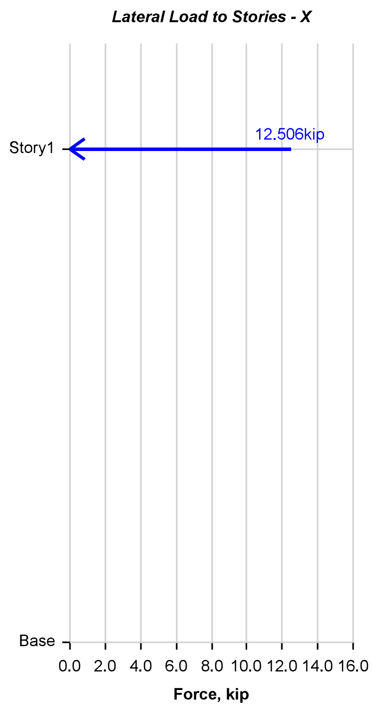
$$C_{S,min} = 0.5 \frac{S_1}{(\frac{R}{I})} \text{ for } S_1 = 0.6g$$

$$C_{S,min} \le C_s \le C_{S,max}$$

Calculated Base Shear

Direction	Period Used (sec)	C_s	W (kip)	V (kip)
X	0.279	0.107358	116.4922	12.5064

Applied Story Forces



Story	Elevation	X-Dir	Y-Dir
	ft	kip	kip
Story1	16.5	12.506	0
Base	0	0	0

ASCE 7-16 Auto Seismic Load Calculation

This calculation presents the automatically generated lateral seismic loads for load pattern Lateral (E-W) according to ASCE 7-16, as calculated by ETABS.

Direction and Eccentricity

Direction = Y

Structural Period

Period Calculation Method = Program Calculated

Coefficient, C_t [ASCE Table 12.8-2]		$C_t = 0.016ft$
Coefficient, x [ASCE Table 12.8-2]		$x = 0.9$
Structure Height Above Base, h_n		$h_n = 16.5\ ft$
Long-Period Transition Period, T_L [ASCE 11.4.5]		$T_L = 6\ sec$

Factors and Coefficients

Response Modification Factor, R [ASCE Table 12.2-1]		$R = 8$
System Overstrength Factor, Ω_0 [ASCE Table 12.2-1]		$\Omega_0 = 3$
Deflection Amplification Factor, C_d [ASCE Table 12.2-1]		$C_d = 5.5$
Importance Factor, I [ASCE Table 1.5-2]		$I = 1$

Ss and S1 Source = 0.9

Mapped MCE Spectral Response Acceleration, S_s [ASCE 11.4.2]		$S_s = 0.991g$
Mapped MCE Spectral Response Acceleration, S_1 [ASCE 11.4.2]		$S_1 = 0.331g$

Site Class [ASCE Table 20.3-1] = E - Soft Clay Soil

Site Coefficient, F_a [ASCE Table 11.4-1]		$F_a = 1.3$
Site Coefficient, F_v [ASCE Table 11.4-2]		$F_v = 2.676$

Seismic Response

MCE Spectral Response Acceleration, S_{MS} [ASCE 11.4.4, Eq. 11.4-1]	$S_{MS} = F_a S_S$	$S_{MS} = 1.2883g$
MCE Spectral Response Acceleration, S_{M1} [ASCE 11.4.4, Eq. 11.4-2]	$S_{M1} = F_v S_1$	$S_{M1} = 0.885756g$
Design Spectral Response Acceleration, S_{DS} [ASCE 11.4.5, Eq. 11.4-3]	$S_{DS} = \frac{2}{3} S_{MS}$	$S_{DS} = 0.858867g$
Design Spectral Response Acceleration, S_{D1} [ASCE 11.4.5, Eq. 11.4-4]	$S_{D1} = \frac{2}{3} S_{M1}$	$S_{D1} = 0.590504g$

Equivalent Lateral Forces

Seismic Response Coefficient, C_S [ASCE 12.8.1.1, Eq. 12.8-2]

$$C_S = \frac{S_{DS}}{(\frac{R}{I})}$$

[ASCE 12.8.1.1, Eq. 12.8-3]

$$C_{S,max} = \frac{S_{D1}}{T(\frac{R}{I})}$$

[ASCE 12.8.1.1, Eq. 12.8-5]

$$C_{S,min} = max\ (0.044\ S_{DS}\ I, 0.01) = 0.03779$$

[ASCE 12.8.1.1, Eq. 12.8-6]

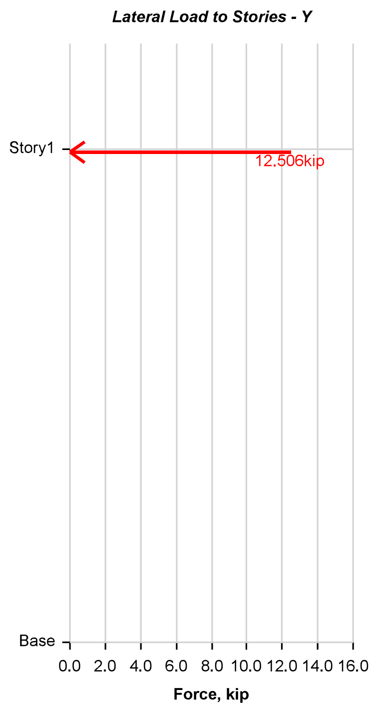
$$C_{S,min} = 0.5 \frac{S_1}{(\frac{R}{I})}\ for\ S_1 = 0.6g$$

$$C_{S,min} \leq C_s \leq C_{S,max}$$

Calculated Base Shear

Direction	Period Used (sec)	C_s	W (kip)	V (kip)
Y	0.151	0.107358	116.4922	12.5064

Applied Story Forces



Story	Elevation	X-Dir	Y-Dir
	ft	kip	kip
Story1	16.5	0	12.506
Base	0	0	0

4.4 Applied Loads

4.4.1 Point Loads

Table 4.5 - Joint Loads Assignments - Force

Story	Label	UniqueName	Load Pattern	FX kip	FY kip	FZ kip	MX kip-ft	MY kip-ft	MZ kip-ft	X Dimension in	Y Dimension in
Story1	7	20	Dead	0	0	-0.46	0	0	0	2.5	2.5
Story1	8	22	Dead	0	0	-0.157	0	0	0	2.5	2.5
Story1	11	4	Dead	0	0	0	0	0	0	0	0
Story1	12	5	Dead	0	0	0	0	0	0	0	0
Story1	25	28	Dead	0	0	-0.157	0	0	0	2.5	2.5
Story1	33	3	Dead	0	0	0	0	0	0	0	0
Story1	35	14	Dead	0	0	0	0	0	0	0	0
Story1	36	16	Dead	0	0	0	0	0	0	0	0
Story1	37	17	Dead	0	0	0	0	0	0	0	0
Story1	38	26	Dead	0	0	-0.46	0	0	0	2.5	2.5
Story1	4	55	Dead	0	0	0	0	0	0	0	0
Base	11	8	Dead	0	0	0	0	0	0	0	0
Story1	7	20	Roof Live	0	0	-0.512	0	0	0	2.5	2.5
Story1	8	22	Roof Live	0	0	-0.242	0	0	0	2.5	2.5
Story1	25	28	Roof Live	0	0	-0.242	0	0	0	2.5	2.5
Story1	38	26	Roof Live	0	0	-0.512	0	0	0	2.5	2.5

4.4.2 Line Loads

Table 4.6 - Frame Loads Assignments - Distributed (Part 1 of 2)

Story	Label	UniqueName	Load Pattern	Load Type	Direction	Distance Type	Relative Distance A	Relative Distance B	Absolute Distance A ft	Absolute Distance B ft
Story1	B5	19	Dead	Force	Gravity	Relative	0	1	0	24.5
Story1	B12	9	Dead	Force	Gravity	Relative	0	1	0	14
Story1	B30	8	Dead	Force	Gravity	Relative	0	1	0	14
Story1	B31	14	Dead	Force	Gravity	Relative	0	1	0	14
Story1	B32	15	Dead	Force	Gravity	Relative	0	1	0	14
Story1	B33	25	Dead	Force	Gravity	Relative	0	1	0	24.5
Story1	B34	1	Dead	Force	Gravity	Relative	0	1	0	14
Story1	B35	3	Dead	Force	Gravity	Relative	0	1	0	14
Story1	B36	17	Dead	Force	Gravity	Relative	0	1	0	14
Story1	B37	18	Dead	Force	Gravity	Relative	0	1	0	14
Story1	B6	29	Dead	Force	Gravity	Relative	0	1	0	14
Story1	B7	30	Dead	Force	Gravity	Relative	0	1	0	14
Story1	B8	31	Dead	Force	Gravity	Relative	0	1	0	14
Story1	B9	32	Dead	Force	Gravity	Relative	0	1	0	14
Story1	B10	24	Dead	Force	Gravity	Relative	0	1	0	24.5
Story1	B5	19	Roof Live	Force	Gravity	Relative	0	1	0	24.5
Story1	B12	9	Roof Live	Force	Gravity	Relative	0	1	0	14
Story1	B30	8	Roof Live	Force	Gravity	Relative	0	1	0	14

Table 4.6 - Frame Loads Assignments - Distributed (Part 1 of 2, continued)

Story	Label	UniqueName	Load Pattern	Load Type	Direction	Distance Type	Relative Distance A	Relative Distance B	Absolute Distance A ft	Absolute Distance B ft
Story1	B31	14	Roof Live	Force	Gravity	Relative	0	1	0	14
Story1	B32	15	Roof Live	Force	Gravity	Relative	0	1	0	14
Story1	B33	25	Roof Live	Force	Gravity	Relative	0	1	0	24.5
Story1	B34	1	Roof Live	Force	Gravity	Relative	0	1	0	14
Story1	B35	3	Roof Live	Force	Gravity	Relative	0	1	0	14
Story1	B36	17	Roof Live	Force	Gravity	Relative	0	1	0	14
Story1	B37	18	Roof Live	Force	Gravity	Relative	0	1	0	14
Story1	B6	29	Roof Live	Force	Gravity	Relative	0	1	0	14
Story1	B7	30	Roof Live	Force	Gravity	Relative	0	1	0	14
Story1	B8	31	Roof Live	Force	Gravity	Relative	0	1	0	14
Story1	B9	32	Roof Live	Force	Gravity	Relative	0	1	0	14
Story1	B10	24	Roof Live	Force	Gravity	Relative	0	1	0	24.5

Table 4.6 - Frame Loads Assignments - Distributed (Part 2 of 2)

Force A kip/ft	Force B kip/ft
0.148	0.148
0.292	0.292
0.292	0.292
0.175	0.175
0.175	0.175
0.148	0.148
0.292	0.292
0.292	0.292
0.175	0.175
0.175	0.175
0.06	0.06
0.06	0.06
0.06	0.06
0.06	0.06
0.296	0.296
0.164	0.164
0.325	0.325
0.325	0.325
0.325	0.325
0.325	0.325
0.164	0.164
0.325	0.325
0.325	0.325
0.325	0.325
0.325	0.325
0.093	0.093
0.093	0.093

Table 4.6 - Frame Loads Assignments - Distributed (Part 2 of 2, continued)

Force A kip/ft	Force B kip/ft
0.093	0.093
0.093	0.093
0.328	0.328

4.4.3 Area Loads

Table 4.7 - Area Load Assignments - Uniform Load Sets

Story	Label	UniqueName	Load Set
Story1	A17	7	6" Stone Infill
Story1	A22	10	6" Stone Infill
Story1	A24	13	6" Stone Infill
Story1	A26	16	6" Stone Infill
Story1	A29	24	Brick Opening
Story1	A31	25	Brick Opening
Story1	A32	26	Brick Opening
Story1	A36	33	Brick Opening
Story1	A38	14	6" Stone Infill
Story1	A44	27	Doors/Windows
Story1	A46	36	6" Stone Infill
Story1	A48	40	6" Stone Infill
Story1	A50	44	Doors/Windows
Story1	A52	48	6" Stone Infill
Story1	A53	6	6" Stone Infill
Story1	A54	9	6" Stone Infill
Story1	A55	12	6" Stone Infill
Story1	A56	15	6" Stone Infill
Story1	A58	20	6" Stone Infill
Story1	A60	23	6" Stone Infill
Story1	A62	29	6" Stone Infill
Story1	A64	32	6" Stone Infill
Story1	A66	11	6" Stone Infill
Story1	A67	21	Doors/Windows
Story1	A69	35	6" Stone Infill
Story1	A71	39	6" Stone Infill
Story1	A72	43	Doors/Windows
Story1	A74	47	6" Stone Infill
Story1	A92	58	Brick Opening
Story1	A94	62	Brick Opening
Story1	A96	66	Brick Opening
Story1	A98	70	Brick Opening
Story1	A99	19	6" Stone Infill
Story1	A100	22	6" Stone Infill
Story1	A101	28	6" Stone Infill
Story1	A102	31	6" Stone Infill
Story1	A103	8	6" Stone Infill

Table 4.7 - Area Load Assignments - Uniform Load Sets (continued)

Story	Label	UniqueName	Load Set
Story1	A104	34	6" Stone Infill
Story1	A105	38	6" Stone Infill
Story1	A106	46	6" Stone Infill
Story1	A107	50	Doors/Windows
Story1	A108	51	6" Stone Infill
Story1	A109	52	Doors/Windows
Story1	A110	53	6" Stone Infill
Story1	A111	56	6" Stone Infill
Story1	A112	57	6" Stone Infill
Story1	A113	60	Doors/Windows
Story1	A114	61	Doors/Windows
Story1	A115	64	Doors/Windows
Story1	A116	65	Doors/Windows
Story1	A117	68	6" Stone Infill
Story1	A118	69	6" Stone Infill

4.5 Load Cases

Table 4.8 - Load Case Definitions - Summary

Name	Type
Dead	Linear Static
Roof Live	Linear Static
Lateral (N-S)	Linear Static
Lateral (E-W)	Linear Static

4.6 Load Combinations

Table 4.9 - Load Combination Definitions

Name	Type	Is Auto	Load Name	SF	Notes
0.9D-Ev+Eew	Linear Add	No	Dead	0.9	Dead (min) + Static Earthquake [Strength]
0.9D-Ev+Eew			Lateral (E-W)	1	
0.9D-Ev+Eew			Dead	-0.1716	
0.9D-Ev+Ens	Linear Add	No	Dead	0.9	Dead (min) + Static Earthquake [Strength]
0.9D-Ev+Ens			Lateral (N-S)	1	
0.9D-Ev+Ens			Dead	-0.1716	
0.9D-Ev-Eew	Linear Add	No	Dead	0.9	Dead (min) - Static Earthquake [Strength]
0.9D-Ev-Eew			Lateral (E-W)	-1	
0.9D-Ev-Eew			Dead	-0.1716	
0.9D-Ev-Ens	Linear Add	No	Dead	0.9	Dead (min) - Static Earthquake [Strength]
0.9D-Ev-Ens			Lateral (N-S)	-1	
0.9D-Ev-Ens			Dead	-0.1716	
1.2D+1.6L	Linear Add	No	Dead	1.2	Dead + Live [Strength]
1.2D+1.6L+0.5RL	Linear Add	No	Dead	1.2	Dead + Live + Roof Live [Strength]
1.2D+1.6L+0.5RL			Roof Live	0.5	
1.2D+L+1.6RL	Linear Add	No	Dead	1.2	Dead + Live + Roof Live [Strength]
1.2D+L+1.6RL			Roof Live	1.6	
1.2D+L+Ev+Eew	Linear Add	No	Dead	1.2	Dead + Live + Static Earthquake [Strength]

Table 4.9 - Load Combination Definitions (continued)

Name	Type	Is Auto	Load Name	SF	Notes
1.2D+L+Ev+Eew			Lateral (E-W)	1	
1.2D+L+Ev+Eew			Dead	0.1716	
1.2D+L+Ev+Ens	Linear Add	No	Dead	1.2	Dead + Live + Static Earthquake [Strength]
1.2D+L+Ev+Ens			Lateral (N-S)	1	
1.2D+L+Ev+Ens			Dead	0.1716	
1.2D+L+Ev-Eew	Linear Add	No	Dead	1.2	Dead + Live - Static Earthquake [Strength]
1.2D+L+Ev-Eew			Lateral (E-W)	-1	
1.2D+L+Ev-Eew			Dead	0.1716	
1.2D+L+Ev-Ens	Linear Add	No	Dead	1.2	Dead + Live - Static Earthquake [Strength]
1.2D+L+Ev-Ens			Lateral (N-S)	-1	
1.2D+L+Ev-Ens			Dead	0.1716	
1.4D	Linear Add	No	Dead	1.4	Dead [Strength]
Envelope	Envelope	No	1.4D	1	
Envelope			1.2D+1.6L	1	
Envelope			1.2D+1.6L+0.5RL	1	
Envelope			1.2D+L+1.6RL	1	
Envelope			1.2D+L+Ev+Ens	1	
Envelope			1.2D+L+Ev-Ens	1	
Envelope			1.2D+L+Ev+Eew	1	
Envelope			1.2D+L+Ev-Eew	1	
Envelope			0.9D-Ev+Ens	1	
Envelope			0.9D-Ev-Ens	1	
Envelope			0.9D-Ev+Eew	1	
Envelope			0.9D-Ev-Eew	1	

5 Analysis Results

This chapter provides analysis results.

5.1 Structure Results

Table 5.1 - Base Reactions

Output Case	Case Type	Step Type	FX kip	FY kip	FZ kip	MX kip-ft	MY kip-ft	MZ kip-ft	X ft	Y ft	Z ft
Dead	LinStatic		0	0	45.25	1267	-585.991	0	0	0	0
Roof Live	LinStatic		0	0	59.188	1657.264	-654.64	0	0	0	0
Lateral (N-S)	LinStatic		-12.506	0	0	0	-206.3558	350.1796	0	0	0
Lateral (E-W)	LinStatic		0	-12.506	0	206.3558	0	-158.6726	0	0	0
Envelope	Combination	Max	12.506	12.506	149.001	4172.0224	-220.48	350.1796	0	0	0
Envelope	Combination	Min	-12.506	-12.506	32.96	716.527	-1750.6132	-350.1796	0	0	0

5.2 Story Results

Table 5.2 - Story Drifts

Story	Output Case	Case Type	Step Type	Direction	Drift	Label	X ft	Y ft	Z ft
Story1	Dead	LinStatic		X	1E-06	37	0	28	16.5
Story1	Dead	LinStatic		Y	3E-06	8	24.5	0	16.5
Story1	Roof Live	LinStatic		X	1E-06	11	24.5	28	16.5
Story1	Roof Live	LinStatic		Y	4E-06	8	24.5	0	16.5
Story1	Lateral (N-S)	LinStatic		X	0.00198	33	24.5	14	16.5
Story1	Lateral (E-W)	LinStatic		Y	0.001106	22	17.4167	0	16.5
Story1	Envelope	Combination	Max	X	0.00198	33	24.5	14	16.5
Story1	Envelope	Combination	Max	Y	0.00111	22	17.4167	0	16.5
Story1	Envelope	Combination	Min	X	0.001981	12	24.5	42	16.5
Story1	Envelope	Combination	Min	Y	0.001108	24	17.4167	56	16.5

5.3 Line Results

Table 5.3 - Element Forces - Columns (Part 1 of 2)

Story	Column	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft
Story1	C57	5	Dead	LinStatic		0	-4.136	0	-0.005	0
Story1	C57	5	Dead	LinStatic		8.25	-4.136	0	-0.005	0
Story1	C57	5	Dead	LinStatic		11	-4.136	0	-0.005	0
Story1	C57	5	Dead	LinStatic		11	-4.136	0	-0.005	0
Story1	C57	5	Dead	LinStatic		12	-4.136	0	-0.005	0
Story1	C57	5	Dead	LinStatic		12	-4.136	0	0.013	0
Story1	C57	5	Dead	LinStatic		16.5	-4.136	0	0.013	0
Story1	C57	5	Roof Live	LinStatic		0	-4.604	0	-0.005	0
Story1	C57	5	Roof Live	LinStatic		8.25	-4.604	0	-0.005	0
Story1	C57	5	Roof Live	LinStatic		11	-4.604	0	-0.005	0
Story1	C57	5	Roof Live	LinStatic		11	-4.604	0	-0.005	0
Story1	C57	5	Roof Live	LinStatic		12	-4.604	0	-0.005	0
Story1	C57	5	Roof Live	LinStatic		12	-4.604	0	0.014	0
Story1	C57	5	Roof Live	LinStatic		16.5	-4.604	0	0.014	0

Table 5.3 - Element Forces - Columns (Part 1 of 2, continued)

Story	Column	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft
Story1	C57	5	Lateral (N-S)	LinStatic		0	-0.003	0	9.805E-06	0
Story1	C57	5	Lateral (N-S)	LinStatic		8.25	-0.003	0	9.805E-06	0
Story1	C57	5	Lateral (N-S)	LinStatic		11	-0.003	0	9.805E-06	0
Story1	C57	5	Lateral (N-S)	LinStatic		11	-0.003	0	9.805E-06	0
Story1	C57	5	Lateral (N-S)	LinStatic		12	-0.003	0	9.805E-06	0
Story1	C57	5	Lateral (N-S)	LinStatic		12	-0.003	0	-2.615E-05	0
Story1	C57	5	Lateral (N-S)	LinStatic		16.5	-0.003	0	-2.615E-05	0
Story1	C57	5	Lateral (E-W)	LinStatic		0	0.007	0	-0.135	0
Story1	C57	5	Lateral (E-W)	LinStatic		8.25	0.007	0	-0.135	0
Story1	C57	5	Lateral (E-W)	LinStatic		11	0.007	0	-0.135	0
Story1	C57	5	Lateral (E-W)	LinStatic		11	0.007	0	-0.135	0
Story1	C57	5	Lateral (E-W)	LinStatic		12	0.007	0	-0.135	0
Story1	C57	5	Lateral (E-W)	LinStatic		12	0.007	0	0.36	0
Story1	C57	5	Lateral (E-W)	LinStatic		16.5	0.007	0	0.36	0
Story1	C57	5	Envelope	Combination	Max	0	-3.006	0	0.132	0
Story1	C57	5	Envelope	Combination	Max	8.25	-3.006	0	0.132	0
Story1	C57	5	Envelope	Combination	Max	11	-3.006	0	0.132	0
Story1	C57	5	Envelope	Combination	Max	11	-3.006	0	0.132	0
Story1	C57	5	Envelope	Combination	Max	12	-3.006	0	0.132	0
Story1	C57	5	Envelope	Combination	Max	12	-3.006	0	0.378	0
Story1	C57	5	Envelope	Combination	Max	16.5	-3.006	0	0.378	0
Story1	C57	5	Envelope	Combination	Min	0	-12.33	0	-0.142	0
Story1	C57	5	Envelope	Combination	Min	8.25	-12.33	0	-0.142	0
Story1	C57	5	Envelope	Combination	Min	11	-12.33	0	-0.142	0
Story1	C57	5	Envelope	Combination	Min	11	-12.33	0	-0.142	0
Story1	C57	5	Envelope	Combination	Min	12	-12.33	0	-0.142	0
Story1	C57	5	Envelope	Combination	Min	12	-12.33	0	-0.351	0
Story1	C57	5	Envelope	Combination	Min	16.5	-12.33	0	-0.351	0
Story1	C58	6	Dead	LinStatic		0	-7.694	-0.001	-1.136	0
Story1	C58	6	Dead	LinStatic		7.75	-7.694	-0.001	-1.136	0
Story1	C58	6	Dead	LinStatic		11	-7.694	-0.001	-1.136	0
Story1	C58	6	Dead	LinStatic		11	-7.694	-0.001	-1.136	0
Story1	C58	6	Dead	LinStatic		12	-7.694	-0.001	-1.136	0
Story1	C58	6	Dead	LinStatic		12	-7.694	0.007	-1.136	0
Story1	C58	6	Dead	LinStatic		15.5	-7.694	0.007	-1.136	0
Story1	C58	6	Roof Live	LinStatic		0	-8.546	-0.002	-1.258	0
Story1	C58	6	Roof Live	LinStatic		7.75	-8.546	-0.002	-1.258	0
Story1	C58	6	Roof Live	LinStatic		11	-8.546	-0.002	-1.258	0
Story1	C58	6	Roof Live	LinStatic		11	-8.546	-0.002	-1.258	0
Story1	C58	6	Roof Live	LinStatic		12	-8.546	-0.002	-1.258	0
Story1	C58	6	Roof Live	LinStatic		12	-8.546	0.008	-1.258	0
Story1	C58	6	Roof Live	LinStatic		15.5	-8.546	0.008	-1.258	0
Story1	C58	6	Lateral (N-S)	LinStatic		0	-0.798	-4.707E-05	-2.801	0
Story1	C58	6	Lateral (N-S)	LinStatic		7.75	-0.798	-4.707E-05	-2.801	0
Story1	C58	6	Lateral (N-S)	LinStatic		11	-0.798	-4.707E-05	-2.801	0

Table 5.3 - Element Forces - Columns (Part 1 of 2, continued)

Story	Column	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft
Story1	C58	6	Lateral (N-S)	LinStatic		11	-0.798	-4.707E-05	-2.801	0
Story1	C58	6	Lateral (N-S)	LinStatic		12	-0.798	-4.707E-05	-2.801	0
Story1	C58	6	Lateral (N-S)	LinStatic		12	-0.798	0.0001554	-2.801	0
Story1	C58	6	Lateral (N-S)	LinStatic		15.5	-0.798	0.0001554	-2.801	0
Story1	C58	6	Lateral (E-W)	LinStatic		0	0.059	3.907	0	0
Story1	C58	6	Lateral (E-W)	LinStatic		7.75	0.059	3.907	0	0
Story1	C58	6	Lateral (E-W)	LinStatic		11	0.059	3.907	0	0
Story1	C58	6	Lateral (E-W)	LinStatic		11	0.059	3.907	0	0
Story1	C58	6	Lateral (E-W)	LinStatic		12	0.059	3.907	0	0
Story1	C58	6	Lateral (E-W)	LinStatic		12	0.059	2.563	0	0
Story1	C58	6	Lateral (E-W)	LinStatic		15.5	0.059	2.563	0	0
Story1	C58	6	Envelope	Combination	Max	0	-4.806	3.906	1.974	0
Story1	C58	6	Envelope	Combination	Max	7.75	-4.806	3.906	1.974	0
Story1	C58	6	Envelope	Combination	Max	11	-4.806	3.906	1.974	0
Story1	C58	6	Envelope	Combination	Max	11	-4.806	3.906	1.974	0
Story1	C58	6	Envelope	Combination	Max	12	-4.806	3.906	1.974	0
Story1	C58	6	Envelope	Combination	Max	12	-4.806	2.573	1.974	0
Story1	C58	6	Envelope	Combination	Max	15.5	-4.806	2.573	1.974	0
Story1	C58	6	Envelope	Combination	Min	0	-22.906	-3.909	-4.358	0
Story1	C58	6	Envelope	Combination	Min	7.75	-22.906	-3.909	-4.358	0
Story1	C58	6	Envelope	Combination	Min	11	-22.906	-3.909	-4.358	0
Story1	C58	6	Envelope	Combination	Min	11	-22.906	-3.909	-4.358	0
Story1	C58	6	Envelope	Combination	Min	12	-22.906	-3.909	-4.358	0
Story1	C58	6	Envelope	Combination	Min	12	-22.906	-2.558	-4.358	0
Story1	C58	6	Envelope	Combination	Min	15.5	-22.906	-2.558	-4.358	0
Story1	C59	7	Dead	LinStatic		0	-4.136	0	0.007	0
Story1	C59	7	Dead	LinStatic		7.75	-4.136	0	0.007	0
Story1	C59	7	Dead	LinStatic		11	-4.136	0	0.007	0
Story1	C59	7	Dead	LinStatic		11	-4.136	0	0.007	0
Story1	C59	7	Dead	LinStatic		12	-4.136	0	0.007	0
Story1	C59	7	Dead	LinStatic		12	-4.136	0	-0.025	0
Story1	C59	7	Dead	LinStatic		15.5	-4.136	0	-0.025	0
Story1	C59	7	Roof Live	LinStatic		0	-4.604	0	0.008	0
Story1	C59	7	Roof Live	LinStatic		7.75	-4.604	0	0.008	0
Story1	C59	7	Roof Live	LinStatic		11	-4.604	0	0.008	0
Story1	C59	7	Roof Live	LinStatic		11	-4.604	0	0.008	0
Story1	C59	7	Roof Live	LinStatic		12	-4.604	0	0.008	0
Story1	C59	7	Roof Live	LinStatic		12	-4.604	0	-0.029	0
Story1	C59	7	Roof Live	LinStatic		15.5	-4.604	0	-0.029	0
Story1	C59	7	Lateral (N-S)	LinStatic		0	-0.003	0	7.686E-05	0
Story1	C59	7	Lateral (N-S)	LinStatic		7.75	-0.003	0	7.686E-05	0
Story1	C59	7	Lateral (N-S)	LinStatic		11	-0.003	0	7.686E-05	0
Story1	C59	7	Lateral (N-S)	LinStatic		11	-0.003	0	7.686E-05	0
Story1	C59	7	Lateral (N-S)	LinStatic		12	-0.003	0	7.686E-05	0
Story1	C59	7	Lateral (N-S)	LinStatic		12	-0.003	0	-0.0002635	0

Table 5.3 - Element Forces - Columns (Part 1 of 2, continued)

Story	Column	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft
Story1	C59	7	Lateral (N-S)	LinStatic		15.5	-0.003	0	-0.0002635	0
Story1	C59	7	Lateral (E-W)	LinStatic		0	-0.014	0	-0.313	0
Story1	C59	7	Lateral (E-W)	LinStatic		7.75	-0.014	0	-0.313	0
Story1	C59	7	Lateral (E-W)	LinStatic		11	-0.014	0	-0.313	0
Story1	C59	7	Lateral (E-W)	LinStatic		11	-0.014	0	-0.313	0
Story1	C59	7	Lateral (E-W)	LinStatic		12	-0.014	0	-0.313	0
Story1	C59	7	Lateral (E-W)	LinStatic		12	-0.014	0	1.073	0
Story1	C59	7	Lateral (E-W)	LinStatic		15.5	-0.014	0	1.073	0
Story1	C59	7	Envelope	Combination	Max	0	-2.998	0	0.323	0
Story1	C59	7	Envelope	Combination	Max	7.75	-2.998	0	0.323	0
Story1	C59	7	Envelope	Combination	Max	11	-2.998	0	0.323	0
Story1	C59	7	Envelope	Combination	Max	11	-2.998	0	0.323	0
Story1	C59	7	Envelope	Combination	Max	12	-2.998	0	0.323	0
Story1	C59	7	Envelope	Combination	Max	12	-2.998	0	1.055	0
Story1	C59	7	Envelope	Combination	Max	15.5	-2.998	0	1.055	0
Story1	C59	7	Envelope	Combination	Min	0	-12.33	0	-0.308	0
Story1	C59	7	Envelope	Combination	Min	7.75	-12.33	0	-0.308	0
Story1	C59	7	Envelope	Combination	Min	11	-12.33	0	-0.308	0
Story1	C59	7	Envelope	Combination	Min	11	-12.33	0	-0.308	0
Story1	C59	7	Envelope	Combination	Min	12	-12.33	0	-0.308	0
Story1	C59	7	Envelope	Combination	Min	12	-12.33	0	-1.108	0
Story1	C59	7	Envelope	Combination	Min	15.5	-12.33	0	-1.108	0
Story1	C60	12	Dead	LinStatic		0	-3.323	0	-0.004	0
Story1	C60	12	Dead	LinStatic		4.5	-3.323	0	-0.004	0
Story1	C60	12	Dead	LinStatic		4.5	-3.323	0	-0.004	0
Story1	C60	12	Dead	LinStatic		7.75	-3.323	0	-0.004	0
Story1	C60	12	Dead	LinStatic		8.5	-3.323	0	-0.004	0
Story1	C60	12	Dead	LinStatic		8.5	-3.323	0	-0.004	0
Story1	C60	12	Dead	LinStatic		11	-3.323	0	-0.004	0
Story1	C60	12	Dead	LinStatic		11	-2.483	0	0.01	0
Story1	C60	12	Dead	LinStatic		12	-2.483	0	0.01	0
Story1	C60	12	Dead	LinStatic		12	-2.483	0	0.01	0
Story1	C60	12	Dead	LinStatic		15.5	-2.483	0	0.01	0
Story1	C60	12	Roof Live	LinStatic		0	-5.908	0	-0.007	0
Story1	C60	12	Roof Live	LinStatic		4.5	-5.908	0	-0.007	0
Story1	C60	12	Roof Live	LinStatic		4.5	-5.908	0	-0.007	0
Story1	C60	12	Roof Live	LinStatic		7.75	-5.908	0	-0.007	0
Story1	C60	12	Roof Live	LinStatic		8.5	-5.908	0	-0.007	0
Story1	C60	12	Roof Live	LinStatic		8.5	-5.908	0	-0.007	0
Story1	C60	12	Roof Live	LinStatic		11	-5.908	0	-0.007	0
Story1	C60	12	Roof Live	LinStatic		11	-4.606	0	0.018	0
Story1	C60	12	Roof Live	LinStatic		12	-4.606	0	0.018	0
Story1	C60	12	Roof Live	LinStatic		12	-4.606	0	0.018	0
Story1	C60	12	Roof Live	LinStatic		15.5	-4.606	0	0.018	0
Story1	C60	12	Lateral (N-S)	LinStatic		0	0.003	0	7.195E-05	0

Table 5.3 - Element Forces - Columns (Part 1 of 2, continued)

Story	Column	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft
Story1	C60	12	Lateral (N-S)	LinStatic		4.5	0.003	0	7.195E-05	0
Story1	C60	12	Lateral (N-S)	LinStatic		4.5	0.003	0	7.195E-05	0
Story1	C60	12	Lateral (N-S)	LinStatic		7.75	0.003	0	7.195E-05	0
Story1	C60	12	Lateral (N-S)	LinStatic		8.5	0.003	0	7.195E-05	0
Story1	C60	12	Lateral (N-S)	LinStatic		8.5	0.003	0	7.195E-05	0
Story1	C60	12	Lateral (N-S)	LinStatic		11	0.003	0	7.195E-05	0
Story1	C60	12	Lateral (N-S)	LinStatic		11	0.003	0	-0.0001759	0
Story1	C60	12	Lateral (N-S)	LinStatic		12	0.003	0	-0.0001759	0
Story1	C60	12	Lateral (N-S)	LinStatic		12	0.003	0	-0.0001759	0
Story1	C60	12	Lateral (N-S)	LinStatic		15.5	0.003	0	-0.0001759	0
Story1	C60	12	Lateral (E-W)	LinStatic		0	0.01	0	-0.296	0
Story1	C60	12	Lateral (E-W)	LinStatic		4.5	0.01	0	-0.296	0
Story1	C60	12	Lateral (E-W)	LinStatic		4.5	0.01	0	-0.296	0
Story1	C60	12	Lateral (E-W)	LinStatic		7.75	0.01	0	-0.296	0
Story1	C60	12	Lateral (E-W)	LinStatic		8.5	0.01	0	-0.296	0
Story1	C60	12	Lateral (E-W)	LinStatic		8.5	0.01	0	-0.296	0
Story1	C60	12	Lateral (E-W)	LinStatic		11	0.01	0	-0.296	0
Story1	C60	12	Lateral (E-W)	LinStatic		11	0.01	0	0.723	0
Story1	C60	12	Lateral (E-W)	LinStatic		12	0.01	0	0.723	0
Story1	C60	12	Lateral (E-W)	LinStatic		12	0.01	0	0.723	0
Story1	C60	12	Lateral (E-W)	LinStatic		15.5	0.01	0	0.723	0
Story1	C60	12	Envelope	Combination	Max	0	-2.411	0	0.293	0
Story1	C60	12	Envelope	Combination	Max	4.5	-2.411	0	0.293	0
Story1	C60	12	Envelope	Combination	Max	4.5	-2.411	0	0.293	0
Story1	C60	12	Envelope	Combination	Max	7.75	-2.411	0	0.293	0
Story1	C60	12	Envelope	Combination	Max	8.5	-2.411	0	0.293	0
Story1	C60	12	Envelope	Combination	Max	8.5	-2.411	0	0.293	0
Story1	C60	12	Envelope	Combination	Max	11	-2.411	0	0.293	0
Story1	C60	12	Envelope	Combination	Max	11	-1.799	0	0.736	0
Story1	C60	12	Envelope	Combination	Max	12	-1.799	0	0.736	0
Story1	C60	12	Envelope	Combination	Max	12	-1.799	0	0.736	0
Story1	C60	12	Envelope	Combination	Max	15.5	-1.799	0	0.736	0
Story1	C60	12	Envelope	Combination	Min	0	-13.44	0	-0.301	0
Story1	C60	12	Envelope	Combination	Min	4.5	-13.44	0	-0.301	0
Story1	C60	12	Envelope	Combination	Min	4.5	-13.44	0	-0.301	0
Story1	C60	12	Envelope	Combination	Min	7.75	-13.44	0	-0.301	0
Story1	C60	12	Envelope	Combination	Min	8.5	-13.44	0	-0.301	0
Story1	C60	12	Envelope	Combination	Min	8.5	-13.44	0	-0.301	0
Story1	C60	12	Envelope	Combination	Min	11	-13.44	0	-0.301	0
Story1	C60	12	Envelope	Combination	Min	11	-10.348	0	-0.716	0
Story1	C60	12	Envelope	Combination	Min	12	-10.348	0	-0.716	0
Story1	C60	12	Envelope	Combination	Min	12	-10.348	0	-0.716	0
Story1	C60	12	Envelope	Combination	Min	15.5	-10.348	0	-0.716	0
Story1	C61	13	Dead	LinStatic		0	-3.323	0	0.004	0
Story1	C61	13	Dead	LinStatic		4.5	-3.323	0	0.004	0

Table 5.3 - Element Forces - Columns (Part 1 of 2, continued)

Story	Column	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft
Story1	C61	13	Dead	LinStatic		4.5	-3.323	0	0.004	0
Story1	C61	13	Dead	LinStatic		7.75	-3.323	0	0.004	0
Story1	C61	13	Dead	LinStatic		8.5	-3.323	0	0.004	0
Story1	C61	13	Dead	LinStatic		8.5	-3.323	0	0.004	0
Story1	C61	13	Dead	LinStatic		11	-3.323	0	0.004	0
Story1	C61	13	Dead	LinStatic		11	-2.483	0	-0.01	0
Story1	C61	13	Dead	LinStatic		12	-2.483	0	-0.01	0
Story1	C61	13	Dead	LinStatic		12	-2.483	0	-0.01	0
Story1	C61	13	Dead	LinStatic		15.5	-2.483	0	-0.01	0
Story1	C61	13	Roof Live	LinStatic		0	-5.908	0	0.007	0
Story1	C61	13	Roof Live	LinStatic		4.5	-5.908	0	0.007	0
Story1	C61	13	Roof Live	LinStatic		4.5	-5.908	0	0.007	0
Story1	C61	13	Roof Live	LinStatic		7.75	-5.908	0	0.007	0
Story1	C61	13	Roof Live	LinStatic		8.5	-5.908	0	0.007	0
Story1	C61	13	Roof Live	LinStatic		8.5	-5.908	0	0.007	0
Story1	C61	13	Roof Live	LinStatic		11	-5.908	0	0.007	0
Story1	C61	13	Roof Live	LinStatic		11	-4.606	0	-0.018	0
Story1	C61	13	Roof Live	LinStatic		12	-4.606	0	-0.018	0
Story1	C61	13	Roof Live	LinStatic		12	-4.606	0	-0.018	0
Story1	C61	13	Roof Live	LinStatic		15.5	-4.606	0	-0.018	0
Story1	C61	13	Lateral (N-S)	LinStatic		0	0.003	0	-7.339E-05	0
Story1	C61	13	Lateral (N-S)	LinStatic		4.5	0.003	0	-7.339E-05	0
Story1	C61	13	Lateral (N-S)	LinStatic		4.5	0.003	0	-7.339E-05	0
Story1	C61	13	Lateral (N-S)	LinStatic		7.75	0.003	0	-7.339E-05	0
Story1	C61	13	Lateral (N-S)	LinStatic		8.5	0.003	0	-7.339E-05	0
Story1	C61	13	Lateral (N-S)	LinStatic		8.5	0.003	0	-7.339E-05	0
Story1	C61	13	Lateral (N-S)	LinStatic		11	0.003	0	-7.339E-05	0
Story1	C61	13	Lateral (N-S)	LinStatic		11	0.003	0	0.0001794	0
Story1	C61	13	Lateral (N-S)	LinStatic		12	0.003	0	0.0001794	0
Story1	C61	13	Lateral (N-S)	LinStatic		12	0.003	0	0.0001794	0
Story1	C61	13	Lateral (N-S)	LinStatic		15.5	0.003	0	0.0001794	0
Story1	C61	13	Lateral (E-W)	LinStatic		0	-0.01	0	-0.296	0
Story1	C61	13	Lateral (E-W)	LinStatic		4.5	-0.01	0	-0.296	0
Story1	C61	13	Lateral (E-W)	LinStatic		4.5	-0.01	0	-0.296	0
Story1	C61	13	Lateral (E-W)	LinStatic		7.75	-0.01	0	-0.296	0
Story1	C61	13	Lateral (E-W)	LinStatic		8.5	-0.01	0	-0.296	0
Story1	C61	13	Lateral (E-W)	LinStatic		8.5	-0.01	0	-0.296	0
Story1	C61	13	Lateral (E-W)	LinStatic		11	-0.01	0	-0.296	0
Story1	C61	13	Lateral (E-W)	LinStatic		11	-0.01	0	0.723	0
Story1	C61	13	Lateral (E-W)	LinStatic		12	-0.01	0	0.723	0
Story1	C61	13	Lateral (E-W)	LinStatic		12	-0.01	0	0.723	0
Story1	C61	13	Lateral (E-W)	LinStatic		15.5	-0.01	0	0.723	0
Story1	C61	13	Envelope	Combination	Max	0	-2.41	0	0.301	0
Story1	C61	13	Envelope	Combination	Max	4.5	-2.41	0	0.301	0
Story1	C61	13	Envelope	Combination	Max	4.5	-2.41	0	0.301	0

Table 5.3 - Element Forces - Columns (Part 1 of 2, continued)

Story	Column	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft
Story1	C61	13	Envelope	Combination	Max	7.75	-2.41	0	0.301	0
Story1	C61	13	Envelope	Combination	Max	8.5	-2.41	0	0.301	0
Story1	C61	13	Envelope	Combination	Max	8.5	-2.41	0	0.301	0
Story1	C61	13	Envelope	Combination	Max	11	-2.41	0	0.301	0
Story1	C61	13	Envelope	Combination	Max	11	-1.798	0	0.716	0
Story1	C61	13	Envelope	Combination	Max	12	-1.798	0	0.716	0
Story1	C61	13	Envelope	Combination	Max	12	-1.798	0	0.716	0
Story1	C61	13	Envelope	Combination	Max	15.5	-1.798	0	0.716	0
Story1	C61	13	Envelope	Combination	Min	0	-13.44	0	-0.293	0
Story1	C61	13	Envelope	Combination	Min	4.5	-13.44	0	-0.293	0
Story1	C61	13	Envelope	Combination	Min	4.5	-13.44	0	-0.293	0
Story1	C61	13	Envelope	Combination	Min	7.75	-13.44	0	-0.293	0
Story1	C61	13	Envelope	Combination	Min	8.5	-13.44	0	-0.293	0
Story1	C61	13	Envelope	Combination	Min	8.5	-13.44	0	-0.293	0
Story1	C61	13	Envelope	Combination	Min	11	-13.44	0	-0.293	0
Story1	C61	13	Envelope	Combination	Min	11	-10.348	0	-0.736	0
Story1	C61	13	Envelope	Combination	Min	12	-10.348	0	-0.736	0
Story1	C61	13	Envelope	Combination	Min	12	-10.348	0	-0.736	0
Story1	C61	13	Envelope	Combination	Min	15.5	-10.348	0	-0.736	0
Story1	C62	16	Dead	LinStatic		0	-6.902	3.833E-05	1.136	0
Story1	C62	16	Dead	LinStatic		4.5	-6.902	3.833E-05	1.136	0
Story1	C62	16	Dead	LinStatic		4.5	-6.902	3.833E-05	1.136	0
Story1	C62	16	Dead	LinStatic		7.75	-6.902	3.833E-05	1.136	0
Story1	C62	16	Dead	LinStatic		8.5	-6.902	3.833E-05	1.136	0
Story1	C62	16	Dead	LinStatic		8.5	-6.902	3.833E-05	1.136	0
Story1	C62	16	Dead	LinStatic		11	-6.902	3.833E-05	1.136	0
Story1	C62	16	Dead	LinStatic		11	-6.062	-1.08E-05	1.136	0
Story1	C62	16	Dead	LinStatic		12	-6.062	-1.08E-05	1.136	0
Story1	C62	16	Dead	LinStatic		12	-6.062	-1.08E-05	1.136	0
Story1	C62	16	Dead	LinStatic		15.5	-6.062	-1.08E-05	1.136	0
Story1	C62	16	Roof Live	LinStatic		0	-9.848	4.344E-05	1.258	0
Story1	C62	16	Roof Live	LinStatic		4.5	-9.848	4.344E-05	1.258	0
Story1	C62	16	Roof Live	LinStatic		4.5	-9.848	4.344E-05	1.258	0
Story1	C62	16	Roof Live	LinStatic		7.75	-9.848	4.344E-05	1.258	0
Story1	C62	16	Roof Live	LinStatic		8.5	-9.848	4.344E-05	1.258	0
Story1	C62	16	Roof Live	LinStatic		8.5	-9.848	4.344E-05	1.258	0
Story1	C62	16	Roof Live	LinStatic		11	-9.848	4.344E-05	1.258	0
Story1	C62	16	Roof Live	LinStatic		11	-8.546	-1.224E-05	1.258	0
Story1	C62	16	Roof Live	LinStatic		12	-8.546	-1.224E-05	1.258	0
Story1	C62	16	Roof Live	LinStatic		12	-8.546	-1.224E-05	1.258	0
Story1	C62	16	Roof Live	LinStatic		15.5	-8.546	-1.224E-05	1.258	0
Story1	C62	16	Lateral (N-S)	LinStatic		0	0.798	0	-2.8	0
Story1	C62	16	Lateral (N-S)	LinStatic		4.5	0.798	0	-2.8	0
Story1	C62	16	Lateral (N-S)	LinStatic		4.5	0.798	0	-2.8	0
Story1	C62	16	Lateral (N-S)	LinStatic		7.75	0.798	0	-2.8	0

Table 5.3 - Element Forces - Columns (Part 1 of 2, continued)

Story	Column	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft
Story1	C62	16	Lateral (N-S)	LinStatic		8.5	0.798	0	-2.8	0
Story1	C62	16	Lateral (N-S)	LinStatic		8.5	0.798	0	-2.8	0
Story1	C62	16	Lateral (N-S)	LinStatic		11	0.798	0	-2.8	0
Story1	C62	16	Lateral (N-S)	LinStatic		11	0.798	0	-2.8	0
Story1	C62	16	Lateral (N-S)	LinStatic		12	0.798	0	-2.8	0
Story1	C62	16	Lateral (N-S)	LinStatic		12	0.798	0	-2.8	0
Story1	C62	16	Lateral (N-S)	LinStatic		15.5	0.798	0	-2.8	0
Story1	C62	16	Lateral (E-W)	LinStatic		0	8.972E-05	3.74	0	0
Story1	C62	16	Lateral (E-W)	LinStatic		4.5	8.972E-05	3.74	0	0
Story1	C62	16	Lateral (E-W)	LinStatic		4.5	8.972E-05	3.74	0	0
Story1	C62	16	Lateral (E-W)	LinStatic		7.75	8.972E-05	3.74	0	0
Story1	C62	16	Lateral (E-W)	LinStatic		8.5	8.972E-05	3.74	0	0
Story1	C62	16	Lateral (E-W)	LinStatic		8.5	8.972E-05	3.74	0	0
Story1	C62	16	Lateral (E-W)	LinStatic		11	8.972E-05	3.74	0	0
Story1	C62	16	Lateral (E-W)	LinStatic		11	8.972E-05	2.387	0	0
Story1	C62	16	Lateral (E-W)	LinStatic		12	8.972E-05	2.387	0	0
Story1	C62	16	Lateral (E-W)	LinStatic		12	8.972E-05	2.387	0	0
Story1	C62	16	Lateral (E-W)	LinStatic		15.5	8.972E-05	2.387	0	0
Story1	C62	16	Envelope	Combination	Max	0	-4.229	3.74	4.358	0
Story1	C62	16	Envelope	Combination	Max	4.5	-4.229	3.74	4.358	0
Story1	C62	16	Envelope	Combination	Max	4.5	-4.229	3.74	4.358	0
Story1	C62	16	Envelope	Combination	Max	7.75	-4.229	3.74	4.358	0
Story1	C62	16	Envelope	Combination	Max	8.5	-4.229	3.74	4.358	0
Story1	C62	16	Envelope	Combination	Max	8.5	-4.229	3.74	4.358	0
Story1	C62	16	Envelope	Combination	Max	11	-4.229	3.74	4.358	0
Story1	C62	16	Envelope	Combination	Max	11	-3.617	2.387	4.358	0
Story1	C62	16	Envelope	Combination	Max	12	-3.617	2.387	4.358	0
Story1	C62	16	Envelope	Combination	Max	12	-3.617	2.387	4.358	0
Story1	C62	16	Envelope	Combination	Max	15.5	-3.617	2.387	4.358	0
Story1	C62	16	Envelope	Combination	Min	0	-24.04	-3.74	-1.973	0
Story1	C62	16	Envelope	Combination	Min	4.5	-24.04	-3.74	-1.973	0
Story1	C62	16	Envelope	Combination	Min	4.5	-24.04	-3.74	-1.973	0
Story1	C62	16	Envelope	Combination	Min	7.75	-24.04	-3.74	-1.973	0
Story1	C62	16	Envelope	Combination	Min	8.5	-24.04	-3.74	-1.973	0
Story1	C62	16	Envelope	Combination	Min	8.5	-24.04	-3.74	-1.973	0
Story1	C62	16	Envelope	Combination	Min	11	-24.04	-3.74	-1.973	0
Story1	C62	16	Envelope	Combination	Min	11	-20.949	-2.387	-1.973	0
Story1	C62	16	Envelope	Combination	Min	12	-20.949	-2.387	-1.973	0
Story1	C62	16	Envelope	Combination	Min	12	-20.949	-2.387	-1.973	0
Story1	C62	16	Envelope	Combination	Min	15.5	-20.949	-2.387	-1.973	0
Story1	C63	20	Dead	LinStatic		0	-2.446	-0.067	0.02	0
Story1	C63	20	Dead	LinStatic		4.5	-2.446	-0.067	0.02	0
Story1	C63	20	Dead	LinStatic		4.5	-2.446	-0.067	0.02	0
Story1	C63	20	Dead	LinStatic		7.75	-2.446	-0.067	0.02	0
Story1	C63	20	Dead	LinStatic		8.5	-2.446	-0.067	0.02	0

Table 5.3 - Element Forces - Columns (Part 1 of 2, continued)

Story	Column	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft
Story1	C63	20	Dead	LinStatic		8.5	-2.446	-0.067	0.02	0
Story1	C63	20	Dead	LinStatic		11	-2.446	-0.067	0.02	0
Story1	C63	20	Dead	LinStatic		11	-2.026	-0.067	-0.517	0
Story1	C63	20	Dead	LinStatic		12	-2.026	-0.067	-0.517	0
Story1	C63	20	Dead	LinStatic		12	-2.026	-0.067	-0.517	0
Story1	C63	20	Dead	LinStatic		15.5	-2.026	-0.067	-0.517	0
Story1	C63	20	Roof Live	LinStatic		0	-3.795	-0.073	0.037	0
Story1	C63	20	Roof Live	LinStatic		4.5	-3.795	-0.073	0.037	0
Story1	C63	20	Roof Live	LinStatic		4.5	-3.795	-0.073	0.037	0
Story1	C63	20	Roof Live	LinStatic		7.75	-3.795	-0.073	0.037	0
Story1	C63	20	Roof Live	LinStatic		8.5	-3.795	-0.073	0.037	0
Story1	C63	20	Roof Live	LinStatic		8.5	-3.795	-0.073	0.037	0
Story1	C63	20	Roof Live	LinStatic		11	-3.795	-0.073	0.037	0
Story1	C63	20	Roof Live	LinStatic		11	-3.144	-0.073	-0.938	0
Story1	C63	20	Roof Live	LinStatic		12	-3.144	-0.073	-0.938	0
Story1	C63	20	Roof Live	LinStatic		12	-3.144	-0.073	-0.938	0
Story1	C63	20	Roof Live	LinStatic		15.5	-3.144	-0.073	-0.938	0
Story1	C63	20	Lateral (N-S)	LinStatic		0	1.695	1.726	8.798E-05	-0.2902
Story1	C63	20	Lateral (N-S)	LinStatic		4.5	1.695	1.726	8.798E-05	-0.2902
Story1	C63	20	Lateral (N-S)	LinStatic		4.5	1.695	1.726	8.798E-05	-0.2902
Story1	C63	20	Lateral (N-S)	LinStatic		7.75	1.695	1.726	8.798E-05	-0.2902
Story1	C63	20	Lateral (N-S)	LinStatic		8.5	1.695	1.726	8.798E-05	-0.2902
Story1	C63	20	Lateral (N-S)	LinStatic		8.5	1.695	1.726	8.798E-05	-0.2902
Story1	C63	20	Lateral (N-S)	LinStatic		11	1.695	1.726	8.798E-05	-0.2902
Story1	C63	20	Lateral (N-S)	LinStatic		11	1.695	1.726	-0.003	-0.2902
Story1	C63	20	Lateral (N-S)	LinStatic		12	1.695	1.726	-0.003	-0.2902
Story1	C63	20	Lateral (N-S)	LinStatic		12	1.695	1.726	-0.003	-0.2902
Story1	C63	20	Lateral (N-S)	LinStatic		15.5	1.695	1.726	-0.003	-0.2902
Story1	C63	20	Lateral (E-W)	LinStatic		0	0.349	-0.001	1.441	0.0984
Story1	C63	20	Lateral (E-W)	LinStatic		4.5	0.349	-0.001	1.441	0.0984
Story1	C63	20	Lateral (E-W)	LinStatic		4.5	0.349	-0.001	1.441	0.0984
Story1	C63	20	Lateral (E-W)	LinStatic		7.75	0.349	-0.001	1.441	0.0984
Story1	C63	20	Lateral (E-W)	LinStatic		8.5	0.349	-0.001	1.441	0.0984
Story1	C63	20	Lateral (E-W)	LinStatic		8.5	0.349	-0.001	1.441	0.0984
Story1	C63	20	Lateral (E-W)	LinStatic		11	0.349	-0.001	1.441	0.0984
Story1	C63	20	Lateral (E-W)	LinStatic		11	0.349	-0.001	1.097	0.0984
Story1	C63	20	Lateral (E-W)	LinStatic		12	0.349	-0.001	1.097	0.0984
Story1	C63	20	Lateral (E-W)	LinStatic		12	0.349	-0.001	1.097	0.0984
Story1	C63	20	Lateral (E-W)	LinStatic		15.5	0.349	-0.001	1.097	0.0984
Story1	C63	20	Envelope	Combination	Max	0	-0.087	1.677	1.469	0.2902
Story1	C63	20	Envelope	Combination	Max	4.5	-0.087	1.677	1.469	0.2902
Story1	C63	20	Envelope	Combination	Max	4.5	-0.087	1.677	1.469	0.2902
Story1	C63	20	Envelope	Combination	Max	7.75	-0.087	1.677	1.469	0.2902
Story1	C63	20	Envelope	Combination	Max	8.5	-0.087	1.677	1.469	0.2902
Story1	C63	20	Envelope	Combination	Max	8.5	-0.087	1.677	1.469	0.2902

Table 5.3 - Element Forces - Columns (Part 1 of 2, continued)

Story	Column	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft
Story1	C63	20	Envelope	Combination	Max	11	-0.087	1.677	1.469	0.2902
Story1	C63	20	Envelope	Combination	Max	11	0.219	1.677	0.72	0.2902
Story1	C63	20	Envelope	Combination	Max	12	0.219	1.677	0.72	0.2902
Story1	C63	20	Envelope	Combination	Max	12	0.219	1.677	0.72	0.2902
Story1	C63	20	Envelope	Combination	Max	15.5	0.219	1.677	0.72	0.2902
Story1	C63	20	Envelope	Combination	Min	0	-9.006	-1.818	-1.426	-0.2902
Story1	C63	20	Envelope	Combination	Min	4.5	-9.006	-1.818	-1.426	-0.2902
Story1	C63	20	Envelope	Combination	Min	4.5	-9.006	-1.818	-1.426	-0.2902
Story1	C63	20	Envelope	Combination	Min	7.75	-9.006	-1.818	-1.426	-0.2902
Story1	C63	20	Envelope	Combination	Min	8.5	-9.006	-1.818	-1.426	-0.2902
Story1	C63	20	Envelope	Combination	Min	8.5	-9.006	-1.818	-1.426	-0.2902
Story1	C63	20	Envelope	Combination	Min	11	-9.006	-1.818	-1.426	-0.2902
Story1	C63	20	Envelope	Combination	Min	11	-7.461	-1.818	-2.12	-0.2902
Story1	C63	20	Envelope	Combination	Min	12	-7.461	-1.818	-2.12	-0.2902
Story1	C63	20	Envelope	Combination	Min	12	-7.461	-1.818	-2.12	-0.2902
Story1	C63	20	Envelope	Combination	Min	15.5	-7.461	-1.818	-2.12	-0.2902
Story1	C64	21	Dead	LinStatic		0	-2.529	0.067	-0.005	0
Story1	C64	21	Dead	LinStatic		8.25	-2.529	0.067	-0.005	0
Story1	C64	21	Dead	LinStatic		11	-2.529	0.067	-0.005	0
Story1	C64	21	Dead	LinStatic		11	-2.529	0.067	-0.005	0
Story1	C64	21	Dead	LinStatic		12	-2.529	0.067	-0.005	0
Story1	C64	21	Dead	LinStatic		12	-2.529	0.067	-0.958	0
Story1	C64	21	Dead	LinStatic		16.5	-2.529	0.067	-0.958	0
Story1	C64	21	Roof Live	LinStatic		0	-2.879	0.073	-0.005	0
Story1	C64	21	Roof Live	LinStatic		8.25	-2.879	0.073	-0.005	0
Story1	C64	21	Roof Live	LinStatic		11	-2.879	0.073	-0.005	0
Story1	C64	21	Roof Live	LinStatic		11	-2.879	0.073	-0.005	0
Story1	C64	21	Roof Live	LinStatic		12	-2.879	0.073	-0.005	0
Story1	C64	21	Roof Live	LinStatic		12	-2.879	0.073	-1.083	0
Story1	C64	21	Roof Live	LinStatic		16.5	-2.879	0.073	-1.083	0
Story1	C64	21	Lateral (N-S)	LinStatic		0	-1.695	1.726	0	-0.3325
Story1	C64	21	Lateral (N-S)	LinStatic		8.25	-1.695	1.726	0	-0.3325
Story1	C64	21	Lateral (N-S)	LinStatic		11	-1.695	1.726	0	-0.3325
Story1	C64	21	Lateral (N-S)	LinStatic		11	-1.695	1.726	0	-0.3325
Story1	C64	21	Lateral (N-S)	LinStatic		12	-1.695	1.726	0	-0.3325
Story1	C64	21	Lateral (N-S)	LinStatic		12	-1.695	1.726	0.003	-0.3325
Story1	C64	21	Lateral (N-S)	LinStatic		16.5	-1.695	1.726	0.003	-0.3325
Story1	C64	21	Lateral (E-W)	LinStatic		0	0.338	0.001	1.493	-0.0984
Story1	C64	21	Lateral (E-W)	LinStatic		8.25	0.338	0.001	1.493	-0.0984
Story1	C64	21	Lateral (E-W)	LinStatic		11	0.338	0.001	1.493	-0.0984
Story1	C64	21	Lateral (E-W)	LinStatic		11	0.338	0.001	1.493	-0.0984
Story1	C64	21	Lateral (E-W)	LinStatic		12	0.338	0.001	1.493	-0.0984
Story1	C64	21	Lateral (E-W)	LinStatic		12	0.338	0.001	1.244	-0.0984
Story1	C64	21	Lateral (E-W)	LinStatic		16.5	0.338	0.001	1.244	-0.0984
Story1	C64	21	Envelope	Combination	Max	0	-0.147	1.818	1.49	0.3325

Table 5.3 - Element Forces - Columns (Part 1 of 2, continued)

Story	Column	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft
Story1	C64	21	Envelope	Combination	Max	8.25	-0.147	1.818	1.49	0.3325
Story1	C64	21	Envelope	Combination	Max	11	-0.147	1.818	1.49	0.3325
Story1	C64	21	Envelope	Combination	Max	11	-0.147	1.818	1.49	0.3325
Story1	C64	21	Envelope	Combination	Max	12	-0.147	1.818	1.49	0.3325
Story1	C64	21	Envelope	Combination	Max	12	-0.147	1.818	0.547	0.3325
Story1	C64	21	Envelope	Combination	Max	16.5	-0.147	1.818	0.547	0.3325
Story1	C64	21	Envelope	Combination	Min	0	-7.641	-1.678	-1.499	-0.3325
Story1	C64	21	Envelope	Combination	Min	8.25	-7.641	-1.678	-1.499	-0.3325
Story1	C64	21	Envelope	Combination	Min	11	-7.641	-1.678	-1.499	-0.3325
Story1	C64	21	Envelope	Combination	Min	11	-7.641	-1.678	-1.499	-0.3325
Story1	C64	21	Envelope	Combination	Min	12	-7.641	-1.678	-1.499	-0.3325
Story1	C64	21	Envelope	Combination	Min	12	-7.641	-1.678	-2.883	-0.3325
Story1	C64	21	Envelope	Combination	Min	16.5	-7.641	-1.678	-2.883	-0.3325
Story1	C65	22	Dead	LinStatic		0	-2.446	-0.067	-0.02	0
Story1	C65	22	Dead	LinStatic		4.5	-2.446	-0.067	-0.02	0
Story1	C65	22	Dead	LinStatic		4.5	-2.446	-0.067	-0.02	0
Story1	C65	22	Dead	LinStatic		7.75	-2.446	-0.067	-0.02	0
Story1	C65	22	Dead	LinStatic		8.5	-2.446	-0.067	-0.02	0
Story1	C65	22	Dead	LinStatic		8.5	-2.446	-0.067	-0.02	0
Story1	C65	22	Dead	LinStatic		11	-2.446	-0.067	-0.02	0
Story1	C65	22	Dead	LinStatic		11	-2.026	-0.067	0.517	0
Story1	C65	22	Dead	LinStatic		12	-2.026	-0.067	0.517	0
Story1	C65	22	Dead	LinStatic		12	-2.026	-0.067	0.517	0
Story1	C65	22	Dead	LinStatic		15.5	-2.026	-0.067	0.517	0
Story1	C65	22	Roof Live	LinStatic		0	-3.795	-0.073	-0.037	0
Story1	C65	22	Roof Live	LinStatic		4.5	-3.795	-0.073	-0.037	0
Story1	C65	22	Roof Live	LinStatic		4.5	-3.795	-0.073	-0.037	0
Story1	C65	22	Roof Live	LinStatic		7.75	-3.795	-0.073	-0.037	0
Story1	C65	22	Roof Live	LinStatic		8.5	-3.795	-0.073	-0.037	0
Story1	C65	22	Roof Live	LinStatic		8.5	-3.795	-0.073	-0.037	0
Story1	C65	22	Roof Live	LinStatic		11	-3.795	-0.073	-0.037	0
Story1	C65	22	Roof Live	LinStatic		11	-3.144	-0.073	0.937	0
Story1	C65	22	Roof Live	LinStatic		12	-3.144	-0.073	0.937	0
Story1	C65	22	Roof Live	LinStatic		12	-3.144	-0.073	0.937	0
Story1	C65	22	Roof Live	LinStatic		15.5	-3.144	-0.073	0.937	0
Story1	C65	22	Lateral (N-S)	LinStatic		0	1.695	1.726	-8.72E-05	0.2902
Story1	C65	22	Lateral (N-S)	LinStatic		4.5	1.695	1.726	-8.72E-05	0.2902
Story1	C65	22	Lateral (N-S)	LinStatic		4.5	1.695	1.726	-8.72E-05	0.2902
Story1	C65	22	Lateral (N-S)	LinStatic		7.75	1.695	1.726	-8.72E-05	0.2902
Story1	C65	22	Lateral (N-S)	LinStatic		8.5	1.695	1.726	-8.72E-05	0.2902
Story1	C65	22	Lateral (N-S)	LinStatic		8.5	1.695	1.726	-8.72E-05	0.2902
Story1	C65	22	Lateral (N-S)	LinStatic		11	1.695	1.726	-8.72E-05	0.2902
Story1	C65	22	Lateral (N-S)	LinStatic		11	1.695	1.726	0.003	0.2902
Story1	C65	22	Lateral (N-S)	LinStatic		12	1.695	1.726	0.003	0.2902
Story1	C65	22	Lateral (N-S)	LinStatic		12	1.695	1.726	0.003	0.2902

Table 5.3 - Element Forces - Columns (Part 1 of 2, continued)

Story	Column	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft
Story1	C65	22	Lateral (N-S)	LinStatic		15.5	1.695	1.726	0.003	0.2902
Story1	C65	22	Lateral (E-W)	LinStatic		0	-0.349	0.001	1.441	0.0984
Story1	C65	22	Lateral (E-W)	LinStatic		4.5	-0.349	0.001	1.441	0.0984
Story1	C65	22	Lateral (E-W)	LinStatic		4.5	-0.349	0.001	1.441	0.0984
Story1	C65	22	Lateral (E-W)	LinStatic		7.75	-0.349	0.001	1.441	0.0984
Story1	C65	22	Lateral (E-W)	LinStatic		8.5	-0.349	0.001	1.441	0.0984
Story1	C65	22	Lateral (E-W)	LinStatic		8.5	-0.349	0.001	1.441	0.0984
Story1	C65	22	Lateral (E-W)	LinStatic		11	-0.349	0.001	1.441	0.0984
Story1	C65	22	Lateral (E-W)	LinStatic		11	-0.349	0.001	1.101	0.0984
Story1	C65	22	Lateral (E-W)	LinStatic		12	-0.349	0.001	1.101	0.0984
Story1	C65	22	Lateral (E-W)	LinStatic		12	-0.349	0.001	1.101	0.0984
Story1	C65	22	Lateral (E-W)	LinStatic		15.5	-0.349	0.001	1.101	0.0984
Story1	C65	22	Envelope	Combination	Max	0	-0.087	1.677	1.426	0.2902
Story1	C65	22	Envelope	Combination	Max	4.5	-0.087	1.677	1.426	0.2902
Story1	C65	22	Envelope	Combination	Max	4.5	-0.087	1.677	1.426	0.2902
Story1	C65	22	Envelope	Combination	Max	7.75	-0.087	1.677	1.426	0.2902
Story1	C65	22	Envelope	Combination	Max	8.5	-0.087	1.677	1.426	0.2902
Story1	C65	22	Envelope	Combination	Max	8.5	-0.087	1.677	1.426	0.2902
Story1	C65	22	Envelope	Combination	Max	11	-0.087	1.677	1.426	0.2902
Story1	C65	22	Envelope	Combination	Max	11	0.219	1.677	2.12	0.2902
Story1	C65	22	Envelope	Combination	Max	12	0.219	1.677	2.12	0.2902
Story1	C65	22	Envelope	Combination	Max	12	0.219	1.677	2.12	0.2902
Story1	C65	22	Envelope	Combination	Max	15.5	0.219	1.677	2.12	0.2902
Story1	C65	22	Envelope	Combination	Min	0	-9.007	-1.818	-1.468	-0.2902
Story1	C65	22	Envelope	Combination	Min	4.5	-9.007	-1.818	-1.468	-0.2902
Story1	C65	22	Envelope	Combination	Min	4.5	-9.007	-1.818	-1.468	-0.2902
Story1	C65	22	Envelope	Combination	Min	7.75	-9.007	-1.818	-1.468	-0.2902
Story1	C65	22	Envelope	Combination	Min	8.5	-9.007	-1.818	-1.468	-0.2902
Story1	C65	22	Envelope	Combination	Min	8.5	-9.007	-1.818	-1.468	-0.2902
Story1	C65	22	Envelope	Combination	Min	11	-9.007	-1.818	-1.468	-0.2902
Story1	C65	22	Envelope	Combination	Min	11	-7.461	-1.818	-0.725	-0.2902
Story1	C65	22	Envelope	Combination	Min	12	-7.461	-1.818	-0.725	-0.2902
Story1	C65	22	Envelope	Combination	Min	12	-7.461	-1.818	-0.725	-0.2902
Story1	C65	22	Envelope	Combination	Min	15.5	-7.461	-1.818	-0.725	-0.2902
Story1	C66	23	Dead	LinStatic		0	-2.528	0.067	0.003	0
Story1	C66	23	Dead	LinStatic		7.75	-2.528	0.067	0.003	0
Story1	C66	23	Dead	LinStatic		11	-2.528	0.067	0.003	0
Story1	C66	23	Dead	LinStatic		11	-2.528	0.067	0.003	0
Story1	C66	23	Dead	LinStatic		12	-2.528	0.067	0.003	0
Story1	C66	23	Dead	LinStatic		12	-2.528	0.067	0.964	0
Story1	C66	23	Dead	LinStatic		15.5	-2.528	0.067	0.964	0
Story1	C66	23	Roof Live	LinStatic		0	-2.878	0.073	0.004	0
Story1	C66	23	Roof Live	LinStatic		7.75	-2.878	0.073	0.004	0
Story1	C66	23	Roof Live	LinStatic		11	-2.878	0.073	0.004	0
Story1	C66	23	Roof Live	LinStatic		11	-2.878	0.073	0.004	0

Table 5.3 - Element Forces - Columns (Part 1 of 2, continued)

Story	Column	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft
Story1	C66	23	Roof Live	LinStatic		12	-2.878	0.073	0.004	0
Story1	C66	23	Roof Live	LinStatic		12	-2.878	0.073	1.09	0
Story1	C66	23	Roof Live	LinStatic		15.5	-2.878	0.073	1.09	0
Story1	C66	23	Lateral (N-S)	LinStatic		0	-1.695	1.726	-3.939E-05	0.3325
Story1	C66	23	Lateral (N-S)	LinStatic		7.75	-1.695	1.726	-3.939E-05	0.3325
Story1	C66	23	Lateral (N-S)	LinStatic		11	-1.695	1.726	-3.939E-05	0.3325
Story1	C66	23	Lateral (N-S)	LinStatic		11	-1.695	1.726	-3.939E-05	0.3325
Story1	C66	23	Lateral (N-S)	LinStatic		12	-1.695	1.726	-3.939E-05	0.3325
Story1	C66	23	Lateral (N-S)	LinStatic		12	-1.695	1.726	-0.003	0.3325
Story1	C66	23	Lateral (N-S)	LinStatic		15.5	-1.695	1.726	-0.003	0.3325
Story1	C66	23	Lateral (E-W)	LinStatic		0	-0.389	-0.001	1.524	-0.0984
Story1	C66	23	Lateral (E-W)	LinStatic		7.75	-0.389	-0.001	1.524	-0.0984
Story1	C66	23	Lateral (E-W)	LinStatic		11	-0.389	-0.001	1.524	-0.0984
Story1	C66	23	Lateral (E-W)	LinStatic		11	-0.389	-0.001	1.524	-0.0984
Story1	C66	23	Lateral (E-W)	LinStatic		12	-0.389	-0.001	1.524	-0.0984
Story1	C66	23	Lateral (E-W)	LinStatic		12	-0.389	-0.001	1.236	-0.0984
Story1	C66	23	Lateral (E-W)	LinStatic		15.5	-0.389	-0.001	1.236	-0.0984
Story1	C66	23	Envelope	Combination	Max	0	-0.147	1.818	1.529	0.3325
Story1	C66	23	Envelope	Combination	Max	7.75	-0.147	1.818	1.529	0.3325
Story1	C66	23	Envelope	Combination	Max	11	-0.147	1.818	1.529	0.3325
Story1	C66	23	Envelope	Combination	Max	11	-0.147	1.818	1.529	0.3325
Story1	C66	23	Envelope	Combination	Max	12	-0.147	1.818	1.529	0.3325
Story1	C66	23	Envelope	Combination	Max	12	-0.147	1.818	2.9	0.3325
Story1	C66	23	Envelope	Combination	Max	15.5	-0.147	1.818	2.9	0.3325
Story1	C66	23	Envelope	Combination	Min	0	-7.638	-1.678	-1.522	-0.3325
Story1	C66	23	Envelope	Combination	Min	7.75	-7.638	-1.678	-1.522	-0.3325
Story1	C66	23	Envelope	Combination	Min	11	-7.638	-1.678	-1.522	-0.3325
Story1	C66	23	Envelope	Combination	Min	11	-7.638	-1.678	-1.522	-0.3325
Story1	C66	23	Envelope	Combination	Min	12	-7.638	-1.678	-1.522	-0.3325
Story1	C66	23	Envelope	Combination	Min	12	-7.638	-1.678	-0.534	-0.3325
Story1	C66	23	Envelope	Combination	Min	15.5	-7.638	-1.678	-0.534	-0.3325
Story1	C67	26	Dead	LinStatic		0	-1.446	0	0	0
Story1	C67	26	Dead	LinStatic		4.5	-1.446	0	0	0
Story1	C67	26	Dead	LinStatic		4.5	-1.446	0	0	0
Story1	C67	26	Dead	LinStatic		8.25	-1.446	0	0	0
Story1	C67	26	Dead	LinStatic		11	-1.446	0	0	0
Story1	C67	26	Dead	LinStatic		11	-1.446	0	0	0
Story1	C67	26	Dead	LinStatic		12	-1.446	0	0	0
Story1	C67	26	Dead	LinStatic		12	-1.446	0	0	0
Story1	C67	26	Dead	LinStatic		16.5	-1.446	0	0	0
Story1	C67	26	Roof Live	LinStatic		0	-1.608	0	0	0
Story1	C67	26	Roof Live	LinStatic		4.5	-1.608	0	0	0
Story1	C67	26	Roof Live	LinStatic		4.5	-1.608	0	0	0
Story1	C67	26	Roof Live	LinStatic		8.25	-1.608	0	0	0
Story1	C67	26	Roof Live	LinStatic		11	-1.608	0	0	0

Table 5.3 - Element Forces - Columns (Part 1 of 2, continued)

Story	Column	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft
Story1	C67	26	Roof Live	LinStatic		11	-1.608	0	0	0
Story1	C67	26	Roof Live	LinStatic		12	-1.608	0	0	0
Story1	C67	26	Roof Live	LinStatic		12	-1.608	0	0	0
Story1	C67	26	Roof Live	LinStatic		16.5	-1.608	0	0	0
Story1	C67	26	Lateral (N-S)	LinStatic		0	-2.193	0	0	0
Story1	C67	26	Lateral (N-S)	LinStatic		4.5	-2.193	0	0	0
Story1	C67	26	Lateral (N-S)	LinStatic		4.5	-2.193	0	0	0
Story1	C67	26	Lateral (N-S)	LinStatic		8.25	-2.193	0	0	0
Story1	C67	26	Lateral (N-S)	LinStatic		11	-2.193	0	0	0
Story1	C67	26	Lateral (N-S)	LinStatic		11	-2.193	0	0	0
Story1	C67	26	Lateral (N-S)	LinStatic		12	-2.193	0	0	0
Story1	C67	26	Lateral (N-S)	LinStatic		12	-2.193	0	0	0
Story1	C67	26	Lateral (N-S)	LinStatic		16.5	-2.193	0	0	0
Story1	C67	26	Lateral (E-W)	LinStatic		0	0.001	0	0	0
Story1	C67	26	Lateral (E-W)	LinStatic		4.5	0.001	0	0	0
Story1	C67	26	Lateral (E-W)	LinStatic		4.5	0.001	0	0	0
Story1	C67	26	Lateral (E-W)	LinStatic		8.25	0.001	0	0	0
Story1	C67	26	Lateral (E-W)	LinStatic		11	0.001	0	0	0
Story1	C67	26	Lateral (E-W)	LinStatic		11	0.001	0	0	0
Story1	C67	26	Lateral (E-W)	LinStatic		12	0.001	0	0	0
Story1	C67	26	Lateral (E-W)	LinStatic		12	0.001	0	0	0
Story1	C67	26	Lateral (E-W)	LinStatic		16.5	0.001	0	0	0
Story1	C67	26	Envelope	Combination	Max	0	1.139	0	0	0
Story1	C67	26	Envelope	Combination	Max	4.5	1.139	0	0	0
Story1	C67	26	Envelope	Combination	Max	4.5	1.139	0	0	0
Story1	C67	26	Envelope	Combination	Max	8.25	1.139	0	0	0
Story1	C67	26	Envelope	Combination	Max	11	1.139	0	0	0
Story1	C67	26	Envelope	Combination	Max	11	1.139	0	0	0
Story1	C67	26	Envelope	Combination	Max	12	1.139	0	0	0
Story1	C67	26	Envelope	Combination	Max	12	1.139	0	0	0
Story1	C67	26	Envelope	Combination	Max	16.5	1.139	0	0	0
Story1	C67	26	Envelope	Combination	Min	0	-4.309	0	0	0
Story1	C67	26	Envelope	Combination	Min	4.5	-4.309	0	0	0
Story1	C67	26	Envelope	Combination	Min	4.5	-4.309	0	0	0
Story1	C67	26	Envelope	Combination	Min	8.25	-4.309	0	0	0
Story1	C67	26	Envelope	Combination	Min	11	-4.309	0	0	0
Story1	C67	26	Envelope	Combination	Min	11	-4.309	0	0	0
Story1	C67	26	Envelope	Combination	Min	12	-4.309	0	0	0
Story1	C67	26	Envelope	Combination	Min	12	-4.309	0	0	0
Story1	C67	26	Envelope	Combination	Min	16.5	-4.309	0	0	0
Story1	C68	27	Dead	LinStatic		0	-1.448	0	0	0
Story1	C68	27	Dead	LinStatic		4.5	-1.448	0	0	0
Story1	C68	27	Dead	LinStatic		4.5	-1.448	0	0	0
Story1	C68	27	Dead	LinStatic		8.25	-1.448	0	0	0
Story1	C68	27	Dead	LinStatic		11	-1.448	0	0	0

Table 5.3 - Element Forces - Columns (Part 1 of 2, continued)

Story	Column	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft
Story1	C68	27	Dead	LinStatic		11	-1.448	0	0	0
Story1	C68	27	Dead	LinStatic		12	-1.448	0	0	0
Story1	C68	27	Dead	LinStatic		12	-1.448	0	0	0
Story1	C68	27	Dead	LinStatic		16.5	-1.448	0	0	0
Story1	C68	27	Roof Live	LinStatic		0	-1.603	0	0	0
Story1	C68	27	Roof Live	LinStatic		4.5	-1.603	0	0	0
Story1	C68	27	Roof Live	LinStatic		4.5	-1.603	0	0	0
Story1	C68	27	Roof Live	LinStatic		8.25	-1.603	0	0	0
Story1	C68	27	Roof Live	LinStatic		11	-1.603	0	0	0
Story1	C68	27	Roof Live	LinStatic		11	-1.603	0	0	0
Story1	C68	27	Roof Live	LinStatic		12	-1.603	0	0	0
Story1	C68	27	Roof Live	LinStatic		12	-1.603	0	0	0
Story1	C68	27	Roof Live	LinStatic		16.5	-1.603	0	0	0
Story1	C68	27	Lateral (N-S)	LinStatic		0	2.193	0	0	0
Story1	C68	27	Lateral (N-S)	LinStatic		4.5	2.193	0	0	0
Story1	C68	27	Lateral (N-S)	LinStatic		4.5	2.193	0	0	0
Story1	C68	27	Lateral (N-S)	LinStatic		8.25	2.193	0	0	0
Story1	C68	27	Lateral (N-S)	LinStatic		11	2.193	0	0	0
Story1	C68	27	Lateral (N-S)	LinStatic		11	2.193	0	0	0
Story1	C68	27	Lateral (N-S)	LinStatic		12	2.193	0	0	0
Story1	C68	27	Lateral (N-S)	LinStatic		12	2.193	0	0	0
Story1	C68	27	Lateral (N-S)	LinStatic		16.5	2.193	0	0	0
Story1	C68	27	Lateral (E-W)	LinStatic		0	0.001	0	0	0
Story1	C68	27	Lateral (E-W)	LinStatic		4.5	0.001	0	0	0
Story1	C68	27	Lateral (E-W)	LinStatic		4.5	0.001	0	0	0
Story1	C68	27	Lateral (E-W)	LinStatic		8.25	0.001	0	0	0
Story1	C68	27	Lateral (E-W)	LinStatic		11	0.001	0	0	0
Story1	C68	27	Lateral (E-W)	LinStatic		11	0.001	0	0	0
Story1	C68	27	Lateral (E-W)	LinStatic		12	0.001	0	0	0
Story1	C68	27	Lateral (E-W)	LinStatic		12	0.001	0	0	0
Story1	C68	27	Lateral (E-W)	LinStatic		16.5	0.001	0	0	0
Story1	C68	27	Envelope	Combination	Max	0	1.138	0	0	0
Story1	C68	27	Envelope	Combination	Max	4.5	1.138	0	0	0
Story1	C68	27	Envelope	Combination	Max	4.5	1.138	0	0	0
Story1	C68	27	Envelope	Combination	Max	8.25	1.138	0	0	0
Story1	C68	27	Envelope	Combination	Max	11	1.138	0	0	0
Story1	C68	27	Envelope	Combination	Max	11	1.138	0	0	0
Story1	C68	27	Envelope	Combination	Max	12	1.138	0	0	0
Story1	C68	27	Envelope	Combination	Max	12	1.138	0	0	0
Story1	C68	27	Envelope	Combination	Max	16.5	1.138	0	0	0
Story1	C68	27	Envelope	Combination	Min	0	-4.303	0	0	0
Story1	C68	27	Envelope	Combination	Min	4.5	-4.303	0	0	0
Story1	C68	27	Envelope	Combination	Min	4.5	-4.303	0	0	0
Story1	C68	27	Envelope	Combination	Min	8.25	-4.303	0	0	0
Story1	C68	27	Envelope	Combination	Min	11	-4.303	0	0	0

Table 5.3 - Element Forces - Columns (Part 1 of 2, continued)

Story	Column	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft
Story1	C68	27	Envelope	Combination	Min	11	-4.303	0	0	0
Story1	C68	27	Envelope	Combination	Min	12	-4.303	0	0	0
Story1	C68	27	Envelope	Combination	Min	12	-4.303	0	0	0
Story1	C68	27	Envelope	Combination	Min	16.5	-4.303	0	0	0
Story1	C69	28	Dead	LinStatic		0	-1.446	0	0	0
Story1	C69	28	Dead	LinStatic		4.5	-1.446	0	0	0
Story1	C69	28	Dead	LinStatic		4.5	-1.446	0	0	0
Story1	C69	28	Dead	LinStatic		8.25	-1.446	0	0	0
Story1	C69	28	Dead	LinStatic		11	-1.446	0	0	0
Story1	C69	28	Dead	LinStatic		11	-1.446	0	0	0
Story1	C69	28	Dead	LinStatic		12	-1.446	0	0	0
Story1	C69	28	Dead	LinStatic		12	-1.446	0	0	0
Story1	C69	28	Dead	LinStatic		16.5	-1.446	0	0	0
Story1	C69	28	Roof Live	LinStatic		0	-1.608	0	0	0
Story1	C69	28	Roof Live	LinStatic		4.5	-1.608	0	0	0
Story1	C69	28	Roof Live	LinStatic		4.5	-1.608	0	0	0
Story1	C69	28	Roof Live	LinStatic		8.25	-1.608	0	0	0
Story1	C69	28	Roof Live	LinStatic		11	-1.608	0	0	0
Story1	C69	28	Roof Live	LinStatic		11	-1.608	0	0	0
Story1	C69	28	Roof Live	LinStatic		12	-1.608	0	0	0
Story1	C69	28	Roof Live	LinStatic		12	-1.608	0	0	0
Story1	C69	28	Roof Live	LinStatic		16.5	-1.608	0	0	0
Story1	C69	28	Lateral (N-S)	LinStatic		0	-2.193	0	0	0
Story1	C69	28	Lateral (N-S)	LinStatic		4.5	-2.193	0	0	0
Story1	C69	28	Lateral (N-S)	LinStatic		4.5	-2.193	0	0	0
Story1	C69	28	Lateral (N-S)	LinStatic		8.25	-2.193	0	0	0
Story1	C69	28	Lateral (N-S)	LinStatic		11	-2.193	0	0	0
Story1	C69	28	Lateral (N-S)	LinStatic		11	-2.193	0	0	0
Story1	C69	28	Lateral (N-S)	LinStatic		12	-2.193	0	0	0
Story1	C69	28	Lateral (N-S)	LinStatic		12	-2.193	0	0	0
Story1	C69	28	Lateral (N-S)	LinStatic		16.5	-2.193	0	0	0
Story1	C69	28	Lateral (E-W)	LinStatic		0	-0.001	0	0	0
Story1	C69	28	Lateral (E-W)	LinStatic		4.5	-0.001	0	0	0
Story1	C69	28	Lateral (E-W)	LinStatic		4.5	-0.001	0	0	0
Story1	C69	28	Lateral (E-W)	LinStatic		8.25	-0.001	0	0	0
Story1	C69	28	Lateral (E-W)	LinStatic		11	-0.001	0	0	0
Story1	C69	28	Lateral (E-W)	LinStatic		11	-0.001	0	0	0
Story1	C69	28	Lateral (E-W)	LinStatic		12	-0.001	0	0	0
Story1	C69	28	Lateral (E-W)	LinStatic		12	-0.001	0	0	0
Story1	C69	28	Lateral (E-W)	LinStatic		16.5	-0.001	0	0	0
Story1	C69	28	Envelope	Combination	Max	0	1.139	0	0	0
Story1	C69	28	Envelope	Combination	Max	4.5	1.139	0	0	0
Story1	C69	28	Envelope	Combination	Max	4.5	1.139	0	0	0
Story1	C69	28	Envelope	Combination	Max	8.25	1.139	0	0	0
Story1	C69	28	Envelope	Combination	Max	11	1.139	0	0	0

Table 5.3 - Element Forces - Columns (Part 1 of 2, continued)

Story	Column	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft
Story1	C69	28	Envelope	Combination	Max	11	1.139	0	0	0
Story1	C69	28	Envelope	Combination	Max	12	1.139	0	0	0
Story1	C69	28	Envelope	Combination	Max	12	1.139	0	0	0
Story1	C69	28	Envelope	Combination	Max	16.5	1.139	0	0	0
Story1	C69	28	Envelope	Combination	Min	0	-4.309	0	0	0
Story1	C69	28	Envelope	Combination	Min	4.5	-4.309	0	0	0
Story1	C69	28	Envelope	Combination	Min	4.5	-4.309	0	0	0
Story1	C69	28	Envelope	Combination	Min	8.25	-4.309	0	0	0
Story1	C69	28	Envelope	Combination	Min	11	-4.309	0	0	0
Story1	C69	28	Envelope	Combination	Min	11	-4.309	0	0	0
Story1	C69	28	Envelope	Combination	Min	12	-4.309	0	0	0
Story1	C69	28	Envelope	Combination	Min	12	-4.309	0	0	0
Story1	C69	28	Envelope	Combination	Min	16.5	-4.309	0	0	0
Story1	C70	33	Dead	LinStatic		0	-1.448	0	0	0
Story1	C70	33	Dead	LinStatic		4.5	-1.448	0	0	0
Story1	C70	33	Dead	LinStatic		4.5	-1.448	0	0	0
Story1	C70	33	Dead	LinStatic		8.25	-1.448	0	0	0
Story1	C70	33	Dead	LinStatic		11	-1.448	0	0	0
Story1	C70	33	Dead	LinStatic		11	-1.448	0	0	0
Story1	C70	33	Dead	LinStatic		12	-1.448	0	0	0
Story1	C70	33	Dead	LinStatic		12	-1.448	0	0	0
Story1	C70	33	Dead	LinStatic		16.5	-1.448	0	0	0
Story1	C70	33	Roof Live	LinStatic		0	-1.603	0	0	0
Story1	C70	33	Roof Live	LinStatic		4.5	-1.603	0	0	0
Story1	C70	33	Roof Live	LinStatic		4.5	-1.603	0	0	0
Story1	C70	33	Roof Live	LinStatic		8.25	-1.603	0	0	0
Story1	C70	33	Roof Live	LinStatic		11	-1.603	0	0	0
Story1	C70	33	Roof Live	LinStatic		11	-1.603	0	0	0
Story1	C70	33	Roof Live	LinStatic		12	-1.603	0	0	0
Story1	C70	33	Roof Live	LinStatic		12	-1.603	0	0	0
Story1	C70	33	Roof Live	LinStatic		16.5	-1.603	0	0	0
Story1	C70	33	Lateral (N-S)	LinStatic		0	2.193	0	0	0
Story1	C70	33	Lateral (N-S)	LinStatic		4.5	2.193	0	0	0
Story1	C70	33	Lateral (N-S)	LinStatic		4.5	2.193	0	0	0
Story1	C70	33	Lateral (N-S)	LinStatic		8.25	2.193	0	0	0
Story1	C70	33	Lateral (N-S)	LinStatic		11	2.193	0	0	0
Story1	C70	33	Lateral (N-S)	LinStatic		11	2.193	0	0	0
Story1	C70	33	Lateral (N-S)	LinStatic		12	2.193	0	0	0
Story1	C70	33	Lateral (N-S)	LinStatic		12	2.193	0	0	0
Story1	C70	33	Lateral (N-S)	LinStatic		16.5	2.193	0	0	0
Story1	C70	33	Lateral (E-W)	LinStatic		0	-0.002	0	0	0
Story1	C70	33	Lateral (E-W)	LinStatic		4.5	-0.002	0	0	0
Story1	C70	33	Lateral (E-W)	LinStatic		4.5	-0.002	0	0	0
Story1	C70	33	Lateral (E-W)	LinStatic		8.25	-0.002	0	0	0
Story1	C70	33	Lateral (E-W)	LinStatic		11	-0.002	0	0	0

Table 5.3 - Element Forces - Columns (Part 1 of 2, continued)

Story	Column	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft
Story1	C70	33	Lateral (E-W)	LinStatic		11	-0.002	0	0	0
Story1	C70	33	Lateral (E-W)	LinStatic		12	-0.002	0	0	0
Story1	C70	33	Lateral (E-W)	LinStatic		12	-0.002	0	0	0
Story1	C70	33	Lateral (E-W)	LinStatic		16.5	-0.002	0	0	0
Story1	C70	33	Envelope	Combination	Max	0	1.138	0	0	0
Story1	C70	33	Envelope	Combination	Max	4.5	1.138	0	0	0
Story1	C70	33	Envelope	Combination	Max	4.5	1.138	0	0	0
Story1	C70	33	Envelope	Combination	Max	8.25	1.138	0	0	0
Story1	C70	33	Envelope	Combination	Max	11	1.138	0	0	0
Story1	C70	33	Envelope	Combination	Max	11	1.138	0	0	0
Story1	C70	33	Envelope	Combination	Max	12	1.138	0	0	0
Story1	C70	33	Envelope	Combination	Max	12	1.138	0	0	0
Story1	C70	33	Envelope	Combination	Max	16.5	1.138	0	0	0
Story1	C70	33	Envelope	Combination	Min	0	-4.303	0	0	0
Story1	C70	33	Envelope	Combination	Min	4.5	-4.303	0	0	0
Story1	C70	33	Envelope	Combination	Min	4.5	-4.303	0	0	0
Story1	C70	33	Envelope	Combination	Min	8.25	-4.303	0	0	0
Story1	C70	33	Envelope	Combination	Min	11	-4.303	0	0	0
Story1	C70	33	Envelope	Combination	Min	11	-4.303	0	0	0
Story1	C70	33	Envelope	Combination	Min	12	-4.303	0	0	0
Story1	C70	33	Envelope	Combination	Min	12	-4.303	0	0	0
Story1	C70	33	Envelope	Combination	Min	16.5	-4.303	0	0	0

Table 5.3 - Element Forces - Columns (Part 2 of 2)

M2 kip-ft	M3 kip-ft	Element	Elem Station ft	Location
0	0	5-1	0	
0.0393	0	5-1	8.25	
0.0524	0	5-1	11	
0.0524	0	5-2	0	
0.0572	0	5-2	1	
0.0572	0	5-3	0	
0	0	5-3	4.5	
0	0	5-1	0	
0.0445	0	5-1	8.25	
0.0593	0	5-1	11	
0.0593	0	5-2	0	
0.0647	0	5-2	1	
0.0647	0	5-3	0	
0	0	5-3	4.5	
0	0	5-1	0	
-0.0001	0	5-1	8.25	
-0.0001	0	5-1	11	
-0.0001	0	5-2	0	

Table 5.3 - Element Forces - Columns (Part 2 of 2, continued)

M2 kip-ft	M3 kip-ft	Element	Elem Station ft	Location
-0.0001	0	5-2	1	
-0.0001	0	5-3	0	
0	0	5-3	4.5	
0	0	5-1	0	
1.1141	0	5-1	8.25	
1.4855	0	5-1	11	
1.4855	0	5-2	0	
1.6205	0	5-2	1	
1.6205	0	5-3	0	
0	0	5-3	4.5	
0	0	5-1	0	
1.168	0	5-1	8.25	
1.5574	0	5-1	11	
1.5574	0	5-2	0	
1.699	0	5-2	1	
1.699	0	5-3	0	
0	0	5-3	4.5	
0	0	5-1	0	
-1.0855	0	5-1	8.25	
-1.4473	0	5-1	11	
-1.4473	0	5-2	0	
-1.5788	0	5-2	1	
-1.5788	0	5-3	0	
0	0	5-3	4.5	
-6.1921	0.0084	6-1	0	
2.6081	0.0193	6-1	7.75	
6.2986	0.0238	6-1	11	
6.2986	0.0238	6-2	0	
7.4341	0.0252	6-2	1	
7.4341	0.0252	6-3	0	
11.4084	0.0015	6-3	3.5	
-6.8562	0.0095	6-1	0	
2.8945	0.0218	6-1	7.75	
6.9835	0.027	6-1	11	
6.9835	0.027	6-2	0	
8.2416	0.0286	6-2	1	
8.2416	0.0286	6-3	0	
12.6452	0.0017	6-3	3.5	
-34.6495	-3.076E-06	6-1	0	
-12.9435	0.0004	6-1	7.75	
-3.841	0.0005	6-1	11	
-3.841	0.0005	6-2	0	
-1.0402	0.0006	6-2	1	
-1.0402	0.0006	6-3	0	

Table 5.3 - Element Forces - Columns (Part 2 of 2, continued)

M2 kip-ft	M3 kip-ft	Element	Elem Station ft	Location
8.7625	1.806E-05	6-3	3.5	
0.0001	48.2152	6-1	0	
4.973E-05	17.9348	6-1	7.75	
4.05E-05	5.2365	6-1	11	
4.05E-05	5.2365	6-2	0	
3.767E-05	1.3294	6-2	1	
3.767E-05	1.3294	6-3	0	
2.773E-05	-7.6421	6-3	3.5	
30.1391	48.2266	6-1	0	
16.5208	17.9612	6-1	7.75	
18.7318	5.2692	6-1	11	
18.7318	5.2692	6-2	0	
22.1075	1.364	6-2	1	
22.1075	1.364	6-3	0	
33.9223	7.6441	6-3	3.5	
-43.1426	-48.2091	6-1	0	
-11.0437	-17.9207	6-1	7.75	
0.7469	-5.2192	6-1	11	
0.7469	-5.2192	6-2	0	
4.3748	-1.311	6-2	1	
4.3748	-1.311	6-3	0	
-0.4526	-7.641	6-3	3.5	
0	0	7-1	0	
-0.0573	0	7-1	7.75	
-0.0813	0	7-1	11	
-0.0813	0	7-2	0	
-0.0887	0	7-2	1	
-0.0887	0	7-3	0	
0	0	7-3	3.5	
0	0	7-1	0	
-0.0649	0	7-1	7.75	
-0.0921	0	7-1	11	
-0.0921	0	7-2	0	
-0.1004	0	7-2	1	
-0.1004	0	7-3	0	
0	0	7-3	3.5	
0	0	7-1	0	
-0.0006	0	7-1	7.75	
-0.0008	0	7-1	11	
-0.0008	0	7-2	0	
-0.0009	0	7-2	1	
-0.0009	0	7-3	0	
0	0	7-3	3.5	
0	0	7-1	0	

Table 5.3 - Element Forces - Columns (Part 2 of 2, continued)

M2 kip-ft	M3 kip-ft	Element	Elem Station ft	Location
2.4257	0	7-1	7.75	
3.443	0	7-1	11	
3.443	0	7-2	0	
3.756	0	7-2	1	
3.756	0	7-3	0	
0	0	7-3	3.5	
0	0	7-1	0	
2.384	0	7-1	7.75	
3.3838	0	7-1	11	
3.3838	0	7-2	0	
3.6914	0	7-2	1	
3.6914	0	7-3	0	
0	0	7-3	3.5	
0	0	7-1	0	
-2.5043	0	7-1	7.75	
-3.5545	0	7-1	11	
-3.5545	0	7-2	0	
-3.8776	0	7-2	1	
-3.8776	0	7-3	0	
0	0	7-3	3.5	
0	0	12-1	0	
0.0183	0	12-1	4.5	
0.0183	0	12-2	0	
0.0315	0	12-2	3.25	
0.0345	0	12-2	4	
0.0345	0	12-3	0	
0.0446	0	12-3	2.5	
0.0446	0	12-4	0	
0.0347	0	12-4	1	
0.0347	0	12-5	0	
0	0	12-5	3.5	
0	0	12-1	0	
0.0335	0	12-1	4.5	
0.0335	0	12-2	0	
0.0577	0	12-2	3.25	
0.0633	0	12-2	4	
0.0633	0	12-3	0	
0.0819	0	12-3	2.5	
0.0819	0	12-4	0	
0.0637	0	12-4	1	
0.0637	0	12-5	0	
0	0	12-5	3.5	
0	0	12-1	0	
-0.0003	0	12-1	4.5	

Table 5.3 - Element Forces - Columns (Part 2 of 2, continued)

M2 kip-ft	M3 kip-ft	Element	Elem Station ft	Location
-0.0003	0	12-2	0	
-0.0006	0	12-2	3.25	
-0.0006	0	12-2	4	
-0.0006	0	12-3	0	
-0.0008	0	12-3	2.5	
-0.0008	0	12-4	0	
-0.0006	0	12-4	1	
-0.0006	0	12-5	0	
0	0	12-5	3.5	
0	0	12-1	0	
1.3307	0	12-1	4.5	
1.3307	0	12-2	0	
2.2917	0	12-2	3.25	
2.5135	0	12-2	4	
2.5135	0	12-3	0	
3.2528	0	12-3	2.5	
3.2528	0	12-4	0	
2.53	0	12-4	1	
2.53	0	12-5	0	
0	0	12-5	3.5	
0	0	12-1	0	
1.3557	0	12-1	4.5	
1.3557	0	12-2	0	
2.3349	0	12-2	3.25	
2.5608	0	12-2	4	
2.5608	0	12-3	0	
3.314	0	12-3	2.5	
3.314	0	12-4	0	
2.5776	0	12-4	1	
2.5776	0	12-5	0	
0	0	12-5	3.5	
0	0	12-1	0	
-1.3174	0	12-1	4.5	
-1.3174	0	12-2	0	
-2.2688	0	12-2	3.25	
-2.4884	0	12-2	4	
-2.4884	0	12-3	0	
-3.2203	0	12-3	2.5	
-3.2203	0	12-4	0	
-2.5047	0	12-4	1	
-2.5047	0	12-5	0	
0	0	12-5	3.5	
0	0	13-1	0	
-0.0179	0	13-1	4.5	

Table 5.3 - Element Forces - Columns (Part 2 of 2, continued)

M2 kip-ft	M3 kip-ft	Element	Elem Station ft	Location
-0.0179	0	13-2	0	
-0.0308	0	13-2	3.25	
-0.0338	0	13-2	4	
-0.0338	0	13-3	0	
-0.0437	0	13-3	2.5	
-0.0437	0	13-4	0	
-0.034	0	13-4	1	
-0.034	0	13-5	0	
0	0	13-5	3.5	
0	0	13-1	0	
-0.0331	0	13-1	4.5	
-0.0331	0	13-2	0	
-0.057	0	13-2	3.25	
-0.0625	0	13-2	4	
-0.0625	0	13-3	0	
-0.0808	0	13-3	2.5	
-0.0808	0	13-4	0	
-0.0629	0	13-4	1	
-0.0629	0	13-5	0	
0	0	13-5	3.5	
0	0	13-1	0	
0.0003	0	13-1	4.5	
0.0003	0	13-2	0	
0.0006	0	13-2	3.25	
0.0006	0	13-2	4	
0.0006	0	13-3	0	
0.0008	0	13-3	2.5	
0.0008	0	13-4	0	
0.0006	0	13-4	1	
0.0006	0	13-5	0	
0	0	13-5	3.5	
0	0	13-1	0	
1.3305	0	13-1	4.5	
1.3305	0	13-2	0	
2.2915	0	13-2	3.25	
2.5132	0	13-2	4	
2.5132	0	13-3	0	
3.2524	0	13-3	2.5	
3.2524	0	13-4	0	
2.5296	0	13-4	1	
2.5296	0	13-5	0	
0	0	13-5	3.5	
0	0	13-1	0	
1.3175	0	13-1	4.5	

Table 5.3 - Element Forces - Columns (Part 2 of 2, continued)

M2 kip-ft	M3 kip-ft	Element	Elem Station ft	Location
1.3175	0	13-2	0	
2.269	0	13-2	3.25	
2.4886	0	13-2	4	
2.4886	0	13-3	0	
3.2205	0	13-3	2.5	
3.2205	0	13-4	0	
2.5049	0	13-4	1	
2.5049	0	13-5	0	
0	0	13-5	3.5	
0	0	13-1	0	
-1.3551	0	13-1	4.5	
-1.3551	0	13-2	0	
-2.3337	0	13-2	3.25	
-2.5596	0	13-2	4	
-2.5596	0	13-3	0	
-3.3124	0	13-3	2.5	
-3.3124	0	13-4	0	
-2.5763	0	13-4	1	
-2.5763	0	13-5	0	
0	0	13-5	3.5	
6.1881	0.0022	16-1	0	
1.0782	0.0021	16-1	4.5	
1.0782	0.0021	16-2	0	
-2.6122	0.0019	16-2	3.25	
-3.4638	0.0019	16-2	4	
-3.4638	0.0019	16-3	0	
-6.3026	0.0018	16-3	2.5	
-6.3026	0.0018	16-4	0	
-7.4381	0.0018	16-4	1	
-7.4381	0.0018	16-5	0	
-11.4124	0.0019	16-5	3.5	
6.8611	0.0025	16-1	0	
1.1994	0.0024	16-1	4.5	
1.1994	0.0024	16-2	0	
-2.8896	0.0022	16-2	3.25	
-3.8333	0.0022	16-2	4	
-3.8333	0.0022	16-3	0	
-6.9786	0.0021	16-3	2.5	
-6.9786	0.0021	16-4	0	
-8.2368	0.0021	16-4	1	
-8.2368	0.0021	16-5	0	
-12.6403	0.0021	16-5	3.5	
-34.6441	3.93E-05	16-1	0	
-22.0424	3.629E-05	16-1	4.5	

Table 5.3 - Element Forces - Columns (Part 2 of 2, continued)

M2 kip-ft	M3 kip-ft	Element	Elem Station ft	Location
-22.0424	3.629E-05	16-2	0	
-12.9412	3.411E-05	16-2	3.25	
-10.8409	3.361E-05	16-2	4	
-10.8409	3.361E-05	16-3	0	
-3.84	3.193E-05	16-3	2.5	
-3.84	3.193E-05	16-4	0	
-1.0396	3.212E-05	16-4	1	
-1.0396	3.212E-05	16-5	0	
8.7617	3.275E-05	16-5	3.5	
4.078E-05	45.2182	16-1	0	
0.0001	28.3898	16-1	4.5	
0.0001	28.3898	16-2	0	
0.0001	16.2359	16-2	3.25	
0.0001	13.4312	16-2	4	
0.0001	13.4312	16-3	0	
0.0001	4.0821	16-3	2.5	
0.0001	4.0821	16-4	0	
0.0001	1.6955	16-4	1	
0.0001	1.6955	16-5	0	
0.0001	-6.6574	16-5	3.5	
43.1317	45.2213	16-1	0	
23.5214	28.3926	16-1	4.5	
23.5214	28.3926	16-2	0	
11.0385	16.2386	16-2	3.25	
8.3179	13.4338	16-2	4	
8.3179	13.4338	16-3	0	
-0.7509	4.0846	16-3	2.5	
-0.7509	4.0846	16-4	0	
-4.3783	1.6981	16-4	1	
-4.3783	1.6981	16-5	0	
0.4489	6.66	16-5	3.5	
-30.1367	-45.2165	16-1	0	
-21.257	-28.3883	16-1	4.5	
-21.257	-28.3883	16-2	0	
-16.5241	-16.2345	16-2	3.25	
-15.5919	-13.4298	16-2	4	
-15.5919	-13.4298	16-3	0	
-18.729	-4.0808	16-3	2.5	
-18.729	-4.0808	16-4	0	
-22.1046	-1.6942	16-4	1	
-22.1046	-1.6942	16-5	0	
-33.9195	-6.656	16-5	3.5	
0.0231	-0.3645	20-1	0	
-0.0681	-0.0625	20-1	4.5	

Table 5.3 - Element Forces - Columns (Part 2 of 2, continued)

M2 kip-ft	M3 kip-ft	Element	Elem Station ft	Location
-0.0681	-0.0625	20-2	0	
-0.1339	0.1556	20-2	3.25	
-0.1491	0.2059	20-2	4	
-0.1491	0.2059	20-3	0	
-0.1997	0.3737	20-3	2.5	
-0.1997	0.3737	20-4	0	
0.3171	0.4408	20-4	1	
0.3171	0.4408	20-5	0	
2.1259	0.6756	20-5	3.5	
0.0414	-0.4043	20-1	0	
-0.124	-0.0737	20-1	4.5	
-0.124	-0.0737	20-2	0	
-0.2434	0.165	20-2	3.25	
-0.271	0.2201	20-2	4	
-0.271	0.2201	20-3	0	
-0.3629	0.4038	20-3	2.5	
-0.3629	0.4038	20-4	0	
0.5747	0.4772	20-4	1	
0.5747	0.4772	20-5	0	
3.8563	0.7343	20-5	3.5	
0.0001	19.9024	20-1	0	
-0.0003	12.1343	20-1	4.5	
-0.0003	12.1343	20-2	0	
-0.0006	6.5241	20-2	3.25	
-0.0007	5.2294	20-2	4	
-0.0007	5.2294	20-3	0	
-0.0009	0.9139	20-3	2.5	
-0.0009	0.9139	20-4	0	
0.0016	-0.8124	20-4	1	
0.0016	-0.8124	20-5	0	
0.0104	-6.8542	20-5	3.5	
17.4883	-0.003	20-1	0	
11.0041	-0.0005	20-1	4.5	
11.0041	-0.0005	20-2	0	
6.321	0.0013	20-2	3.25	
5.2403	0.0018	20-2	4	
5.2403	0.0018	20-3	0	
1.6379	0.0032	20-3	2.5	
1.6379	0.0032	20-4	0	
0.5413	0.0037	20-4	1	
0.5413	0.0037	20-5	0	
-3.2968	0.0057	20-5	3.5	
17.52	19.6369	20-1	0	
10.9545	12.0888	20-1	4.5	

Table 5.3 - Element Forces - Columns (Part 2 of 2, continued)

M2 kip-ft	M3 kip-ft	Element	Elem Station ft	Location
10.9545	12.0888	20-2	0	
6.2234	6.7375	20-2	3.25	
5.1317	5.5118	20-2	4	
5.1317	5.5118	20-3	0	
1.4924	1.4264	20-3	2.5	
1.4924	1.4264	20-4	0	
1.3	1.4169	20-4	1	
1.3	1.4169	20-5	0	
8.7212	7.7809	20-5	3.5	
-17.4715	-20.4023	20-1	0	
-11.0974	-12.2201	20-1	4.5	
-11.0974	-12.2201	20-2	0	
-6.5046	-6.4108	20-2	3.25	
-5.4447	-5.0794	20-2	4	
-5.4447	-5.0794	20-3	0	
-1.9118	-0.6417	20-3	2.5	
-1.9118	-0.6417	20-4	0	
-0.3103	-0.4913	20-4	1	
-0.3103	-0.4913	20-5	0	
-1.7483	-6.362	20-5	3.5	
-0.0887	0.3671	21-1	0	
-0.0515	-0.1865	21-1	8.25	
-0.039	-0.371	21-1	11	
-0.039	-0.371	21-2	0	
-0.0345	-0.4381	21-2	1	
-0.0345	-0.4381	21-3	0	
4.2759	-0.7401	21-3	4.5	
-0.1003	0.3966	21-1	0	
-0.0582	-0.2094	21-1	8.25	
-0.0441	-0.4114	21-1	11	
-0.0441	-0.4114	21-2	0	
-0.039	-0.4849	21-2	1	
-0.039	-0.4849	21-3	0	
4.8359	-0.8155	21-3	4.5	
0.0003	19.9045	21-1	0	
0.0003	5.6617	21-1	8.25	
0.0003	0.914	21-1	11	
0.0003	0.914	21-2	0	
0.0003	-0.8124	21-2	1	
0.0003	-0.8124	21-3	0	
-0.013	-8.5812	21-3	4.5	
18.5752	0.0031	21-1	0	
6.2559	-0.0015	21-1	8.25	
2.1494	-0.003	21-1	11	

Table 5.3 - Element Forces - Columns (Part 2 of 2, continued)

M2 kip-ft	M3 kip-ft	Element	Elem Station ft	Location
2.1494	-0.003	21-2	0	
0.6562	-0.0036	21-2	1	
0.6562	-0.0036	21-3	0	
-4.9436	-0.0061	21-3	4.5	
18.5106	20.4081	21-1	0	
6.2184	5.5258	21-1	8.25	
2.121	0.6438	21-1	11	
2.121	0.6438	21-2	0	
0.631	0.4932	21-2	1	
0.631	0.4932	21-3	0	
12.8685	8.0421	21-3	4.5	
-18.6969	-19.6371	21-1	0	
-6.3264	-5.9174	21-1	8.25	
-2.203	-1.4229	21-1	11	
-2.203	-1.4229	21-2	0	
-0.7035	-1.4133	21-2	1	
-0.7035	-1.4133	21-3	0	
-1.8291	-9.5963	21-3	4.5	
-0.0213	-0.3645	22-1	0	
0.0696	-0.0625	22-1	4.5	
0.0696	-0.0625	22-2	0	
0.1353	0.1556	22-2	3.25	
0.1505	0.2059	22-2	4	
0.1505	0.2059	22-3	0	
0.201	0.3737	22-3	2.5	
0.201	0.3737	22-4	0	
-0.3156	0.4408	22-4	1	
-0.3156	0.4408	22-5	0	
-2.1238	0.6756	22-5	3.5	
-0.0394	-0.4043	22-1	0	
0.1258	-0.0737	22-1	4.5	
0.1258	-0.0737	22-2	0	
0.2451	0.165	22-2	3.25	
0.2726	0.2201	22-2	4	
0.2726	0.2201	22-3	0	
0.3643	0.4038	22-3	2.5	
0.3643	0.4038	22-4	0	
-0.573	0.4772	22-4	1	
-0.573	0.4772	22-5	0	
-3.8539	0.7343	22-5	3.5	
-4.004E-05	19.9024	22-1	0	
0.0004	12.1343	22-1	4.5	
0.0004	12.1343	22-2	0	
0.0006	6.5241	22-2	3.25	

Table 5.3 - Element Forces - Columns (Part 2 of 2, continued)

M2 kip-ft	M3 kip-ft	Element	Elem Station ft	Location
0.0007	5.2294	22-2	4	
0.0007	5.2294	22-3	0	
0.0009	0.9139	22-3	2.5	
0.0009	0.9139	22-4	0	
-0.0016	-0.8124	22-4	1	
-0.0016	-0.8124	22-5	0	
-0.0103	-6.8542	22-5	3.5	
17.4881	0.0035	22-1	0	
11.0047	0.0008	22-1	4.5	
11.0047	0.0008	22-2	0	
6.3222	-0.0012	22-2	3.25	
5.2416	-0.0016	22-2	4	
5.2416	-0.0016	22-3	0	
1.6397	-0.0031	22-3	2.5	
1.6397	-0.0031	22-4	0	
0.5385	-0.0037	22-4	1	
0.5385	-0.0037	22-5	0	
-3.3159	-0.0058	22-5	3.5	
17.4726	19.6369	22-1	0	
11.1002	12.0888	22-1	4.5	
11.1002	12.0888	22-2	0	
6.5078	6.7375	22-2	3.25	
5.448	5.5118	22-2	4	
5.448	5.5118	22-3	0	
1.9154	1.4264	22-3	2.5	
1.9154	1.4264	22-4	0	
0.3086	1.4169	22-4	1	
0.3086	1.4169	22-5	0	
1.7689	7.7809	22-5	3.5	
-17.5174	-20.4023	22-1	0	
-10.954	-12.2201	22-1	4.5	
-10.954	-12.2201	22-2	0	
-6.2236	-6.4108	22-2	3.25	
-5.132	-5.0794	22-2	4	
-5.132	-5.0794	22-3	0	
-1.4933	-0.6417	22-3	2.5	
-1.4933	-0.6417	22-4	0	
-1.2956	-0.4913	22-4	1	
-1.2956	-0.4913	22-5	0	
-8.7147	-6.362	22-5	3.5	
0.0945	0.3671	23-1	0	
0.0689	-0.1529	23-1	7.75	
0.0582	-0.371	23-1	11	
0.0582	-0.371	23-2	0	

Table 5.3 - Element Forces - Columns (Part 2 of 2, continued)

M2 kip-ft	M3 kip-ft	Element	Elem Station ft	Location
0.0549	-0.4381	23-2	1	
0.0549	-0.4381	23-3	0	
-3.3181	-0.673	23-3	3.5	
0.1069	0.3966	23-1	0	
0.078	-0.1727	23-1	7.75	
0.0659	-0.4115	23-1	11	
0.0659	-0.4115	23-2	0	
0.0622	-0.4849	23-2	1	
0.0622	-0.4849	23-3	0	
-3.7526	-0.742	23-3	3.5	
-0.0003	19.9045	23-1	0	
-1.935E-05	6.5249	23-1	7.75	
0.0001	0.914	23-1	11	
0.0001	0.914	23-2	0	
0.0001	-0.8124	23-2	1	
0.0001	-0.8124	23-3	0	
0.01	-6.8548	23-3	3.5	
18.7297	-0.0031	23-1	0	
6.9181	0.0016	23-1	7.75	
1.9649	0.0035	23-1	11	
1.9649	0.0035	23-2	0	
0.4408	0.0041	23-2	1	
0.4408	0.0041	23-3	0	
-3.8835	0.0062	23-3	3.5	
18.8593	20.4081	23-1	0	
7.0127	6.4135	23-1	7.75	
2.0447	0.6438	23-1	11	
2.0447	0.6438	23-2	0	
0.5161	0.4932	23-2	1	
0.5161	0.4932	23-3	0	
1.4666	6.3646	23-3	3.5	
-18.6609	-19.6371	23-1	0	
-6.8679	-6.7346	23-1	7.75	
-1.9224	-1.423	23-1	11	
-1.9224	-1.423	23-2	0	
-0.4008	-1.4133	23-2	1	
-0.4008	-1.4133	23-3	0	
-9.9859	-7.7779	23-3	3.5	
0	0	26-1	0	
0	0	26-1	4.5	
0	0	26-2	0	
0	0	26-2	3.75	
0	0	26-2	6.5	
0	0	26-3	0	

Table 5.3 - Element Forces - Columns (Part 2 of 2, continued)

M2 kip-ft	M3 kip-ft	Element	Elem Station ft	Location
0	0	26-3	1	
0	0	26-4	0	
0	0	26-4	4.5	
0	0	26-1	0	
0	0	26-1	4.5	
0	0	26-2	0	
0	0	26-2	3.75	
0	0	26-2	6.5	
0	0	26-3	0	
0	0	26-3	1	
0	0	26-4	0	
0	0	26-4	4.5	
0	0	26-1	0	
0	0	26-1	4.5	
0	0	26-2	0	
0	0	26-2	3.75	
0	0	26-2	6.5	
0	0	26-3	0	
0	0	26-3	1	
0	0	26-4	0	
0	0	26-4	4.5	
0	0	26-1	0	
0	0	26-1	4.5	
0	0	26-2	0	
0	0	26-2	3.75	
0	0	26-2	6.5	
0	0	26-3	0	
0	0	26-3	1	
0	0	26-4	0	
0	0	26-4	4.5	
0	0	26-1	0	
0	0	26-1	4.5	
0	0	26-2	0	
0	0	26-2	3.75	
0	0	26-2	6.5	
0	0	26-3	0	
0	0	26-3	1	
0	0	26-4	0	
0	0	26-4	4.5	
0	0	26-1	0	
0	0	26-1	4.5	
0	0	26-2	0	
0	0	26-2	3.75	
0	0	26-2	6.5	

Table 5.3 - Element Forces - Columns (Part 2 of 2, continued)

M2 kip-ft	M3 kip-ft	Element	Elem Station ft	Location
0	0	26-3	0	
0	0	26-3	1	
0	0	26-4	0	
0	0	26-4	4.5	
0	0	27-1	0	
0	0	27-1	4.5	
0	0	27-2	0	
0	0	27-2	3.75	
0	0	27-2	6.5	
0	0	27-3	0	
0	0	27-3	1	
0	0	27-4	0	
0	0	27-4	4.5	
0	0	27-1	0	
0	0	27-1	4.5	
0	0	27-2	0	
0	0	27-2	3.75	
0	0	27-2	6.5	
0	0	27-3	0	
0	0	27-3	1	
0	0	27-4	0	
0	0	27-4	4.5	
0	0	27-1	0	
0	0	27-1	4.5	
0	0	27-2	0	
0	0	27-2	3.75	
0	0	27-2	6.5	
0	0	27-3	0	
0	0	27-3	1	
0	0	27-4	0	
0	0	27-4	4.5	
0	0	27-1	0	
0	0	27-1	4.5	
0	0	27-2	0	
0	0	27-2	3.75	
0	0	27-2	6.5	
0	0	27-3	0	
0	0	27-3	1	
0	0	27-4	0	
0	0	27-4	4.5	
0	0	27-1	0	
0	0	27-1	4.5	
0	0	27-2	0	
0	0	27-2	3.75	

Table 5.3 - Element Forces - Columns (Part 2 of 2, continued)

M2 kip-ft	M3 kip-ft	Element	Elem Station ft	Location
0	0	27-2	6.5	
0	0	27-3	0	
0	0	27-3	1	
0	0	27-4	0	
0	0	27-4	4.5	
0	0	27-1	0	
0	0	27-1	4.5	
0	0	27-2	0	
0	0	27-2	3.75	
0	0	27-2	6.5	
0	0	27-3	0	
0	0	27-3	1	
0	0	27-4	0	
0	0	27-4	4.5	
0	0	28-1	0	
0	0	28-1	4.5	
0	0	28-2	0	
0	0	28-2	3.75	
0	0	28-2	6.5	
0	0	28-3	0	
0	0	28-3	1	
0	0	28-4	0	
0	0	28-4	4.5	
0	0	28-1	0	
0	0	28-1	4.5	
0	0	28-2	0	
0	0	28-2	3.75	
0	0	28-2	6.5	
0	0	28-3	0	
0	0	28-3	1	
0	0	28-4	0	
0	0	28-4	4.5	
0	0	28-1	0	
0	0	28-1	4.5	
0	0	28-2	0	
0	0	28-2	3.75	
0	0	28-2	6.5	
0	0	28-3	0	
0	0	28-3	1	
0	0	28-4	0	
0	0	28-4	4.5	
0	0	28-1	0	
0	0	28-1	4.5	
0	0	28-2	0	

Table 5.3 - Element Forces - Columns (Part 2 of 2, continued)

M2 kip-ft	M3 kip-ft	Element	Elem Station ft	Location
0	0	28-2	3.75	
0	0	28-2	6.5	
0	0	28-3	0	
0	0	28-3	1	
0	0	28-4	0	
0	0	28-4	4.5	
0	0	28-1	0	
0	0	28-1	4.5	
0	0	28-2	0	
0	0	28-2	3.75	
0	0	28-2	6.5	
0	0	28-3	0	
0	0	28-3	1	
0	0	28-4	0	
0	0	28-4	4.5	
0	0	28-1	0	
0	0	28-1	4.5	
0	0	28-2	0	
0	0	28-2	3.75	
0	0	28-2	6.5	
0	0	28-3	0	
0	0	28-3	1	
0	0	28-4	0	
0	0	28-4	4.5	
0	0	33-1	0	
0	0	33-1	4.5	
0	0	33-2	0	
0	0	33-2	3.75	
0	0	33-2	6.5	
0	0	33-3	0	
0	0	33-3	1	
0	0	33-4	0	
0	0	33-4	4.5	
0	0	33-1	0	
0	0	33-1	4.5	
0	0	33-2	0	
0	0	33-2	3.75	
0	0	33-2	6.5	
0	0	33-3	0	
0	0	33-3	1	
0	0	33-4	0	
0	0	33-4	4.5	
0	0	33-1	0	
0	0	33-1	4.5	

Table 5.3 - Element Forces - Columns (Part 2 of 2, continued)

M2 kip-ft	M3 kip-ft	Element	Elem Station ft	Location
0	0	33-2	0	
0	0	33-2	3.75	
0	0	33-2	6.5	
0	0	33-3	0	
0	0	33-3	1	
0	0	33-4	0	
0	0	33-4	4.5	
0	0	33-1	0	
0	0	33-1	4.5	
0	0	33-2	0	
0	0	33-2	3.75	
0	0	33-2	6.5	
0	0	33-3	0	
0	0	33-3	1	
0	0	33-4	0	
0	0	33-4	4.5	
0	0	33-1	0	
0	0	33-1	4.5	
0	0	33-2	0	
0	0	33-2	3.75	
0	0	33-2	6.5	
0	0	33-3	0	
0	0	33-3	1	
0	0	33-4	0	
0	0	33-4	4.5	
0	0	33-1	0	
0	0	33-1	4.5	
0	0	33-2	0	
0	0	33-2	3.75	
0	0	33-2	6.5	
0	0	33-3	0	
0	0	33-3	1	
0	0	33-4	0	
0	0	33-4	4.5	

Table 5.4 - Element Forces - Beams (Part 1 of 2)

Story	Beam	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft	M2 kip-ft
Story1	B5	19	Dead	LinStatic		0.6667	-0.067	-0.268	0	-0.0677	0
Story1	B5	19	Dead	LinStatic		2.2708	-0.067	-0.03	0	-0.0677	0
Story1	B5	19	Dead	LinStatic		3.875	-0.067	0.207	0	-0.0677	0
Story1	B5	19	Dead	LinStatic		5.4792	-0.067	0.445	0	-0.0677	0
Story1	B5	19	Dead	LinStatic		7.0833	-0.067	0.682	0	-0.0677	0
Story1	B5	19	Dead	LinStatic		7.0833	-0.067	-0.764	0	-0.0677	0

Table 5.4 - Element Forces - Beams (Part 1 of 2, continued)

Story	Beam	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft	M2 kip-ft
Story1	B5	19	Dead	LinStatic		8.8056	-0.067	-0.509	0	-0.0677	0
Story1	B5	19	Dead	LinStatic		10.5278	-0.067	-0.255	0	-0.0677	0
Story1	B5	19	Dead	LinStatic		12.25	-0.067	0.0003308	0	-0.0677	0
Story1	B5	19	Dead	LinStatic		13.9722	-0.067	0.255	0	-0.0677	0
Story1	B5	19	Dead	LinStatic		15.6944	-0.067	0.51	0	-0.0677	0
Story1	B5	19	Dead	LinStatic		17.4167	-0.067	0.765	0	-0.0677	0
Story1	B5	19	Dead	LinStatic		17.4167	-0.067	-0.683	0	-0.0677	0
Story1	B5	19	Dead	LinStatic		19.0208	-0.067	-0.445	0	-0.0677	0
Story1	B5	19	Dead	LinStatic		20.625	-0.067	-0.208	0	-0.0677	0
Story1	B5	19	Dead	LinStatic		22.2292	-0.067	0.029	0	-0.0677	0
Story1	B5	19	Dead	LinStatic		23.8333	-0.067	0.267	0	-0.0677	0
Story1	B5	19	Roof Live	LinStatic		0.6667	-0.073	-0.292	0	0.0102	0
Story1	B5	19	Roof Live	LinStatic		2.2708	-0.073	-0.029	0	0.0102	0
Story1	B5	19	Roof Live	LinStatic		3.875	-0.073	0.234	0	0.0102	0
Story1	B5	19	Roof Live	LinStatic		5.4792	-0.073	0.497	0	0.0102	0
Story1	B5	19	Roof Live	LinStatic		7.0833	-0.073	0.76	0	0.0102	0
Story1	B5	19	Roof Live	LinStatic		7.0833	-0.073	-0.848	0	0.0102	0
Story1	B5	19	Roof Live	LinStatic		8.8056	-0.073	-0.566	0	0.0102	0
Story1	B5	19	Roof Live	LinStatic		10.5278	-0.073	-0.284	0	0.0102	0
Story1	B5	19	Roof Live	LinStatic		12.25	-0.073	-0.001	0	0.0102	0
Story1	B5	19	Roof Live	LinStatic		13.9722	-0.073	0.281	0	0.0102	0
Story1	B5	19	Roof Live	LinStatic		15.6944	-0.073	0.564	0	0.0102	0
Story1	B5	19	Roof Live	LinStatic		17.4167	-0.073	0.846	0	0.0102	0
Story1	B5	19	Roof Live	LinStatic		17.4167	-0.073	-0.757	0	0.0102	0
Story1	B5	19	Roof Live	LinStatic		19.0208	-0.073	-0.494	0	0.0102	0
Story1	B5	19	Roof Live	LinStatic		20.625	-0.073	-0.231	0	0.0102	0
Story1	B5	19	Roof Live	LinStatic		22.2292	-0.073	0.032	0	0.0102	0
Story1	B5	19	Roof Live	LinStatic		23.8333	-0.073	0.295	0	0.0102	0
Story1	B5	19	Lateral (N-S)	LinStatic		0.6667	0.195	1.697	0	0.0012	0
Story1	B5	19	Lateral (N-S)	LinStatic		2.2708	0.195	1.697	0	0.0012	0
Story1	B5	19	Lateral (N-S)	LinStatic		3.875	0.195	1.697	0	0.0012	0
Story1	B5	19	Lateral (N-S)	LinStatic		5.4792	0.195	1.697	0	0.0012	0
Story1	B5	19	Lateral (N-S)	LinStatic		7.0833	0.195	1.697	0	0.0012	0
Story1	B5	19	Lateral (N-S)	LinStatic		7.0833	0.047	-0.496	0	0.0012	0
Story1	B5	19	Lateral (N-S)	LinStatic		8.8056	0.047	-0.496	0	0.0012	0
Story1	B5	19	Lateral (N-S)	LinStatic		10.5278	0.047	-0.496	0	0.0012	0
Story1	B5	19	Lateral (N-S)	LinStatic		12.25	0.047	-0.496	0	0.0012	0
Story1	B5	19	Lateral (N-S)	LinStatic		13.9722	0.047	-0.496	0	0.0012	0
Story1	B5	19	Lateral (N-S)	LinStatic		15.6944	0.047	-0.496	0	0.0012	0
Story1	B5	19	Lateral (N-S)	LinStatic		17.4167	0.047	-0.496	0	0.0012	0
Story1	B5	19	Lateral (N-S)	LinStatic		17.4167	-0.1	1.697	0	0.0012	0
Story1	B5	19	Lateral (N-S)	LinStatic		19.0208	-0.1	1.697	0	0.0012	0
Story1	B5	19	Lateral (N-S)	LinStatic		20.625	-0.1	1.697	0	0.0012	0
Story1	B5	19	Lateral (N-S)	LinStatic		22.2292	-0.1	1.697	0	0.0012	0
Story1	B5	19	Lateral (N-S)	LinStatic		23.8333	-0.1	1.697	0	0.0012	0

Table 5.4 - Element Forces - Beams (Part 1 of 2, continued)

Story	Beam	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft	M2 kip-ft
Story1	B5	19	Lateral (E-W)	LinStatic		0.6667	-0.001	-0.001	-0.148	-0.1799	0
Story1	B5	19	Lateral (E-W)	LinStatic		2.2708	-0.001	-0.001	-0.148	-0.1799	0.2368
Story1	B5	19	Lateral (E-W)	LinStatic		3.875	-0.001	-0.001	-0.148	-0.1799	0.4736
Story1	B5	19	Lateral (E-W)	LinStatic		5.4792	-0.001	-0.001	-0.148	-0.1799	0.7104
Story1	B5	19	Lateral (E-W)	LinStatic		7.0833	-0.001	-0.001	-0.148	-0.1799	0.9472
Story1	B5	19	Lateral (E-W)	LinStatic		7.0833	-0.001	1.835E-05	0	-0.1799	0.9472
Story1	B5	19	Lateral (E-W)	LinStatic		8.8056	-0.001	1.835E-05	0	-0.1799	0.9472
Story1	B5	19	Lateral (E-W)	LinStatic		10.5278	-0.001	1.835E-05	0	-0.1799	0.9472
Story1	B5	19	Lateral (E-W)	LinStatic		12.25	-0.001	1.835E-05	0	-0.1799	0.9472
Story1	B5	19	Lateral (E-W)	LinStatic		13.9722	-0.001	1.835E-05	0	-0.1799	0.9472
Story1	B5	19	Lateral (E-W)	LinStatic		15.6944	-0.001	1.835E-05	0	-0.1799	0.9472
Story1	B5	19	Lateral (E-W)	LinStatic		17.4167	-0.001	1.835E-05	0	-0.1799	0.9472
Story1	B5	19	Lateral (E-W)	LinStatic		17.4167	-0.001	0.001	0.148	-0.1799	0.9472
Story1	B5	19	Lateral (E-W)	LinStatic		19.0208	-0.001	0.001	0.148	-0.1799	0.7104
Story1	B5	19	Lateral (E-W)	LinStatic		20.625	-0.001	0.001	0.148	-0.1799	0.4736
Story1	B5	19	Lateral (E-W)	LinStatic		22.2292	-0.001	0.001	0.148	-0.1799	0.2368
Story1	B5	19	Lateral (E-W)	LinStatic		23.8333	-0.001	0.001	0.148	-0.1799	0
Story1	B5	19	Envelope	Combination	Max	0.6667	0.146	1.502	0.148	0.1306	0
Story1	B5	19	Envelope	Combination	Max	2.2708	0.146	1.675	0.148	0.1306	0.2368
Story1	B5	19	Envelope	Combination	Max	3.875	0.146	1.981	0.148	0.1306	0.4736
Story1	B5	19	Envelope	Combination	Max	5.4792	0.146	2.306	0.148	0.1306	0.7104
Story1	B5	19	Envelope	Combination	Max	7.0833	0.146	2.632	0.148	0.1306	0.9472
Story1	B5	19	Envelope	Combination	Max	7.0833	-0.002	-0.061	0	0.1306	0.9472
Story1	B5	19	Envelope	Combination	Max	8.8056	-0.002	0.125	0	0.1306	0.9472
Story1	B5	19	Envelope	Combination	Max	10.5278	-0.002	0.311	0	0.1306	0.9472
Story1	B5	19	Envelope	Combination	Max	12.25	-0.002	0.497	0	0.1306	0.9472
Story1	B5	19	Envelope	Combination	Max	13.9722	-0.002	0.846	0	0.1306	0.9472
Story1	B5	19	Envelope	Combination	Max	15.6944	-0.002	1.514	0	0.1306	0.9472
Story1	B5	19	Envelope	Combination	Max	17.4167	-0.002	2.272	0	0.1306	0.9472
Story1	B5	19	Envelope	Combination	Max	17.4167	0.051	1.199	0.148	0.1306	0.9472
Story1	B5	19	Envelope	Combination	Max	19.0208	0.051	1.372	0.148	0.1306	0.7104
Story1	B5	19	Envelope	Combination	Max	20.625	0.051	1.545	0.148	0.1306	0.4736
Story1	B5	19	Envelope	Combination	Max	22.2292	0.051	1.737	0.148	0.1306	0.2368
Story1	B5	19	Envelope	Combination	Max	23.8333	0.051	2.063	0.148	0.1306	0
Story1	B5	19	Envelope	Combination	Min	0.6667	-0.287	-2.064	-0.148	-0.2727	0
Story1	B5	19	Envelope	Combination	Min	2.2708	-0.287	-1.738	-0.148	-0.2727	-0.2368
Story1	B5	19	Envelope	Combination	Min	3.875	-0.287	-1.546	-0.148	-0.2727	-0.4736
Story1	B5	19	Envelope	Combination	Min	5.4792	-0.287	-1.373	-0.148	-0.2727	-0.7104
Story1	B5	19	Envelope	Combination	Min	7.0833	-0.287	-1.2	-0.148	-0.2727	-0.9472
Story1	B5	19	Envelope	Combination	Min	7.0833	-0.198	-2.275	0	-0.2727	-0.9472
Story1	B5	19	Envelope	Combination	Min	8.8056	-0.198	-1.517	0	-0.2727	-0.9472
Story1	B5	19	Envelope	Combination	Min	10.5278	-0.198	-0.845	0	-0.2727	-0.9472
Story1	B5	19	Envelope	Combination	Min	12.25	-0.198	-0.496	0	-0.2727	-0.9472
Story1	B5	19	Envelope	Combination	Min	13.9722	-0.198	-0.31	0	-0.2727	-0.9472
Story1	B5	19	Envelope	Combination	Min	15.6944	-0.198	-0.125	0	-0.2727	-0.9472

Table 5.4 - Element Forces - Beams (Part 1 of 2, continued)

Story	Beam	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft	M2 kip-ft
Story1	B5	19	Envelope	Combination	Min	17.4167	-0.198	0.061	0	-0.2727	-0.9472
Story1	B5	19	Envelope	Combination	Min	17.4167	-0.198	-2.633	-0.148	-0.2727	-0.9472
Story1	B5	19	Envelope	Combination	Min	19.0208	-0.198	-2.308	-0.148	-0.2727	-0.7104
Story1	B5	19	Envelope	Combination	Min	20.625	-0.198	-1.982	-0.148	-0.2727	-0.4736
Story1	B5	19	Envelope	Combination	Min	22.2292	-0.198	-1.675	-0.148	-0.2727	-0.2368
Story1	B5	19	Envelope	Combination	Min	23.8333	-0.198	-1.502	-0.148	-0.2727	0
Story1	B12	9	Dead	LinStatic		0.9167	-0.938	-1.767	0	0.6786	0
Story1	B12	9	Dead	LinStatic		2.7262	-0.938	-1.238	0	0.6786	0
Story1	B12	9	Dead	LinStatic		4.5357	-0.938	-0.71	0	0.6786	0
Story1	B12	9	Dead	LinStatic		6.3452	-0.938	-0.182	0	0.6786	0
Story1	B12	9	Dead	LinStatic		8.1548	-0.938	0.347	0	0.6786	0
Story1	B12	9	Dead	LinStatic		9.9643	-0.938	0.875	0	0.6786	0
Story1	B12	9	Dead	LinStatic		11.7738	-0.938	1.403	0	0.6786	0
Story1	B12	9	Dead	LinStatic		13.5833	-0.938	1.932	0	0.6786	0
Story1	B12	9	Roof Live	LinStatic		0.9167	-1.061	-1.966	0	0.7521	0
Story1	B12	9	Roof Live	LinStatic		2.7262	-1.061	-1.378	0	0.7521	0
Story1	B12	9	Roof Live	LinStatic		4.5357	-1.061	-0.79	0	0.7521	0
Story1	B12	9	Roof Live	LinStatic		6.3452	-1.061	-0.202	0	0.7521	0
Story1	B12	9	Roof Live	LinStatic		8.1548	-1.061	0.386	0	0.7521	0
Story1	B12	9	Roof Live	LinStatic		9.9643	-1.061	0.974	0	0.7521	0
Story1	B12	9	Roof Live	LinStatic		11.7738	-1.061	1.562	0	0.7521	0
Story1	B12	9	Roof Live	LinStatic		13.5833	-1.061	2.15	0	0.7521	0
Story1	B12	9	Lateral (N-S)	LinStatic		0.9167	0.003	0.002	0.508	-0.8736	0
Story1	B12	9	Lateral (N-S)	LinStatic		2.7262	0.003	0.002	0.508	-0.8736	-0.9196
Story1	B12	9	Lateral (N-S)	LinStatic		4.5357	0.003	0.002	0.508	-0.8736	-1.8393
Story1	B12	9	Lateral (N-S)	LinStatic		6.3452	0.003	0.002	0.508	-0.8736	-2.7589
Story1	B12	9	Lateral (N-S)	LinStatic		8.1548	0.003	0.002	0.508	-0.8736	-3.6785
Story1	B12	9	Lateral (N-S)	LinStatic		9.9643	0.003	0.002	0.508	-0.8736	-4.5981
Story1	B12	9	Lateral (N-S)	LinStatic		11.7738	0.003	0.002	0.508	-0.8736	-5.5178
Story1	B12	9	Lateral (N-S)	LinStatic		13.5833	0.003	0.002	0.508	-0.8736	-6.4374
Story1	B12	9	Lateral (E-W)	LinStatic		0.9167	-0.027	0.405	0	0.0006	0
Story1	B12	9	Lateral (E-W)	LinStatic		2.7262	-0.027	0.405	0	0.0006	0
Story1	B12	9	Lateral (E-W)	LinStatic		4.5357	-0.027	0.405	0	0.0006	0
Story1	B12	9	Lateral (E-W)	LinStatic		6.3452	-0.027	0.405	0	0.0006	0
Story1	B12	9	Lateral (E-W)	LinStatic		8.1548	-0.027	0.405	0	0.0006	0
Story1	B12	9	Lateral (E-W)	LinStatic		9.9643	-0.027	0.405	0	0.0006	0
Story1	B12	9	Lateral (E-W)	LinStatic		11.7738	-0.027	0.405	0	0.0006	0
Story1	B12	9	Lateral (E-W)	LinStatic		13.5833	-0.027	0.405	0	0.0006	0
Story1	B12	9	Envelope	Combination	Max	0.9167	-0.657	-0.882	0.508	2.0177	0
Story1	B12	9	Envelope	Combination	Max	2.7262	-0.657	-0.497	0.508	2.0177	0.9196
Story1	B12	9	Envelope	Combination	Max	4.5357	-0.657	-0.112	0.508	2.0177	1.8393
Story1	B12	9	Envelope	Combination	Max	6.3452	-0.657	0.273	0.508	2.0177	2.7589
Story1	B12	9	Envelope	Combination	Max	8.1548	-0.657	1.034	0.508	2.0177	3.6785
Story1	B12	9	Envelope	Combination	Max	9.9643	-0.657	2.609	0.508	2.0177	4.5981
Story1	B12	9	Envelope	Combination	Max	11.7738	-0.657	4.184	0.508	2.0177	5.5178

Table 5.4 - Element Forces - Beams (Part 1 of 2, continued)

Story	Beam	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft	M2 kip-ft
Story1	B12	9	Envelope	Combination	Max	13.5833	-0.657	5.759	0.508	2.0177	6.4374
Story1	B12	9	Envelope	Combination	Min	0.9167	-2.824	-5.266	-0.508	-0.3793	0
Story1	B12	9	Envelope	Combination	Min	2.7262	-2.824	-3.691	-0.508	-0.3793	-0.9196
Story1	B12	9	Envelope	Combination	Min	4.5357	-2.824	-2.116	-0.508	-0.3793	-1.8393
Story1	B12	9	Envelope	Combination	Min	6.3452	-2.824	-0.654	-0.508	-0.3793	-2.7589
Story1	B12	9	Envelope	Combination	Min	8.1548	-2.824	-0.152	-0.508	-0.3793	-3.6785
Story1	B12	9	Envelope	Combination	Min	9.9643	-2.824	0.232	-0.508	-0.3793	-4.5981
Story1	B12	9	Envelope	Combination	Min	11.7738	-2.824	0.617	-0.508	-0.3793	-5.5178
Story1	B12	9	Envelope	Combination	Min	13.5833	-2.824	1.002	-0.508	-0.3793	-6.4374
Story1	B30	8	Dead	LinStatic		0.4167	-0.945	-1.933	0	-0.6786	0
Story1	B30	8	Dead	LinStatic		2.2262	-0.945	-1.404	0	-0.6786	0
Story1	B30	8	Dead	LinStatic		4.0357	-0.945	-0.876	0	-0.6786	0
Story1	B30	8	Dead	LinStatic		5.8452	-0.945	-0.347	0	-0.6786	0
Story1	B30	8	Dead	LinStatic		7.6548	-0.945	0.181	0	-0.6786	0
Story1	B30	8	Dead	LinStatic		9.4643	-0.945	0.709	0	-0.6786	0
Story1	B30	8	Dead	LinStatic		11.2738	-0.945	1.238	0	-0.6786	0
Story1	B30	8	Dead	LinStatic		13.0833	-0.945	1.766	0	-0.6786	0
Story1	B30	8	Roof Live	LinStatic		0.4167	-1.069	-2.151	0	-0.7521	0
Story1	B30	8	Roof Live	LinStatic		2.2262	-1.069	-1.563	0	-0.7521	0
Story1	B30	8	Roof Live	LinStatic		4.0357	-1.069	-0.975	0	-0.7521	0
Story1	B30	8	Roof Live	LinStatic		5.8452	-1.069	-0.387	0	-0.7521	0
Story1	B30	8	Roof Live	LinStatic		7.6548	-1.069	0.201	0	-0.7521	0
Story1	B30	8	Roof Live	LinStatic		9.4643	-1.069	0.789	0	-0.7521	0
Story1	B30	8	Roof Live	LinStatic		11.2738	-1.069	1.377	0	-0.7521	0
Story1	B30	8	Roof Live	LinStatic		13.0833	-1.069	1.965	0	-0.7521	0
Story1	B30	8	Lateral (N-S)	LinStatic		0.4167	0.003	-0.002	-0.508	0.8736	-6.4374
Story1	B30	8	Lateral (N-S)	LinStatic		2.2262	0.003	-0.002	-0.508	0.8736	-5.5178
Story1	B30	8	Lateral (N-S)	LinStatic		4.0357	0.003	-0.002	-0.508	0.8736	-4.5981
Story1	B30	8	Lateral (N-S)	LinStatic		5.8452	0.003	-0.002	-0.508	0.8736	-3.6785
Story1	B30	8	Lateral (N-S)	LinStatic		7.6548	0.003	-0.002	-0.508	0.8736	-2.7589
Story1	B30	8	Lateral (N-S)	LinStatic		9.4643	0.003	-0.002	-0.508	0.8736	-1.8393
Story1	B30	8	Lateral (N-S)	LinStatic		11.2738	0.003	-0.002	-0.508	0.8736	-0.9196
Story1	B30	8	Lateral (N-S)	LinStatic		13.0833	0.003	-0.002	-0.508	0.8736	0
Story1	B30	8	Lateral (E-W)	LinStatic		0.4167	-0.677	0.346	0	0.0005	0
Story1	B30	8	Lateral (E-W)	LinStatic		2.2262	-0.677	0.346	0	0.0005	0
Story1	B30	8	Lateral (E-W)	LinStatic		4.0357	-0.677	0.346	0	0.0005	0
Story1	B30	8	Lateral (E-W)	LinStatic		5.8452	-0.677	0.346	0	0.0005	0
Story1	B30	8	Lateral (E-W)	LinStatic		7.6548	-0.677	0.346	0	0.0005	0
Story1	B30	8	Lateral (E-W)	LinStatic		9.4643	-0.677	0.346	0	0.0005	0
Story1	B30	8	Lateral (E-W)	LinStatic		11.2738	-0.677	0.346	0	0.0005	0
Story1	B30	8	Lateral (E-W)	LinStatic		13.0833	-0.677	0.346	0	0.0005	0
Story1	B30	8	Envelope	Combination	Max	0.4167	-0.011	-1.062	0.508	0.3793	6.4374
Story1	B30	8	Envelope	Combination	Max	2.2262	-0.011	-0.677	0.508	0.3793	5.5178
Story1	B30	8	Envelope	Combination	Max	4.0357	-0.011	-0.292	0.508	0.3793	4.5981
Story1	B30	8	Envelope	Combination	Max	5.8452	-0.011	0.093	0.508	0.3793	3.6785

Table 5.4 - Element Forces - Beams (Part 1 of 2, continued)

Story	Beam	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft	M2 kip-ft
Story1	B30	8	Envelope	Combination	Max	7.6548	-0.011	0.594	0.508	0.3793	2.7589
Story1	B30	8	Envelope	Combination	Max	9.4643	-0.011	2.114	0.508	0.3793	1.8393
Story1	B30	8	Envelope	Combination	Max	11.2738	-0.011	3.689	0.508	0.3793	0.9196
Story1	B30	8	Envelope	Combination	Max	13.0833	-0.011	5.264	0.508	0.3793	0
Story1	B30	8	Envelope	Combination	Min	0.4167	-2.844	-5.761	-0.508	-2.0177	-6.4374
Story1	B30	8	Envelope	Combination	Min	2.2262	-2.844	-4.186	-0.508	-2.0177	-5.5178
Story1	B30	8	Envelope	Combination	Min	4.0357	-2.844	-2.611	-0.508	-2.0177	-4.5981
Story1	B30	8	Envelope	Combination	Min	5.8452	-2.844	-1.036	-0.508	-2.0177	-3.6785
Story1	B30	8	Envelope	Combination	Min	7.6548	-2.844	-0.214	-0.508	-2.0177	-2.7589
Story1	B30	8	Envelope	Combination	Min	9.4643	-2.844	0.171	-0.508	-2.0177	-1.8393
Story1	B30	8	Envelope	Combination	Min	11.2738	-2.844	0.556	-0.508	-2.0177	-0.9196
Story1	B30	8	Envelope	Combination	Min	13.0833	-2.844	0.941	-0.508	-2.0177	0
Story1	B31	14	Dead	LinStatic		0.4167	-0.507	-1.159	0	0.6787	0
Story1	B31	14	Dead	LinStatic		2.2262	-0.507	-0.842	0	0.6787	0
Story1	B31	14	Dead	LinStatic		4.0357	-0.507	-0.526	0	0.6787	0
Story1	B31	14	Dead	LinStatic		5.8452	-0.507	-0.209	0	0.6787	0
Story1	B31	14	Dead	LinStatic		7.6548	-0.507	0.108	0	0.6787	0
Story1	B31	14	Dead	LinStatic		9.4643	-0.507	0.424	0	0.6787	0
Story1	B31	14	Dead	LinStatic		11.2738	-0.507	0.741	0	0.6787	0
Story1	B31	14	Dead	LinStatic		13.0833	-0.507	1.058	0	0.6787	0
Story1	B31	14	Roof Live	LinStatic		0.4167	-0.919	-2.15	0	0.7534	0
Story1	B31	14	Roof Live	LinStatic		2.2262	-0.919	-1.562	0	0.7534	0
Story1	B31	14	Roof Live	LinStatic		4.0357	-0.919	-0.974	0	0.7534	0
Story1	B31	14	Roof Live	LinStatic		5.8452	-0.919	-0.386	0	0.7534	0
Story1	B31	14	Roof Live	LinStatic		7.6548	-0.919	0.202	0	0.7534	0
Story1	B31	14	Roof Live	LinStatic		9.4643	-0.919	0.79	0	0.7534	0
Story1	B31	14	Roof Live	LinStatic		11.2738	-0.919	1.378	0	0.7534	0
Story1	B31	14	Roof Live	LinStatic		13.0833	-0.919	1.966	0	0.7534	0
Story1	B31	14	Lateral (N-S)	LinStatic		0.4167	-0.003	0.002	-0.444	0.8733	-5.6199
Story1	B31	14	Lateral (N-S)	LinStatic		2.2262	-0.003	0.002	-0.444	0.8733	-4.817
Story1	B31	14	Lateral (N-S)	LinStatic		4.0357	-0.003	0.002	-0.444	0.8733	-4.0142
Story1	B31	14	Lateral (N-S)	LinStatic		5.8452	-0.003	0.002	-0.444	0.8733	-3.2113
Story1	B31	14	Lateral (N-S)	LinStatic		7.6548	-0.003	0.002	-0.444	0.8733	-2.4085
Story1	B31	14	Lateral (N-S)	LinStatic		9.4643	-0.003	0.002	-0.444	0.8733	-1.6057
Story1	B31	14	Lateral (N-S)	LinStatic		11.2738	-0.003	0.002	-0.444	0.8733	-0.8028
Story1	B31	14	Lateral (N-S)	LinStatic		13.0833	-0.003	0.002	-0.444	0.8733	0
Story1	B31	14	Lateral (E-W)	LinStatic		0.4167	-0.303	0.361	0	-0.0005	0
Story1	B31	14	Lateral (E-W)	LinStatic		2.2262	-0.303	0.361	0	-0.0005	0
Story1	B31	14	Lateral (E-W)	LinStatic		4.0357	-0.303	0.361	0	-0.0005	0
Story1	B31	14	Lateral (E-W)	LinStatic		5.8452	-0.303	0.361	0	-0.0005	0
Story1	B31	14	Lateral (E-W)	LinStatic		7.6548	-0.303	0.361	0	-0.0005	0
Story1	B31	14	Lateral (E-W)	LinStatic		9.4643	-0.303	0.361	0	-0.0005	0
Story1	B31	14	Lateral (E-W)	LinStatic		11.2738	-0.303	0.361	0	-0.0005	0
Story1	B31	14	Lateral (E-W)	LinStatic		13.0833	-0.303	0.361	0	-0.0005	0
Story1	B31	14	Envelope	Combination	Max	0.4167	-0.066	-0.484	0.444	2.0199	5.6199

Table 5.4 - Element Forces - Beams (Part 1 of 2, continued)

Story	Beam	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft	M2 kip-ft
Story1	B31	14	Envelope	Combination	Max	2.2262	-0.066	-0.253	0.444	2.0199	4.817
Story1	B31	14	Envelope	Combination	Max	4.0357	-0.066	-0.022	0.444	2.0199	4.0142
Story1	B31	14	Envelope	Combination	Max	5.8452	-0.066	0.208	0.444	2.0199	3.2113
Story1	B31	14	Envelope	Combination	Max	7.6548	-0.066	0.508	0.444	2.0199	2.4085
Story1	B31	14	Envelope	Combination	Max	9.4643	-0.066	1.773	0.444	2.0199	1.6057
Story1	B31	14	Envelope	Combination	Max	11.2738	-0.066	3.094	0.444	2.0199	0.8028
Story1	B31	14	Envelope	Combination	Max	13.0833	-0.066	4.415	0.444	2.0199	0
Story1	B31	14	Envelope	Combination	Min	0.4167	-2.079	-4.831	-0.444	-0.379	-5.6199
Story1	B31	14	Envelope	Combination	Min	2.2262	-2.079	-3.51	-0.444	-0.379	-4.817
Story1	B31	14	Envelope	Combination	Min	4.0357	-2.079	-2.19	-0.444	-0.379	-4.0142
Story1	B31	14	Envelope	Combination	Min	5.8452	-2.079	-0.869	-0.444	-0.379	-3.2113
Story1	B31	14	Envelope	Combination	Min	7.6548	-2.079	-0.282	-0.444	-0.379	-2.4085
Story1	B31	14	Envelope	Combination	Min	9.4643	-2.079	-0.052	-0.444	-0.379	-1.6057
Story1	B31	14	Envelope	Combination	Min	11.2738	-2.079	0.179	-0.444	-0.379	-0.8028
Story1	B31	14	Envelope	Combination	Min	13.0833	-2.079	0.41	-0.444	-0.379	0
Story1	B32	15	Dead	LinStatic		0.9167	-0.507	-1.057	0	-0.6787	0
Story1	B32	15	Dead	LinStatic		2.7262	-0.507	-0.741	0	-0.6787	0
Story1	B32	15	Dead	LinStatic		4.5357	-0.507	-0.424	0	-0.6787	0
Story1	B32	15	Dead	LinStatic		6.3452	-0.507	-0.107	0	-0.6787	0
Story1	B32	15	Dead	LinStatic		8.1548	-0.507	0.209	0	-0.6787	0
Story1	B32	15	Dead	LinStatic		9.9643	-0.507	0.526	0	-0.6787	0
Story1	B32	15	Dead	LinStatic		11.7738	-0.507	0.843	0	-0.6787	0
Story1	B32	15	Dead	LinStatic		13.5833	-0.507	1.159	0	-0.6787	0
Story1	B32	15	Roof Live	LinStatic		0.9167	-0.919	-1.966	0	-0.7534	0
Story1	B32	15	Roof Live	LinStatic		2.7262	-0.919	-1.378	0	-0.7534	0
Story1	B32	15	Roof Live	LinStatic		4.5357	-0.919	-0.79	0	-0.7534	0
Story1	B32	15	Roof Live	LinStatic		6.3452	-0.919	-0.202	0	-0.7534	0
Story1	B32	15	Roof Live	LinStatic		8.1548	-0.919	0.386	0	-0.7534	0
Story1	B32	15	Roof Live	LinStatic		9.9643	-0.919	0.974	0	-0.7534	0
Story1	B32	15	Roof Live	LinStatic		11.7738	-0.919	1.562	0	-0.7534	0
Story1	B32	15	Roof Live	LinStatic		13.5833	-0.919	2.15	0	-0.7534	0
Story1	B32	15	Lateral (N-S)	LinStatic		0.9167	-0.003	-0.002	0.444	-0.8733	0
Story1	B32	15	Lateral (N-S)	LinStatic		2.7262	-0.003	-0.002	0.444	-0.8733	-0.8028
Story1	B32	15	Lateral (N-S)	LinStatic		4.5357	-0.003	-0.002	0.444	-0.8733	-1.6057
Story1	B32	15	Lateral (N-S)	LinStatic		6.3452	-0.003	-0.002	0.444	-0.8733	-2.4085
Story1	B32	15	Lateral (N-S)	LinStatic		8.1548	-0.003	-0.002	0.444	-0.8733	-3.2113
Story1	B32	15	Lateral (N-S)	LinStatic		9.9643	-0.003	-0.002	0.444	-0.8733	-4.0142
Story1	B32	15	Lateral (N-S)	LinStatic		11.7738	-0.003	-0.002	0.444	-0.8733	-4.817
Story1	B32	15	Lateral (N-S)	LinStatic		13.5833	-0.003	-0.002	0.444	-0.8733	-5.6199
Story1	B32	15	Lateral (E-W)	LinStatic		0.9167	0.299	0.361	0	-0.0005	0
Story1	B32	15	Lateral (E-W)	LinStatic		2.7262	0.299	0.361	0	-0.0005	0
Story1	B32	15	Lateral (E-W)	LinStatic		4.5357	0.299	0.361	0	-0.0005	0
Story1	B32	15	Lateral (E-W)	LinStatic		6.3452	0.299	0.361	0	-0.0005	0
Story1	B32	15	Lateral (E-W)	LinStatic		8.1548	0.299	0.361	0	-0.0005	0
Story1	B32	15	Lateral (E-W)	LinStatic		9.9643	0.299	0.361	0	-0.0005	0

Table 5.4 - Element Forces - Beams (Part 1 of 2, continued)

Story	Beam	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft	M2 kip-ft
Story1	B32	15	Lateral (E-W)	LinStatic		11.7738	0.299	0.361	0	-0.0005	0
Story1	B32	15	Lateral (E-W)	LinStatic		13.5833	0.299	0.361	0	-0.0005	0
Story1	B32	15	Envelope	Combination	Max	0.9167	-0.071	-0.41	0.444	0.379	0
Story1	B32	15	Envelope	Combination	Max	2.7262	-0.071	-0.179	0.444	0.379	0.8028
Story1	B32	15	Envelope	Combination	Max	4.5357	-0.071	0.052	0.444	0.379	1.6057
Story1	B32	15	Envelope	Combination	Max	6.3452	-0.071	0.282	0.444	0.379	2.4085
Story1	B32	15	Envelope	Combination	Max	8.1548	-0.071	0.869	0.444	0.379	3.2113
Story1	B32	15	Envelope	Combination	Max	9.9643	-0.071	2.19	0.444	0.379	4.0142
Story1	B32	15	Envelope	Combination	Max	11.7738	-0.071	3.511	0.444	0.379	4.817
Story1	B32	15	Envelope	Combination	Max	13.5833	-0.071	4.832	0.444	0.379	5.6199
Story1	B32	15	Envelope	Combination	Min	0.9167	-2.079	-4.415	-0.444	-2.0199	0
Story1	B32	15	Envelope	Combination	Min	2.7262	-2.079	-3.094	-0.444	-2.0199	-0.8028
Story1	B32	15	Envelope	Combination	Min	4.5357	-2.079	-1.773	-0.444	-2.0199	-1.6057
Story1	B32	15	Envelope	Combination	Min	6.3452	-2.079	-0.508	-0.444	-2.0199	-2.4085
Story1	B32	15	Envelope	Combination	Min	8.1548	-2.079	-0.208	-0.444	-2.0199	-3.2113
Story1	B32	15	Envelope	Combination	Min	9.9643	-2.079	0.022	-0.444	-2.0199	-4.0142
Story1	B32	15	Envelope	Combination	Min	11.7738	-2.079	0.253	-0.444	-2.0199	-4.817
Story1	B32	15	Envelope	Combination	Min	13.5833	-2.079	0.484	-0.444	-2.0199	-5.6199
Story1	B33	25	Dead	LinStatic		0.6667	-0.067	-0.268	0	0.0641	0
Story1	B33	25	Dead	LinStatic		2.2708	-0.067	-0.03	0	0.0641	0
Story1	B33	25	Dead	LinStatic		3.875	-0.067	0.207	0	0.0641	0
Story1	B33	25	Dead	LinStatic		5.4792	-0.067	0.445	0	0.0641	0
Story1	B33	25	Dead	LinStatic		7.0833	-0.067	0.682	0	0.0641	0
Story1	B33	25	Dead	LinStatic		7.0833	-0.067	-0.764	0	0.0641	0
Story1	B33	25	Dead	LinStatic		8.8056	-0.067	-0.509	0	0.0641	0
Story1	B33	25	Dead	LinStatic		10.5278	-0.067	-0.255	0	0.0641	0
Story1	B33	25	Dead	LinStatic		12.25	-0.067	0.0003295	0	0.0641	0
Story1	B33	25	Dead	LinStatic		13.9722	-0.067	0.255	0	0.0641	0
Story1	B33	25	Dead	LinStatic		15.6944	-0.067	0.51	0	0.0641	0
Story1	B33	25	Dead	LinStatic		17.4167	-0.067	0.765	0	0.0641	0
Story1	B33	25	Dead	LinStatic		17.4167	-0.067	-0.683	0	0.0641	0
Story1	B33	25	Dead	LinStatic		19.0208	-0.067	-0.445	0	0.0641	0
Story1	B33	25	Dead	LinStatic		20.625	-0.067	-0.208	0	0.0641	0
Story1	B33	25	Dead	LinStatic		22.2292	-0.067	0.029	0	0.0641	0
Story1	B33	25	Dead	LinStatic		23.8333	-0.067	0.267	0	0.0641	0
Story1	B33	25	Roof Live	LinStatic		0.6667	-0.073	-0.292	0	-0.0143	0
Story1	B33	25	Roof Live	LinStatic		2.2708	-0.073	-0.029	0	-0.0143	0
Story1	B33	25	Roof Live	LinStatic		3.875	-0.073	0.234	0	-0.0143	0
Story1	B33	25	Roof Live	LinStatic		5.4792	-0.073	0.497	0	-0.0143	0
Story1	B33	25	Roof Live	LinStatic		7.0833	-0.073	0.76	0	-0.0143	0
Story1	B33	25	Roof Live	LinStatic		7.0833	-0.073	-0.848	0	-0.0143	0
Story1	B33	25	Roof Live	LinStatic		8.8056	-0.073	-0.566	0	-0.0143	0
Story1	B33	25	Roof Live	LinStatic		10.5278	-0.073	-0.284	0	-0.0143	0
Story1	B33	25	Roof Live	LinStatic		12.25	-0.073	-0.001	0	-0.0143	0
Story1	B33	25	Roof Live	LinStatic		13.9722	-0.073	0.281	0	-0.0143	0

Table 5.4 - Element Forces - Beams (Part 1 of 2, continued)

Story	Beam	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft	M2 kip-ft
Story1	B33	25	Roof Live	LinStatic		15.6944	-0.073	0.564	0	-0.0143	0
Story1	B33	25	Roof Live	LinStatic		17.4167	-0.073	0.846	0	-0.0143	0
Story1	B33	25	Roof Live	LinStatic		17.4167	-0.073	-0.757	0	-0.0143	0
Story1	B33	25	Roof Live	LinStatic		19.0208	-0.073	-0.494	0	-0.0143	0
Story1	B33	25	Roof Live	LinStatic		20.625	-0.073	-0.231	0	-0.0143	0
Story1	B33	25	Roof Live	LinStatic		22.2292	-0.073	0.032	0	-0.0143	0
Story1	B33	25	Roof Live	LinStatic		23.8333	-0.073	0.295	0	-0.0143	0
Story1	B33	25	Lateral (N-S)	LinStatic		0.6667	0.195	1.697	0	-0.0012	0
Story1	B33	25	Lateral (N-S)	LinStatic		2.2708	0.195	1.697	0	-0.0012	0
Story1	B33	25	Lateral (N-S)	LinStatic		3.875	0.195	1.697	0	-0.0012	0
Story1	B33	25	Lateral (N-S)	LinStatic		5.4792	0.195	1.697	0	-0.0012	0
Story1	B33	25	Lateral (N-S)	LinStatic		7.0833	0.195	1.697	0	-0.0012	0
Story1	B33	25	Lateral (N-S)	LinStatic		7.0833	0.047	-0.496	0	-0.0012	0
Story1	B33	25	Lateral (N-S)	LinStatic		8.8056	0.047	-0.496	0	-0.0012	0
Story1	B33	25	Lateral (N-S)	LinStatic		10.5278	0.047	-0.496	0	-0.0012	0
Story1	B33	25	Lateral (N-S)	LinStatic		12.25	0.047	-0.496	0	-0.0012	0
Story1	B33	25	Lateral (N-S)	LinStatic		13.9722	0.047	-0.496	0	-0.0012	0
Story1	B33	25	Lateral (N-S)	LinStatic		15.6944	0.047	-0.496	0	-0.0012	0
Story1	B33	25	Lateral (N-S)	LinStatic		17.4167	0.047	-0.496	0	-0.0012	0
Story1	B33	25	Lateral (N-S)	LinStatic		17.4167	-0.1	1.697	0	-0.0012	0
Story1	B33	25	Lateral (N-S)	LinStatic		19.0208	-0.1	1.697	0	-0.0012	0
Story1	B33	25	Lateral (N-S)	LinStatic		20.625	-0.1	1.697	0	-0.0012	0
Story1	B33	25	Lateral (N-S)	LinStatic		22.2292	-0.1	1.697	0	-0.0012	0
Story1	B33	25	Lateral (N-S)	LinStatic		23.8333	-0.1	1.697	0	-0.0012	0
Story1	B33	25	Lateral (E-W)	LinStatic		0.6667	0.001	0.001	-0.148	-0.1535	0
Story1	B33	25	Lateral (E-W)	LinStatic		2.2708	0.001	0.001	-0.148	-0.1535	0.2368
Story1	B33	25	Lateral (E-W)	LinStatic		3.875	0.001	0.001	-0.148	-0.1535	0.4736
Story1	B33	25	Lateral (E-W)	LinStatic		5.4792	0.001	0.001	-0.148	-0.1535	0.7104
Story1	B33	25	Lateral (E-W)	LinStatic		7.0833	0.001	0.001	-0.148	-0.1535	0.9472
Story1	B33	25	Lateral (E-W)	LinStatic		7.0833	0.001	6.194E-05	0	-0.1535	0.9472
Story1	B33	25	Lateral (E-W)	LinStatic		8.8056	0.001	6.194E-05	0	-0.1535	0.9472
Story1	B33	25	Lateral (E-W)	LinStatic		10.5278	0.001	6.194E-05	0	-0.1535	0.9472
Story1	B33	25	Lateral (E-W)	LinStatic		12.25	0.001	6.194E-05	0	-0.1535	0.9472
Story1	B33	25	Lateral (E-W)	LinStatic		13.9722	0.001	6.194E-05	0	-0.1535	0.9472
Story1	B33	25	Lateral (E-W)	LinStatic		15.6944	0.001	6.194E-05	0	-0.1535	0.9472
Story1	B33	25	Lateral (E-W)	LinStatic		17.4167	0.001	6.194E-05	0	-0.1535	0.9472
Story1	B33	25	Lateral (E-W)	LinStatic		17.4167	0.001	-0.002	0.148	-0.1535	0.9472
Story1	B33	25	Lateral (E-W)	LinStatic		19.0208	0.001	-0.002	0.148	-0.1535	0.7104
Story1	B33	25	Lateral (E-W)	LinStatic		20.625	0.001	-0.002	0.148	-0.1535	0.4736
Story1	B33	25	Lateral (E-W)	LinStatic		22.2292	0.001	-0.002	0.148	-0.1535	0.2368
Story1	B33	25	Lateral (E-W)	LinStatic		23.8333	0.001	-0.002	0.148	-0.1535	0
Story1	B33	25	Envelope	Combination	Max	0.6667	0.146	1.502	0.148	0.2413	0
Story1	B33	25	Envelope	Combination	Max	2.2708	0.146	1.675	0.148	0.2413	0.2368
Story1	B33	25	Envelope	Combination	Max	3.875	0.146	1.981	0.148	0.2413	0.4736
Story1	B33	25	Envelope	Combination	Max	5.4792	0.146	2.306	0.148	0.2413	0.7104

Table 5.4 - Element Forces - Beams (Part 1 of 2, continued)

Story	Beam	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft	M2 kip-ft
Story1	B33	25	Envelope	Combination	Max	7.0833	0.146	2.632	0.148	0.2413	0.9472
Story1	B33	25	Envelope	Combination	Max	7.0833	-0.002	-0.061	0	0.2413	0.9472
Story1	B33	25	Envelope	Combination	Max	8.8056	-0.002	0.125	0	0.2413	0.9472
Story1	B33	25	Envelope	Combination	Max	10.5278	-0.002	0.311	0	0.2413	0.9472
Story1	B33	25	Envelope	Combination	Max	12.25	-0.002	0.497	0	0.2413	0.9472
Story1	B33	25	Envelope	Combination	Max	13.9722	-0.002	0.846	0	0.2413	0.9472
Story1	B33	25	Envelope	Combination	Max	15.6944	-0.002	1.514	0	0.2413	0.9472
Story1	B33	25	Envelope	Combination	Max	17.4167	-0.002	2.272	0	0.2413	0.9472
Story1	B33	25	Envelope	Combination	Max	17.4167	0.051	1.199	0.148	0.2413	0.9472
Story1	B33	25	Envelope	Combination	Max	19.0208	0.051	1.372	0.148	0.2413	0.7104
Story1	B33	25	Envelope	Combination	Max	20.625	0.051	1.545	0.148	0.2413	0.4736
Story1	B33	25	Envelope	Combination	Max	22.2292	0.051	1.737	0.148	0.2413	0.2368
Story1	B33	25	Envelope	Combination	Max	23.8333	0.051	2.063	0.148	0.2413	0
Story1	B33	25	Envelope	Combination	Min	0.6667	-0.287	-2.064	-0.148	-0.1068	0
Story1	B33	25	Envelope	Combination	Min	2.2708	-0.287	-1.738	-0.148	-0.1068	-0.2368
Story1	B33	25	Envelope	Combination	Min	3.875	-0.287	-1.546	-0.148	-0.1068	-0.4736
Story1	B33	25	Envelope	Combination	Min	5.4792	-0.287	-1.373	-0.148	-0.1068	-0.7104
Story1	B33	25	Envelope	Combination	Min	7.0833	-0.287	-1.2	-0.148	-0.1068	-0.9472
Story1	B33	25	Envelope	Combination	Min	7.0833	-0.198	-2.275	0	-0.1068	-0.9472
Story1	B33	25	Envelope	Combination	Min	8.8056	-0.198	-1.517	0	-0.1068	-0.9472
Story1	B33	25	Envelope	Combination	Min	10.5278	-0.198	-0.845	0	-0.1068	-0.9472
Story1	B33	25	Envelope	Combination	Min	12.25	-0.198	-0.496	0	-0.1068	-0.9472
Story1	B33	25	Envelope	Combination	Min	13.9722	-0.198	-0.31	0	-0.1068	-0.9472
Story1	B33	25	Envelope	Combination	Min	15.6944	-0.198	-0.125	0	-0.1068	-0.9472
Story1	B33	25	Envelope	Combination	Min	17.4167	-0.198	0.061	0	-0.1068	-0.9472
Story1	B33	25	Envelope	Combination	Min	17.4167	-0.198	-2.633	-0.148	-0.1068	-0.9472
Story1	B33	25	Envelope	Combination	Min	19.0208	-0.198	-2.308	-0.148	-0.1068	-0.7104
Story1	B33	25	Envelope	Combination	Min	20.625	-0.198	-1.982	-0.148	-0.1068	-0.4736
Story1	B33	25	Envelope	Combination	Min	22.2292	-0.198	-1.675	-0.148	-0.1068	-0.2368
Story1	B33	25	Envelope	Combination	Min	23.8333	-0.198	-1.502	-0.148	-0.1068	0
Story1	B34	1	Dead	LinStatic		0.6667	-0.958	-1.812	0	-0.6786	0
Story1	B34	1	Dead	LinStatic		2.5119	-0.958	-1.273	0	-0.6786	0
Story1	B34	1	Dead	LinStatic		4.3571	-0.958	-0.734	0	-0.6786	0
Story1	B34	1	Dead	LinStatic		6.2024	-0.958	-0.195	0	-0.6786	0
Story1	B34	1	Dead	LinStatic		8.0476	-0.958	0.344	0	-0.6786	0
Story1	B34	1	Dead	LinStatic		9.8929	-0.958	0.882	0	-0.6786	0
Story1	B34	1	Dead	LinStatic		11.7381	-0.958	1.421	0	-0.6786	0
Story1	B34	1	Dead	LinStatic		13.5833	-0.958	1.96	0	-0.6786	0
Story1	B34	1	Roof Live	LinStatic		0.6667	-1.083	-2.016	0	-0.7521	0
Story1	B34	1	Roof Live	LinStatic		2.5119	-1.083	-1.416	0	-0.7521	0
Story1	B34	1	Roof Live	LinStatic		4.3571	-1.083	-0.816	0	-0.7521	0
Story1	B34	1	Roof Live	LinStatic		6.2024	-1.083	-0.216	0	-0.7521	0
Story1	B34	1	Roof Live	LinStatic		8.0476	-1.083	0.383	0	-0.7521	0
Story1	B34	1	Roof Live	LinStatic		9.8929	-1.083	0.983	0	-0.7521	0
Story1	B34	1	Roof Live	LinStatic		11.7381	-1.083	1.583	0	-0.7521	0

Table 5.4 - Element Forces - Beams (Part 1 of 2, continued)

Story	Beam	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft	M2 kip-ft
Story1	B34	1	Roof Live	LinStatic		13.5833	-1.083	2.182	0	-0.7521	0
Story1	B34	1	Lateral (N-S)	LinStatic		0.6667	0.003	0.002	0.499	0.8736	0
Story1	B34	1	Lateral (N-S)	LinStatic		2.5119	0.003	0.002	0.499	0.8736	-0.9202
Story1	B34	1	Lateral (N-S)	LinStatic		4.3571	0.003	0.002	0.499	0.8736	-1.8404
Story1	B34	1	Lateral (N-S)	LinStatic		6.2024	0.003	0.002	0.499	0.8736	-2.7606
Story1	B34	1	Lateral (N-S)	LinStatic		8.0476	0.003	0.002	0.499	0.8736	-3.6808
Story1	B34	1	Lateral (N-S)	LinStatic		9.8929	0.003	0.002	0.499	0.8736	-4.601
Story1	B34	1	Lateral (N-S)	LinStatic		11.7381	0.003	0.002	0.499	0.8736	-5.5212
Story1	B34	1	Lateral (N-S)	LinStatic		13.5833	0.003	0.002	0.499	0.8736	-6.4414
Story1	B34	1	Lateral (E-W)	LinStatic		0.6667	-0.031	0.339	0	0.0005	0
Story1	B34	1	Lateral (E-W)	LinStatic		2.5119	-0.031	0.339	0	0.0005	0
Story1	B34	1	Lateral (E-W)	LinStatic		4.3571	-0.031	0.339	0	0.0005	0
Story1	B34	1	Lateral (E-W)	LinStatic		6.2024	-0.031	0.339	0	0.0005	0
Story1	B34	1	Lateral (E-W)	LinStatic		8.0476	-0.031	0.339	0	0.0005	0
Story1	B34	1	Lateral (E-W)	LinStatic		9.8929	-0.031	0.339	0	0.0005	0
Story1	B34	1	Lateral (E-W)	LinStatic		11.7381	-0.031	0.339	0	0.0005	0
Story1	B34	1	Lateral (E-W)	LinStatic		13.5833	-0.031	0.339	0	0.0005	0
Story1	B34	1	Envelope	Combination	Max	0.6667	-0.667	-0.98	0.499	0.3793	0
Story1	B34	1	Envelope	Combination	Max	2.5119	-0.667	-0.588	0.499	0.3793	0.9202
Story1	B34	1	Envelope	Combination	Max	4.3571	-0.667	-0.196	0.499	0.3793	1.8404
Story1	B34	1	Envelope	Combination	Max	6.2024	-0.667	0.197	0.499	0.3793	2.7606
Story1	B34	1	Envelope	Combination	Max	8.0476	-0.667	1.026	0.499	0.3793	3.6808
Story1	B34	1	Envelope	Combination	Max	9.8929	-0.667	2.632	0.499	0.3793	4.601
Story1	B34	1	Envelope	Combination	Max	11.7381	-0.667	4.238	0.499	0.3793	5.5212
Story1	B34	1	Envelope	Combination	Max	13.5833	-0.667	5.844	0.499	0.3793	6.4414
Story1	B34	1	Envelope	Combination	Min	0.6667	-2.883	-5.399	-0.499	-2.0177	0
Story1	B34	1	Envelope	Combination	Min	2.5119	-2.883	-3.793	-0.499	-2.0177	-0.9202
Story1	B34	1	Envelope	Combination	Min	4.3571	-2.883	-2.187	-0.499	-2.0177	-1.8404
Story1	B34	1	Envelope	Combination	Min	6.2024	-2.883	-0.607	-0.499	-2.0177	-2.7606
Story1	B34	1	Envelope	Combination	Min	8.0476	-2.883	-0.089	-0.499	-2.0177	-3.6808
Story1	B34	1	Envelope	Combination	Min	9.8929	-2.883	0.304	-0.499	-2.0177	-4.601
Story1	B34	1	Envelope	Combination	Min	11.7381	-2.883	0.696	-0.499	-2.0177	-5.5212
Story1	B34	1	Envelope	Combination	Min	13.5833	-2.883	1.089	-0.499	-2.0177	-6.4414
Story1	B35	3	Dead	LinStatic		0.4167	-0.964	-1.961	0	0.6786	0
Story1	B35	3	Dead	LinStatic		2.2619	-0.964	-1.422	0	0.6786	0
Story1	B35	3	Dead	LinStatic		4.1071	-0.964	-0.883	0	0.6786	0
Story1	B35	3	Dead	LinStatic		5.9524	-0.964	-0.344	0	0.6786	0
Story1	B35	3	Dead	LinStatic		7.7976	-0.964	0.194	0	0.6786	0
Story1	B35	3	Dead	LinStatic		9.6429	-0.964	0.733	0	0.6786	0
Story1	B35	3	Dead	LinStatic		11.4881	-0.964	1.272	0	0.6786	0
Story1	B35	3	Dead	LinStatic		13.3333	-0.964	1.811	0	0.6786	0
Story1	B35	3	Roof Live	LinStatic		0.4167	-1.09	-2.183	0	0.7521	0
Story1	B35	3	Roof Live	LinStatic		2.2619	-1.09	-1.583	0	0.7521	0
Story1	B35	3	Roof Live	LinStatic		4.1071	-1.09	-0.984	0	0.7521	0
Story1	B35	3	Roof Live	LinStatic		5.9524	-1.09	-0.384	0	0.7521	0

Table 5.4 - Element Forces - Beams (Part 1 of 2, continued)

Story	Beam	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft	M2 kip-ft
Story1	B35	3	Roof Live	LinStatic		7.7976	-1.09	0.216	0	0.7521	0
Story1	B35	3	Roof Live	LinStatic		9.6429	-1.09	0.815	0	0.7521	0
Story1	B35	3	Roof Live	LinStatic		11.4881	-1.09	1.415	0	0.7521	0
Story1	B35	3	Roof Live	LinStatic		13.3333	-1.09	2.015	0	0.7521	0
Story1	B35	3	Lateral (N-S)	LinStatic		0.4167	0.003	-0.002	-0.499	-0.8736	-6.4414
Story1	B35	3	Lateral (N-S)	LinStatic		2.2619	0.003	-0.002	-0.499	-0.8736	-5.5212
Story1	B35	3	Lateral (N-S)	LinStatic		4.1071	0.003	-0.002	-0.499	-0.8736	-4.601
Story1	B35	3	Lateral (N-S)	LinStatic		5.9524	0.003	-0.002	-0.499	-0.8736	-3.6808
Story1	B35	3	Lateral (N-S)	LinStatic		7.7976	0.003	-0.002	-0.499	-0.8736	-2.7606
Story1	B35	3	Lateral (N-S)	LinStatic		9.6429	0.003	-0.002	-0.499	-0.8736	-1.8404
Story1	B35	3	Lateral (N-S)	LinStatic		11.4881	0.003	-0.002	-0.499	-0.8736	-0.9202
Story1	B35	3	Lateral (N-S)	LinStatic		13.3333	0.003	-0.002	-0.499	-0.8736	0
Story1	B35	3	Lateral (E-W)	LinStatic		0.4167	0.039	0.391	0	0.0006	0
Story1	B35	3	Lateral (E-W)	LinStatic		2.2619	0.039	0.391	0	0.0006	0
Story1	B35	3	Lateral (E-W)	LinStatic		4.1071	0.039	0.391	0	0.0006	0
Story1	B35	3	Lateral (E-W)	LinStatic		5.9524	0.039	0.391	0	0.0006	0
Story1	B35	3	Lateral (E-W)	LinStatic		7.7976	0.039	0.391	0	0.0006	0
Story1	B35	3	Lateral (E-W)	LinStatic		9.6429	0.039	0.391	0	0.0006	0
Story1	B35	3	Lateral (E-W)	LinStatic		11.4881	0.039	0.391	0	0.0006	0
Story1	B35	3	Lateral (E-W)	LinStatic		13.3333	0.039	0.391	0	0.0006	0
Story1	B35	3	Envelope	Combination	Max	0.4167	-0.662	-1.038	0.499	2.0177	6.4414
Story1	B35	3	Envelope	Combination	Max	2.2619	-0.662	-0.645	0.499	2.0177	5.5212
Story1	B35	3	Envelope	Combination	Max	4.1071	-0.662	-0.253	0.499	2.0177	4.601
Story1	B35	3	Envelope	Combination	Max	5.9524	-0.662	0.14	0.499	2.0177	3.6808
Story1	B35	3	Envelope	Combination	Max	7.7976	-0.662	0.657	0.499	2.0177	2.7606
Story1	B35	3	Envelope	Combination	Max	9.6429	-0.662	2.184	0.499	2.0177	1.8404
Story1	B35	3	Envelope	Combination	Max	11.4881	-0.662	3.791	0.499	2.0177	0.9202
Story1	B35	3	Envelope	Combination	Max	13.3333	-0.662	5.397	0.499	2.0177	0
Story1	B35	3	Envelope	Combination	Min	0.4167	-2.9	-5.846	-0.499	-0.3793	-6.4414
Story1	B35	3	Envelope	Combination	Min	2.2619	-2.9	-4.24	-0.499	-0.3793	-5.5212
Story1	B35	3	Envelope	Combination	Min	4.1071	-2.9	-2.634	-0.499	-0.3793	-4.601
Story1	B35	3	Envelope	Combination	Min	5.9524	-2.9	-1.028	-0.499	-0.3793	-3.6808
Story1	B35	3	Envelope	Combination	Min	7.7976	-2.9	-0.249	-0.499	-0.3793	-2.7606
Story1	B35	3	Envelope	Combination	Min	9.6429	-2.9	0.144	-0.499	-0.3793	-1.8404
Story1	B35	3	Envelope	Combination	Min	11.4881	-2.9	0.536	-0.499	-0.3793	-0.9202
Story1	B35	3	Envelope	Combination	Min	13.3333	-2.9	0.928	-0.499	-0.3793	0
Story1	B36	17	Dead	LinStatic		0.6667	-0.517	-1.083	0	0.6787	0
Story1	B36	17	Dead	LinStatic		2.5119	-0.517	-0.76	0	0.6787	0
Story1	B36	17	Dead	LinStatic		4.3571	-0.517	-0.437	0	0.6787	0
Story1	B36	17	Dead	LinStatic		6.2024	-0.517	-0.114	0	0.6787	0
Story1	B36	17	Dead	LinStatic		8.0476	-0.517	0.209	0	0.6787	0
Story1	B36	17	Dead	LinStatic		9.8929	-0.517	0.532	0	0.6787	0
Story1	B36	17	Dead	LinStatic		11.7381	-0.517	0.855	0	0.6787	0
Story1	B36	17	Dead	LinStatic		13.5833	-0.517	1.178	0	0.6787	0
Story1	B36	17	Roof Live	LinStatic		0.6667	-0.938	-2.013	0	0.7534	0

Table 5.4 - Element Forces - Beams (Part 1 of 2, continued)

Story	Beam	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft	M2 kip-ft
Story1	B36	17	Roof Live	LinStatic		2.5119	-0.938	-1.414	0	0.7534	0
Story1	B36	17	Roof Live	LinStatic		4.3571	-0.938	-0.814	0	0.7534	0
Story1	B36	17	Roof Live	LinStatic		6.2024	-0.938	-0.214	0	0.7534	0
Story1	B36	17	Roof Live	LinStatic		8.0476	-0.938	0.385	0	0.7534	0
Story1	B36	17	Roof Live	LinStatic		9.8929	-0.938	0.985	0	0.7534	0
Story1	B36	17	Roof Live	LinStatic		11.7381	-0.938	1.585	0	0.7534	0
Story1	B36	17	Roof Live	LinStatic		13.5833	-0.938	2.185	0	0.7534	0
Story1	B36	17	Lateral (N-S)	LinStatic		0.6667	-0.003	-0.002	0.435	0.8733	0
Story1	B36	17	Lateral (N-S)	LinStatic		2.5119	-0.003	-0.002	0.435	0.8733	-0.8033
Story1	B36	17	Lateral (N-S)	LinStatic		4.3571	-0.003	-0.002	0.435	0.8733	-1.6067
Story1	B36	17	Lateral (N-S)	LinStatic		6.2024	-0.003	-0.002	0.435	0.8733	-2.41
Story1	B36	17	Lateral (N-S)	LinStatic		8.0476	-0.003	-0.002	0.435	0.8733	-3.2133
Story1	B36	17	Lateral (N-S)	LinStatic		9.8929	-0.003	-0.002	0.435	0.8733	-4.0167
Story1	B36	17	Lateral (N-S)	LinStatic		11.7381	-0.003	-0.002	0.435	0.8733	-4.82
Story1	B36	17	Lateral (N-S)	LinStatic		13.5833	-0.003	-0.002	0.435	0.8733	-5.6233
Story1	B36	17	Lateral (E-W)	LinStatic		0.6667	-0.147	0.351	0	-0.0005	0
Story1	B36	17	Lateral (E-W)	LinStatic		2.5119	-0.147	0.351	0	-0.0005	0
Story1	B36	17	Lateral (E-W)	LinStatic		4.3571	-0.147	0.351	0	-0.0005	0
Story1	B36	17	Lateral (E-W)	LinStatic		6.2024	-0.147	0.351	0	-0.0005	0
Story1	B36	17	Lateral (E-W)	LinStatic		8.0476	-0.147	0.351	0	-0.0005	0
Story1	B36	17	Lateral (E-W)	LinStatic		9.8929	-0.147	0.351	0	-0.0005	0
Story1	B36	17	Lateral (E-W)	LinStatic		11.7381	-0.147	0.351	0	-0.0005	0
Story1	B36	17	Lateral (E-W)	LinStatic		13.5833	-0.147	0.351	0	-0.0005	0
Story1	B36	17	Envelope	Combination	Max	0.6667	-0.229	-0.438	0.435	2.0199	0
Story1	B36	17	Envelope	Combination	Max	2.5119	-0.229	-0.203	0.435	2.0199	0.8033
Story1	B36	17	Envelope	Combination	Max	4.3571	-0.229	0.033	0.435	2.0199	1.6067
Story1	B36	17	Envelope	Combination	Max	6.2024	-0.229	0.268	0.435	2.0199	2.41
Story1	B36	17	Envelope	Combination	Max	8.0476	-0.229	0.868	0.435	2.0199	3.2133
Story1	B36	17	Envelope	Combination	Max	9.8929	-0.229	2.215	0.435	2.0199	4.0167
Story1	B36	17	Envelope	Combination	Max	11.7381	-0.229	3.562	0.435	2.0199	4.82
Story1	B36	17	Envelope	Combination	Max	13.5833	-0.229	4.909	0.435	2.0199	5.6233
Story1	B36	17	Envelope	Combination	Min	0.6667	-2.12	-4.521	-0.435	-0.379	0
Story1	B36	17	Envelope	Combination	Min	2.5119	-2.12	-3.173	-0.435	-0.379	-0.8033
Story1	B36	17	Envelope	Combination	Min	4.3571	-2.12	-1.826	-0.435	-0.379	-1.6067
Story1	B36	17	Envelope	Combination	Min	6.2024	-2.12	-0.507	-0.435	-0.379	-2.41
Story1	B36	17	Envelope	Combination	Min	8.0476	-2.12	-0.199	-0.435	-0.379	-3.2133
Story1	B36	17	Envelope	Combination	Min	9.8929	-2.12	0.037	-0.435	-0.379	-4.0167
Story1	B36	17	Envelope	Combination	Min	11.7381	-2.12	0.272	-0.435	-0.379	-4.82
Story1	B36	17	Envelope	Combination	Min	13.5833	-2.12	0.507	-0.435	-0.379	-5.6233
Story1	B37	18	Dead	LinStatic		0.4167	-0.517	-1.178	0	-0.6787	0
Story1	B37	18	Dead	LinStatic		2.2619	-0.517	-0.855	0	-0.6787	0
Story1	B37	18	Dead	LinStatic		4.1071	-0.517	-0.532	0	-0.6787	0
Story1	B37	18	Dead	LinStatic		5.9524	-0.517	-0.209	0	-0.6787	0
Story1	B37	18	Dead	LinStatic		7.7976	-0.517	0.114	0	-0.6787	0
Story1	B37	18	Dead	LinStatic		9.6429	-0.517	0.437	0	-0.6787	0

Table 5.4 - Element Forces - Beams (Part 1 of 2, continued)

Story	Beam	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft	M2 kip-ft
Story1	B37	18	Dead	LinStatic		11.4881	-0.517	0.76	0	-0.6787	0
Story1	B37	18	Dead	LinStatic		13.3333	-0.517	1.083	0	-0.6787	0
Story1	B37	18	Roof Live	LinStatic		0.4167	-0.937	-2.184	0	-0.7534	0
Story1	B37	18	Roof Live	LinStatic		2.2619	-0.937	-1.585	0	-0.7534	0
Story1	B37	18	Roof Live	LinStatic		4.1071	-0.937	-0.985	0	-0.7534	0
Story1	B37	18	Roof Live	LinStatic		5.9524	-0.937	-0.385	0	-0.7534	0
Story1	B37	18	Roof Live	LinStatic		7.7976	-0.937	0.214	0	-0.7534	0
Story1	B37	18	Roof Live	LinStatic		9.6429	-0.937	0.814	0	-0.7534	0
Story1	B37	18	Roof Live	LinStatic		11.4881	-0.937	1.414	0	-0.7534	0
Story1	B37	18	Roof Live	LinStatic		13.3333	-0.937	2.013	0	-0.7534	0
Story1	B37	18	Lateral (N-S)	LinStatic		0.4167	-0.003	0.002	-0.435	-0.8733	-5.6233
Story1	B37	18	Lateral (N-S)	LinStatic		2.2619	-0.003	0.002	-0.435	-0.8733	-4.82
Story1	B37	18	Lateral (N-S)	LinStatic		4.1071	-0.003	0.002	-0.435	-0.8733	-4.0167
Story1	B37	18	Lateral (N-S)	LinStatic		5.9524	-0.003	0.002	-0.435	-0.8733	-3.2133
Story1	B37	18	Lateral (N-S)	LinStatic		7.7976	-0.003	0.002	-0.435	-0.8733	-2.41
Story1	B37	18	Lateral (N-S)	LinStatic		9.6429	-0.003	0.002	-0.435	-0.8733	-1.6067
Story1	B37	18	Lateral (N-S)	LinStatic		11.4881	-0.003	0.002	-0.435	-0.8733	-0.8033
Story1	B37	18	Lateral (N-S)	LinStatic		13.3333	-0.003	0.002	-0.435	-0.8733	0
Story1	B37	18	Lateral (E-W)	LinStatic		0.4167	0.142	0.351	0	-0.0005	0
Story1	B37	18	Lateral (E-W)	LinStatic		2.2619	0.142	0.351	0	-0.0005	0
Story1	B37	18	Lateral (E-W)	LinStatic		4.1071	0.142	0.351	0	-0.0005	0
Story1	B37	18	Lateral (E-W)	LinStatic		5.9524	0.142	0.351	0	-0.0005	0
Story1	B37	18	Lateral (E-W)	LinStatic		7.7976	0.142	0.351	0	-0.0005	0
Story1	B37	18	Lateral (E-W)	LinStatic		9.6429	0.142	0.351	0	-0.0005	0
Story1	B37	18	Lateral (E-W)	LinStatic		11.4881	0.142	0.351	0	-0.0005	0
Story1	B37	18	Lateral (E-W)	LinStatic		13.3333	0.142	0.351	0	-0.0005	0
Story1	B37	18	Envelope	Combination	Max	0.4167	-0.234	-0.507	0.435	0.379	5.6233
Story1	B37	18	Envelope	Combination	Max	2.2619	-0.234	-0.272	0.435	0.379	4.82
Story1	B37	18	Envelope	Combination	Max	4.1071	-0.234	-0.037	0.435	0.379	4.0167
Story1	B37	18	Envelope	Combination	Max	5.9524	-0.234	0.198	0.435	0.379	3.2133
Story1	B37	18	Envelope	Combination	Max	7.7976	-0.234	0.507	0.435	0.379	2.41
Story1	B37	18	Envelope	Combination	Max	9.6429	-0.234	1.827	0.435	0.379	1.6067
Story1	B37	18	Envelope	Combination	Max	11.4881	-0.234	3.174	0.435	0.379	0.8033
Story1	B37	18	Envelope	Combination	Max	13.3333	-0.234	4.521	0.435	0.379	0
Story1	B37	18	Envelope	Combination	Min	0.4167	-2.12	-4.908	-0.435	-2.0199	-5.6233
Story1	B37	18	Envelope	Combination	Min	2.2619	-2.12	-3.561	-0.435	-2.0199	-4.82
Story1	B37	18	Envelope	Combination	Min	4.1071	-2.12	-2.214	-0.435	-2.0199	-4.0167
Story1	B37	18	Envelope	Combination	Min	5.9524	-2.12	-0.867	-0.435	-2.0199	-3.2133
Story1	B37	18	Envelope	Combination	Min	7.7976	-2.12	-0.268	-0.435	-2.0199	-2.41
Story1	B37	18	Envelope	Combination	Min	9.6429	-2.12	-0.032	-0.435	-2.0199	-1.6067
Story1	B37	18	Envelope	Combination	Min	11.4881	-2.12	0.203	-0.435	-2.0199	-0.8033
Story1	B37	18	Envelope	Combination	Min	13.3333	-2.12	0.438	-0.435	-2.0199	0
Story1	B1	10	Dead	LinStatic		0	0.936	0	0	0	0
Story1	B1	10	Dead	LinStatic		2	0.936	0	0	0	0
Story1	B1	10	Dead	LinStatic		4	0.936	0	0	0	0

Table 5.4 - Element Forces - Beams (Part 1 of 2, continued)

Story	Beam	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft	M2 kip-ft
Story1	B1	10	Dead	LinStatic		6	0.936	0	0	0	0
Story1	B1	10	Dead	LinStatic		8	0.936	0	0	0	0
Story1	B1	10	Dead	LinStatic		10	0.936	0	0	0	0
Story1	B1	10	Dead	LinStatic		12	0.936	0	0	0	0
Story1	B1	10	Dead	LinStatic		14	0.936	0	0	0	0
Story1	B1	10	Roof Live	LinStatic		0	1.058	0	0	0	0
Story1	B1	10	Roof Live	LinStatic		2	1.058	0	0	0	0
Story1	B1	10	Roof Live	LinStatic		4	1.058	0	0	0	0
Story1	B1	10	Roof Live	LinStatic		6	1.058	0	0	0	0
Story1	B1	10	Roof Live	LinStatic		8	1.058	0	0	0	0
Story1	B1	10	Roof Live	LinStatic		10	1.058	0	0	0	0
Story1	B1	10	Roof Live	LinStatic		12	1.058	0	0	0	0
Story1	B1	10	Roof Live	LinStatic		14	1.058	0	0	0	0
Story1	B1	10	Lateral (N-S)	LinStatic		0	-0.003	0	0	0	0
Story1	B1	10	Lateral (N-S)	LinStatic		2	-0.003	0	0	0	0
Story1	B1	10	Lateral (N-S)	LinStatic		4	-0.003	0	0	0	0
Story1	B1	10	Lateral (N-S)	LinStatic		6	-0.003	0	0	0	0
Story1	B1	10	Lateral (N-S)	LinStatic		8	-0.003	0	0	0	0
Story1	B1	10	Lateral (N-S)	LinStatic		10	-0.003	0	0	0	0
Story1	B1	10	Lateral (N-S)	LinStatic		12	-0.003	0	0	0	0
Story1	B1	10	Lateral (N-S)	LinStatic		14	-0.003	0	0	0	0
Story1	B1	10	Lateral (E-W)	LinStatic		0	-0.246	0	0	0	0
Story1	B1	10	Lateral (E-W)	LinStatic		2	-0.246	0	0	0	0
Story1	B1	10	Lateral (E-W)	LinStatic		4	-0.246	0	0	0	0
Story1	B1	10	Lateral (E-W)	LinStatic		6	-0.246	0	0	0	0
Story1	B1	10	Lateral (E-W)	LinStatic		8	-0.246	0	0	0	0
Story1	B1	10	Lateral (E-W)	LinStatic		10	-0.246	0	0	0	0
Story1	B1	10	Lateral (E-W)	LinStatic		12	-0.246	0	0	0	0
Story1	B1	10	Lateral (E-W)	LinStatic		14	-0.246	0	0	0	0
Story1	B1	10	Envelope	Combination	Max	0	2.817	0	0	0	0
Story1	B1	10	Envelope	Combination	Max	2	2.817	0	0	0	0
Story1	B1	10	Envelope	Combination	Max	4	2.817	0	0	0	0
Story1	B1	10	Envelope	Combination	Max	6	2.817	0	0	0	0
Story1	B1	10	Envelope	Combination	Max	8	2.817	0	0	0	0
Story1	B1	10	Envelope	Combination	Max	10	2.817	0	0	0	0
Story1	B1	10	Envelope	Combination	Max	12	2.817	0	0	0	0
Story1	B1	10	Envelope	Combination	Max	14	2.817	0	0	0	0
Story1	B1	10	Envelope	Combination	Min	0	0.435	0	0	0	0
Story1	B1	10	Envelope	Combination	Min	2	0.435	0	0	0	0
Story1	B1	10	Envelope	Combination	Min	4	0.435	0	0	0	0
Story1	B1	10	Envelope	Combination	Min	6	0.435	0	0	0	0
Story1	B1	10	Envelope	Combination	Min	8	0.435	0	0	0	0
Story1	B1	10	Envelope	Combination	Min	10	0.435	0	0	0	0
Story1	B1	10	Envelope	Combination	Min	12	0.435	0	0	0	0
Story1	B1	10	Envelope	Combination	Min	14	0.435	0	0	0	0

Table 5.4 - Element Forces - Beams (Part 1 of 2, continued)

Story	Beam	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft	M2 kip-ft
Story1	B2	11	Dead	LinStatic		0	0.928	0	0	0	0
Story1	B2	11	Dead	LinStatic		2	0.928	0	0	0	0
Story1	B2	11	Dead	LinStatic		4	0.928	0	0	0	0
Story1	B2	11	Dead	LinStatic		6	0.928	0	0	0	0
Story1	B2	11	Dead	LinStatic		8	0.928	0	0	0	0
Story1	B2	11	Dead	LinStatic		10	0.928	0	0	0	0
Story1	B2	11	Dead	LinStatic		12	0.928	0	0	0	0
Story1	B2	11	Dead	LinStatic		14	0.928	0	0	0	0
Story1	B2	11	Roof Live	LinStatic		0	1.049	0	0	0	0
Story1	B2	11	Roof Live	LinStatic		2	1.049	0	0	0	0
Story1	B2	11	Roof Live	LinStatic		4	1.049	0	0	0	0
Story1	B2	11	Roof Live	LinStatic		6	1.049	0	0	0	0
Story1	B2	11	Roof Live	LinStatic		8	1.049	0	0	0	0
Story1	B2	11	Roof Live	LinStatic		10	1.049	0	0	0	0
Story1	B2	11	Roof Live	LinStatic		12	1.049	0	0	0	0
Story1	B2	11	Roof Live	LinStatic		14	1.049	0	0	0	0
Story1	B2	11	Lateral (N-S)	LinStatic		0	-0.003	0	0	0	0
Story1	B2	11	Lateral (N-S)	LinStatic		2	-0.003	0	0	0	0
Story1	B2	11	Lateral (N-S)	LinStatic		4	-0.003	0	0	0	0
Story1	B2	11	Lateral (N-S)	LinStatic		6	-0.003	0	0	0	0
Story1	B2	11	Lateral (N-S)	LinStatic		8	-0.003	0	0	0	0
Story1	B2	11	Lateral (N-S)	LinStatic		10	-0.003	0	0	0	0
Story1	B2	11	Lateral (N-S)	LinStatic		12	-0.003	0	0	0	0
Story1	B2	11	Lateral (N-S)	LinStatic		14	-0.003	0	0	0	0
Story1	B2	11	Lateral (E-W)	LinStatic		0	1.098	0	0	0	0
Story1	B2	11	Lateral (E-W)	LinStatic		2	1.098	0	0	0	0
Story1	B2	11	Lateral (E-W)	LinStatic		4	1.098	0	0	0	0
Story1	B2	11	Lateral (E-W)	LinStatic		6	1.098	0	0	0	0
Story1	B2	11	Lateral (E-W)	LinStatic		8	1.098	0	0	0	0
Story1	B2	11	Lateral (E-W)	LinStatic		10	1.098	0	0	0	0
Story1	B2	11	Lateral (E-W)	LinStatic		12	1.098	0	0	0	0
Story1	B2	11	Lateral (E-W)	LinStatic		14	1.098	0	0	0	0
Story1	B2	11	Envelope	Combination	Max	0	2.792	0	0	0	0
Story1	B2	11	Envelope	Combination	Max	2	2.792	0	0	0	0
Story1	B2	11	Envelope	Combination	Max	4	2.792	0	0	0	0
Story1	B2	11	Envelope	Combination	Max	6	2.792	0	0	0	0
Story1	B2	11	Envelope	Combination	Max	8	2.792	0	0	0	0
Story1	B2	11	Envelope	Combination	Max	10	2.792	0	0	0	0
Story1	B2	11	Envelope	Combination	Max	12	2.792	0	0	0	0
Story1	B2	11	Envelope	Combination	Max	14	2.792	0	0	0	0
Story1	B2	11	Envelope	Combination	Min	0	-0.422	0	0	0	0
Story1	B2	11	Envelope	Combination	Min	2	-0.422	0	0	0	0
Story1	B2	11	Envelope	Combination	Min	4	-0.422	0	0	0	0
Story1	B2	11	Envelope	Combination	Min	6	-0.422	0	0	0	0
Story1	B2	11	Envelope	Combination	Min	8	-0.422	0	0	0	0

Table 5.4 - Element Forces - Beams (Part 1 of 2, continued)

Story	Beam	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft	M2 kip-ft
Story1	B2	11	Envelope	Combination	Min	10	-0.422	0	0	0	0
Story1	B2	11	Envelope	Combination	Min	12	-0.422	0	0	0	0
Story1	B2	11	Envelope	Combination	Min	14	-0.422	0	0	0	0
Story1	B3	2	Dead	LinStatic		0	0.953	0	0	0	0
Story1	B3	2	Dead	LinStatic		2	0.953	0	0	0	0
Story1	B3	2	Dead	LinStatic		4	0.953	0	0	0	0
Story1	B3	2	Dead	LinStatic		6	0.953	0	0	0	0
Story1	B3	2	Dead	LinStatic		8	0.953	0	0	0	0
Story1	B3	2	Dead	LinStatic		10	0.953	0	0	0	0
Story1	B3	2	Dead	LinStatic		12	0.953	0	0	0	0
Story1	B3	2	Dead	LinStatic		14	0.953	0	0	0	0
Story1	B3	2	Roof Live	LinStatic		0	1.078	0	0	0	0
Story1	B3	2	Roof Live	LinStatic		2	1.078	0	0	0	0
Story1	B3	2	Roof Live	LinStatic		4	1.078	0	0	0	0
Story1	B3	2	Roof Live	LinStatic		6	1.078	0	0	0	0
Story1	B3	2	Roof Live	LinStatic		8	1.078	0	0	0	0
Story1	B3	2	Roof Live	LinStatic		10	1.078	0	0	0	0
Story1	B3	2	Roof Live	LinStatic		12	1.078	0	0	0	0
Story1	B3	2	Roof Live	LinStatic		14	1.078	0	0	0	0
Story1	B3	2	Lateral (N-S)	LinStatic		0	-0.003	0	0	0	0
Story1	B3	2	Lateral (N-S)	LinStatic		2	-0.003	0	0	0	0
Story1	B3	2	Lateral (N-S)	LinStatic		4	-0.003	0	0	0	0
Story1	B3	2	Lateral (N-S)	LinStatic		6	-0.003	0	0	0	0
Story1	B3	2	Lateral (N-S)	LinStatic		8	-0.003	0	0	0	0
Story1	B3	2	Lateral (N-S)	LinStatic		10	-0.003	0	0	0	0
Story1	B3	2	Lateral (N-S)	LinStatic		12	-0.003	0	0	0	0
Story1	B3	2	Lateral (N-S)	LinStatic		14	-0.003	0	0	0	0
Story1	B3	2	Lateral (E-W)	LinStatic		0	0.249	0	0	0	0
Story1	B3	2	Lateral (E-W)	LinStatic		2	0.249	0	0	0	0
Story1	B3	2	Lateral (E-W)	LinStatic		4	0.249	0	0	0	0
Story1	B3	2	Lateral (E-W)	LinStatic		6	0.249	0	0	0	0
Story1	B3	2	Lateral (E-W)	LinStatic		8	0.249	0	0	0	0
Story1	B3	2	Lateral (E-W)	LinStatic		10	0.249	0	0	0	0
Story1	B3	2	Lateral (E-W)	LinStatic		12	0.249	0	0	0	0
Story1	B3	2	Lateral (E-W)	LinStatic		14	0.249	0	0	0	0
Story1	B3	2	Envelope	Combination	Max	0	2.869	0	0	0	0
Story1	B3	2	Envelope	Combination	Max	2	2.869	0	0	0	0
Story1	B3	2	Envelope	Combination	Max	4	2.869	0	0	0	0
Story1	B3	2	Envelope	Combination	Max	6	2.869	0	0	0	0
Story1	B3	2	Envelope	Combination	Max	8	2.869	0	0	0	0
Story1	B3	2	Envelope	Combination	Max	10	2.869	0	0	0	0
Story1	B3	2	Envelope	Combination	Max	12	2.869	0	0	0	0
Story1	B3	2	Envelope	Combination	Max	14	2.869	0	0	0	0
Story1	B3	2	Envelope	Combination	Min	0	0.446	0	0	0	0
Story1	B3	2	Envelope	Combination	Min	2	0.446	0	0	0	0

Table 5.4 - Element Forces - Beams (Part 1 of 2, continued)

Story	Beam	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft	M2 kip-ft
Story1	B3	2	Envelope	Combination	Min	4	0.446	0	0	0	0
Story1	B3	2	Envelope	Combination	Min	6	0.446	0	0	0	0
Story1	B3	2	Envelope	Combination	Min	8	0.446	0	0	0	0
Story1	B3	2	Envelope	Combination	Min	10	0.446	0	0	0	0
Story1	B3	2	Envelope	Combination	Min	12	0.446	0	0	0	0
Story1	B3	2	Envelope	Combination	Min	14	0.446	0	0	0	0
Story1	B4	4	Dead	LinStatic		0	0.96	0	0	0	0
Story1	B4	4	Dead	LinStatic		2	0.96	0	0	0	0
Story1	B4	4	Dead	LinStatic		4	0.96	0	0	0	0
Story1	B4	4	Dead	LinStatic		6	0.96	0	0	0	0
Story1	B4	4	Dead	LinStatic		8	0.96	0	0	0	0
Story1	B4	4	Dead	LinStatic		10	0.96	0	0	0	0
Story1	B4	4	Dead	LinStatic		12	0.96	0	0	0	0
Story1	B4	4	Dead	LinStatic		14	0.96	0	0	0	0
Story1	B4	4	Roof Live	LinStatic		0	1.086	0	0	0	0
Story1	B4	4	Roof Live	LinStatic		2	1.086	0	0	0	0
Story1	B4	4	Roof Live	LinStatic		4	1.086	0	0	0	0
Story1	B4	4	Roof Live	LinStatic		6	1.086	0	0	0	0
Story1	B4	4	Roof Live	LinStatic		8	1.086	0	0	0	0
Story1	B4	4	Roof Live	LinStatic		10	1.086	0	0	0	0
Story1	B4	4	Roof Live	LinStatic		12	1.086	0	0	0	0
Story1	B4	4	Roof Live	LinStatic		14	1.086	0	0	0	0
Story1	B4	4	Lateral (N-S)	LinStatic		0	-0.003	0	0	0	0
Story1	B4	4	Lateral (N-S)	LinStatic		2	-0.003	0	0	0	0
Story1	B4	4	Lateral (N-S)	LinStatic		4	-0.003	0	0	0	0
Story1	B4	4	Lateral (N-S)	LinStatic		6	-0.003	0	0	0	0
Story1	B4	4	Lateral (N-S)	LinStatic		8	-0.003	0	0	0	0
Story1	B4	4	Lateral (N-S)	LinStatic		10	-0.003	0	0	0	0
Story1	B4	4	Lateral (N-S)	LinStatic		12	-0.003	0	0	0	0
Story1	B4	4	Lateral (N-S)	LinStatic		14	-0.003	0	0	0	0
Story1	B4	4	Lateral (E-W)	LinStatic		0	-0.289	0	0	0	0
Story1	B4	4	Lateral (E-W)	LinStatic		2	-0.289	0	0	0	0
Story1	B4	4	Lateral (E-W)	LinStatic		4	-0.289	0	0	0	0
Story1	B4	4	Lateral (E-W)	LinStatic		6	-0.289	0	0	0	0
Story1	B4	4	Lateral (E-W)	LinStatic		8	-0.289	0	0	0	0
Story1	B4	4	Lateral (E-W)	LinStatic		10	-0.289	0	0	0	0
Story1	B4	4	Lateral (E-W)	LinStatic		12	-0.289	0	0	0	0
Story1	B4	4	Lateral (E-W)	LinStatic		14	-0.289	0	0	0	0
Story1	B4	4	Envelope	Combination	Max	0	2.89	0	0	0	0
Story1	B4	4	Envelope	Combination	Max	2	2.89	0	0	0	0
Story1	B4	4	Envelope	Combination	Max	4	2.89	0	0	0	0
Story1	B4	4	Envelope	Combination	Max	6	2.89	0	0	0	0
Story1	B4	4	Envelope	Combination	Max	8	2.89	0	0	0	0
Story1	B4	4	Envelope	Combination	Max	10	2.89	0	0	0	0
Story1	B4	4	Envelope	Combination	Max	12	2.89	0	0	0	0

Table 5.4 - Element Forces - Beams (Part 1 of 2, continued)

Story	Beam	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft	M2 kip-ft
Story1	B4	4	Envelope	Combination	Max	14	2.89	0	0	0	0
Story1	B4	4	Envelope	Combination	Min	0	0.411	0	0	0	0
Story1	B4	4	Envelope	Combination	Min	2	0.411	0	0	0	0
Story1	B4	4	Envelope	Combination	Min	4	0.411	0	0	0	0
Story1	B4	4	Envelope	Combination	Min	6	0.411	0	0	0	0
Story1	B4	4	Envelope	Combination	Min	8	0.411	0	0	0	0
Story1	B4	4	Envelope	Combination	Min	10	0.411	0	0	0	0
Story1	B4	4	Envelope	Combination	Min	12	0.411	0	0	0	0
Story1	B4	4	Envelope	Combination	Min	14	0.411	0	0	0	0
Story1	B6	29	Dead	LinStatic		0	0.537	-0.42	0	0	0
Story1	B6	29	Dead	LinStatic		2	0.537	-0.3	0	0	0
Story1	B6	29	Dead	LinStatic		4	0.537	-0.18	0	0	0
Story1	B6	29	Dead	LinStatic		6	0.537	-0.06	0	0	0
Story1	B6	29	Dead	LinStatic		8	0.537	0.06	0	0	0
Story1	B6	29	Dead	LinStatic		10	0.537	0.18	0	0	0
Story1	B6	29	Dead	LinStatic		12	0.537	0.3	0	0	0
Story1	B6	29	Dead	LinStatic		14	0.537	0.42	0	0	0
Story1	B6	29	Roof Live	LinStatic		0	0.974	-0.651	0	0	0
Story1	B6	29	Roof Live	LinStatic		2	0.974	-0.465	0	0	0
Story1	B6	29	Roof Live	LinStatic		4	0.974	-0.279	0	0	0
Story1	B6	29	Roof Live	LinStatic		6	0.974	-0.093	0	0	0
Story1	B6	29	Roof Live	LinStatic		8	0.974	0.093	0	0	0
Story1	B6	29	Roof Live	LinStatic		10	0.974	0.279	0	0	0
Story1	B6	29	Roof Live	LinStatic		12	0.974	0.465	0	0	0
Story1	B6	29	Roof Live	LinStatic		14	0.974	0.651	0	0	0
Story1	B6	29	Lateral (N-S)	LinStatic		0	0.003	0	0	0	0
Story1	B6	29	Lateral (N-S)	LinStatic		2	0.003	0	0	0	0
Story1	B6	29	Lateral (N-S)	LinStatic		4	0.003	0	0	0	0
Story1	B6	29	Lateral (N-S)	LinStatic		6	0.003	0	0	0	0
Story1	B6	29	Lateral (N-S)	LinStatic		8	0.003	0	0	0	0
Story1	B6	29	Lateral (N-S)	LinStatic		10	0.003	0	0	0	0
Story1	B6	29	Lateral (N-S)	LinStatic		12	0.003	0	0	0	0
Story1	B6	29	Lateral (N-S)	LinStatic		14	0.003	0	0	0	0
Story1	B6	29	Lateral (E-W)	LinStatic		0	0.344	0	0	0	0
Story1	B6	29	Lateral (E-W)	LinStatic		2	0.344	0	0	0	0
Story1	B6	29	Lateral (E-W)	LinStatic		4	0.344	0	0	0	0
Story1	B6	29	Lateral (E-W)	LinStatic		6	0.344	0	0	0	0
Story1	B6	29	Lateral (E-W)	LinStatic		8	0.344	0	0	0	0
Story1	B6	29	Lateral (E-W)	LinStatic		10	0.344	0	0	0	0
Story1	B6	29	Lateral (E-W)	LinStatic		12	0.344	0	0	0	0
Story1	B6	29	Lateral (E-W)	LinStatic		14	0.344	0	0	0	0
Story1	B6	29	Envelope	Combination	Max	0	2.203	-0.306	0	0	0
Story1	B6	29	Envelope	Combination	Max	2	2.203	-0.219	0	0	0
Story1	B6	29	Envelope	Combination	Max	4	2.203	-0.131	0	0	0
Story1	B6	29	Envelope	Combination	Max	6	2.203	-0.044	0	0	0

Table 5.4 - Element Forces - Beams (Part 1 of 2, continued)

Story	Beam	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft	M2 kip-ft
Story1	B6	29	Envelope	Combination	Max	8	2.203	0.221	0	0	0
Story1	B6	29	Envelope	Combination	Max	10	2.203	0.662	0	0	0
Story1	B6	29	Envelope	Combination	Max	12	2.203	1.104	0	0	0
Story1	B6	29	Envelope	Combination	Max	14	2.203	1.546	0	0	0
Story1	B6	29	Envelope	Combination	Min	0	0.047	-1.546	0	0	0
Story1	B6	29	Envelope	Combination	Min	2	0.047	-1.104	0	0	0
Story1	B6	29	Envelope	Combination	Min	4	0.047	-0.662	0	0	0
Story1	B6	29	Envelope	Combination	Min	6	0.047	-0.221	0	0	0
Story1	B6	29	Envelope	Combination	Min	8	0.047	0.044	0	0	0
Story1	B6	29	Envelope	Combination	Min	10	0.047	0.131	0	0	0
Story1	B6	29	Envelope	Combination	Min	12	0.047	0.219	0	0	0
Story1	B6	29	Envelope	Combination	Min	14	0.047	0.306	0	0	0
Story1	B7	30	Dead	LinStatic		0	0.523	-0.42	0	0	0
Story1	B7	30	Dead	LinStatic		2	0.523	-0.3	0	0	0
Story1	B7	30	Dead	LinStatic		4	0.523	-0.18	0	0	0
Story1	B7	30	Dead	LinStatic		6	0.523	-0.06	0	0	0
Story1	B7	30	Dead	LinStatic		8	0.523	0.06	0	0	0
Story1	B7	30	Dead	LinStatic		10	0.523	0.18	0	0	0
Story1	B7	30	Dead	LinStatic		12	0.523	0.3	0	0	0
Story1	B7	30	Dead	LinStatic		14	0.523	0.42	0	0	0
Story1	B7	30	Roof Live	LinStatic		0	0.949	-0.651	0	0	0
Story1	B7	30	Roof Live	LinStatic		2	0.949	-0.465	0	0	0
Story1	B7	30	Roof Live	LinStatic		4	0.949	-0.279	0	0	0
Story1	B7	30	Roof Live	LinStatic		6	0.949	-0.093	0	0	0
Story1	B7	30	Roof Live	LinStatic		8	0.949	0.093	0	0	0
Story1	B7	30	Roof Live	LinStatic		10	0.949	0.279	0	0	0
Story1	B7	30	Roof Live	LinStatic		12	0.949	0.465	0	0	0
Story1	B7	30	Roof Live	LinStatic		14	0.949	0.651	0	0	0
Story1	B7	30	Lateral (N-S)	LinStatic		0	0.003	0	0	0	0
Story1	B7	30	Lateral (N-S)	LinStatic		2	0.003	0	0	0	0
Story1	B7	30	Lateral (N-S)	LinStatic		4	0.003	0	0	0	0
Story1	B7	30	Lateral (N-S)	LinStatic		6	0.003	0	0	0	0
Story1	B7	30	Lateral (N-S)	LinStatic		8	0.003	0	0	0	0
Story1	B7	30	Lateral (N-S)	LinStatic		10	0.003	0	0	0	0
Story1	B7	30	Lateral (N-S)	LinStatic		12	0.003	0	0	0	0
Story1	B7	30	Lateral (N-S)	LinStatic		14	0.003	0	0	0	0
Story1	B7	30	Lateral (E-W)	LinStatic		0	-0.674	0	0	0	0
Story1	B7	30	Lateral (E-W)	LinStatic		2	-0.674	0	0	0	0
Story1	B7	30	Lateral (E-W)	LinStatic		4	-0.674	0	0	0	0
Story1	B7	30	Lateral (E-W)	LinStatic		6	-0.674	0	0	0	0
Story1	B7	30	Lateral (E-W)	LinStatic		8	-0.674	0	0	0	0
Story1	B7	30	Lateral (E-W)	LinStatic		10	-0.674	0	0	0	0
Story1	B7	30	Lateral (E-W)	LinStatic		12	-0.674	0	0	0	0
Story1	B7	30	Lateral (E-W)	LinStatic		14	-0.674	0	0	0	0
Story1	B7	30	Envelope	Combination	Max	0	2.146	-0.306	0	0	0

Table 5.4 - Element Forces - Beams (Part 1 of 2, continued)

Story	Beam	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft	M2 kip-ft
Story1	B7	30	Envelope	Combination	Max	2	2.146	-0.219	0	0	0
Story1	B7	30	Envelope	Combination	Max	4	2.146	-0.131	0	0	0
Story1	B7	30	Envelope	Combination	Max	6	2.146	-0.044	0	0	0
Story1	B7	30	Envelope	Combination	Max	8	2.146	0.221	0	0	0
Story1	B7	30	Envelope	Combination	Max	10	2.146	0.662	0	0	0
Story1	B7	30	Envelope	Combination	Max	12	2.146	1.104	0	0	0
Story1	B7	30	Envelope	Combination	Max	14	2.146	1.546	0	0	0
Story1	B7	30	Envelope	Combination	Min	0	-0.293	-1.546	0	0	0
Story1	B7	30	Envelope	Combination	Min	2	-0.293	-1.104	0	0	0
Story1	B7	30	Envelope	Combination	Min	4	-0.293	-0.662	0	0	0
Story1	B7	30	Envelope	Combination	Min	6	-0.293	-0.221	0	0	0
Story1	B7	30	Envelope	Combination	Min	8	-0.293	0.044	0	0	0
Story1	B7	30	Envelope	Combination	Min	10	-0.293	0.131	0	0	0
Story1	B7	30	Envelope	Combination	Min	12	-0.293	0.219	0	0	0
Story1	B7	30	Envelope	Combination	Min	14	-0.293	0.306	0	0	0
Story1	B8	31	Dead	LinStatic		0	0.523	-0.42	0	0	0
Story1	B8	31	Dead	LinStatic		2	0.523	-0.3	0	0	0
Story1	B8	31	Dead	LinStatic		4	0.523	-0.18	0	0	0
Story1	B8	31	Dead	LinStatic		6	0.523	-0.06	0	0	0
Story1	B8	31	Dead	LinStatic		8	0.523	0.06	0	0	0
Story1	B8	31	Dead	LinStatic		10	0.523	0.18	0	0	0
Story1	B8	31	Dead	LinStatic		12	0.523	0.3	0	0	0
Story1	B8	31	Dead	LinStatic		14	0.523	0.42	0	0	0
Story1	B8	31	Roof Live	LinStatic		0	0.949	-0.651	0	0	0
Story1	B8	31	Roof Live	LinStatic		2	0.949	-0.465	0	0	0
Story1	B8	31	Roof Live	LinStatic		4	0.949	-0.279	0	0	0
Story1	B8	31	Roof Live	LinStatic		6	0.949	-0.093	0	0	0
Story1	B8	31	Roof Live	LinStatic		8	0.949	0.093	0	0	0
Story1	B8	31	Roof Live	LinStatic		10	0.949	0.279	0	0	0
Story1	B8	31	Roof Live	LinStatic		12	0.949	0.465	0	0	0
Story1	B8	31	Roof Live	LinStatic		14	0.949	0.651	0	0	0
Story1	B8	31	Lateral (N-S)	LinStatic		0	0.003	0	0	0	0
Story1	B8	31	Lateral (N-S)	LinStatic		2	0.003	0	0	0	0
Story1	B8	31	Lateral (N-S)	LinStatic		4	0.003	0	0	0	0
Story1	B8	31	Lateral (N-S)	LinStatic		6	0.003	0	0	0	0
Story1	B8	31	Lateral (N-S)	LinStatic		8	0.003	0	0	0	0
Story1	B8	31	Lateral (N-S)	LinStatic		10	0.003	0	0	0	0
Story1	B8	31	Lateral (N-S)	LinStatic		12	0.003	0	0	0	0
Story1	B8	31	Lateral (N-S)	LinStatic		14	0.003	0	0	0	0
Story1	B8	31	Lateral (E-W)	LinStatic		0	0.679	0	0	0	0
Story1	B8	31	Lateral (E-W)	LinStatic		2	0.679	0	0	0	0
Story1	B8	31	Lateral (E-W)	LinStatic		4	0.679	0	0	0	0
Story1	B8	31	Lateral (E-W)	LinStatic		6	0.679	0	0	0	0
Story1	B8	31	Lateral (E-W)	LinStatic		8	0.679	0	0	0	0
Story1	B8	31	Lateral (E-W)	LinStatic		10	0.679	0	0	0	0

Table 5.4 - Element Forces - Beams (Part 1 of 2, continued)

Story	Beam	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft	M2 kip-ft
Story1	B8	31	Lateral (E-W)	LinStatic		12	0.679	0	0	0	0
Story1	B8	31	Lateral (E-W)	LinStatic		14	0.679	0	0	0	0
Story1	B8	31	Envelope	Combination	Max	0	2.146	-0.306	0	0	0
Story1	B8	31	Envelope	Combination	Max	2	2.146	-0.219	0	0	0
Story1	B8	31	Envelope	Combination	Max	4	2.146	-0.131	0	0	0
Story1	B8	31	Envelope	Combination	Max	6	2.146	-0.044	0	0	0
Story1	B8	31	Envelope	Combination	Max	8	2.146	0.221	0	0	0
Story1	B8	31	Envelope	Combination	Max	10	2.146	0.662	0	0	0
Story1	B8	31	Envelope	Combination	Max	12	2.146	1.104	0	0	0
Story1	B8	31	Envelope	Combination	Max	14	2.146	1.546	0	0	0
Story1	B8	31	Envelope	Combination	Min	0	-0.298	-1.546	0	0	0
Story1	B8	31	Envelope	Combination	Min	2	-0.298	-1.104	0	0	0
Story1	B8	31	Envelope	Combination	Min	4	-0.298	-0.662	0	0	0
Story1	B8	31	Envelope	Combination	Min	6	-0.298	-0.221	0	0	0
Story1	B8	31	Envelope	Combination	Min	8	-0.298	0.044	0	0	0
Story1	B8	31	Envelope	Combination	Min	10	-0.298	0.131	0	0	0
Story1	B8	31	Envelope	Combination	Min	12	-0.298	0.219	0	0	0
Story1	B8	31	Envelope	Combination	Min	14	-0.298	0.306	0	0	0
Story1	B9	32	Dead	LinStatic		0	0.537	-0.42	0	0	0
Story1	B9	32	Dead	LinStatic		2	0.537	-0.3	0	0	0
Story1	B9	32	Dead	LinStatic		4	0.537	-0.18	0	0	0
Story1	B9	32	Dead	LinStatic		6	0.537	-0.06	0	0	0
Story1	B9	32	Dead	LinStatic		8	0.537	0.06	0	0	0
Story1	B9	32	Dead	LinStatic		10	0.537	0.18	0	0	0
Story1	B9	32	Dead	LinStatic		12	0.537	0.3	0	0	0
Story1	B9	32	Dead	LinStatic		14	0.537	0.42	0	0	0
Story1	B9	32	Roof Live	LinStatic		0	0.974	-0.651	0	0	0
Story1	B9	32	Roof Live	LinStatic		2	0.974	-0.465	0	0	0
Story1	B9	32	Roof Live	LinStatic		4	0.974	-0.279	0	0	0
Story1	B9	32	Roof Live	LinStatic		6	0.974	-0.093	0	0	0
Story1	B9	32	Roof Live	LinStatic		8	0.974	0.093	0	0	0
Story1	B9	32	Roof Live	LinStatic		10	0.974	0.279	0	0	0
Story1	B9	32	Roof Live	LinStatic		12	0.974	0.465	0	0	0
Story1	B9	32	Roof Live	LinStatic		14	0.974	0.651	0	0	0
Story1	B9	32	Lateral (N-S)	LinStatic		0	0.003	0	0	0	0
Story1	B9	32	Lateral (N-S)	LinStatic		2	0.003	0	0	0	0
Story1	B9	32	Lateral (N-S)	LinStatic		4	0.003	0	0	0	0
Story1	B9	32	Lateral (N-S)	LinStatic		6	0.003	0	0	0	0
Story1	B9	32	Lateral (N-S)	LinStatic		8	0.003	0	0	0	0
Story1	B9	32	Lateral (N-S)	LinStatic		10	0.003	0	0	0	0
Story1	B9	32	Lateral (N-S)	LinStatic		12	0.003	0	0	0	0
Story1	B9	32	Lateral (N-S)	LinStatic		14	0.003	0	0	0	0
Story1	B9	32	Lateral (E-W)	LinStatic		0	-0.34	0	0	0	0
Story1	B9	32	Lateral (E-W)	LinStatic		2	-0.34	0	0	0	0
Story1	B9	32	Lateral (E-W)	LinStatic		4	-0.34	0	0	0	0

Table 5.4 - Element Forces - Beams (Part 1 of 2, continued)

Story	Beam	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft	M2 kip-ft
Story1	B9	32	Lateral (E-W)	LinStatic		6	-0.34	0	0	0	0
Story1	B9	32	Lateral (E-W)	LinStatic		8	-0.34	0	0	0	0
Story1	B9	32	Lateral (E-W)	LinStatic		10	-0.34	0	0	0	0
Story1	B9	32	Lateral (E-W)	LinStatic		12	-0.34	0	0	0	0
Story1	B9	32	Lateral (E-W)	LinStatic		14	-0.34	0	0	0	0
Story1	B9	32	Envelope	Combination	Max	0	2.203	-0.306	0	0	0
Story1	B9	32	Envelope	Combination	Max	2	2.203	-0.219	0	0	0
Story1	B9	32	Envelope	Combination	Max	4	2.203	-0.131	0	0	0
Story1	B9	32	Envelope	Combination	Max	6	2.203	-0.044	0	0	0
Story1	B9	32	Envelope	Combination	Max	8	2.203	0.221	0	0	0
Story1	B9	32	Envelope	Combination	Max	10	2.203	0.662	0	0	0
Story1	B9	32	Envelope	Combination	Max	12	2.203	1.104	0	0	0
Story1	B9	32	Envelope	Combination	Max	14	2.203	1.546	0	0	0
Story1	B9	32	Envelope	Combination	Min	0	0.051	-1.546	0	0	0
Story1	B9	32	Envelope	Combination	Min	2	0.051	-1.104	0	0	0
Story1	B9	32	Envelope	Combination	Min	4	0.051	-0.662	0	0	0
Story1	B9	32	Envelope	Combination	Min	6	0.051	-0.221	0	0	0
Story1	B9	32	Envelope	Combination	Min	8	0.051	0.044	0	0	0
Story1	B9	32	Envelope	Combination	Min	10	0.051	0.131	0	0	0
Story1	B9	32	Envelope	Combination	Min	12	0.051	0.219	0	0	0
Story1	B9	32	Envelope	Combination	Min	14	0.051	0.306	0	0	0
Story1	B10	24	Dead	LinStatic		0.6667	-1.136	-3.429	0	-0.0031	0
Story1	B10	24	Dead	LinStatic		2.5972	-1.136	-2.857	0	-0.0031	0
Story1	B10	24	Dead	LinStatic		4.5278	-1.136	-2.286	0	-0.0031	0
Story1	B10	24	Dead	LinStatic		6.4583	-1.136	-1.715	0	-0.0031	0
Story1	B10	24	Dead	LinStatic		8.3889	-1.136	-1.143	0	-0.0031	0
Story1	B10	24	Dead	LinStatic		10.3194	-1.136	-0.572	0	-0.0031	0
Story1	B10	24	Dead	LinStatic		12.25	-1.136	-0.0001741	0	-0.0031	0
Story1	B10	24	Dead	LinStatic		14.1806	-1.136	0.571	0	-0.0031	0
Story1	B10	24	Dead	LinStatic		16.1111	-1.136	1.143	0	-0.0031	0
Story1	B10	24	Dead	LinStatic		18.0417	-1.136	1.714	0	-0.0031	0
Story1	B10	24	Dead	LinStatic		19.9722	-1.136	2.286	0	-0.0031	0
Story1	B10	24	Dead	LinStatic		21.9028	-1.136	2.857	0	-0.0031	0
Story1	B10	24	Dead	LinStatic		23.8333	-1.136	3.428	0	-0.0031	0
Story1	B10	24	Roof Live	LinStatic		0.6667	-1.258	-3.799	0	-0.0035	0
Story1	B10	24	Roof Live	LinStatic		2.5972	-1.258	-3.166	0	-0.0035	0
Story1	B10	24	Roof Live	LinStatic		4.5278	-1.258	-2.533	0	-0.0035	0
Story1	B10	24	Roof Live	LinStatic		6.4583	-1.258	-1.9	0	-0.0035	0
Story1	B10	24	Roof Live	LinStatic		8.3889	-1.258	-1.266	0	-0.0035	0
Story1	B10	24	Roof Live	LinStatic		10.3194	-1.258	-0.633	0	-0.0035	0
Story1	B10	24	Roof Live	LinStatic		12.25	-1.258	8.8E-05	0	-0.0035	0
Story1	B10	24	Roof Live	LinStatic		14.1806	-1.258	0.633	0	-0.0035	0
Story1	B10	24	Roof Live	LinStatic		16.1111	-1.258	1.267	0	-0.0035	0
Story1	B10	24	Roof Live	LinStatic		18.0417	-1.258	1.9	0	-0.0035	0
Story1	B10	24	Roof Live	LinStatic		19.9722	-1.258	2.533	0	-0.0035	0

Table 5.4 - Element Forces - Beams (Part 1 of 2, continued)

Story	Beam	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft	M2 kip-ft
Story1	B10	24	Roof Live	LinStatic		21.9028	-1.258	3.166	0	-0.0035	0
Story1	B10	24	Roof Live	LinStatic		23.8333	-1.258	3.799	0	-0.0035	0
Story1	B10	24	Lateral (N-S)	LinStatic		0.6667	0.128	0.801	0	-0.0001	0
Story1	B10	24	Lateral (N-S)	LinStatic		2.5972	0.128	0.801	0	-0.0001	0
Story1	B10	24	Lateral (N-S)	LinStatic		4.5278	0.128	0.801	0	-0.0001	0
Story1	B10	24	Lateral (N-S)	LinStatic		6.4583	0.128	0.801	0	-0.0001	0
Story1	B10	24	Lateral (N-S)	LinStatic		8.3889	0.128	0.801	0	-0.0001	0
Story1	B10	24	Lateral (N-S)	LinStatic		10.3194	0.128	0.801	0	-0.0001	0
Story1	B10	24	Lateral (N-S)	LinStatic		12.25	0.128	0.801	0	-0.0001	0
Story1	B10	24	Lateral (N-S)	LinStatic		14.1806	0.128	0.801	0	-0.0001	0
Story1	B10	24	Lateral (N-S)	LinStatic		16.1111	0.128	0.801	0	-0.0001	0
Story1	B10	24	Lateral (N-S)	LinStatic		18.0417	0.128	0.801	0	-0.0001	0
Story1	B10	24	Lateral (N-S)	LinStatic		19.9722	0.128	0.801	0	-0.0001	0
Story1	B10	24	Lateral (N-S)	LinStatic		21.9028	0.128	0.801	0	-0.0001	0
Story1	B10	24	Lateral (N-S)	LinStatic		23.8333	0.128	0.801	0	-0.0001	0
Story1	B10	24	Lateral (E-W)	LinStatic		0.6667	0	1.351E-05	0	-0.2828	0
Story1	B10	24	Lateral (E-W)	LinStatic		2.5972	0	1.351E-05	0	-0.2828	0
Story1	B10	24	Lateral (E-W)	LinStatic		4.5278	0	1.351E-05	0	-0.2828	0
Story1	B10	24	Lateral (E-W)	LinStatic		6.4583	0	1.351E-05	0	-0.2828	0
Story1	B10	24	Lateral (E-W)	LinStatic		8.3889	0	1.351E-05	0	-0.2828	0
Story1	B10	24	Lateral (E-W)	LinStatic		10.3194	0	1.351E-05	0	-0.2828	0
Story1	B10	24	Lateral (E-W)	LinStatic		12.25	0	1.351E-05	0	-0.2828	0
Story1	B10	24	Lateral (E-W)	LinStatic		14.1806	0	1.351E-05	0	-0.2828	0
Story1	B10	24	Lateral (E-W)	LinStatic		16.1111	0	1.351E-05	0	-0.2828	0
Story1	B10	24	Lateral (E-W)	LinStatic		18.0417	0	1.351E-05	0	-0.2828	0
Story1	B10	24	Lateral (E-W)	LinStatic		19.9722	0	1.351E-05	0	-0.2828	0
Story1	B10	24	Lateral (E-W)	LinStatic		21.9028	0	1.351E-05	0	-0.2828	0
Story1	B10	24	Lateral (E-W)	LinStatic		23.8333	0	1.351E-05	0	-0.2828	0
Story1	B10	24	Envelope	Combination	Max	0.6667	-0.699	-1.696	0	0.2805	0
Story1	B10	24	Envelope	Combination	Max	2.5972	-0.699	-1.28	0	0.2805	0
Story1	B10	24	Envelope	Combination	Max	4.5278	-0.699	-0.864	0	0.2805	0
Story1	B10	24	Envelope	Combination	Max	6.4583	-0.699	-0.448	0	0.2805	0
Story1	B10	24	Envelope	Combination	Max	8.3889	-0.699	-0.031	0	0.2805	0
Story1	B10	24	Envelope	Combination	Max	10.3194	-0.699	0.385	0	0.2805	0
Story1	B10	24	Envelope	Combination	Max	12.25	-0.699	0.801	0	0.2805	0
Story1	B10	24	Envelope	Combination	Max	14.1806	-0.699	1.699	0	0.2805	0
Story1	B10	24	Envelope	Combination	Max	16.1111	-0.699	3.398	0	0.2805	0
Story1	B10	24	Envelope	Combination	Max	18.0417	-0.699	5.097	0	0.2805	0
Story1	B10	24	Envelope	Combination	Max	19.9722	-0.699	6.795	0	0.2805	0
Story1	B10	24	Envelope	Combination	Max	21.9028	-0.699	8.494	0	0.2805	0
Story1	B10	24	Envelope	Combination	Max	23.8333	-0.699	10.193	0	0.2805	0
Story1	B10	24	Envelope	Combination	Min	0.6667	-3.376	-10.193	0	-0.287	0
Story1	B10	24	Envelope	Combination	Min	2.5972	-3.376	-8.495	0	-0.287	0
Story1	B10	24	Envelope	Combination	Min	4.5278	-3.376	-6.796	0	-0.287	0
Story1	B10	24	Envelope	Combination	Min	6.4583	-3.376	-5.097	0	-0.287	0

Table 5.4 - Element Forces - Beams (Part 1 of 2, continued)

Story	Beam	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft	M2 kip-ft
Story1	B10	24	Envelope	Combination	Min	8.3889	-3.376	-3.398	0	-0.287	0
Story1	B10	24	Envelope	Combination	Min	10.3194	-3.376	-1.699	0	-0.287	0
Story1	B10	24	Envelope	Combination	Min	12.25	-3.376	-0.802	0	-0.287	0
Story1	B10	24	Envelope	Combination	Min	14.1806	-3.376	-0.385	0	-0.287	0
Story1	B10	24	Envelope	Combination	Min	16.1111	-3.376	0.031	0	-0.287	0
Story1	B10	24	Envelope	Combination	Min	18.0417	-3.376	0.447	0	-0.287	0
Story1	B10	24	Envelope	Combination	Min	19.9722	-3.376	0.864	0	-0.287	0
Story1	B10	24	Envelope	Combination	Min	21.9028	-3.376	1.28	0	-0.287	0
Story1	B10	24	Envelope	Combination	Min	23.8333	-3.376	1.696	0	-0.287	0

Table 5.4 - Element Forces - Beams (Part 2 of 2)

M3 kip-ft	Element	Elem Station ft	Location
0.1473	19-1	0.6667	
0.3861	19-1	2.2708	
0.2442	19-1	3.875	
-0.2787	19-1	5.4792	
-1.1824	19-1	7.0833	
-1.1824	19-2	0	
-0.0855	19-2	1.7222	
0.5724	19-2	3.4444	
0.7913	19-2	5.1667	
0.5712	19-2	6.8889	
-0.0878	19-2	8.6111	
-1.1858	19-2	10.3333	
-1.1858	19-3	0	
-0.2807	19-3	1.6042	
0.2434	19-3	3.2083	
0.3868	19-3	4.8125	
0.1492	19-3	6.4167	
0.177	19-1	0.6667	
0.4351	19-1	2.2708	
0.2711	19-1	3.875	
-0.3149	19-1	5.4792	
-1.3229	19-1	7.0833	
-1.3229	19-2	0	
-0.105	19-2	1.7222	
0.6265	19-2	3.4444	
0.8715	19-2	5.1667	
0.6301	19-2	6.8889	
-0.0977	19-2	8.6111	
-1.3119	19-2	10.3333	
-1.3119	19-3	0	
-0.3084	19-3	1.6042	

Table 5.4 - Element Forces - Beams (Part 2 of 2, continued)

M3 kip-ft	Element	Elem Station ft	Location
0.273	19-3	3.2083	
0.4325	19-3	4.8125	
0.1699	19-3	6.4167	
8.3227	19-1	0.6667	
5.6012	19-1	2.2708	
2.8797	19-1	3.875	
0.1583	19-1	5.4792	
-2.5632	19-1	7.0833	
-2.5632	19-2	0	
-1.7088	19-2	1.7222	
-0.8544	19-2	3.4444	
0.0001	19-2	5.1667	
0.8545	19-2	6.8889	
1.709	19-2	8.6111	
2.5634	19-2	10.3333	
2.5634	19-3	0	
-0.1584	19-3	1.6042	
-2.8801	19-3	3.2083	
-5.6019	19-3	4.8125	
-8.3237	19-3	6.4167	
-0.0058	19-1	0.6667	
-0.0035	19-1	2.2708	
-0.0012	19-1	3.875	
0.0011	19-1	5.4792	
0.0034	19-1	7.0833	
0.0034	19-2	0	
0.0034	19-2	1.7222	
0.0034	19-2	3.4444	
0.0033	19-2	5.1667	
0.0033	19-2	6.8889	
0.0033	19-2	8.6111	
0.0032	19-2	10.3333	
0.0032	19-3	0	
0.001	19-3	1.6042	
-0.0012	19-3	3.2083	
-0.0034	19-3	4.8125	
-0.0057	19-3	6.4167	
8.5247	19-1	0.6667	
6.1309	19-1	2.2708	
3.2146	19-1	3.875	
-0.0447	19-1	5.4792	
1.702	19-1	7.0833	
1.702	19-2	0	
1.6465	19-2	1.7222	

Table 5.4 - Element Forces - Beams (Part 2 of 2, continued)

M3 kip-ft	Element	Elem Station ft	Location
1.6892	19-2	3.4444	
2.344	19-2	5.1667	
1.6937	19-2	6.8889	
1.645	19-2	8.6111	
1.6997	19-2	10.3333	
1.6997	19-3	0	
-0.0461	19-3	1.6042	
3.214	19-3	3.2083	
6.1324	19-3	4.8125	
8.5284	19-3	6.4167	
-8.2154	19-1	0.6667	
-5.32	19-1	2.2708	
-2.7019	19-1	3.875	
-0.8383	19-1	5.4792	
-4.185	19-1	7.0833	
-4.185	19-2	0	
-1.8261	19-2	1.7222	
-0.4374	19-2	3.4444	
0.573	19-2	5.1667	
-0.4384	19-2	6.8889	
-1.8294	19-2	8.6111	
-4.1898	19-2	10.3333	
-4.1898	19-3	0	
-0.8304	19-3	1.6042	
-2.7028	19-3	3.2083	
-5.3202	19-3	4.8125	
-8.215	19-3	6.4167	
-2.9838	9	0.9167	
-0.2647	9	2.7262	
1.4983	9	4.5357	
2.3052	9	6.3452	
2.1559	9	8.1548	
1.0506	9	9.9643	
-1.0109	9	11.7738	
-4.0285	9	13.5833	
-3.3201	9	0.9167	
-0.2942	9	2.7262	
1.6676	9	4.5357	
2.5652	9	6.3452	
2.3987	9	8.1548	
1.1679	9	9.9643	
-1.127	9	11.7738	
-4.486	9	13.5833	
0.0078	9	0.9167	

Table 5.4 - Element Forces - Beams (Part 2 of 2, continued)

M3 kip-ft	Element	Elem Station ft	Location
0.0051	9	2.7262	
0.0023	9	4.5357	
-0.0004	9	6.3452	
-0.0031	9	8.1548	
-0.0058	9	9.9643	
-0.0086	9	11.7738	
-0.0113	9	13.5833	
4.728	9	0.9167	
3.9951	9	2.7262	
3.2623	9	4.5357	
2.5294	9	6.3452	
1.7966	9	8.1548	
1.0637	9	9.9643	
0.3309	9	11.7738	
-0.4019	9	13.5833	
2.5545	9	0.9167	
3.8023	9	2.7262	
5.3173	9	4.5357	
6.8706	9	6.3452	
6.425	9	8.1548	
3.1294	9	9.9643	
-0.4054	9	11.7738	
-2.5324	9	13.5833	
-8.8928	9	0.9167	
-4.3582	9	2.7262	
-2.1709	9	4.5357	
-0.8504	9	6.3452	
-0.2262	9	8.1548	
-0.2985	9	9.9643	
-3.0162	9	11.7738	
-12.0119	9	13.5833	
-4.0409	8	0.4167	
-1.0219	8	2.2262	
1.0409	8	4.0357	
2.1476	8	5.8452	
2.2982	8	7.6548	
1.4926	8	9.4643	
-0.269	8	11.2738	
-2.9868	8	13.0833	
-4.5	8	0.4167	
-1.1394	8	2.2262	
1.157	8	4.0357	
2.3893	8	5.8452	
2.5573	8	7.6548	

Table 5.4 - Element Forces - Beams (Part 2 of 2, continued)

M3 kip-ft	Element	Elem Station ft	Location
1.6613	8	9.4643	
-0.299	8	11.2738	
-3.3234	8	13.0833	
-0.0114	8	0.4167	
-0.0087	8	2.2262	
-0.006	8	4.0357	
-0.0032	8	5.8452	
-0.0005	8	7.6548	
0.0022	8	9.4643	
0.005	8	11.2738	
0.0077	8	13.0833	
-0.1282	8	0.4167	
-0.7537	8	2.2262	
-1.3791	8	4.0357	
-2.0046	8	5.8452	
-2.6301	8	7.6548	
-3.2556	8	9.4643	
-3.8811	8	11.2738	
-4.5065	8	13.0833	
-2.8152	8	0.4167	
0.0093	8	2.2262	
3.1003	8	4.0357	
6.3999	8	5.8452	
6.8496	8	7.6548	
5.3029	8	9.4643	
3.6851	8	11.2738	
2.331	8	13.0833	
-12.0491	8	0.4167	
-3.0494	8	2.2262	
-0.621	8	4.0357	
-0.4403	8	5.8452	
-0.9561	8	7.6548	
-2.1683	8	9.4643	
-4.25	8	11.2738	
-8.9016	8	13.0833	
-2.4266	14	0.4167	
-0.6156	14	2.2262	
0.6223	14	4.0357	
1.2873	14	5.8452	
1.3792	14	7.6548	
0.8981	14	9.4643	
-0.156	14	11.2738	
-1.7832	14	13.0833	
-4.4916	14	0.4167	

Table 5.4 - Element Forces - Beams (Part 2 of 2, continued)

M3 kip-ft	Element	Elem Station ft	Location
-1.1327	14	2.2262	
1.162	14	4.0357	
2.3926	14	5.8452	
2.5589	14	7.6548	
1.6612	14	9.4643	
-0.3008	14	11.2738	
-3.3269	14	13.0833	
0.0113	14	0.4167	
0.0086	14	2.2262	
0.0059	14	4.0357	
0.0031	14	5.8452	
0.0004	14	7.6548	
-0.0023	14	9.4643	
-0.005	14	11.2738	
-0.0077	14	13.0833	
0.2345	14	0.4167	
-0.418	14	2.2262	
-1.0704	14	4.0357	
-1.7229	14	5.8452	
-2.3753	14	7.6548	
-3.0278	14	9.4643	
-3.6802	14	11.2738	
-4.3327	14	13.0833	
-1.5331	14	0.4167	
-0.0304	14	2.2262	
2.606	14	4.0357	
5.3728	14	5.8452	
5.7493	14	7.6548	
4.2596	14	9.4643	
3.5666	14	11.2738	
3.0338	14	13.0833	
-10.0985	14	0.4167	
-2.5511	14	2.2262	
-0.6171	14	4.0357	
-0.7852	14	5.8452	
-1.3707	14	7.6548	
-2.3736	14	9.4643	
-3.8943	14	11.2738	
-7.4629	14	13.0833	
-1.7821	15	0.9167	
-0.1551	15	2.7262	
0.8988	15	4.5357	
1.3798	15	6.3452	
1.2877	15	8.1548	

Table 5.4 - Element Forces - Beams (Part 2 of 2, continued)

M3 kip-ft	Element	Elem Station ft	Location
0.6226	15	9.9643	
-0.6155	15	11.7738	
-2.4266	15	13.5833	
-3.3257	15	0.9167	
-0.2997	15	2.7262	
1.662	15	4.5357	
2.5596	15	6.3452	
2.3931	15	8.1548	
1.1623	15	9.9643	
-1.1326	15	11.7738	
-4.4917	15	13.5833	
-0.0077	15	0.9167	
-0.005	15	2.7262	
-0.0023	15	4.5357	
0.0004	15	6.3452	
0.0031	15	8.1548	
0.0059	15	9.9643	
0.0086	15	11.7738	
0.0113	15	13.5833	
4.3329	15	0.9167	
3.6804	15	2.7262	
3.0278	15	4.5357	
2.3752	15	6.3452	
1.7226	15	8.1548	
1.07	15	9.9643	
0.4174	15	11.7738	
-0.2351	15	13.5833	
3.0349	15	0.9167	
3.5674	15	2.7262	
4.2606	15	4.5357	
5.7511	15	6.3452	
5.3741	15	8.1548	
2.6069	15	9.9643	
-0.0309	15	11.7738	
-1.5324	15	13.5833	
-7.4596	15	0.9167	
-3.8931	15	2.7262	
-2.3731	15	4.5357	
-1.3702	15	6.3452	
-0.7846	15	8.1548	
-0.6165	15	9.9643	
-2.5507	15	11.7738	
-10.0986	15	13.5833	
0.1473	25-1	0.6667	

Table 5.4 - Element Forces - Beams (Part 2 of 2, continued)

M3 kip-ft	Element	Elem Station ft	Location
0.3861	25-1	2.2708	
0.2442	25-1	3.875	
-0.2787	25-1	5.4792	
-1.1824	25-1	7.0833	
-1.1824	25-2	0	
-0.0855	25-2	1.7222	
0.5724	25-2	3.4444	
0.7913	25-2	5.1667	
0.5713	25-2	6.8889	
-0.0878	25-2	8.6111	
-1.1858	25-2	10.3333	
-1.1858	25-3	0	
-0.2807	25-3	1.6042	
0.2434	25-3	3.2083	
0.3868	25-3	4.8125	
0.1492	25-3	6.4167	
0.177	25-1	0.6667	
0.4351	25-1	2.2708	
0.2711	25-1	3.875	
-0.3149	25-1	5.4792	
-1.3229	25-1	7.0833	
-1.3229	25-2	0	
-0.105	25-2	1.7222	
0.6265	25-2	3.4444	
0.8715	25-2	5.1667	
0.6301	25-2	6.8889	
-0.0977	25-2	8.6111	
-1.3119	25-2	10.3333	
-1.3119	25-3	0	
-0.3084	25-3	1.6042	
0.273	25-3	3.2083	
0.4325	25-3	4.8125	
0.1699	25-3	6.4167	
8.3227	25-1	0.6667	
5.6012	25-1	2.2708	
2.8797	25-1	3.875	
0.1583	25-1	5.4792	
-2.5632	25-1	7.0833	
-2.5632	25-2	0	
-1.7088	25-2	1.7222	
-0.8544	25-2	3.4444	
0.0001	25-2	5.1667	
0.8545	25-2	6.8889	
1.709	25-2	8.6111	

Table 5.4 - Element Forces - Beams (Part 2 of 2, continued)

M3 kip-ft	Element	Elem Station ft	Location
2.5634	25-2	10.3333	
2.5634	25-3	0	
-0.1584	25-3	1.6042	
-2.8801	25-3	3.2083	
-5.6019	25-3	4.8125	
-8.3237	25-3	6.4167	
0.0059	25-1	0.6667	
0.0036	25-1	2.2708	
0.0013	25-1	3.875	
-0.001	25-1	5.4792	
-0.0033	25-1	7.0833	
-0.0033	25-2	0	
-0.0034	25-2	1.7222	
-0.0035	25-2	3.4444	
-0.0036	25-2	5.1667	
-0.0037	25-2	6.8889	
-0.0038	25-2	8.6111	
-0.0039	25-2	10.3333	
-0.0039	25-3	0	
-0.0013	25-3	1.6042	
0.0012	25-3	3.2083	
0.0038	25-3	4.8125	
0.0064	25-3	6.4167	
8.5247	25-1	0.6667	
6.1309	25-1	2.2708	
3.2146	25-1	3.875	
-0.0447	25-1	5.4792	
1.702	25-1	7.0833	
1.702	25-2	0	
1.6465	25-2	1.7222	
1.6892	25-2	3.4444	
2.344	25-2	5.1667	
1.6937	25-2	6.8889	
1.645	25-2	8.6111	
1.6997	25-2	10.3333	
1.6997	25-3	0	
-0.0461	25-3	1.6042	
3.214	25-3	3.2083	
6.1324	25-3	4.8125	
8.5284	25-3	6.4167	
-8.2154	25-1	0.6667	
-5.32	25-1	2.2708	
-2.7019	25-1	3.875	
-0.8383	25-1	5.4792	

Table 5.4 - Element Forces - Beams (Part 2 of 2, continued)

M3 kip-ft	Element	Elem Station ft	Location
-4.185	25-1	7.0833	
-4.185	25-2	0	
-1.8261	25-2	1.7222	
-0.4374	25-2	3.4444	
0.5728	25-2	5.1667	
-0.4384	25-2	6.8889	
-1.8294	25-2	8.6111	
-4.1898	25-2	10.3333	
-4.1898	25-3	0	
-0.8304	25-3	1.6042	
-2.7028	25-3	3.2083	
-5.3202	25-3	4.8125	
-8.215	25-3	6.4167	
-3.071	1	0.6667	
-0.2252	1	2.5119	
1.6264	1	4.3571	
2.4837	1	6.2024	
2.3467	1	8.0476	
1.2156	1	9.8929	
-0.9098	1	11.7381	
-4.0294	1	13.5833	
-3.4098	1	0.6667	
-0.2439	1	2.5119	
1.8154	1	4.3571	
2.7681	1	6.2024	
2.6142	1	8.0476	
1.3537	1	9.8929	
-1.0134	1	11.7381	
-4.4871	1	13.5833	
0.0129	1	0.6667	
0.0095	1	2.5119	
0.006	1	4.3571	
0.0026	1	6.2024	
-0.0009	1	8.0476	
-0.0043	1	9.8929	
-0.0078	1	11.7381	
-0.0113	1	13.5833	
4.5377	1	0.6667	
3.9119	1	2.5119	
3.2861	1	4.3571	
2.6603	1	6.2024	
2.0345	1	8.0476	
1.4087	1	9.8929	
0.7829	1	11.7381	

Table 5.4 - Element Forces - Beams (Part 2 of 2, continued)

M3 kip-ft	Element	Elem Station ft	Location
0.1571	1	13.5833	
2.3008	1	0.6667	
3.7479	1	2.5119	
5.5168	1	4.3571	
7.4093	1	6.2024	
6.9988	1	8.0476	
3.6246	1	9.8929	
0.1202	1	11.7381	
-2.7779	1	13.5833	
-9.1408	1	0.6667	
-4.2208	1	2.5119	
-2.1015	1	4.3571	
-0.8512	1	6.2024	
-0.3252	1	8.0476	
-0.5233	1	9.8929	
-2.7132	1	11.7381	
-12.0146	1	13.5833	
-4.0418	3	0.4167	
-0.9208	3	2.2619	
1.206	3	4.1071	
2.3385	3	5.9524	
2.4768	3	7.7976	
1.6208	3	9.6429	
-0.2293	3	11.4881	
-3.0737	3	13.3333	
-4.5011	3	0.4167	
-1.0258	3	2.2619	
1.3428	3	4.1071	
2.6049	3	5.9524	
2.7603	3	7.7976	
1.8092	3	9.6429	
-0.2486	3	11.4881	
-3.4129	3	13.3333	
-0.0114	3	0.4167	
-0.0079	3	2.2619	
-0.0045	3	4.1071	
-0.001	3	5.9524	
0.0025	3	7.7976	
0.0059	3	9.6429	
0.0094	3	11.4881	
0.0129	3	13.3333	
0.3397	3	0.4167	
-0.381	3	2.2619	
-1.1017	3	4.1071	

Table 5.4 - Element Forces - Beams (Part 2 of 2, continued)

M3 kip-ft	Element	Elem Station ft	Location
-1.8224	3	5.9524	
-2.5431	3	7.7976	
-3.2638	3	9.6429	
-3.9845	3	11.4881	
-4.7051	3	13.3333	
-2.6043	3	0.4167	
-0.2897	3	2.2619	
3.5957	3	4.1071	
6.974	3	5.9524	
7.3886	3	7.7976	
5.4869	3	9.6429	
3.8174	3	11.4881	
2.4662	3	13.3333	
-12.0518	3	0.4167	
-2.7463	3	2.2619	
-0.2232	3	4.1071	
-0.119	3	5.9524	
-0.739	3	7.7976	
-2.0831	3	9.6429	
-4.299	3	11.4881	
-9.1491	3	13.3333	
-1.8144	17	0.6667	
-0.1146	17	2.5119	
0.9894	17	4.3571	
1.4975	17	6.2024	
1.4097	17	8.0476	
0.7261	17	9.8929	
-0.5534	17	11.7381	
-2.4287	17	13.5833	
-3.3896	17	0.6667	
-0.2278	17	2.5119	
1.8274	17	4.3571	
2.776	17	6.2024	
2.618	17	8.0476	
1.3534	17	9.8929	
-1.0178	17	11.7381	
-4.4955	17	13.5833	
-0.0128	17	0.6667	
-0.0094	17	2.5119	
-0.0059	17	4.3571	
-0.0025	17	6.2024	
0.001	17	8.0476	
0.0044	17	9.8929	
0.0079	17	11.7381	

Table 5.4 - Element Forces - Beams (Part 2 of 2, continued)

M3 kip-ft	Element	Elem Station ft	Location
0.0113	17	13.5833	
4.3394	17	0.6667	
3.6921	17	2.5119	
3.0447	17	4.3571	
2.3974	17	6.2024	
1.75	17	8.0476	
1.1027	17	9.8929	
0.4554	17	11.7381	
-0.192	17	13.5833	
3.0178	17	0.6667	
3.6086	17	2.5119	
4.4018	17	4.3571	
6.2385	17	6.2024	
5.8804	17	8.0476	
3.0368	17	9.8929	
0.0523	17	11.7381	
-1.5771	17	13.5833	
-7.6007	17	0.6667	
-3.8492	17	2.5119	
-2.324	17	4.3571	
-1.3066	17	6.2024	
-0.7232	17	8.0476	
-0.5738	17	9.8929	
-2.2925	17	11.7381	
-10.1073	17	13.5833	
-2.4286	18	0.4167	
-0.5535	18	2.2619	
0.7258	18	4.1071	
1.4092	18	5.9524	
1.4968	18	7.7976	
0.9885	18	9.6429	
-0.1156	18	11.4881	
-1.8156	18	13.3333	
-4.4954	18	0.4167	
-1.0179	18	2.2619	
1.3531	18	4.1071	
2.6175	18	5.9524	
2.7752	18	7.7976	
1.8264	18	9.6429	
-0.229	18	11.4881	
-3.391	18	13.3333	
0.0113	18	0.4167	
0.0079	18	2.2619	
0.0044	18	4.1071	

Table 5.4 - Element Forces - Beams (Part 2 of 2, continued)

M3 kip-ft	Element	Elem Station ft	Location
0.001	18	5.9524	
-0.0025	18	7.7976	
-0.0059	18	9.6429	
-0.0094	18	11.4881	
-0.0128	18	13.3333	
0.1913	18	0.4167	
-0.4556	18	2.2619	
-1.1025	18	4.1071	
-1.7493	18	5.9524	
-2.3962	18	7.7976	
-3.0431	18	9.6429	
-3.69	18	11.4881	
-4.3368	18	13.3333	
-1.5777	18	0.4167	
0.0524	18	2.2619	
3.0359	18	4.1071	
5.879	18	5.9524	
6.2366	18	7.7976	
4.399	18	9.6429	
3.6058	18	11.4881	
3.0144	18	13.3333	
-10.1071	18	0.4167	
-2.2928	18	2.2619	
-0.5738	18	4.1071	
-0.7229	18	5.9524	
-1.3059	18	7.7976	
-2.323	18	9.6429	
-3.8485	18	11.4881	
-7.6043	18	13.3333	
0	10	0	
0	10	2	
0	10	4	
0	10	6	
0	10	8	
0	10	10	
0	10	12	
0	10	14	
0	10	0	
0	10	2	
0	10	4	
0	10	6	
0	10	8	
0	10	10	
0	10	12	

Table 5.4 - Element Forces - Beams (Part 2 of 2, continued)

M3 kip-ft	Element	Elem Station ft	Location
0	10	14	
0	10	0	
0	10	2	
0	10	4	
0	10	6	
0	10	8	
0	10	10	
0	10	12	
0	10	14	
0	10	0	
0	10	2	
0	10	4	
0	10	6	
0	10	8	
0	10	10	
0	10	12	
0	10	14	
0	10	0	
0	10	2	
0	10	4	
0	10	6	
0	10	8	
0	10	10	
0	10	12	
0	10	14	
0	10	0	
0	10	2	
0	10	4	
0	10	6	
0	10	8	
0	10	10	
0	10	12	
0	10	14	
0	11	0	
0	11	2	
0	11	4	
0	11	6	
0	11	8	
0	11	10	
0	11	12	
0	11	14	
0	11	0	
0	11	2	
0	11	4	

Table 5.4 - Element Forces - Beams (Part 2 of 2, continued)

M3 kip-ft	Element	Elem Station ft	Location
0	11	6	
0	11	8	
0	11	10	
0	11	12	
0	11	14	
0	11	0	
0	11	2	
0	11	4	
0	11	6	
0	11	8	
0	11	10	
0	11	12	
0	11	14	
0	11	0	
0	11	2	
0	11	4	
0	11	6	
0	11	8	
0	11	10	
0	11	12	
0	11	14	
0	11	0	
0	11	2	
0	11	4	
0	11	6	
0	11	8	
0	11	10	
0	11	12	
0	11	14	
0	11	0	
0	11	2	
0	11	4	
0	11	6	
0	11	8	
0	11	10	
0	11	12	
0	11	14	
0	2	0	
0	2	2	
0	2	4	
0	2	6	
0	2	8	
0	2	10	
0	2	12	

Table 5.4 - Element Forces - Beams (Part 2 of 2, continued)

M3 kip-ft	Element	Elem Station ft	Location
0	2	14	
0	2	0	
0	2	2	
0	2	4	
0	2	6	
0	2	8	
0	2	10	
0	2	12	
0	2	14	
0	2	0	
0	2	2	
0	2	4	
0	2	6	
0	2	8	
0	2	10	
0	2	12	
0	2	14	
0	2	0	
0	2	2	
0	2	4	
0	2	6	
0	2	8	
0	2	10	
0	2	12	
0	2	14	
0	2	0	
0	2	2	
0	2	4	
0	2	6	
0	2	8	
0	2	10	
0	2	12	
0	2	14	
0	2	0	
0	2	2	
0	2	4	
0	2	6	
0	2	8	
0	2	10	
0	2	12	
0	2	14	
0	4	0	
0	4	2	
0	4	4	

Table 5.4 - Element Forces - Beams (Part 2 of 2, continued)

M3 kip-ft	Element	Elem Station ft	Location
0	4	6	
0	4	8	
0	4	10	
0	4	12	
0	4	14	
0	4	0	
0	4	2	
0	4	4	
0	4	6	
0	4	8	
0	4	10	
0	4	12	
0	4	14	
0	4	0	
0	4	2	
0	4	4	
0	4	6	
0	4	8	
0	4	10	
0	4	12	
0	4	14	
0	4	0	
0	4	2	
0	4	4	
0	4	6	
0	4	8	
0	4	10	
0	4	12	
0	4	14	
0	4	0	
0	4	2	
0	4	4	
0	4	6	
0	4	8	
0	4	10	
0	4	12	
0	4	14	
0	4	0	
0	4	2	
0	4	4	
0	4	6	
0	4	8	
0	4	10	
0	4	12	

Table 5.4 - Element Forces - Beams (Part 2 of 2, continued)

M3 kip-ft	Element	Elem Station ft	Location
0	4	14	
0	29	0	
0.72	29	2	
1.2	29	4	
1.44	29	6	
1.44	29	8	
1.2	29	10	
0.72	29	12	
0	29	14	
0	29	0	
1.116	29	2	
1.86	29	4	
2.232	29	6	
2.232	29	8	
1.86	29	10	
1.116	29	12	
0	29	14	
0	29	0	
0	29	2	
0	29	4	
0	29	6	
0	29	8	
0	29	10	
0	29	12	
0	29	14	
0	29	0	
0	29	2	
0	29	4	
0	29	6	
0	29	8	
0	29	10	
0	29	12	
0	29	14	
0	29	0	
2.6496	29	2	
4.416	29	4	
5.2992	29	6	
5.2992	29	8	
4.416	29	10	
2.6496	29	12	
0	29	14	
0	29	0	
0.5244	29	2	
0.8741	29	4	

Table 5.4 - Element Forces - Beams (Part 2 of 2, continued)

M3 kip-ft	Element	Elem Station ft	Location
1.0489	29	6	
1.0489	29	8	
0.8741	29	10	
0.5244	29	12	
0	29	14	
0	30	0	
0.72	30	2	
1.2	30	4	
1.44	30	6	
1.44	30	8	
1.2	30	10	
0.72	30	12	
0	30	14	
0	30	0	
1.116	30	2	
1.86	30	4	
2.232	30	6	
2.232	30	8	
1.86	30	10	
1.116	30	12	
0	30	14	
0	30	0	
0	30	2	
0	30	4	
0	30	6	
0	30	8	
0	30	10	
0	30	12	
0	30	14	
0	30	0	
0	30	2	
0	30	4	
0	30	6	
0	30	8	
0	30	10	
0	30	12	
0	30	14	
0	30	0	
2.6496	30	2	
4.416	30	4	
5.2992	30	6	
5.2992	30	8	
4.416	30	10	
2.6496	30	12	

Table 5.4 - Element Forces - Beams (Part 2 of 2, continued)

M3 kip-ft	Element	Elem Station ft	Location
0	30	14	
0	30	0	
0.5244	30	2	
0.8741	30	4	
1.0489	30	6	
1.0489	30	8	
0.8741	30	10	
0.5244	30	12	
0	30	14	
0	31	0	
0.72	31	2	
1.2	31	4	
1.44	31	6	
1.44	31	8	
1.2	31	10	
0.72	31	12	
0	31	14	
0	31	0	
1.116	31	2	
1.86	31	4	
2.232	31	6	
2.232	31	8	
1.86	31	10	
1.116	31	12	
0	31	14	
0	31	0	
0	31	2	
0	31	4	
0	31	6	
0	31	8	
0	31	10	
0	31	12	
0	31	14	
0	31	0	
0	31	2	
0	31	4	
0	31	6	
0	31	8	
0	31	10	
0	31	12	
0	31	14	
0	31	0	
2.6496	31	2	
4.416	31	4	

Table 5.4 - Element Forces - Beams (Part 2 of 2, continued)

M3 kip-ft	Element	Elem Station ft	Location
5.2992	31	6	
5.2992	31	8	
4.416	31	10	
2.6496	31	12	
0	31	14	
0	31	0	
0.5244	31	2	
0.8741	31	4	
1.0489	31	6	
1.0489	31	8	
0.8741	31	10	
0.5244	31	12	
0	31	14	
0	32	0	
0.72	32	2	
1.2	32	4	
1.44	32	6	
1.44	32	8	
1.2	32	10	
0.72	32	12	
0	32	14	
0	32	0	
1.116	32	2	
1.86	32	4	
2.232	32	6	
2.232	32	8	
1.86	32	10	
1.116	32	12	
0	32	14	
0	32	0	
0	32	2	
0	32	4	
0	32	6	
0	32	8	
0	32	10	
0	32	12	
0	32	14	
0	32	0	
0	32	2	
0	32	4	
0	32	6	
0	32	8	
0	32	10	
0	32	12	

Table 5.4 - Element Forces - Beams (Part 2 of 2, continued)

M3 kip-ft	Element	Elem Station ft	Location
0	32	14	
0	32	0	
2.6496	32	2	
4.416	32	4	
5.2992	32	6	
5.2992	32	8	
4.416	32	10	
2.6496	32	12	
0	32	14	
0	32	0	
0.5244	32	2	
0.8741	32	4	
1.0489	32	6	
1.0489	32	8	
0.8741	32	10	
0.5244	32	12	
0	32	14	
-11.5537	24	0.6667	
-5.4858	24	2.5972	
-0.521	24	4.5278	
3.3406	24	6.4583	
6.0989	24	8.3889	
7.7541	24	10.3194	
8.306	24	12.25	
7.7547	24	14.1806	
6.1003	24	16.1111	
3.3426	24	18.0417	
-0.5183	24	19.9722	
-5.4824	24	21.9028	
-11.5497	24	23.8333	
-12.7996	24	0.6667	
-6.0762	24	2.5972	
-0.5752	24	4.5278	
3.7032	24	6.4583	
6.7592	24	8.3889	
8.5928	24	10.3194	
9.2038	24	12.25	
8.5924	24	14.1806	
6.7586	24	16.1111	
3.7022	24	18.0417	
-0.5766	24	19.9722	
-6.0779	24	21.9028	
-12.8017	24	23.8333	
9.2813	24	0.6667	

Table 5.4 - Element Forces - Beams (Part 2 of 2, continued)

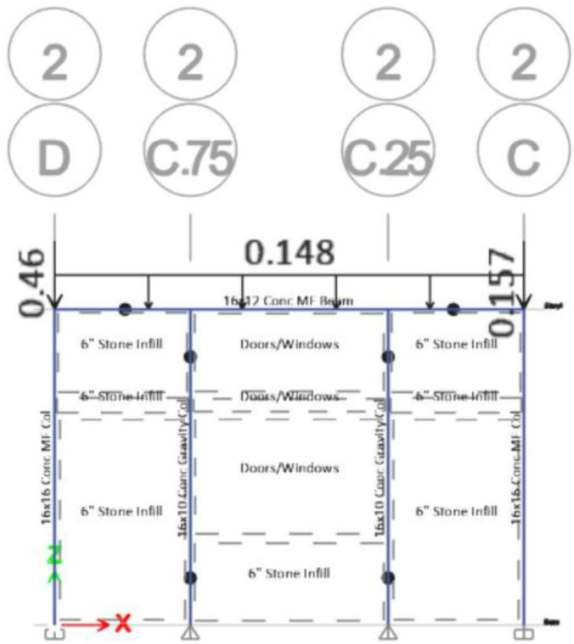
M3 kip-ft	Element	Elem Station ft	Location
7.7343	24	2.5972	
6.1874	24	4.5278	
4.6405	24	6.4583	
3.0936	24	8.3889	
1.5466	24	10.3194	
-0.0003	24	12.25	
-1.5472	24	14.1806	
-3.0941	24	16.1111	
-4.6411	24	18.0417	
-6.188	24	19.9722	
-7.7349	24	21.9028	
-9.2819	24	23.8333	
0.0002	24	0.6667	
0.0001	24	2.5972	
0.0001	24	4.5278	
0.0001	24	6.4583	
4.99E-05	24	8.3889	
2.382E-05	24	10.3194	
-2.257E-06	24	12.25	
-2.833E-05	24	14.1806	
-0.0001	24	16.1111	
-0.0001	24	18.0417	
-0.0001	24	19.9722	
-0.0001	24	21.9028	
-0.0002	24	23.8333	
0.8655	24	0.6667	
3.7385	24	2.5972	
5.8079	24	4.5278	
9.9338	24	6.4583	
18.1335	24	8.3889	
23.0533	24	10.3194	
24.6933	24	12.25	
23.0536	24	14.1806	
18.134	24	16.1111	
9.9346	24	18.0417	
5.8105	24	19.9722	
3.7416	24	21.9028	
0.8691	24	23.8333	
-34.3438	24	0.6667	
-16.3048	24	2.5972	
-6.902	24	4.5278	
-2.2072	24	6.4583	
1.3489	24	8.3889	
4.1014	24	10.3194	

Table 5.4 - Element Forces - Beams (Part 2 of 2, continued)

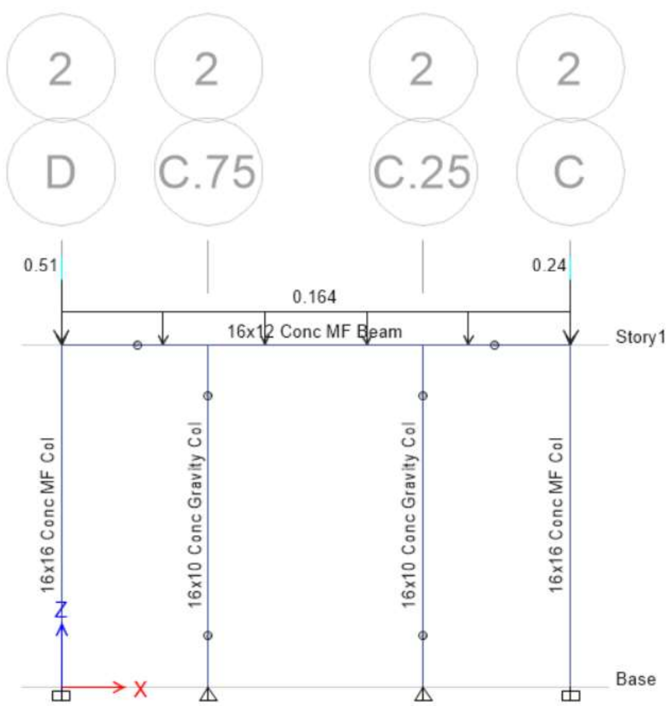
M3 kip-ft	Element	Elem Station ft	Location
6.0498	24	12.25	
4.1013	24	14.1806	
1.3493	24	16.1111	
-2.2063	24	18.0417	
-6.8989	24	19.9722	
-16.3035	24	21.9028	
-34.3423	24	23.8333	

MAIN BUILDING

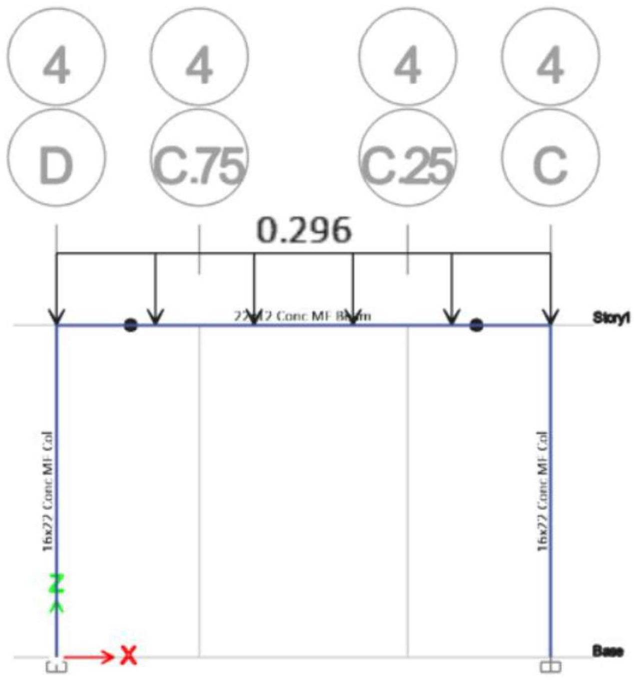
DEAD LOAD (GL. 2)



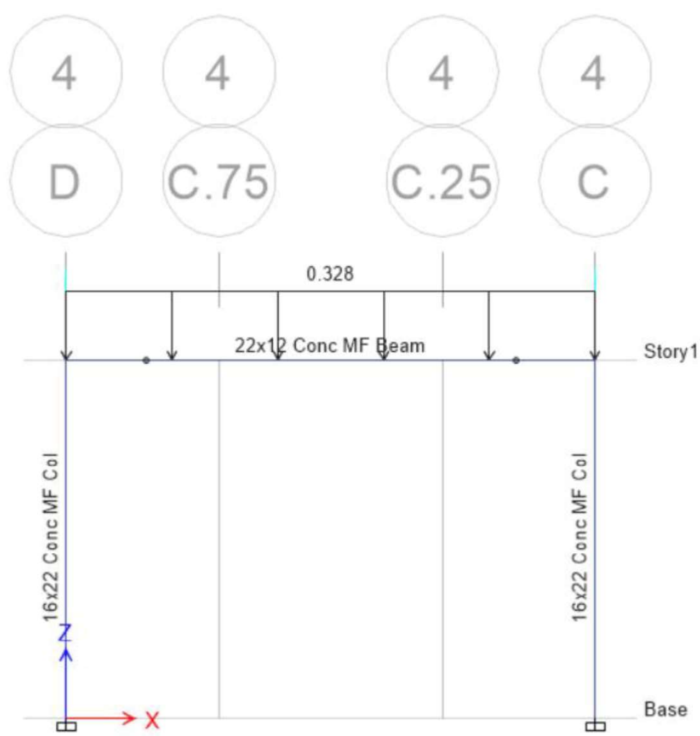
LIVE LOAD (GL. 2)



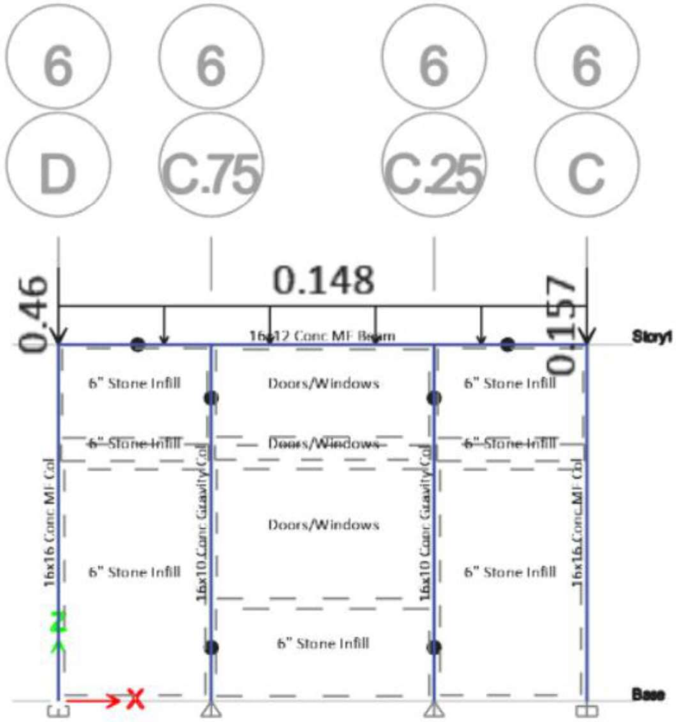
DEAD LOAD (GL. 4)



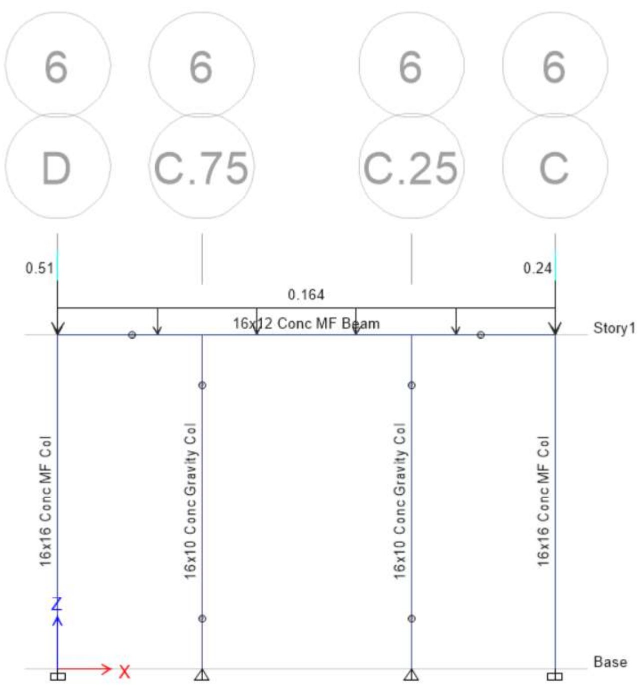
LIVE LOAD (GL. 4)



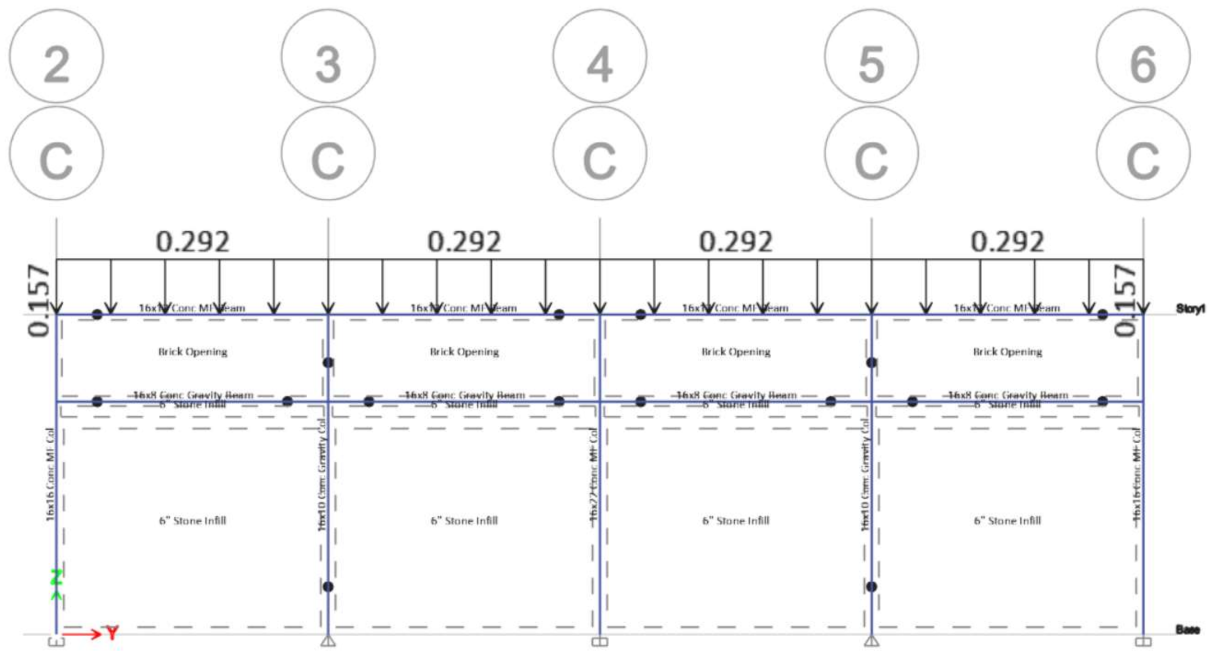
DEAD LOAD (GL. 6)



LIVE LOAD (GL. 6)

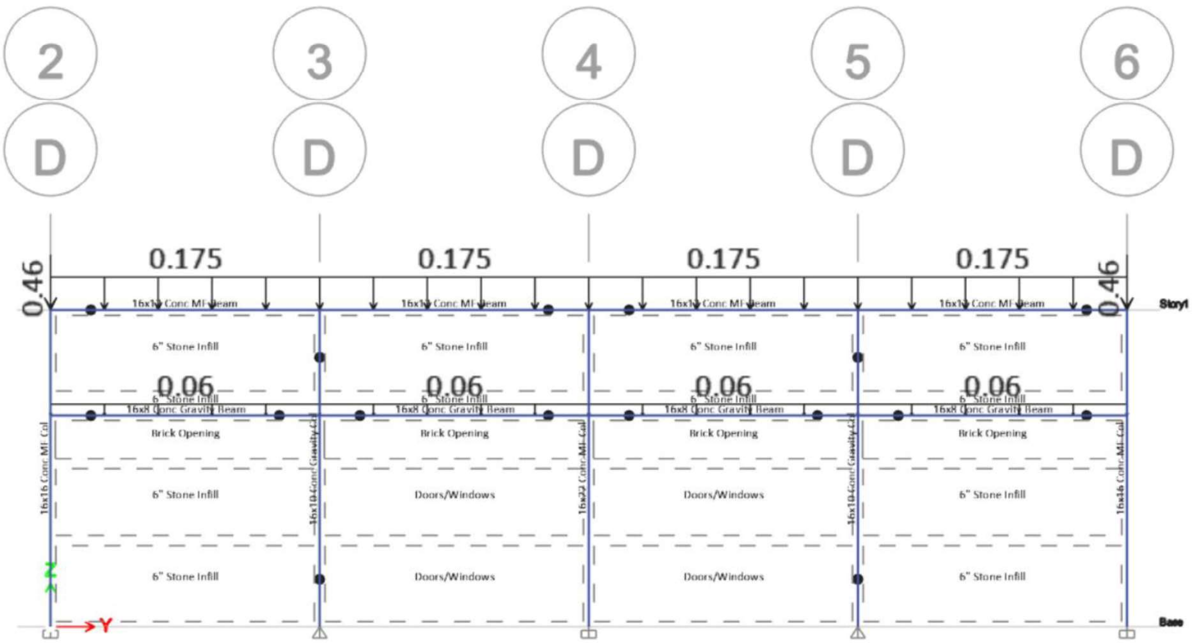


DEAD LOAD (GL. C)



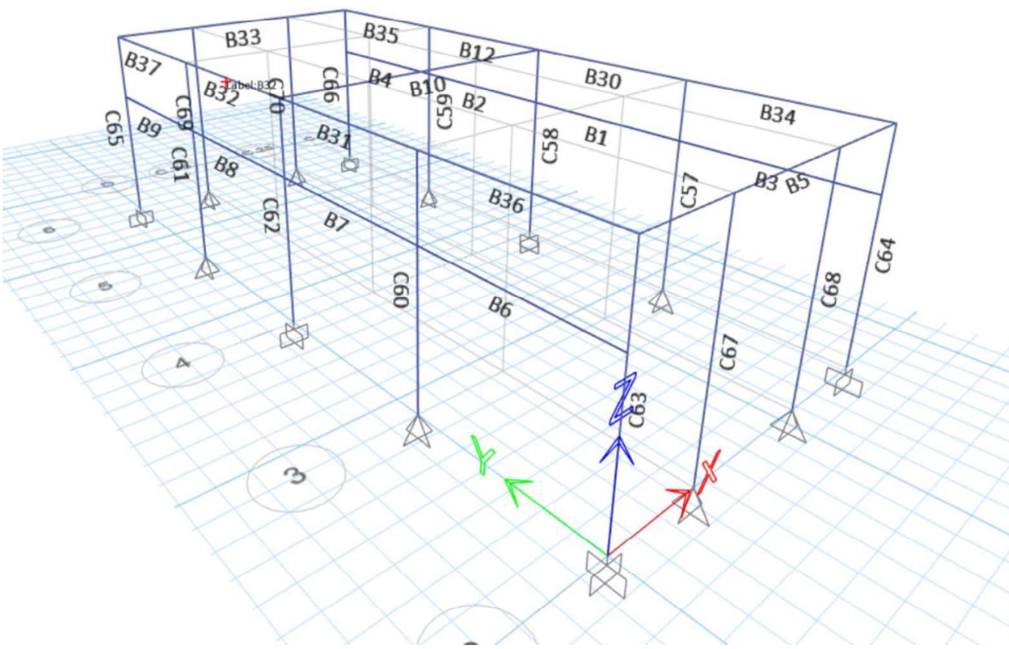
LIVE LOAD (GL. C)

DEAD LOAD (GL. D)

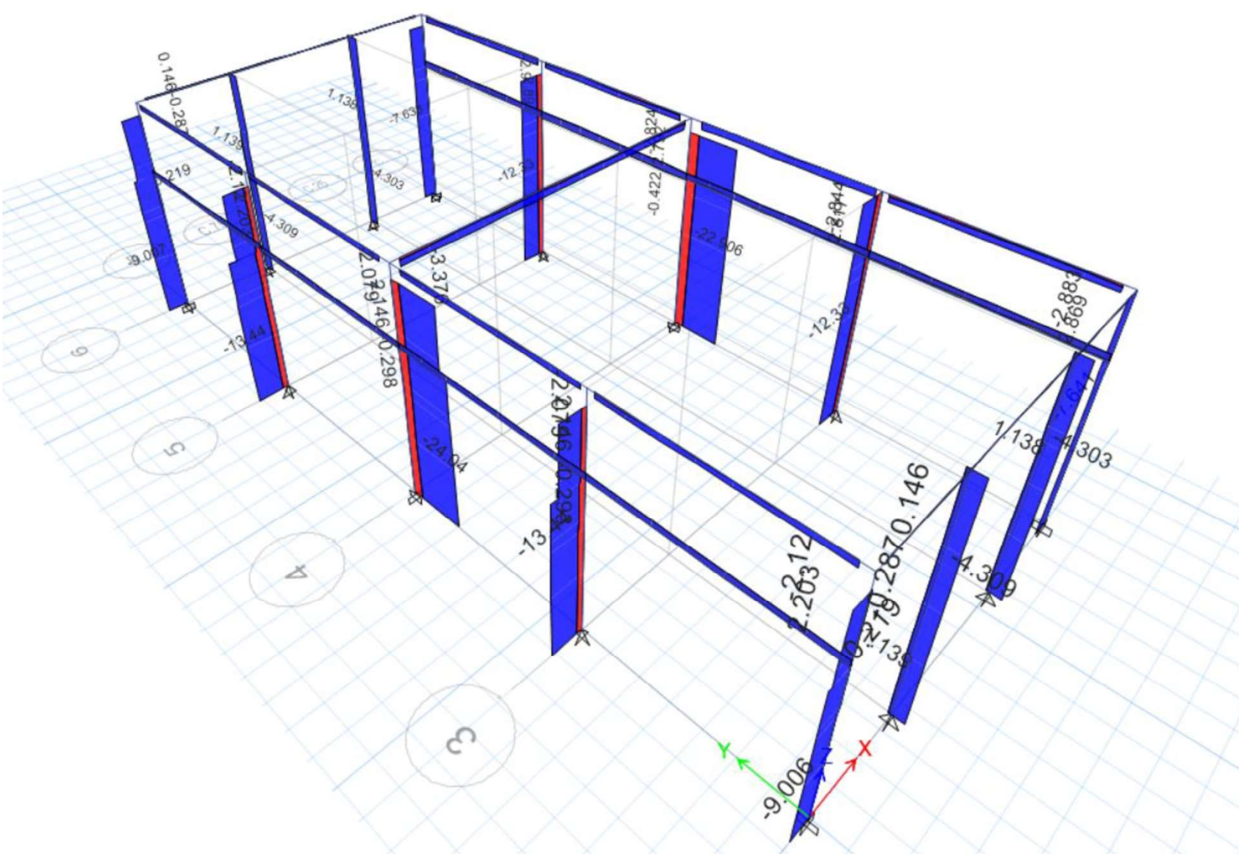


LIVE LOAD (GL. D)

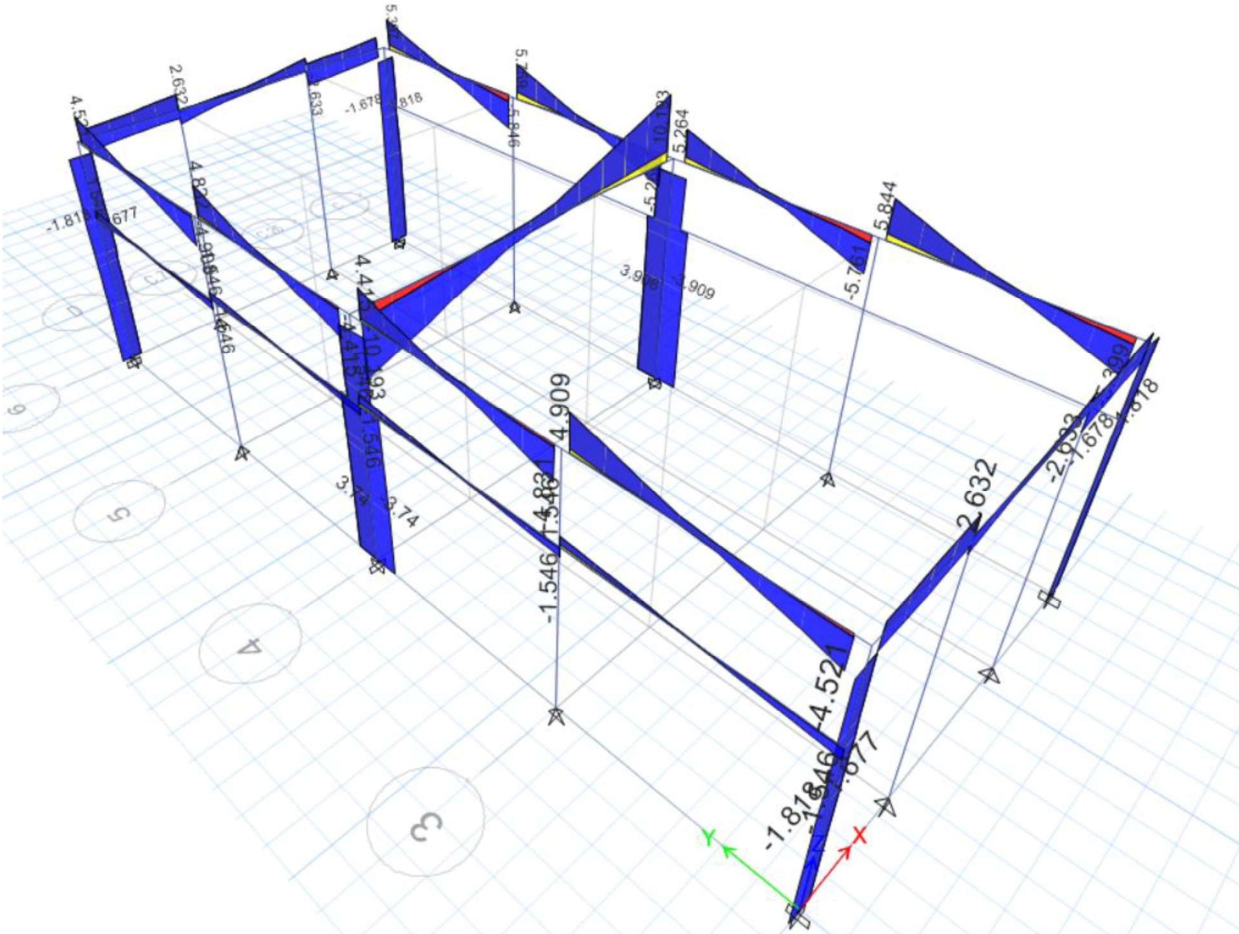
LABELS



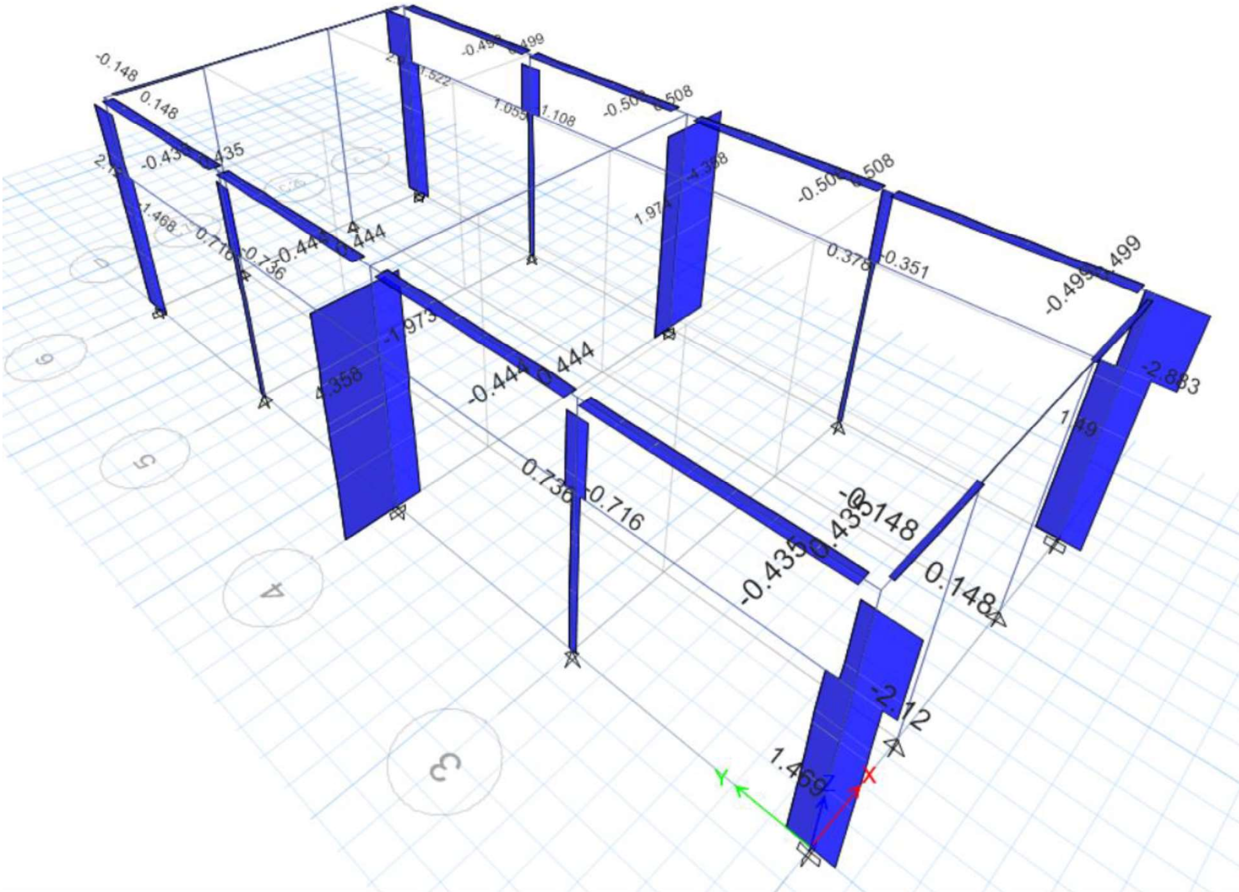
AXIAL



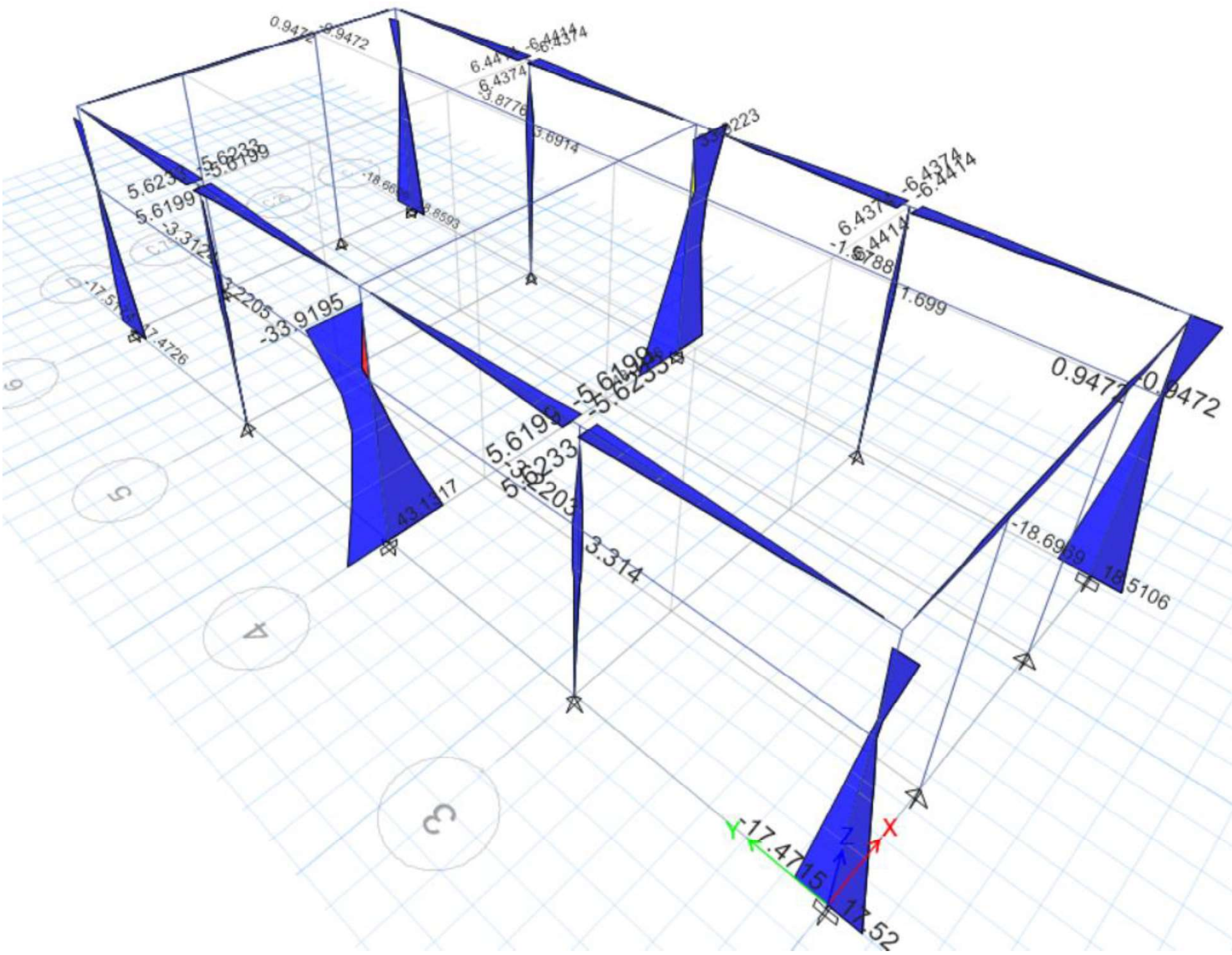
STRONG AXIS SHEAR (V2)



WEAK AXIS SHEAR (V3)



WEAK AXIS MOMENT (M2)



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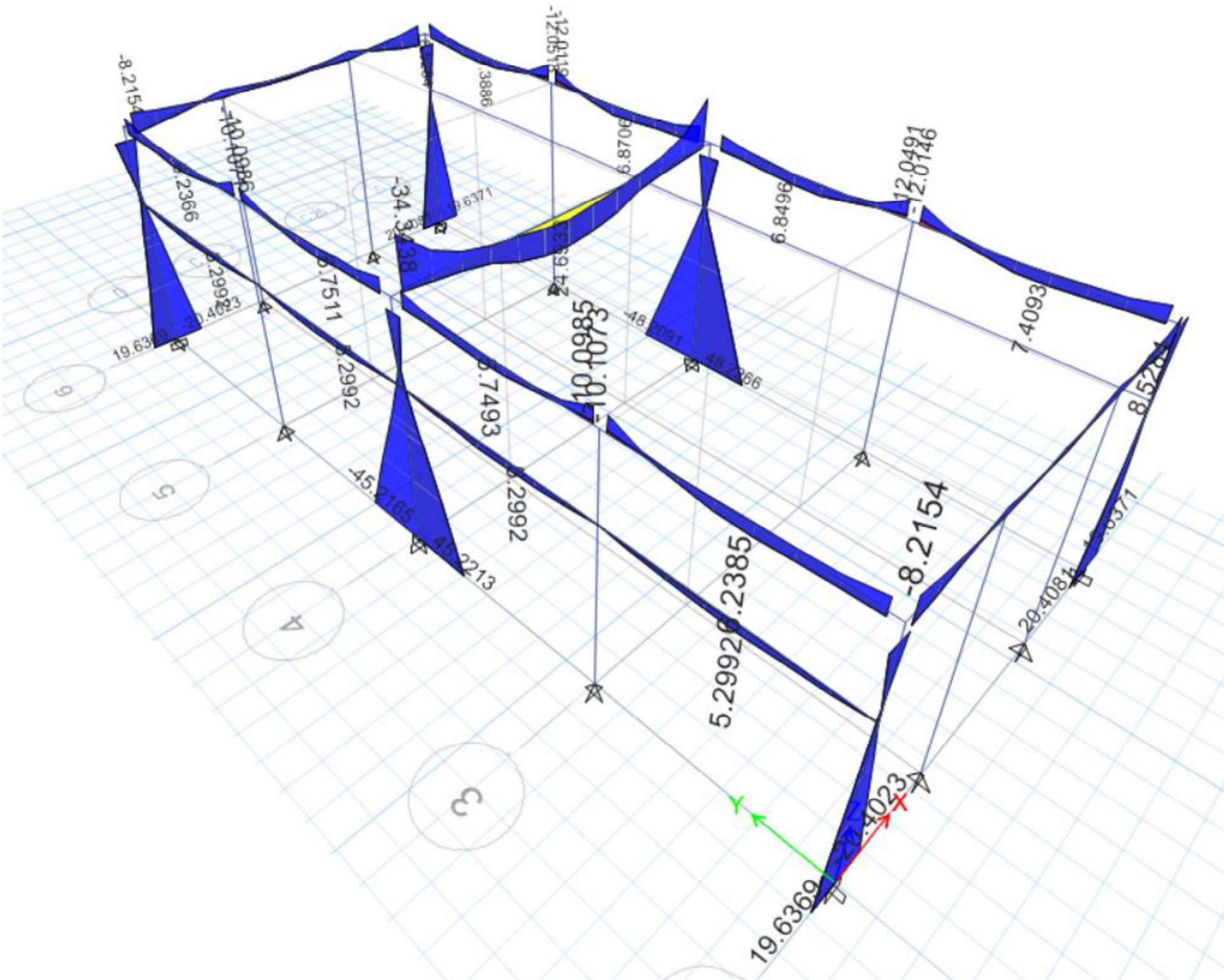
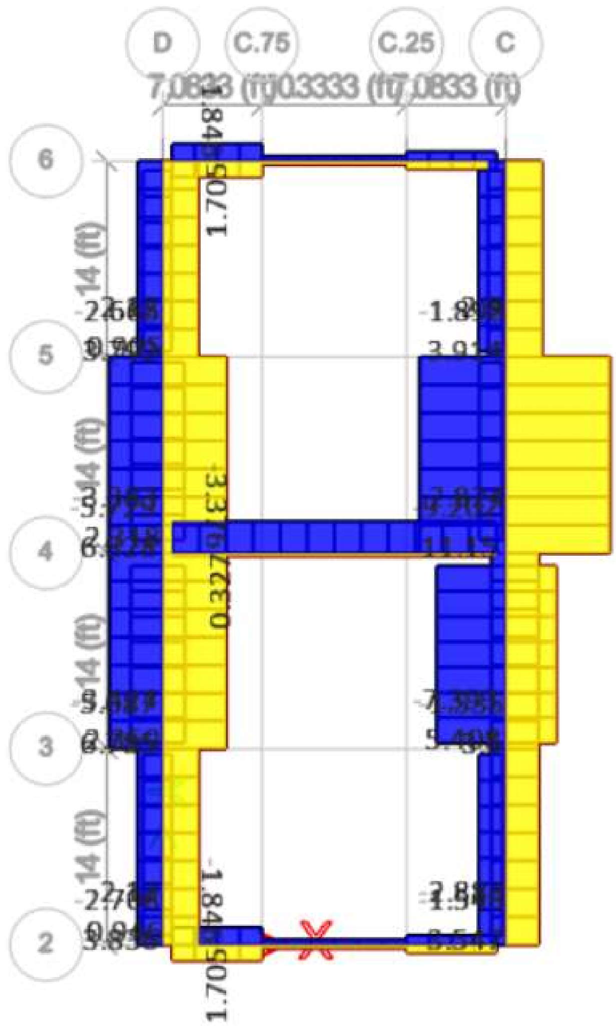


MAIN BUILDING (WITH OVERSTRENGTH)

AXIAL



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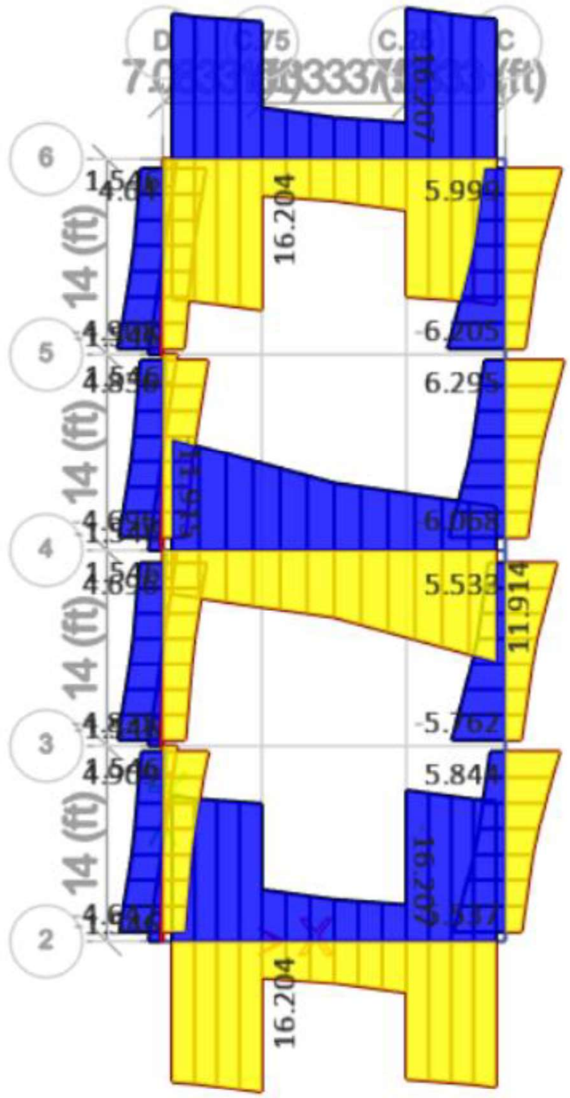
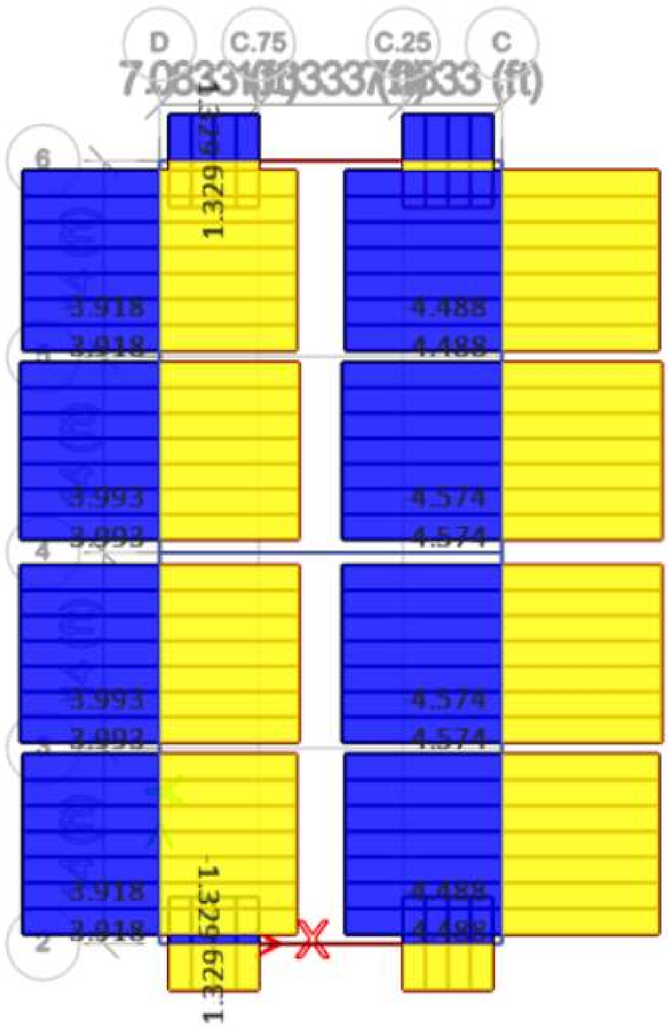
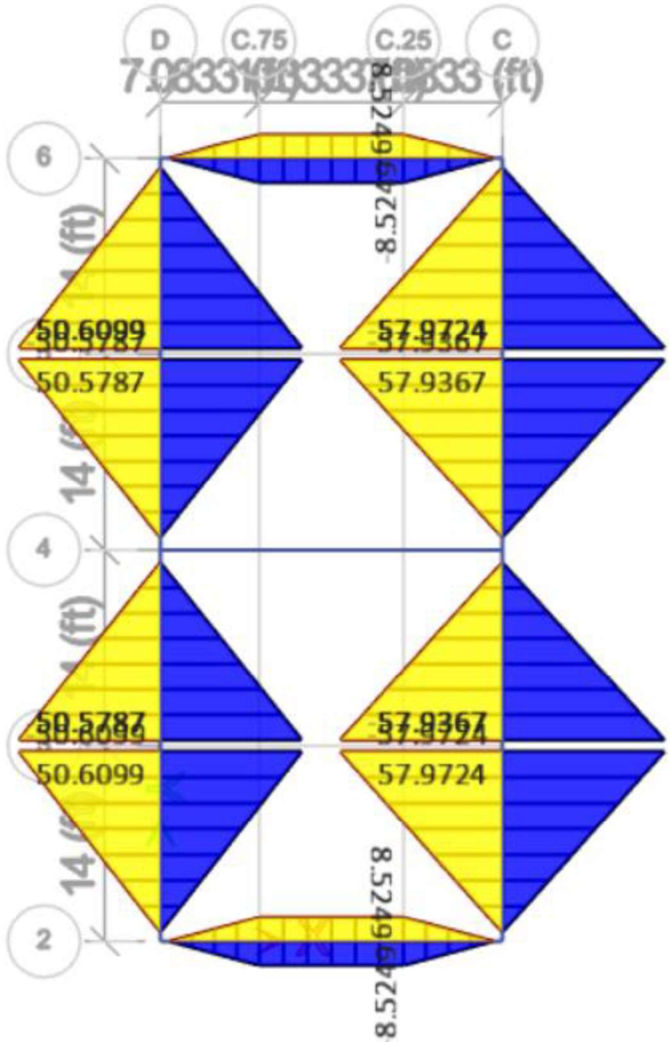


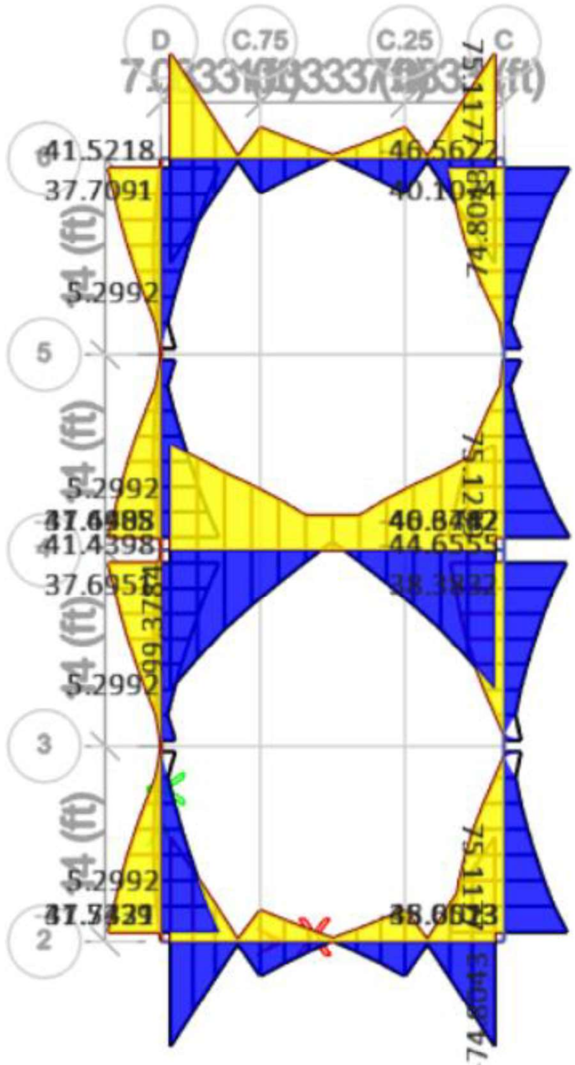
<u>WEAK AXIS SHEAR (V3)</u>



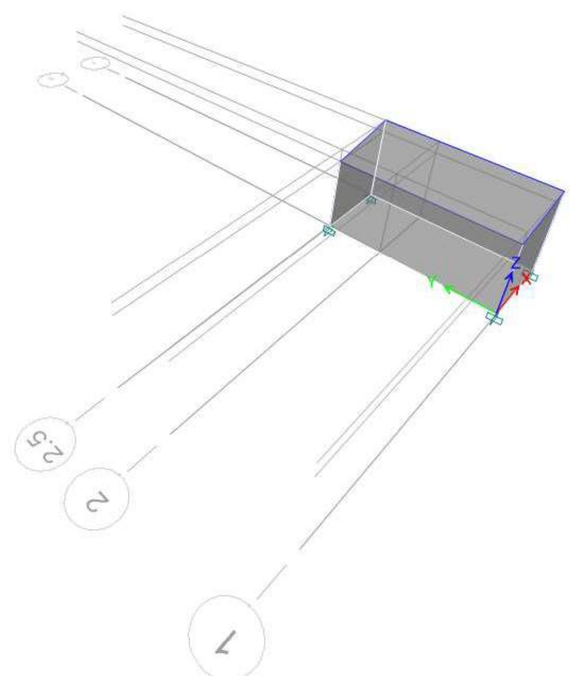
WEAK AXIS MOMENT (M2)



STRONG AXIS MOMENT (M3)



ETABS® version 18



OFFICE/BATHROOM LATERAL

Model File: Moment Frame Beam Forces, Revision 0
6/15/2020

Table of Contents

List of Tables

1 Structure Data

This chapter provides model geometry information, including items such as story levels, point coordinates, and element connectivity.

1.1 Story Data

Table 1.1 - Story Definitions

Tower	Name	Height ft	Master Story	Similar To	Splice Story	Color
T1	Story2	1.5834	Yes	None	No	Green
T1	Story1	9.5833	Yes	None	No	Green

1.2 Grid Data

Table 1.2 - Grid Definitions - General

Tower	Name	Type	Ux ft	Uy ft	Rz deg	Story Range	Bubble Size in	Color
T1	G1	Cartesian	-34.5	14	0	Default	60	Gray6

Table 1.3 - Grid Definitions - Grid Lines

Name	Grid Line Type	Ordinate ft	Bubble Location	Visible
G1	X (Cartesian)	0	End	No
G1	X (Cartesian)	7.0833	End	No
G1	X (Cartesian)	17.4167	End	No
G1	X (Cartesian)	24.5	End	No
G1	X (Cartesian)	34.5	End	Yes
G1	X (Cartesian)	44	End	Yes
G1	Y (Cartesian)	-14	Start	Yes
G1	Y (Cartesian)	0	Start	Yes
G1	Y (Cartesian)	7	Start	Yes
G1	Y (Cartesian)	14	Start	No
G1	Y (Cartesian)	28	Start	No
G1	Y (Cartesian)	42	Start	No
G1	Y (Cartesian)	56	Start	No

1.3 Point Coordinates

Table 1.4 - Point Bays

Label	Is Auto Point	X ft	Y ft	DZBelow ft
1	No	0	0	0
2	No	9.5	0	0
3	No	0	21	0
4	No	9.5	21	0

1.4 Line Connectivity

Table 1.5 - Column Bays

Label	PointBayI	PointBayJ	IEndStory
C1	1	1	Below
C2	2	2	Same
C3	3	3	Below
C4	4	4	Same

Table 1.6 - Beam Bays

Label	PointBayI	PointBayJ
B1	1	2
B2	1	3
B3	2	4
B4	3	4

1.5 Area Connectivity

Table 1.7 - Null Area Bays

Label	NumPoints	PointNumber	PointBay	PointStory
A1	4	1	1	Same
A1		2	2	Same
A1		3	2	Same
A1		4	1	Below
A2	4	1	1	Below
A2		2	3	Below
A2		3	3	Same
A2		4	1	Same
A3	4	1	2	Same
A3		2	4	Same
A3		3	4	Same
A3		4	2	Same
A4	4	1	4	Same
A4		2	3	Same
A4		3	3	Below
A4		4	4	Same

1.6 Mass

Table 1.8 - Mass Source Definition

Name	Is Default	Include Lateral Mass?	Include Vertical Mass?	Lump Mass?	Source Self Mass?	Source Added Mass?	Source Load Patterns?	Move Mass Centroid?	Load Pattern	Multiplier
MsSrc1	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Dead	1

Table 1.9 - Mass Summary by Story

Story	UX lb-s2/ft	UY lb-s2/ft	UZ lb-s2/ft
Story2	272	272	272
Story1	290.89	290.89	290.89
Base	171.98	171.98	171.98

Table 1.10 - Mass Summary by Group

Group	Self Mass lb-s2/ft	Self Weight kip	Mass X lb-s2/ft	Mass Y lb-s2/ft	Mass Z lb-s2/ft
All	576.33	0	2210.15	2210.15	2210.15

1.7 Groups

Table 1.11 - Group Definitions

Name	Color	Steel Design?	Concrete Design?	Composite Design?
All	Yellow	No	No	No

2 Properties

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

2.1 Materials

Table 2.1 - Material Properties - General

Material	Type	SymType	Grade	Color	Notes
3000Psi	Concrete	Isotropic	Unknown	Red	
3000psi weightless	Concrete	Isotropic	Unknown	Red	
4000Psi	Concrete	Isotropic	Unknown	Gray8Dark	
A416Gr270	Tendon	Uniaxial	Unknown	Green	
A615Gr40	Rebar	Uniaxial	Grade 40	Cyan	
A615Gr60	Rebar	Uniaxial	Unknown	Blue	
A992Fy50	Steel	Isotropic	Unknown	Yellow	

2.2 Frame Sections

Table 2.2 - Frame Section Property Definitions - Summary (Part 1 of 3)

Name	Material	Shape	Color	Area in2	J in4	I33 in4	I22 in4	As2 in2	As3 in2
12x28 Conc Column	3000Psi	Concrete Rectangular	Cyan	336	11785.68	21952	4032	280	280
16x16 Conc Cant. Col	3000Psi	Concrete Rectangular	Gray8Dark	256	9229.65	5461.33	5461.33	213.33	213.33
16x8 Conc Gravity Beam	3000Psi	Concrete Rectangular	Magenta	128	1874.99	682.67	2730.67	106.67	106.67
18x10 Conc Gravity Col	3000Psi	Concrete Rectangular	Cyan	180	3916.67	4860	1500	150	150
18x12 Conc MF Beam	3000Psi	Concrete Rectangular	Magenta	216	6085.12	2592	5832	180	180
18x18 Conc Col	3000Psi	Concrete Rectangular	Yellow	324	14784.12	8748	8748	270	270
18x20 Conc MF Col	3000Psi	Concrete Rectangular	Yellow	360	18040.35	12000	9720	300	300
20x12 Conc MF Beam	3000Psi	Concrete Rectangular	Green	240	7212.47	2880	8000	200	200
28x18 Conc MF Beam	3000Psi	Concrete Rectangular	Green	504	32700.79	32928	13608	420	420

Table 2.2 - Frame Section Property Definitions - Summary (Part 2 of 3)

S33Pos in3	S33Neg in3	S22Pos in3	S22Neg in3	Z33 in3	Z22 in3	R33 in	R22 in	CG Offset 3 in	CG Offset 2 in	PNA Offset 3 in	PNA Offset 2 in	Area Modifier
1568	1568	672	672	2352	1008	8.0829	3.4641	0	0	0	0	1
682.67	682.67	682.67	682.67	1024	1024	4.6188	4.6188	0	0	0	0	1
170.67	170.67	341.33	341.33	256	512	2.3094	4.6188	0	0	0	0	1
540	540	300	300	810	450	5.1962	2.8868	0	0	0	0	1
432	432	648	648	648	972	3.4641	5.1962	0	0	0	0	1
972	972	972	972	1458	1458	5.1962	5.1962	0	0	0	0	1
1200	1200	1080	1080	1800	1620	5.7735	5.1962	0	0	0	0	1
480	480	800	800	720	1200	3.4641	5.7735	0	0	0	0	1
2352	2352	1512	1512	3528	2268	8.0829	5.1962	0	0	0	0	1

Table 2.2 - Frame Section Property Definitions - Summary (Part 3 of 3)

As3 Modifier	J Modifier	I33 Modifier	I22 Modifier	Mass Modifier	Weight Modifier
1	1	0.7	0.7	1	1
1	1	0.7	0.7	1	1
1	1	0.35	0.35	1	1
1	1	0.7	0.7	1	1
1	1	0.35	0.35	1	1
1	1	0.7	0.7	1	1
1	1	0.7	0.7	1	1
1	1	0.35	0.35	1	1
1	1	0.3	0.3	1	1

2.3 Shell Sections

Table 2.3 - Area Section Property Definitions - Summary

Name	Type	Element Type	Material	Total Thickness in	Deck Material	Deck Depth in
Deck1	Deck	Membrane	4000Psi	6.5	A992Fy50	3
Plank1	Slab	Membrane	4000Psi	8		
Slab1	Slab	Shell-Thin	4000Psi	8		
Wall1	Wall	Shell-Thin	4000Psi	12		

2.4 Links

Table 2.4 - Link Property Definitions - Summary

Name	Type	Degrees of Freedom	Mass lb-s2/ft	Weight kip	Defined Length ft	Defined Area ft2
Link1	Linear	U1	0	0	1	1

3 Assignments

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

3.1 Joint Assignments

Table 3.1 - Joint Assignments - Summary

Story	Label	UniqueName	Diaphragm	Restraints
Story2	2	8	From Area	
Story2	4	10	From Area	
Story1	1	14	From Area	
Story1	3	16	From Area	
Base	1	13	From Area	UX; UY; UZ; RX; RY; RZ
Base	2	7	From Area	UX; UY; UZ; RX; RY; RZ
Base	3	15	From Area	UX; UY; UZ; RX; RY; RZ
Base	4	9	From Area	UX; UY; UZ; RX; RY; RZ

3.2 Frame Assignments

Table 3.2 - Frame Assignments - Summary

Story	Label	UniqueName	Design Type	Length ft	Analysis Section	Design Section	Max Station Spacing ft	Min Number Stations	Releases
Story2	B1	10	Beam	9.6311	16x8 Conc Gravity Beam	N/A		3	Yes
Story2	B3	12	Beam	21	16x8 Conc Gravity Beam	N/A	2		Yes
Story2	B4	13	Beam	9.6311	16x8 Conc Gravity Beam	N/A		3	Yes
Story2	C2	5	Column	11.1667	16x16 Conc Cant. Col	N/A		3	
Story2	C4	6	Column	11.1667	16x16 Conc Cant. Col	N/A		3	
Story1	B2	14	Beam	21	16x8 Conc Gravity Beam	N/A	2		Yes
Story1	C1	8	Column	9.5833	16x16 Conc Cant. Col	N/A		3	
Story1	C3	9	Column	9.5833	16x16 Conc Cant. Col	N/A		3	

Table 3.3 - Frame Assignments - Section Properties

Story	Label	UniqueName	Shape	Auto Select List	Section Property
Story2	B1	10	Concrete Rectangular	N.A.	16x8 Conc Gravity Beam
Story2	B3	12	Concrete Rectangular	N.A.	16x8 Conc Gravity Beam
Story2	B4	13	Concrete Rectangular	N.A.	16x8 Conc Gravity Beam
Story2	C2	5	Concrete Rectangular	N.A.	16x16 Conc Cant. Col
Story2	C4	6	Concrete Rectangular	N.A.	16x16 Conc Cant. Col
Story1	B2	14	Concrete Rectangular	N.A.	16x8 Conc Gravity Beam
Story1	C1	8	Concrete Rectangular	N.A.	16x16 Conc Cant. Col
Story1	C3	9	Concrete Rectangular	N.A.	16x16 Conc Cant. Col

3.3 Shell Assignments

Table 3.4 - Area Assignments - Summary

Story	Label	UniqueName	Section Property	Property Type
Story2	A1	53	None	Null
Story2	A3	54	None	Null
Story2	A4	48	None	Null
Story1	A2	50	None	Null

4 Loads

This chapter provides loading information as applied to the model.

4.1 Load Patterns

Table 4.1 - Load Pattern Definitions

Name	Is Auto Load	Type	Self Weight Multiplier	Auto Load
~LLRF	Yes	Other	0	
Dead	No	Dead	0	
Lateral (E-W)	No	Seismic	0	ASCE 7-16
Lateral (N-S)	No	Seismic	0	ASCE 7-16
Roof Live	No	Roof Live	0	

4.2 Load Sets

Table 4.2 - Shell Uniform Load Sets

Name	Load Pattern	Load Value lb/ft2
6" Stone Infill	Dead	75
Brick Opening	Dead	105
Doors/Windows	Dead	8

4.3 Auto Seismic Loading

ASCE 7-16 Auto Seismic Load Calculation

This calculation presents the automatically generated lateral seismic loads for load pattern Lateral (N-S) according to ASCE 7-16, as calculated by ETABS.

Direction and Eccentricity

Direction = X

Structural Period

Period Calculation Method = Program Calculated

Coefficient, C_t [ASCE Table 12.8-2]		$C_t = 0.02ft$
Coefficient, x [ASCE Table 12.8-2]		$x = 0.75$
Structure Height Above Base, h_n		$h_n = 11.17\ ft$
Long-Period Transition Period, T_L [ASCE 11.4.5]		$T_L = 6\ sec$

Factors and Coefficients

Response Modification Factor, R [ASCE Table 12.2-1]		$R = 2.5$
System Overstrength Factor, Ω_0 [ASCE Table 12.2-1]		$\Omega_0 = 1.25$
Deflection Amplification Factor, C_d [ASCE Table 12.2-1]		$C_d = 2.5$
Importance Factor, I [ASCE Table 1.5-2]		$I = 1$

Ss and S1 Source = 0.75

Mapped MCE Spectral Response Acceleration, S_s [ASCE 11.4.2]		$S_s = 0.991g$
Mapped MCE Spectral Response Acceleration, S_1 [ASCE 11.4.2]		$S_1 = 0.331g$

Site Class [ASCE Table 20.3-1] = E - Soft Clay Soil

Site Coefficient, F_a [ASCE Table 11.4-1]		$F_a = 1.3$
Site Coefficient, F_v [ASCE Table 11.4-2]		$F_v = 2.676$

Seismic Response

MCE Spectral Response Acceleration, S_{MS} [ASCE 11.4.4, Eq. 11.4-1]	$S_{MS} = F_a\, S_S$	$S_{MS} = 1.2883g$
MCE Spectral Response Acceleration, S_{M1} [ASCE 11.4.4, Eq. 11.4-2]	$S_{M1} = F_v\, S_1$	$S_{M1} = 0.885756g$
Design Spectral Response Acceleration, S_{DS} [ASCE 11.4.5, Eq. 11.4-3]	$S_{DS} = \frac{2}{3} S_{MS}$	$S_{DS} = 0.858867g$
Design Spectral Response Acceleration, S_{D1} [ASCE 11.4.5, Eq. 11.4-4]	$S_{D1} = \frac{2}{3} S_{M1}$	$S_{D1} = 0.590504g$

Equivalent Lateral Forces

Seismic Response Coefficient, C_S [ASCE 12.8.1.1, Eq. 12.8-2]

$$C_S = \frac{S_{DS}}{(\frac{R}{I})}$$

[ASCE 12.8.1.1, Eq. 12.8-3]

$$C_{S,max} = \frac{S_{D1}}{T(\frac{R}{I})}$$

[ASCE 12.8.1.1, Eq. 12.8-5]

$$C_{S,min} = max\ (0.044\ S_{DS}\ I, 0.01\ ) = 0.03779$$

[ASCE 12.8.1.1, Eq. 12.8-6]

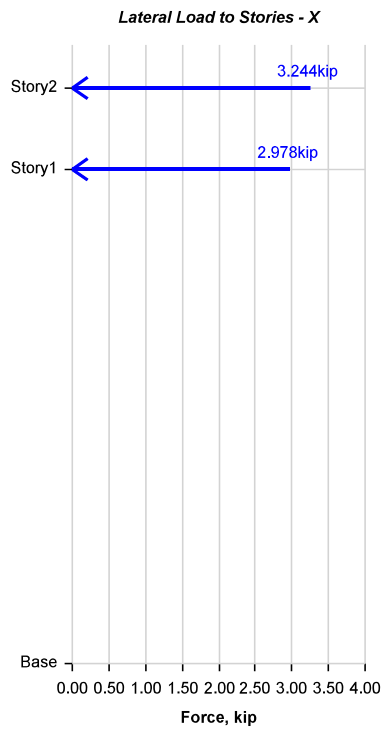
$$C_{S,min} = 0.5 \frac{S_1}{(\frac{R}{I})}\ for\ S_1 = 0.6g$$

$$C_{S,min} \le C_s \le C_{S,max}$$

Calculated Base Shear

Direction	Period Used (sec)	C_s	W (kip)	V (kip)
X	0.171	0.343547	18.1103	6.2217

Applied Story Forces



Story	Elevation	X-Dir	Y-Dir
	ft	kip	kip
Story2	11.1667	3.244	0
Story1	9.5833	2.978	0
Base	0	0	0

ASCE 7-16 Auto Seismic Load Calculation

This calculation presents the automatically generated lateral seismic loads for load pattern Lateral (E-W) according to ASCE 7-16, as calculated by ETABS.

Direction and Eccentricity

Direction = Y

Structural Period

Period Calculation Method = Program Calculated

Coefficient, C_t [ASCE Table 12.8-2]		$C_t = 0.02ft$
Coefficient, x [ASCE Table 12.8-2]		$x = 0.75$
Structure Height Above Base, h_n		$h_n = 11.17\ ft$
Long-Period Transition Period, T_L [ASCE 11.4.5]		$T_L = 6\ sec$

Factors and Coefficients

Response Modification Factor, R [ASCE Table 12.2-1]		$R = 2.5$
System Overstrength Factor, Ω_0 [ASCE Table 12.2-1]		$\Omega_0 = 1.25$
Deflection Amplification Factor, C_d [ASCE Table 12.2-1]		$C_d = 2.5$
Importance Factor, I [ASCE Table 1.5-2]		$I = 1$
Ss and S1 Source = 0.75		
Mapped MCE Spectral Response Acceleration, S_s [ASCE 11.4.2]		$S_s = 0.991g$
Mapped MCE Spectral Response Acceleration, S_1 [ASCE 11.4.2]		$S_1 = 0.331g$
Site Class [ASCE Table 20.3-1] = E - Soft Clay Soil		
Site Coefficient, F_a [ASCE Table 11.4-1]		$F_a = 1.3$
Site Coefficient, F_v [ASCE Table 11.4-2]		$F_v = 2.676$

Seismic Response

MCE Spectral Response Acceleration, S_{MS} [ASCE 11.4.4, Eq. 11.4-1]	$S_{MS} = F_a S_S$	$S_{MS} = 1.2883g$
MCE Spectral Response Acceleration, S_{M1} [ASCE 11.4.4, Eq. 11.4-2]	$S_{M1} = F_v S_1$	$S_{M1} = 0.885756g$
Design Spectral Response Acceleration, S_{DS} [ASCE 11.4.5, Eq. 11.4-3]	$S_{DS} = \frac{2}{3} S_{MS}$	$S_{DS} = 0.858867g$
Design Spectral Response Acceleration, S_{D1} [ASCE 11.4.5, Eq. 11.4-4]	$S_{D1} = \frac{2}{3} S_{M1}$	$S_{D1} = 0.590504g$

Equivalent Lateral Forces

Seismic Response Coefficient, C_S [ASCE 12.8.1.1, Eq. 12.8-2]

$$C_S = \frac{S_{DS}}{(\frac{R}{I})}$$

[ASCE 12.8.1.1, Eq. 12.8-3]

$$C_{S,max} = \frac{S_{D1}}{T\,(\frac{R}{I})}$$

[ASCE 12.8.1.1, Eq. 12.8-5]

$$C_{S,min} = max\ (0.044\ S_{DS}\,I, 0.01\ ) = 0.03779$$

[ASCE 12.8.1.1, Eq. 12.8-6]

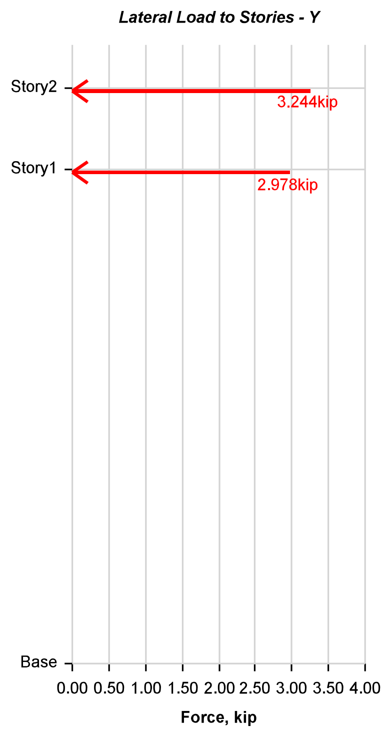
$$C_{S,min} = 0.5\frac{S_1}{(\frac{R}{I})}\ for\ S_1 = 0.6g$$

$$C_{S,min} \le C_s \le C_{S,max}$$

Calculated Base Shear

Direction	Period Used (sec)	C_s	W (kip)	V (kip)
Y	0.151	0.343547	18.1103	6.2217

Applied Story Forces



Story	Elevation	X-Dir	Y-Dir
	ft	kip	kip
Story2	11.1667	0	3.244
Story1	9.5833	0	2.978
Base	0	0	0

4.4 Applied Loads

4.4.1 Point Loads

Table 4.5 - Joint Loads Assignments - Force

Story	Label	UniqueName	Load Pattern	FX kip	FY kip	FZ kip	MX kip-ft	MY kip-ft	MZ kip-ft	X Dimension in	Y Dimension in
Story1	3	16	Dead	0	0	-0.148	0	0	0	0	0
Story1	3	16	Roof Live	0	0	-0.228	0	0	0	0	0

4.4.2 Line Loads

Table 4.6 - Frame Loads Assignments - Distributed (Part 1 of 2)

Story	Label	UniqueName	Load Pattern	Load Type	Direction	Distance Type	Relative Distance A	Relative Distance B	Absolute Distance A ft	Absolute Distance B ft
Story2	B1	10	Dead	Force	Gravity	Relative	0	1	0	9.6311
Story2	B3	12	Dead	Force	Gravity	Relative	0	1	0	21
Story2	B4	13	Dead	Force	Gravity	Relative	0	1	0	9.6311
Story1	B2	14	Dead	Force	Gravity	Relative	0	1	0	21
Story2	B1	10	Roof Live	Force	Gravity	Relative	0	1	0	9.6311
Story2	B3	12	Roof Live	Force	Gravity	Relative	0	1	0	21
Story2	B4	13	Roof Live	Force	Gravity	Relative	0	1	0	9.6311
Story1	B2	14	Roof Live	Force	Gravity	Relative	0	1	0	21

Table 4.6 - Frame Loads Assignments - Distributed (Part 2 of 2)

Force A kip/ft	Force B kip/ft
0.026	0.026
0.085	0.085
0.026	0.026
0.127	0.127
0.04	0.04
0.13	0.13
0.04	0.04
0.195	0.195

4.4.3 Area Loads

Table 4.7 - Area Load Assignments - Uniform Load Sets

Story	Label	UniqueName	Load Set
Story2	A1	53	6" Stone Infill
Story2	A3	54	6" Stone Infill
Story2	A4	48	6" Stone Infill
Story1	A2	50	6" Stone Infill

4.5 Load Cases

Table 4.8 - Load Case Definitions - Summary

Name	Type
Dead	Linear Static
Roof Live	Linear Static
Lateral (N-S)	Linear Static
Lateral (E-W)	Linear Static

4.6 Load Combinations

Table 4.9 - Load Combination Definitions

Name	Type	Is Auto	Load Name	SF	Notes
0.9D-Ev+Eew	Linear Add	No	Dead	0.9	Dead (min) + Static Earthquake [Strength]
0.9D-Ev+Eew			Lateral (E-W)	1	
0.9D-Ev+Eew			Dead	-0.1716	
0.9D-Ev+Ens	Linear Add	No	Dead	0.9	Dead (min) + Static Earthquake [Strength]
0.9D-Ev+Ens			Lateral (N-S)	1	
0.9D-Ev+Ens			Dead	-0.1716	
0.9D-Ev-Eew	Linear Add	No	Dead	0.9	Dead (min) - Static Earthquake [Strength]
0.9D-Ev-Eew			Lateral (E-W)	-1	
0.9D-Ev-Eew			Dead	-0.1716	
0.9D-Ev-Ens	Linear Add	No	Dead	0.9	Dead (min) - Static Earthquake [Strength]
0.9D-Ev-Ens			Lateral (N-S)	-1	
0.9D-Ev-Ens			Dead	-0.1716	
1.2D+1.6L	Linear Add	No	Dead	1.2	Dead + Live [Strength]
1.2D+1.6L+0.5RL	Linear Add	No	Dead	1.2	Dead + Live + Roof Live [Strength]
1.2D+1.6L+0.5RL			Roof Live	0.5	
1.2D+L+1.6RL	Linear Add	No	Dead	1.2	Dead + Live + Roof Live [Strength]
1.2D+L+1.6RL			Roof Live	1.6	
1.2D+L+Ev+Eew	Linear Add	No	Dead	1.2	Dead + Live + Static Earthquake [Strength]
1.2D+L+Ev+Eew			Lateral (E-W)	1	
1.2D+L+Ev+Eew			Dead	0.1716	
1.2D+L+Ev+Ens	Linear Add	No	Dead	1.2	Dead + Live + Static Earthquake [Strength]
1.2D+L+Ev+Ens			Lateral (N-S)	1	
1.2D+L+Ev+Ens			Dead	0.1716	
1.2D+L+Ev-Eew	Linear Add	No	Dead	1.2	Dead + Live - Static Earthquake [Strength]
1.2D+L+Ev-Eew			Lateral (E-W)	-1	
1.2D+L+Ev-Eew			Dead	0.1716	
1.2D+L+Ev-Ens	Linear Add	No	Dead	1.2	Dead + Live - Static Earthquake [Strength]
1.2D+L+Ev-Ens			Lateral (N-S)	-1	
1.2D+L+Ev-Ens			Dead	0.1716	
1.4D	Linear Add	No	Dead	1.4	Dead [Strength]
Envelope	Envelope	No	1.4D	1	
Envelope			1.2D+1.6L	1	
Envelope			1.2D+1.6L+0.5RL	1	
Envelope			1.2D+L+1.6RL	1	
Envelope			1.2D+L+Ev+Ens	1	
Envelope			1.2D+L+Ev-Ens	1	

Table 4.9 - Load Combination Definitions (continued)

Name	Type	Is Auto	Load Name	SF	Notes
Envelope			1.2D+L+Ev+Eew	1	
Envelope			1.2D+L+Ev-Eew	1	
Envelope			0.9D-Ev+Ens	1	
Envelope			0.9D-Ev-Ens	1	
Envelope			0.9D-Ev+Eew	1	
Envelope			0.9D-Ev-Eew	1	

5 Analysis Results

This chapter provides analysis results.

5.1 Structure Results

Table 5.1 - Base Reactions

Output Case	Case Type	Step Type	FX kip	FY kip	FZ kip	MX kip-ft	MY kip-ft	MZ kip-ft	X ft	Y ft	Z ft
Dead	LinStatic		0	0	5.101	55.1126	-19.3364	0	0	0	0
Roof Live	LinStatic		0	0	7.823	84.5406	-29.5948	0	0	0	0
Lateral (N-S)	LinStatic		-18.665	0	0	0	-194.2854	197.4677	0	0	0
Lateral (E-W)	LinStatic		0	-18.665	0	194.2854	0	-92.4596	0	0	0
Envelope	Combination	Max	18.665	18.665	18.639	269.8777	180.2007	197.4677	0	0	0
Envelope	Combination	Min	-18.665	-18.665	3.715	-154.1414	-220.8071	-197.4677	0	0	0

5.2 Story Results

Table 5.2 - Story Drifts

Story	Output Case	Case Type	Step Type	Direction	Drift	Label	X ft	Y ft	Z ft
Story2	Dead	LinStatic		X	2.646E-07	2	9.5	0	11.1667
Story2	Roof Live	LinStatic		X	4.065E-07	2	9.5	0	11.1667
Story2	Lateral (N-S)	LinStatic		X	0.001844	4	9.5	21	11.1667
Story2	Lateral (E-W)	LinStatic		Y	0.002458	4	9.5	21	11.1667
Story2	Envelope	Combination	Max	X	0.001844	4	9.5	21	11.1667
Story2	Envelope	Combination	Max	Y	0.002458	2	9.5	0	11.1667
Story2	Envelope	Combination	Min	X	0.001844	4	9.5	21	11.1667
Story2	Envelope	Combination	Min	Y	0.002458	4	9.5	21	11.1667
Story1	Dead	LinStatic		X	4.044E-07	3	0	21	9.5833
Story1	Roof Live	LinStatic		X	1E-06	3	0	21	9.5833
Story1	Lateral (N-S)	LinStatic		X	0.002145	3	0	21	9.5833
Story1	Lateral (E-W)	LinStatic		Y	0.001666	3	0	21	9.5833
Story1	Envelope	Combination	Max	X	0.002146	3	0	21	9.5833
Story1	Envelope	Combination	Max	Y	0.001666	1	0	0	9.5833
Story1	Envelope	Combination	Min	X	0.002145	3	0	21	9.5833
Story1	Envelope	Combination	Min	Y	0.001666	3	0	21	9.5833

5.3 Line Results

Table 5.3 - Element Forces - Columns (Part 1 of 2)

Story	Column	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft	M2 kip-ft
Story2	C2	5	Dead	LinStatic		0	-1.016	0.01	-0.076	0	-0.2779
Story2	C2	5	Dead	LinStatic		5.25	-1.016	0.01	-0.076	0	0.1236
Story2	C2	5	Dead	LinStatic		10.5001	-1.016	0.01	-0.076	0	0.5251
Story2	C2	5	Roof Live	LinStatic		0	-1.555	0.016	-0.117	0	-0.425
Story2	C2	5	Roof Live	LinStatic		5.25	-1.555	0.016	-0.117	0	0.189
Story2	C2	5	Roof Live	LinStatic		10.5001	-1.555	0.016	-0.117	0	0.8031
Story2	C2	5	Lateral (N-S)	LinStatic		0	-0.212	3.596	0	0	0
Story2	C2	5	Lateral (N-S)	LinStatic		5.25	-0.212	3.596	0	0	0

Table 5.3 - Element Forces - Columns (Part 1 of 2, continued)

Story	Column	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft	M2 kip-ft
Story2	C2	5	Lateral (N-S)	LinStatic		10.5001	-0.212	3.596	0	0	0
Story2	C2	5	Lateral (E-W)	LinStatic		0	0	0	4.866	0	54.3406
Story2	C2	5	Lateral (E-W)	LinStatic		5.25	0	0	4.866	0	28.7924
Story2	C2	5	Lateral (E-W)	LinStatic		10.5001	0	0	4.866	0	3.2442
Story2	C2	5	Envelope	Combination	Max	0	-0.528	3.61	4.811	0	54.1382
Story2	C2	5	Envelope	Combination	Max	5.25	-0.528	3.61	4.811	0	28.9619
Story2	C2	5	Envelope	Combination	Max	10.5001	-0.528	3.61	4.811	0	3.9645
Story2	C2	5	Envelope	Combination	Min	0	-3.707	-3.589	-4.971	0	-54.7218
Story2	C2	5	Envelope	Combination	Min	5.25	-3.707	-3.589	-4.971	0	-28.7024
Story2	C2	5	Envelope	Combination	Min	10.5001	-3.707	-3.589	-4.971	0	-2.8617
Story2	C4	6	Dead	LinStatic		0	-1.016	0.01	0.076	0	0.2779
Story2	C4	6	Dead	LinStatic		5.25	-1.016	0.01	0.076	0	-0.1236
Story2	C4	6	Dead	LinStatic		10.5001	-1.016	0.01	0.076	0	-0.5251
Story2	C4	6	Roof Live	LinStatic		0	-1.555	0.016	0.117	0	0.425
Story2	C4	6	Roof Live	LinStatic		5.25	-1.555	0.016	0.117	0	-0.189
Story2	C4	6	Roof Live	LinStatic		10.5001	-1.555	0.016	0.117	0	-0.8031
Story2	C4	6	Lateral (N-S)	LinStatic		0	-0.203	3.651	0	0	0
Story2	C4	6	Lateral (N-S)	LinStatic		5.25	-0.203	3.651	0	0	0
Story2	C4	6	Lateral (N-S)	LinStatic		10.5001	-0.203	3.651	0	0	0
Story2	C4	6	Lateral (E-W)	LinStatic		0	0	0	4.866	0	54.3406
Story2	C4	6	Lateral (E-W)	LinStatic		5.25	0	0	4.866	0	28.7924
Story2	C4	6	Lateral (E-W)	LinStatic		10.5001	0	0	4.866	0	3.2442
Story2	C4	6	Envelope	Combination	Max	0	-0.537	3.665	4.971	0	54.7218
Story2	C4	6	Envelope	Combination	Max	5.25	-0.537	3.665	4.971	0	28.7024
Story2	C4	6	Envelope	Combination	Max	10.5001	-0.537	3.665	4.971	0	2.8617
Story2	C4	6	Envelope	Combination	Min	0	-3.707	-3.643	-4.811	0	-54.1382
Story2	C4	6	Envelope	Combination	Min	5.25	-3.707	-3.643	-4.811	0	-28.9619
Story2	C4	6	Envelope	Combination	Min	10.5001	-3.707	-3.643	-4.811	0	-3.9645
Story1	C1	8	Dead	LinStatic		0	-1.46	-0.01	-0.132	0	-0.4086
Story1	C1	8	Dead	LinStatic		4.4583	-1.46	-0.01	-0.132	0	0.1819
Story1	C1	8	Dead	LinStatic		8.9167	-1.46	-0.01	-0.132	0	0.7725
Story1	C1	8	Roof Live	LinStatic		0	-2.243	-0.016	-0.203	0	-0.6274
Story1	C1	8	Roof Live	LinStatic		4.4583	-2.243	-0.016	-0.203	0	0.2794
Story1	C1	8	Roof Live	LinStatic		8.9167	-2.243	-0.016	-0.203	0	1.1861
Story1	C1	8	Lateral (N-S)	LinStatic		0	0.212	5.666	0	0	0
Story1	C1	8	Lateral (N-S)	LinStatic		4.4583	0.212	5.666	0	0	0
Story1	C1	8	Lateral (N-S)	LinStatic		8.9167	0.212	5.666	0	0	0
Story1	C1	8	Lateral (E-W)	LinStatic		0	0	0	4.466	0	42.7972
Story1	C1	8	Lateral (E-W)	LinStatic		4.4583	0	0	4.466	0	22.8872
Story1	C1	8	Lateral (E-W)	LinStatic		8.9167	0	0	4.466	0	2.9772
Story1	C1	8	Envelope	Combination	Max	0	-0.852	5.658	4.369	0	42.4995
Story1	C1	8	Envelope	Combination	Max	4.4583	-0.852	5.658	4.369	0	23.1367
Story1	C1	8	Envelope	Combination	Max	8.9167	-0.852	5.658	4.369	0	4.0367
Story1	C1	8	Envelope	Combination	Min	0	-5.341	-5.68	-4.647	0	-43.3576
Story1	C1	8	Envelope	Combination	Min	4.4583	-5.341	-5.68	-4.647	0	-22.7546

Table 5.3 - Element Forces - Columns (Part 1 of 2, continued)

Story	Column	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft	M2 kip-ft
Story1	C1	8	Envelope	Combination	Min	8.9167	-5.341	-5.68	-4.647	0	-2.4145
Story1	C3	9	Dead	LinStatic		0	-1.608	-0.01	0.132	0	0.4086
Story1	C3	9	Dead	LinStatic		4.4583	-1.608	-0.01	0.132	0	-0.1819
Story1	C3	9	Dead	LinStatic		8.9167	-1.608	-0.01	0.132	0	-0.7725
Story1	C3	9	Roof Live	LinStatic		0	-2.471	-0.016	0.203	0	0.6274
Story1	C3	9	Roof Live	LinStatic		4.4583	-2.471	-0.016	0.203	0	-0.2794
Story1	C3	9	Roof Live	LinStatic		8.9167	-2.471	-0.016	0.203	0	-1.1861
Story1	C3	9	Lateral (N-S)	LinStatic		0	0.203	5.752	0	0	0
Story1	C3	9	Lateral (N-S)	LinStatic		4.4583	0.203	5.752	0	0	0
Story1	C3	9	Lateral (N-S)	LinStatic		8.9167	0.203	5.752	0	0	0
Story1	C3	9	Lateral (E-W)	LinStatic		0	0	0	4.467	0	42.807
Story1	C3	9	Lateral (E-W)	LinStatic		4.4583	0	0	4.467	0	22.8925
Story1	C3	9	Lateral (E-W)	LinStatic		8.9167	0	0	4.467	0	2.9779
Story1	C3	9	Envelope	Combination	Max	0	-0.969	5.745	4.648	0	43.3674
Story1	C3	9	Envelope	Combination	Max	4.4583	-0.969	5.745	4.648	0	22.7599
Story1	C3	9	Envelope	Combination	Max	8.9167	-0.969	5.745	4.648	0	2.4152
Story1	C3	9	Envelope	Combination	Min	0	-5.883	-5.766	-4.37	0	-42.5094
Story1	C3	9	Envelope	Combination	Min	4.4583	-5.883	-5.766	-4.37	0	-23.142
Story1	C3	9	Envelope	Combination	Min	8.9167	-5.883	-5.766	-4.37	0	-4.0374

Table 5.3 - Element Forces - Columns (Part 2 of 2)

M3 kip-ft	Element	Elem Station ft	Location
0.0415	5	0	
-0.0123	5	5.25	
-0.066	5	10.5001	
0.0638	5	0	
-0.0189	5	5.25	
-0.1016	5	10.5001	
40.1571	5	0	
21.2773	5	5.25	
2.3974	5	10.5001	
0	5	0	
0	5	5.25	
0	5	10.5001	
40.214	5	0	
21.2683	5	5.25	
2.3493	5	10.5001	
-40.1269	5	0	
-21.2941	5	5.25	
-2.488	5	10.5001	
0.0411	6	0	
-0.0125	6	5.25	
-0.066	6	10.5001	

Table 5.3 - Element Forces - Columns (Part 2 of 2, continued)

M3 kip-ft	Element	Elem Station ft	Location
0.0633	6	0	
-0.0192	6	5.25	
-0.1016	6	10.5001	
40.7672	6	0	
21.6005	6	5.25	
2.4339	6	10.5001	
0	6	0	
0	6	5.25	
0	6	10.5001	
40.8237	6	0	
21.5915	6	5.25	
2.3858	6	10.5001	
-40.7373	6	0	
-21.6176	6	5.25	
-2.5244	6	10.5001	
-0.0253	8	0	
0.0204	8	4.4583	
0.066	8	8.9167	
-0.0389	8	0	
0.0313	8	4.4583	
0.1016	8	8.9167	
54.2976	8	0	
29.0374	8	4.4583	
3.7772	8	8.9167	
0	8	0	
0	8	4.4583	
0	8	8.9167	
54.2792	8	0	
29.0653	8	4.4583	
3.8678	8	8.9167	
-54.3322	8	0	
-29.0226	8	4.4583	
-3.7291	8	8.9167	
-0.025	9	0	
0.0205	9	4.4583	
0.066	9	8.9167	
-0.0384	9	0	
0.0316	9	4.4583	
0.1016	9	8.9167	
55.1276	9	0	
29.4813	9	4.4583	
3.835	9	8.9167	
0	9	0	
0	9	4.4583	

Table 5.3 - Element Forces - Columns (Part 2 of 2, continued)

M3 kip-ft	Element	Elem Station ft	Location
0	9	8.9167	
55.1095	9	0	
29.5095	9	4.4583	
3.9255	9	8.9167	
-55.1619	9	0	
-29.4664	9	4.4583	
-3.7869	9	8.9167	

Table 5.4 - Element Forces - Beams (Part 1 of 2)

Story	Beam	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft	M2 kip-ft
Story2	B1	10	Dead	LinStatic		0.6311	-0.028	-0.107	0	0	0
Story2	B1	10	Dead	LinStatic		4.8155	-0.01	0	0	0	0
Story2	B1	10	Dead	LinStatic		8.9999	0.008	0.107	0	0	0
Story2	B1	10	Roof Live	LinStatic		0.6311	-0.043	-0.165	0	0	0
Story2	B1	10	Roof Live	LinStatic		4.8155	-0.016	0	0	0	0
Story2	B1	10	Roof Live	LinStatic		8.9999	0.012	0.165	0	0	0
Story2	B1	10	Lateral (N-S)	LinStatic		0.6311	1.288	0	0	0	0
Story2	B1	10	Lateral (N-S)	LinStatic		4.8155	1.288	0	0	0	0
Story2	B1	10	Lateral (N-S)	LinStatic		8.9999	1.288	0	0	0	0
Story2	B1	10	Lateral (E-W)	LinStatic		0.6311	0	0	0	0	0
Story2	B1	10	Lateral (E-W)	LinStatic		4.8155	0	0	0	0	0
Story2	B1	10	Lateral (E-W)	LinStatic		8.9999	0	0	0	0	0
Story2	B1	10	Envelope	Combination	Max	0.6311	1.267	-0.078	0	0	0
Story2	B1	10	Envelope	Combination	Max	4.8155	1.28	0	0	0	0
Story2	B1	10	Envelope	Combination	Max	8.9999	1.298	0.393	0	0	0
Story2	B1	10	Envelope	Combination	Min	0.6311	-1.326	-0.393	0	0	0
Story2	B1	10	Envelope	Combination	Min	4.8155	-1.302	0	0	0	0
Story2	B1	10	Envelope	Combination	Min	8.9999	-1.282	0.078	0	0	0
Story2	B3	12	Dead	LinStatic		0.6667	-0.076	-0.836	0	0	0
Story2	B3	12	Dead	LinStatic		2.6333	-0.076	-0.669	0	0	0
Story2	B3	12	Dead	LinStatic		4.6	-0.076	-0.502	0	0	0
Story2	B3	12	Dead	LinStatic		6.5667	-0.076	-0.334	0	0	0
Story2	B3	12	Dead	LinStatic		8.5333	-0.076	-0.167	0	0	0
Story2	B3	12	Dead	LinStatic		10.5	-0.076	0	0	0	0
Story2	B3	12	Dead	LinStatic		12.4667	-0.076	0.167	0	0	0
Story2	B3	12	Dead	LinStatic		14.4333	-0.076	0.334	0	0	0
Story2	B3	12	Dead	LinStatic		16.4	-0.076	0.502	0	0	0
Story2	B3	12	Dead	LinStatic		18.3667	-0.076	0.669	0	0	0
Story2	B3	12	Dead	LinStatic		20.3333	-0.076	0.836	0	0	0
Story2	B3	12	Roof Live	LinStatic		0.6667	-0.117	-1.278	0	0	0
Story2	B3	12	Roof Live	LinStatic		2.6333	-0.117	-1.023	0	0	0
Story2	B3	12	Roof Live	LinStatic		4.6	-0.117	-0.767	0	0	0
Story2	B3	12	Roof Live	LinStatic		6.5667	-0.117	-0.511	0	0	0

Table 5.4 - Element Forces - Beams (Part 1 of 2, continued)

Story	Beam	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft	M2 kip-ft
Story2	B3	12	Roof Live	LinStatic		8.5333	-0.117	-0.256	0	0	0
Story2	B3	12	Roof Live	LinStatic		10.5	-0.117	0	0	0	0
Story2	B3	12	Roof Live	LinStatic		12.4667	-0.117	0.256	0	0	0
Story2	B3	12	Roof Live	LinStatic		14.4333	-0.117	0.511	0	0	0
Story2	B3	12	Roof Live	LinStatic		16.4	-0.117	0.767	0	0	0
Story2	B3	12	Roof Live	LinStatic		18.3667	-0.117	1.023	0	0	0
Story2	B3	12	Roof Live	LinStatic		20.3333	-0.117	1.278	0	0	0
Story2	B3	12	Lateral (N-S)	LinStatic		0.6667	0	0	0	0	0
Story2	B3	12	Lateral (N-S)	LinStatic		2.6333	0	0	0	0	0
Story2	B3	12	Lateral (N-S)	LinStatic		4.6	0	0	0	0	0
Story2	B3	12	Lateral (N-S)	LinStatic		6.5667	0	0	0	0	0
Story2	B3	12	Lateral (N-S)	LinStatic		8.5333	0	0	0	0	0
Story2	B3	12	Lateral (N-S)	LinStatic		10.5	0	0	0	0	0
Story2	B3	12	Lateral (N-S)	LinStatic		12.4667	0	0	0	0	0
Story2	B3	12	Lateral (N-S)	LinStatic		14.4333	0	0	0	0	0
Story2	B3	12	Lateral (N-S)	LinStatic		16.4	0	0	0	0	0
Story2	B3	12	Lateral (N-S)	LinStatic		18.3667	0	0	0	0	0
Story2	B3	12	Lateral (N-S)	LinStatic		20.3333	0	0	0	0	0
Story2	B3	12	Lateral (E-W)	LinStatic		0.6667	0	0	0	0	0
Story2	B3	12	Lateral (E-W)	LinStatic		2.6333	0	0	0	0	0
Story2	B3	12	Lateral (E-W)	LinStatic		4.6	0	0	0	0	0
Story2	B3	12	Lateral (E-W)	LinStatic		6.5667	0	0	0	0	0
Story2	B3	12	Lateral (E-W)	LinStatic		8.5333	0	0	0	0	0
Story2	B3	12	Lateral (E-W)	LinStatic		10.5	0	0	0	0	0
Story2	B3	12	Lateral (E-W)	LinStatic		12.4667	0	0	0	0	0
Story2	B3	12	Lateral (E-W)	LinStatic		14.4333	0	0	0	0	0
Story2	B3	12	Lateral (E-W)	LinStatic		16.4	0	0	0	0	0
Story2	B3	12	Lateral (E-W)	LinStatic		18.3667	0	0	0	0	0
Story2	B3	12	Lateral (E-W)	LinStatic		20.3333	0	0	0	0	0
Story2	B3	12	Envelope	Combination	Max	0.6667	-0.056	-0.609	0	0	0
Story2	B3	12	Envelope	Combination	Max	2.6333	-0.056	-0.487	0	0	0
Story2	B3	12	Envelope	Combination	Max	4.6	-0.056	-0.365	0	0	0
Story2	B3	12	Envelope	Combination	Max	6.5667	-0.056	-0.244	0	0	0
Story2	B3	12	Envelope	Combination	Max	8.5333	-0.056	-0.122	0	0	0
Story2	B3	12	Envelope	Combination	Max	10.5	-0.056	0	0	0	0
Story2	B3	12	Envelope	Combination	Max	12.4667	-0.056	0.61	0	0	0
Story2	B3	12	Envelope	Combination	Max	14.4333	-0.056	1.219	0	0	0
Story2	B3	12	Envelope	Combination	Max	16.4	-0.056	1.829	0	0	0
Story2	B3	12	Envelope	Combination	Max	18.3667	-0.056	2.439	0	0	0
Story2	B3	12	Envelope	Combination	Max	20.3333	-0.056	3.048	0	0	0
Story2	B3	12	Envelope	Combination	Min	0.6667	-0.279	-3.048	0	0	0
Story2	B3	12	Envelope	Combination	Min	2.6333	-0.279	-2.439	0	0	0
Story2	B3	12	Envelope	Combination	Min	4.6	-0.279	-1.829	0	0	0
Story2	B3	12	Envelope	Combination	Min	6.5667	-0.279	-1.219	0	0	0
Story2	B3	12	Envelope	Combination	Min	8.5333	-0.279	-0.61	0	0	0

Table 5.4 - Element Forces - Beams (Part 1 of 2, continued)

Story	Beam	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft	M2 kip-ft
Story2	B3	12	Envelope	Combination	Min	10.5	-0.279	0	0	0	0
Story2	B3	12	Envelope	Combination	Min	12.4667	-0.279	0.122	0	0	0
Story2	B3	12	Envelope	Combination	Min	14.4333	-0.279	0.244	0	0	0
Story2	B3	12	Envelope	Combination	Min	16.4	-0.279	0.365	0	0	0
Story2	B3	12	Envelope	Combination	Min	18.3667	-0.279	0.487	0	0	0
Story2	B3	12	Envelope	Combination	Min	20.3333	-0.279	0.609	0	0	0
Story2	B4	13	Dead	LinStatic		0.6311	-0.028	-0.107	0	0	0
Story2	B4	13	Dead	LinStatic		4.8155	-0.01	0	0	0	0
Story2	B4	13	Dead	LinStatic		8.9999	0.008	0.107	0	0	0
Story2	B4	13	Roof Live	LinStatic		0.6311	-0.043	-0.165	0	0	0
Story2	B4	13	Roof Live	LinStatic		4.8155	-0.016	0	0	0	0
Story2	B4	13	Roof Live	LinStatic		8.9999	0.012	0.165	0	0	0
Story2	B4	13	Lateral (N-S)	LinStatic		0.6311	1.232	0	0	0	0
Story2	B4	13	Lateral (N-S)	LinStatic		4.8155	1.232	0	0	0	0
Story2	B4	13	Lateral (N-S)	LinStatic		8.9999	1.232	0	0	0	0
Story2	B4	13	Lateral (E-W)	LinStatic		0.6311	0	0	0	0	0
Story2	B4	13	Lateral (E-W)	LinStatic		4.8155	0	0	0	0	0
Story2	B4	13	Lateral (E-W)	LinStatic		8.9999	0	0	0	0	0
Story2	B4	13	Envelope	Combination	Max	0.6311	1.212	-0.078	0	0	0
Story2	B4	13	Envelope	Combination	Max	4.8155	1.225	0	0	0	0
Story2	B4	13	Envelope	Combination	Max	8.9999	1.243	0.393	0	0	0
Story2	B4	13	Envelope	Combination	Min	0.6311	-1.271	-0.393	0	0	0
Story2	B4	13	Envelope	Combination	Min	4.8155	-1.246	0	0	0	0
Story2	B4	13	Envelope	Combination	Min	8.9999	-1.227	0.078	0	0	0
Story1	B2	14	Dead	LinStatic		0.6667	-0.132	-1.249	0	0	0
Story1	B2	14	Dead	LinStatic		2.6333	-0.132	-0.999	0	0	0
Story1	B2	14	Dead	LinStatic		4.6	-0.132	-0.749	0	0	0
Story1	B2	14	Dead	LinStatic		6.5667	-0.132	-0.5	0	0	0
Story1	B2	14	Dead	LinStatic		8.5333	-0.132	-0.25	0	0	0
Story1	B2	14	Dead	LinStatic		10.5	-0.132	0	0	0	0
Story1	B2	14	Dead	LinStatic		12.4667	-0.132	0.25	0	0	0
Story1	B2	14	Dead	LinStatic		14.4333	-0.132	0.5	0	0	0
Story1	B2	14	Dead	LinStatic		16.4	-0.132	0.749	0	0	0
Story1	B2	14	Dead	LinStatic		18.3667	-0.132	0.999	0	0	0
Story1	B2	14	Dead	LinStatic		20.3333	-0.132	1.249	0	0	0
Story1	B2	14	Roof Live	LinStatic		0.6667	-0.203	-1.918	0	0	0
Story1	B2	14	Roof Live	LinStatic		2.6333	-0.203	-1.534	0	0	0
Story1	B2	14	Roof Live	LinStatic		4.6	-0.203	-1.151	0	0	0
Story1	B2	14	Roof Live	LinStatic		6.5667	-0.203	-0.767	0	0	0
Story1	B2	14	Roof Live	LinStatic		8.5333	-0.203	-0.384	0	0	0
Story1	B2	14	Roof Live	LinStatic		10.5	-0.203	0	0	0	0
Story1	B2	14	Roof Live	LinStatic		12.4667	-0.203	0.383	0	0	0
Story1	B2	14	Roof Live	LinStatic		14.4333	-0.203	0.767	0	0	0
Story1	B2	14	Roof Live	LinStatic		16.4	-0.203	1.151	0	0	0
Story1	B2	14	Roof Live	LinStatic		18.3667	-0.203	1.534	0	0	0

Table 5.4 - Element Forces - Beams (Part 1 of 2, continued)

Story	Beam	Unique Name	Output Case	Case Type	Step Type	Station ft	P kip	V2 kip	V3 kip	T kip-ft	M2 kip-ft
Story1	B2	14	Roof Live	LinStatic		20.3333	-0.203	1.918	0	0	0
Story1	B2	14	Lateral (N-S)	LinStatic		0.6667	0	0	0	0	0
Story1	B2	14	Lateral (N-S)	LinStatic		2.6333	0	0	0	0	0
Story1	B2	14	Lateral (N-S)	LinStatic		4.6	0	0	0	0	0
Story1	B2	14	Lateral (N-S)	LinStatic		6.5667	0	0	0	0	0
Story1	B2	14	Lateral (N-S)	LinStatic		8.5333	0	0	0	0	0
Story1	B2	14	Lateral (N-S)	LinStatic		10.5	0	0	0	0	0
Story1	B2	14	Lateral (N-S)	LinStatic		12.4667	0	0	0	0	0
Story1	B2	14	Lateral (N-S)	LinStatic		14.4333	0	0	0	0	0
Story1	B2	14	Lateral (N-S)	LinStatic		16.4	0	0	0	0	0
Story1	B2	14	Lateral (N-S)	LinStatic		18.3667	0	0	0	0	0
Story1	B2	14	Lateral (N-S)	LinStatic		20.3333	0	0	0	0	0
Story1	B2	14	Lateral (E-W)	LinStatic		0.6667	0.07	0	0	0	0
Story1	B2	14	Lateral (E-W)	LinStatic		2.6333	0.07	0	0	0	0
Story1	B2	14	Lateral (E-W)	LinStatic		4.6	0.07	0	0	0	0
Story1	B2	14	Lateral (E-W)	LinStatic		6.5667	0.07	0	0	0	0
Story1	B2	14	Lateral (E-W)	LinStatic		8.5333	0.07	0	0	0	0
Story1	B2	14	Lateral (E-W)	LinStatic		10.5	0.07	0	0	0	0
Story1	B2	14	Lateral (E-W)	LinStatic		12.4667	0.07	0	0	0	0
Story1	B2	14	Lateral (E-W)	LinStatic		14.4333	0.07	0	0	0	0
Story1	B2	14	Lateral (E-W)	LinStatic		16.4	0.07	0	0	0	0
Story1	B2	14	Lateral (E-W)	LinStatic		18.3667	0.07	0	0	0	0
Story1	B2	14	Lateral (E-W)	LinStatic		20.3333	0.07	0	0	0	0
Story1	B2	14	Envelope	Combination	Max	0.6667	-0.026	-0.91	0	0	0
Story1	B2	14	Envelope	Combination	Max	2.6333	-0.026	-0.728	0	0	0
Story1	B2	14	Envelope	Combination	Max	4.6	-0.026	-0.546	0	0	0
Story1	B2	14	Envelope	Combination	Max	6.5667	-0.026	-0.364	0	0	0
Story1	B2	14	Envelope	Combination	Max	8.5333	-0.026	-0.182	0	0	0
Story1	B2	14	Envelope	Combination	Max	10.5	-0.026	0	0	0	0
Story1	B2	14	Envelope	Combination	Max	12.4667	-0.026	0.913	0	0	0
Story1	B2	14	Envelope	Combination	Max	14.4333	-0.026	1.827	0	0	0
Story1	B2	14	Envelope	Combination	Max	16.4	-0.026	2.74	0	0	0
Story1	B2	14	Envelope	Combination	Max	18.3667	-0.026	3.653	0	0	0
Story1	B2	14	Envelope	Combination	Max	20.3333	-0.026	4.567	0	0	0
Story1	B2	14	Envelope	Combination	Min	0.6667	-0.484	-4.567	0	0	0
Story1	B2	14	Envelope	Combination	Min	2.6333	-0.484	-3.653	0	0	0
Story1	B2	14	Envelope	Combination	Min	4.6	-0.484	-2.74	0	0	0
Story1	B2	14	Envelope	Combination	Min	6.5667	-0.484	-1.827	0	0	0
Story1	B2	14	Envelope	Combination	Min	8.5333	-0.484	-0.913	0	0	0
Story1	B2	14	Envelope	Combination	Min	10.5	-0.484	0	0	0	0
Story1	B2	14	Envelope	Combination	Min	12.4667	-0.484	0.182	0	0	0
Story1	B2	14	Envelope	Combination	Min	14.4333	-0.484	0.364	0	0	0
Story1	B2	14	Envelope	Combination	Min	16.4	-0.484	0.546	0	0	0
Story1	B2	14	Envelope	Combination	Min	18.3667	-0.484	0.728	0	0	0
Story1	B2	14	Envelope	Combination	Min	20.3333	-0.484	0.91	0	0	0

Table 5.4 - Element Forces - Beams (Part 2 of 2)

M3 kip-ft	Element	Elem Station ft	Location
0	10	0.6311	
0.2245	10	4.8155	
0	10	8.9999	
0	10	0.6311	
0.3454	10	4.8155	
0	10	8.9999	
0	10	0.6311	
0	10	4.8155	
0	10	8.9999	
0	10	0.6311	
0	10	4.8155	
0	10	8.9999	
0	10	0.6311	
0.8221	10	4.8155	
0	10	8.9999	
0	10	0.6311	
0.1635	10	4.8155	
0	10	8.9999	
0	12	0.6667	
1.4794	12	2.6333	
2.6301	12	4.6	
3.452	12	6.5667	
3.9451	12	8.5333	
4.1095	12	10.5	
3.9451	12	12.4667	
3.452	12	14.4333	
2.6301	12	16.4	
1.4794	12	18.3667	
0	12	20.3333	
0	12	0.6667	
2.2627	12	2.6333	
4.0225	12	4.6	
5.2795	12	6.5667	
6.0337	12	8.5333	
6.2851	12	10.5	
6.0337	12	12.4667	
5.2795	12	14.4333	
4.0225	12	16.4	
2.2627	12	18.3667	
0	12	20.3333	
0	12	0.6667	
0	12	2.6333	
0	12	4.6	
0	12	6.5667	

Table 5.4 - Element Forces - Beams (Part 2 of 2, continued)

M3 kip-ft	Element	Elem Station ft	Location
0	12	8.5333	
0	12	10.5	
0	12	12.4667	
0	12	14.4333	
0	12	16.4	
0	12	18.3667	
0	12	20.3333	
0	12	0.6667	
0	12	2.6333	
0	12	4.6	
0	12	6.5667	
0	12	8.5333	
0	12	10.5	
0	12	12.4667	
0	12	14.4333	
0	12	16.4	
0	12	18.3667	
0	12	20.3333	
0	12	0.6667	
5.3956	12	2.6333	
9.5921	12	4.6	
12.5896	12	6.5667	
14.3881	12	8.5333	
14.9876	12	10.5	
14.3881	12	12.4667	
12.5896	12	14.4333	
9.5921	12	16.4	
5.3956	12	18.3667	
0	12	20.3333	
0	12	0.6667	
1.0776	12	2.6333	
1.9158	12	4.6	
2.5144	12	6.5667	
2.8736	12	8.5333	
2.9934	12	10.5	
2.8736	12	12.4667	
2.5144	12	14.4333	
1.9158	12	16.4	
1.0776	12	18.3667	
0	12	20.3333	
0	13	0.6311	
0.2245	13	4.8155	
0	13	8.9999	

Table 5.4 - Element Forces - Beams (Part 2 of 2, continued)

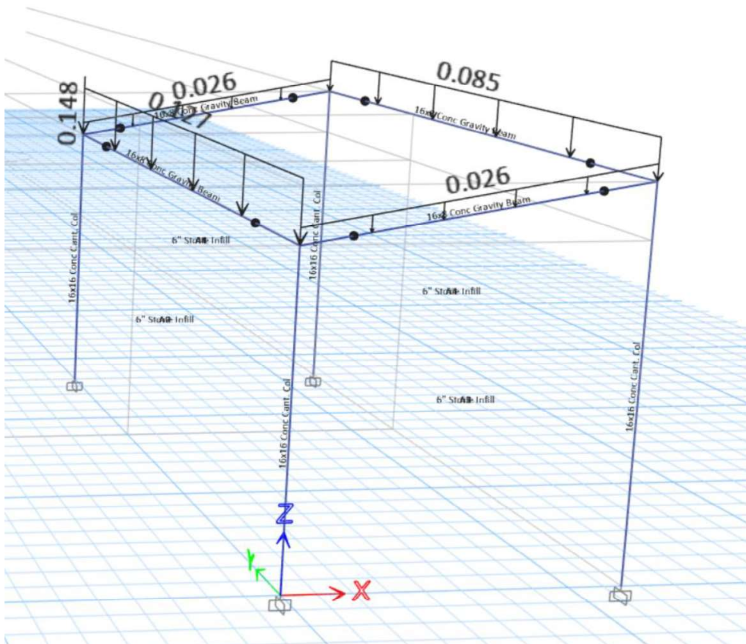
M3 kip-ft	Element	Elem Station ft	Location
0	13	0.6311	
0.3454	13	4.8155	
0	13	8.9999	
0	13	0.6311	
0	13	4.8155	
0	13	8.9999	
0	13	0.6311	
0	13	4.8155	
0	13	8.9999	
0	13	0.6311	
0.8221	13	4.8155	
0	13	8.9999	
0	13	0.6311	
0.1635	13	4.8155	
0	13	8.9999	
0	14	0.6667	
2.2104	14	2.6333	
3.9297	14	4.6	
5.1577	14	6.5667	
5.8945	14	8.5333	
6.1401	14	10.5	
5.8945	14	12.4667	
5.1577	14	14.4333	
3.9297	14	16.4	
2.2104	14	18.3667	
0	14	20.3333	
0	14	0.6667	
3.394	14	2.6333	
6.0337	14	4.6	
7.9193	14	6.5667	
9.0506	14	8.5333	
9.4277	14	10.5	
9.0506	14	12.4667	
7.9193	14	14.4333	
6.0337	14	16.4	
3.394	14	18.3667	
0	14	20.3333	
0	14	0.6667	
0	14	2.6333	
0	14	4.6	
0	14	6.5667	
0	14	8.5333	
0	14	10.5	

Table 5.4 - Element Forces - Beams (Part 2 of 2, continued)

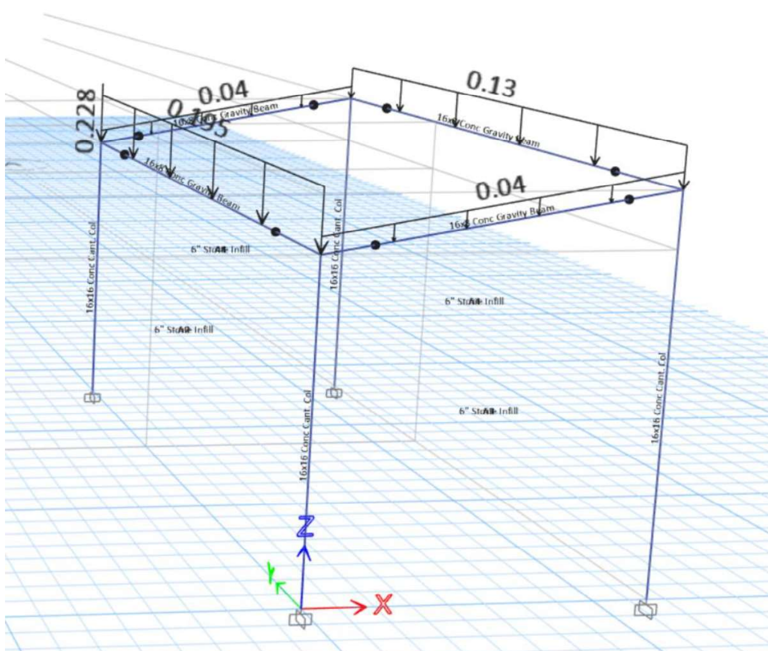
M3 kip-ft	Element	Elem Station ft	Location
0	14	12.4667	
0	14	14.4333	
0	14	16.4	
0	14	18.3667	
0	14	20.3333	
0	14	0.6667	
0	14	2.6333	
0	14	4.6	
0	14	6.5667	
0	14	8.5333	
0	14	10.5	
0	14	12.4667	
0	14	14.4333	
0	14	16.4	
0	14	18.3667	
0	14	20.3333	
0	14	0.6667	
8.0829	14	2.6333	
14.3696	14	4.6	
18.8601	14	6.5667	
21.5544	14	8.5333	
22.4525	14	10.5	
21.5544	14	12.4667	
18.8601	14	14.4333	
14.3696	14	16.4	
8.0829	14	18.3667	
0	14	20.3333	
0	14	0.6667	
1.6101	14	2.6333	
2.8624	14	4.6	
3.7569	14	6.5667	
4.2935	14	8.5333	
4.4724	14	10.5	
4.2935	14	12.4667	
3.7569	14	14.4333	
2.8624	14	16.4	
1.6101	14	18.3667	
0	14	20.3333	

ADMIN/BATHROOM

DEAD LOAD



LIVE LOAD



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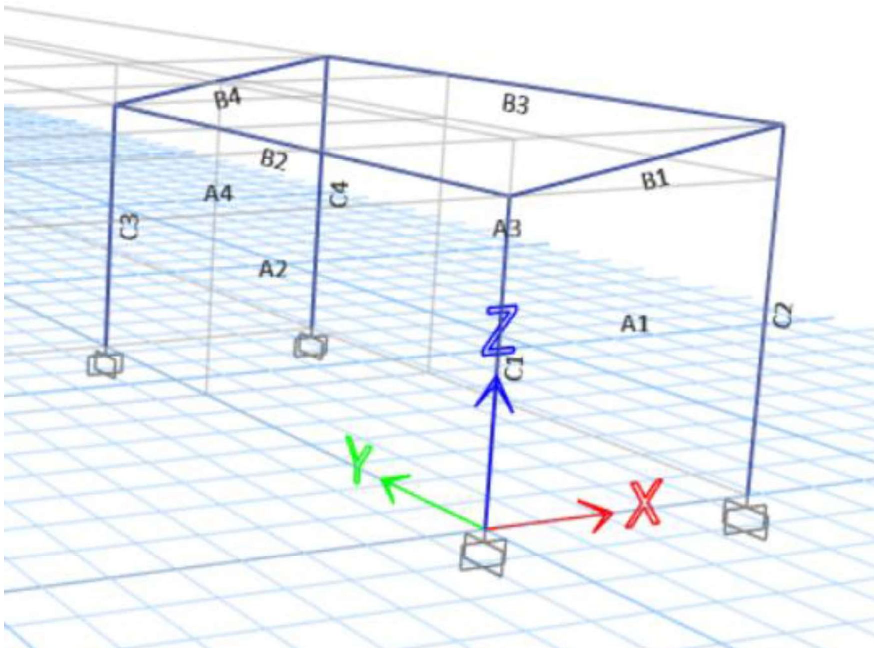
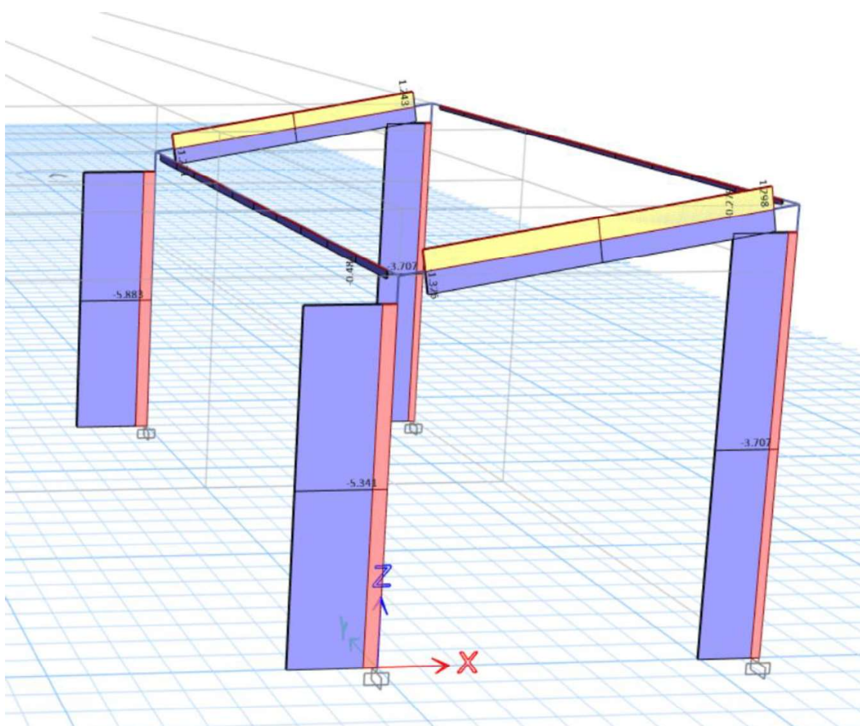
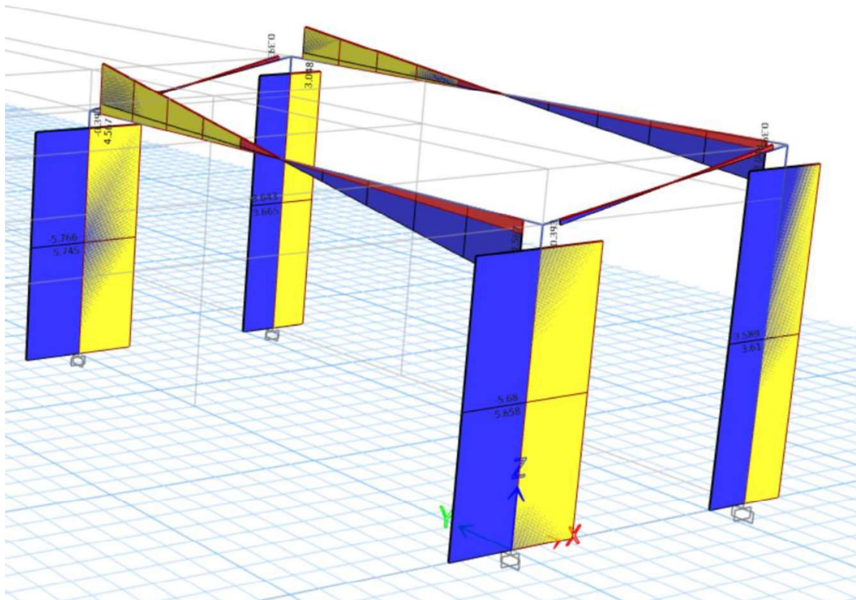


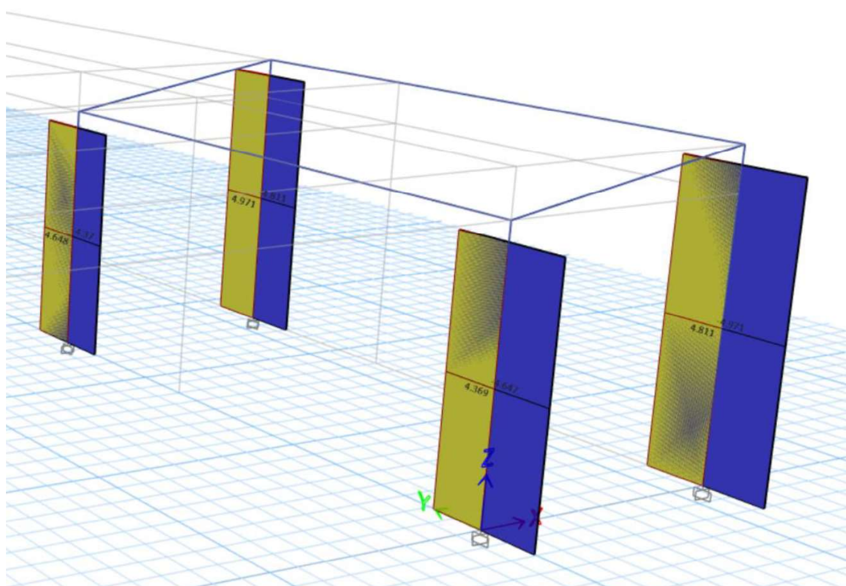
AXIAL



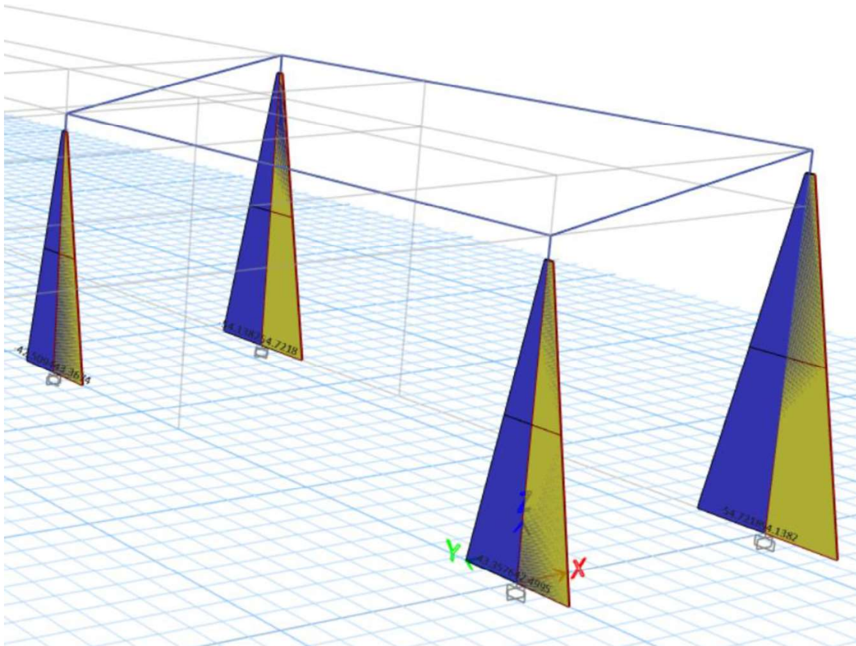
STRONG AXIS SHEAR (V2)



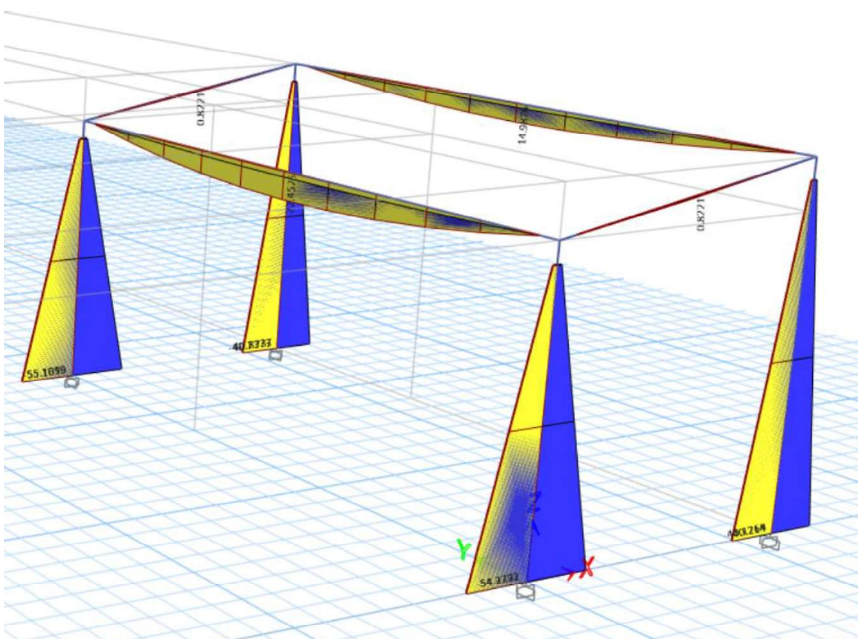
WEAK AXIS SHEAR (V3)

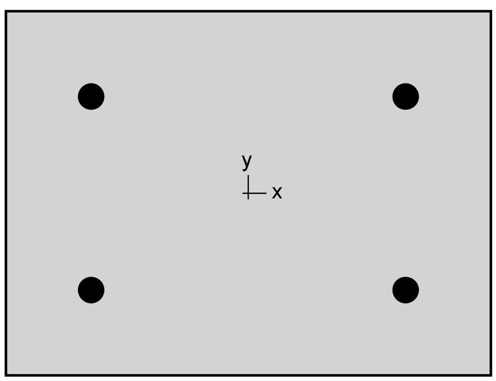


WEAK AXIS MOMENT (M2)



STRONG AXIS MOMENT (M3)





spColumn v6.50
Computer program for the Strength Design of Reinforced Concrete Sections

Contents

List of Figures

1. General Information

File Name	c:\senior project\lateral\beam design\b1.col
Project	---
Column	---
Engineer	---
Code	ACI 318-14
Bar Set	ASTM A615
Units	English
Run Option	Design
Run Axis	Biaxial
Slenderness	Not Considered
Column Type	Structural
Capacity Method	Critical capacity

2. Material Properties

2.1. Concrete

Type	Standard	
f'_c	3	ksi
E_c	3122.02	ksi
f_c	2.55	ksi
ε_u	0.003	in/in
β_1	0.85	

2.2. Steel

Type	Standard	
f_y	40	ksi
E_s	29000	ksi
ε_{yt}	0.00137931	in/in

3. Section

3.1. Shape and Properties

Type	Rectangular	
Width	16	in
Depth	12	in
A_g	192	in^2
I_x	2304	in^4
I_y	4096	in^4
r_x	3.4641	in
r_y	4.6188	in
X_o	0	in
Y_o	0	in

3.2. Section Figure

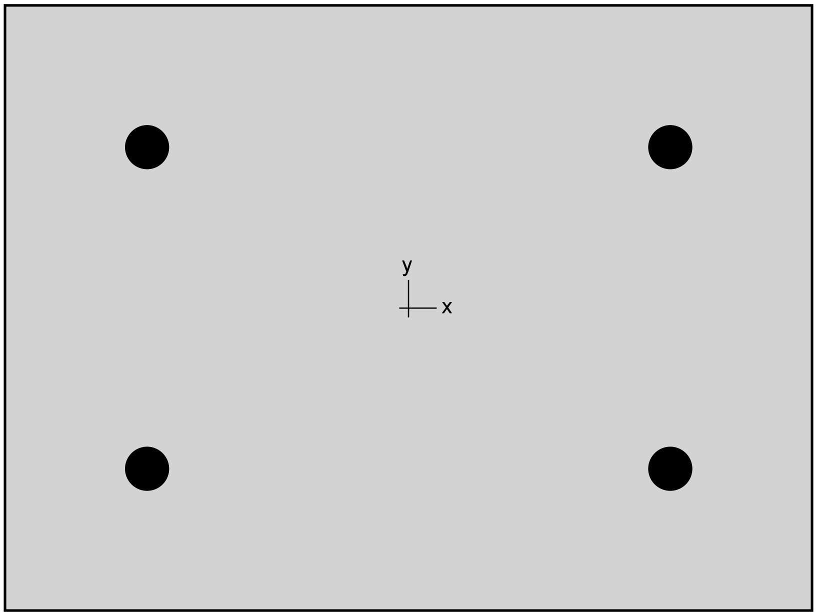


Figure 1: Column section

4. Reinforcement

4.1. Bar Set: ASTM A615

Bar	Diameter	Area	Bar	Diameter	Area	Bar	Diameter	Area
	in	in^2		in	in^2		in	in^2
#3	0.38	0.11	#4	0.50	0.20	#5	0.63	0.31
#6	0.75	0.44	#7	0.88	0.60	#8	1.00	0.79
#9	1.13	1.00	#10	1.27	1.27	#11	1.41	1.56
#14	1.69	2.25	#18	2.26	4.00			

4.2. Design Criteria

Bar selection	Min. number of bars
$A_{s,min}$ = 0.01 x A_g	1.92 in^2
$A_{s,max}$ = 0.08 x A_g	15.36 in^2
Allowable Capacity Ratio (<1 is safe)	1.00

4.3. Confinement and Factors

Confinement type	Tied
For #10 bars or less	#3 ties
For larger bars	#4 ties
Capacity Reduction Factors	
Axial compression, (a)	0.8
Tension controlled ϕ, (b)	0.9
Compression controlled ϕ, (c)	0.65

4.4. Arrangement

Pattern	All sides equal
Bar layout	Rectangular
Cover to	Transverse bars
Clear cover	2 in
Bars	4 #7
Total steel area, A_s	2.40 in^2
Rho	1.25 %
Minimum clear spacing	5.50 in

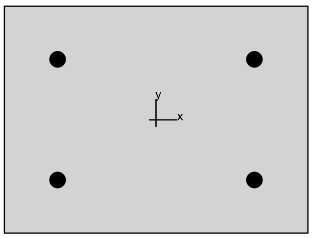
5. Factored Loads and Moments with Corresponding Capacity Ratios

NOTE: Calculations are based on "Critical Capacity" Method.
Allowable Capacity (Ratio) <= 1.00

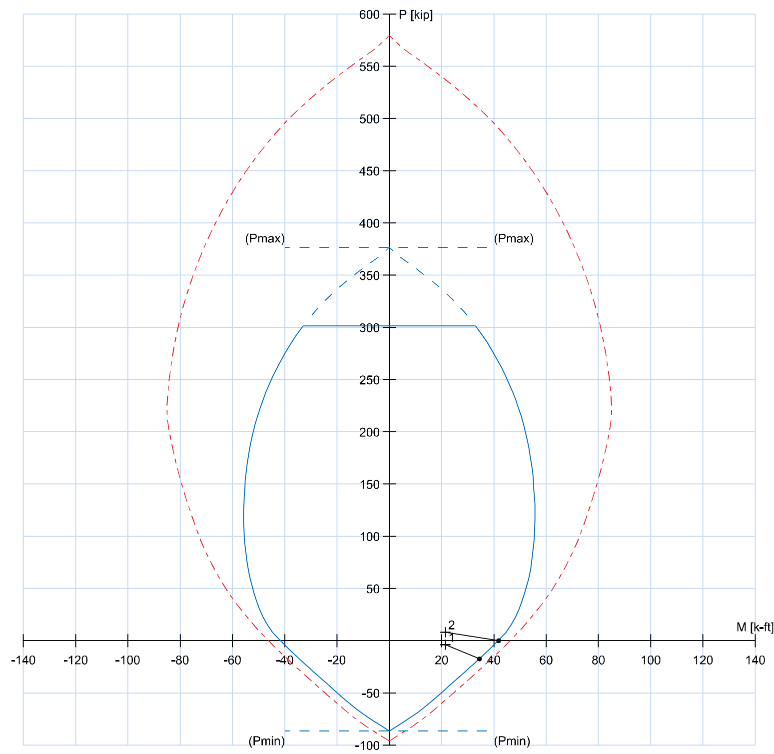
No.	Demand			Capacity			Parameters at Capacity			Capacity
	P_u	M_{ux}	M_{uy}	ϕP_n	ϕM_{nx}	ϕM_{ny}	NA Depth	ε_t	ϕ	Ratio
	kip	k-ft	k-ft	kip	k-ft	k-ft	in			
1	-3.83	15.54	14.74	-17.46	25.05	23.76	3.57	0.00728	0.900	0.72
2	8.16	15.54	14.74	0.00	30.35	28.79	4.25	0.00590	0.900	0.63

6. Diagrams

6.1. PM at θ=43 [deg]



16 x 12 in



PM at 43.0 [deg]

General Information

Project	---
Column	---
Engineer	---
Code	ACI 318-14
Bar Set	ASTM A615
Units	English
Run Option	Design
Run Axis	Biaxial
Slenderness	Not Considered
Column Type	Structural
Capacity Method	Critical capacity

Materials

f'_c	3 ksi
E_c	3122.02 ksi
f_y	40 ksi
E_s	29000 ksi

Section

Type	Rectangular
Width	16 in
Depth	12 in
A_g	192 in²
I_x	2304 in⁴
I_y	4096 in⁴

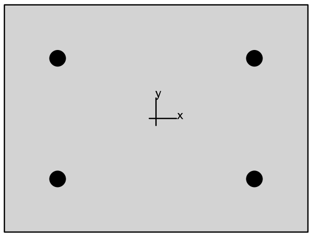
Reinforcement

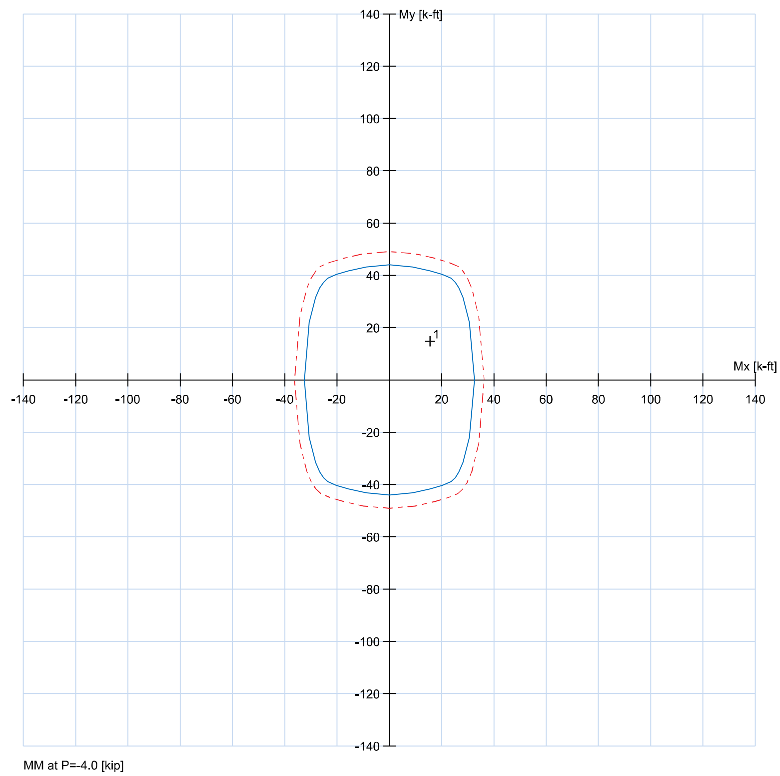
Pattern	All sides equal
Bar layout	Rectangular
Cover to	Transverse bars
Clear cover	2 in
Bars	4 #7
Confinement type	Tied
Total steel area, A_s	2.40 in²
Rho	1.25 %
Min. clear spacing	5.50 in

No.	P_u kip	M_{ux} k-ft	M_{uy} k-ft	ϕP_n kip	ϕM_{nx} k-ft	ϕM_{ny} k-ft	Capacity Ratio
1	-3.8	15.5	14.7	-17.46	25.05	23.76	0.72
2	8.2	15.5	14.7	0.00	30.35	28.79	0.63

Max. Capacity Ratio: 0.72

6.2. MM at P=-4 [kip]


16 x 12 in



General Information

Project	---
Column	---
Engineer	---
Code	ACI 318-14
Bar Set	ASTM A615
Units	English
Run Option	Design
Run Axis	Biaxial
Slenderness	Not Considered
Column Type	Structural
Capacity Method	Critical capacity

Materials

f'_c	3 ksi
E_c	3122.02 ksi
f_y	40 ksi
E_s	29000 ksi

Section

Type	Rectangular
Width	16 in
Depth	12 in
A_g	192 in²
I_x	2304 in⁴
I_y	4096 in⁴

Reinforcement

Pattern	All sides equal
Bar layout	Rectangular
Cover to	Transverse bars
Clear cover	2 in
Bars	4 #7
Confinement type	Tied
Total steel area, A_s	2.40 in²
Rho	1.25 %
Min. clear spacing	5.50 in

No.	P_u	M_{ux}	M_{uy}	ϕP_n	ϕM_{nx}	ϕM_{ny}	Capacity
	kip	k-ft	k-ft	kip	k-ft	k-ft	Ratio
1	-3.8	15.5	14.7	-17.46	25.05	23.76	0.72

Max. Capacity Ratio: 0.72

Beam Design B1 - Special Moment Frame Beam

IN PLANE BENDING

Bending Axis	Shear Axis	
X-X/3-3	Y-Y/2-2	
lu (out of plane span) (in) =	336	
ln (in plane span) (in) =	168	
b (in) =	16	
h (in) =	12	
long bar size =	7	
Tie size =	3	
number of longitudinal bars =	4	
Area of long bars =	0.601	
d' =	2.375	
f'c (psi) =	3000	
fy (psi) =	40000	
Pu Compression (k) =	5.8	
Pu Tension (k) =	3.830	
Tu (k-ft) =	4.52	
Max NA depth (in) =	3.6	1 layer in tension
Min NA depth (in) =	3.1	1 layer in tension
Mu Strong (k-ft) =	15.54	
Mu Weak (k-ft) =	14.74	

Beam Design Requirements

Stability

ACI 318-14 (Sec. 9.2.3.1a) — lu ≤ 50*b
lu (in) = 336 ≤ 50*b (in) = 800 , Therefore OK

Minimum Beam Depth

ACI 318-14 (T. 9.3.1.1) — hmin (one end continuous) = ln/18.5*(0.4+fy/100,000)
hmin = 7.26 ≤ h= 12 , Therefore OK

Moment

ACI 318-14 (Sec. 9.5.2.1) — Ag*f'c/10 (k) = 56.88 ≥ Pu (k) = 5.8 , Therefore Mn shall be calculated in accordance with Section 22.3, and design of combined flexural and axial strength is not required

Reinforcement Strain Limit in Nonprestressed Beams

ACI 318-14 (Sec. 9.3.3.1) — εt ≥ 0.004
SP Column Results — εt (compression) = 0.00681 ≥ 0.004 , Therefore OK
SP Column Results — εt (tension) = 0.00811 ≥ 0.004 , Therefore OK

Special Moment Frame Beam Design Requirements

Dimensional Limits

ACI 318-14 (Sec. 18.6.2.1a) — ln ≥ 4d
ln (in) = 168 ≥ 4d (in) = 45.59 , Therefore OK
ACI 318-14 (Sec. 18.6.2.1b) — b ≥ min (0.3*h, 10in)
b (in) = 16 ≥ 0.3*h (in) = 3.6 & 10 , Therefore OK
ACI 318-14 (Sec. 18.6.2.1c) — Beam width is to equal to column width , Therefore OK

Longitudinal Reinforcement

ACI 318-14 (Eq. 9.6.1.2a) — As min = (3*√f'c*b*d)/fy = 0.749 in^2 ≤ As provided = 2.405 in^2 , Therefore OK
ACI 318-14 (Eq. 9.6.1.2b) — As min = (200*b*d)/fy = 0.399 in^2 ≤ As provided = 2.405 in^2 , Therefore OK

Longitudinal Reinforcement

ACI 318-14 (Sec. 18.6.3.1) — ρ max = 0.025 in^2/in^2 ≥ ρ provided = 0.013 , Therefore OK
ACI 318-14 (Sec. 18.6.3.2) — Beam is symmetric about x axis and flexural design is uniform throughout section , Therefore OK
ACI 318-14 (Sec. 18.6.4.2) — spacing between longitudinal bars with ties ≤ 14 in — spacing provided = 11.25 in , Therefore OK

Distribution of Flexural Reinforcement in one-way Slabs and Beams

ACI 318-14 (T. 24.3.2) — Smax, H (in) = 15*(40,000/0.66*fy) - 2.5*Cc = 16.6 ≥ spacing provided = 12 in
ACI 318-14 (T. 24.3.2) — Smax, H (in) = 12*(40,000/0.66*fy) = 18.0 ≥ spacing provided = 12 in

OUT OF PLANE BENDING

Bending Axis	Shear Axis
Y-Y/2-2	X-X/3-3
lu (out of plane span) (in) =	168
ln (in plane span) (in) =	336
b (in) =	12
h (in) =	16
long bar size =	7
Tie size =	3
d bar long. =	0.875
d tie =	0.375
number of longitudinal bars =	4
Area of long bars =	0.601
f'c (psi) =	3000
fy (psi) =	40000
Pu Compression (k) =	5.8
Pu Tension (k) =	3.83
Tu (k) =	4.52
εy =	0.00138
Ag (in^2) =	189.6

Beam Design Requirements

Stability					
ACI 318-14 (Sec. 9.2.3.1a)	lu ≤ 50*b				
	lu (in) =	168 ≤	50*b (in) =	600	, Therefore OK
Minimum Beam Depth					
ACI 318-14 (T. 9.3.1.1)	hmin (one end continuous) = ln/18.5*(0.4+fy/100,000)				
	hmin =	7.26 ≤	h=	16	, Therefore OK
Moment					
ACI 318-14 (Sec. 9.5.2.1)	Ag*f'c/10 (k) =	56.88 ≥	Pu (k) =	5.8	, Therefore slenderness can be neglected, Mn shall be calculated in accordance with Section 22.3, and design of combined flexural and axial strength is not required
Reinforcement Strain Limit in Nonprestressed Beams					
ACI 318-14 (Sec. 9.3.3.1)	εt ≥ 0.004				
SP Column Results	εt (compression) =	0.00681 ≥	0.004	, Therefore OK	
SP Column Results	εt (tension) =	0.00811 ≥	0.004	, Therefore OK	

Diaphragm Design Requirements

Reinforcement					
ACI 318-14 (Sec. 18.12.7.3)	εt (tension) =	0.00811 ≥	εy =	0.00138	, Therefore Tension Steel has Yielded

IN PLANE SHEAR

Beam Design Requirements

	Vu (k) =	5.82 +/-			
Nonprestressed Members with Axial Compression					
ACI 318-14 (Eq.22.5.6.1)	Vc Compression (k) =				
	2*(1+(Pu/2000*Ag))*λ*√f'c*b*d =	20.28			
Nonprestressed Members with Significant Axial Tension					
ACI 318-14 (Eq.22.5.7.1)	Vc Tension (k) = 2*(1+(Pu/500*Ag))*λ*√f'c*b*d =	12712 ≥	Vc Compression (k) =	5.82	, Therefore Vc compression controls
Minimum Shear Reinforcement					
ACI 318-14 (Sec. 9.6.3.1)	0.5*ϕv*Vc compression (k) =	7.607 ≥	Vu (k) =	5.82	, Therefore Av, min Not Required
	ϕv*Vc compression (k) =	15.213 ≥	Vu (k) =	5.82	, Therefore No Additional Shear Reinforcement Required
ACI 318-14 (T. 9.6.3.3a)	Av, min/s (in^2/in) = (0.75*√f'c*b)/fyt =	0.016			
ACI 318-14 (T. 9.6.3.3b)	Av,min/s (in^2/in) = (50*b)/fyt) =	0.020 Controls			
	Av, provided =	0.221			
One-way Shear Strength Provided by Transverse Reinforcement					
ACI 318-14 (Eq. 22.5.10.5.3)	Vs (lbs) = (Av/s)*fyt*d =	25179			
Shear					
ACI 318-14 (T. 9.7.6.2.2)	4*√f'c*b*d (lbs) =	39957 ≥	Vs =	25179	, Therefore sv max = Min (d/2 , 24)
	sv max (in) = Min (d/2 , 24) =	5.7 , Therefore use ties spaced @ 3" o.c.			

Special Moment Frame Beam Design Requirements

Transverse Reinforcement					
ACI 318-14 (Sec. 18.6.4.1a & 18.6.4.4)	Ties to be provided at least	32.0	in from each side of support starting ≤ 2in from face of column		
ACI 318-14 (Sec. 18.6.4.1b)	Ties to be provided where flexural reinforcement is anticipated to yield out-of-plane = center	64.0	in within the beam		
ACI 318-14 (Sec. 18.6.4.4)	sv, max (in) where hoops required = Min(d/4, 6df, 6) =	2.8	in		, Therefore use spacing of 2.5" at locations required by 18.6.4.1
ACI 318-14 (Sec. 18.6.4.6)	sv, max (in) where hoops not required = d/2 =	5.7	in		, Therefore use spacing of 5.5" at all locations other than those required by 18.6.4.1
ACI 318-14 (Sec. 18.6.4.7)	Ag*f'c/10 (k) =	56.88 ≥	Pu (k) =	5.8	, Therefore Additional Shear Reinforcement Not Required
Shear Strength					
ACI 318-14 (Sec. 18.6.5.2)	Ve (k) = Max Seismic Shear =	10.07 ≥	Vu/2 (k) =	2.91	
	Ag*f'c/20 (k) =	28.44 ≥	Pu (k) =	5.8	, Therefore Shear Reinforcement Shall be designed assuming Vc=0 for locations specified in Sec. 18.6.4.1
ACI 318-14 (Eq. 22.5.10.5.3)	ϕv*Vn (k) = ϕv*Vs = ϕv*(Av/s)*fyt*d =	64 ≥	Vu (k) =	5.82	, Therefore #3 ties spaced @ 2.5" o.c. are adequate

OUT OF PLANE SHEAR

Beam Design Requirements

Vu out-of-plane ≤ Vu min in-plane , Therefore No Additional Shear Reinforcement Required

Diaphragm Design Requirements

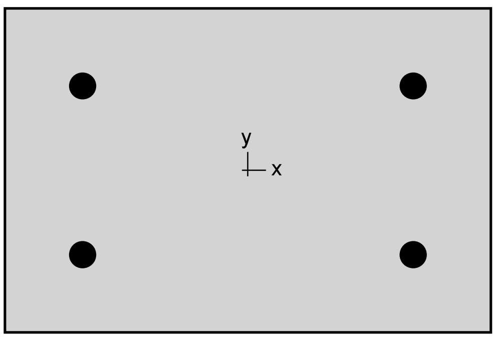
Shear					
ACI 318-14 (Eq. 12.5.3.3, Eq.18.12.9.1)	Vn (k) = Acv*(2* λ*√f'c + ρt*fy) =	22.95			
	ϕVn (k) =	17.21 ≥	Vu (k) =	5.82	, Therefore Ok
ACI 318-14 (Eq. 12.5.3.4)	ϕ8*Acv*√f'c (k) =	62 ≥	Vn (k) =	22.95	, Therefore Ok
Reinforcement					
ACI 318-14 (Sec. 18.12.7.5)	(Pu/A)/f'c =	0.010 ≤		0.4	, Therefore Additional Transverse Reinforcement Not Required
Shear Strength					
ACI 318-14 (Sec.18.12.9.2)	Vn, max (k) = 8*Acv*√f'c =	83 ≥		22.95	, Therefore Ok

TORSION

Torsional Strength

Threshold Torsion					
ACI 318-14 (Sec. 22.7.4.1a & 22.7.1.1)	ϕT_{th} compression (k) = $(\lambda*\sqrt{f'c}*A_{cp}^2)/p_{cp} * \sqrt{(1+ (Nu/4*Ag*\lambda*\sqrt{f'c}))}$ =	28.87 ≥	Tu (k) =	4.52	, Therefore Torsional Effects may be Neglected
	ϕT_{th} tension (k) = $(\lambda*\sqrt{f'c}*A_{cp}^2)/p_{cp} * \sqrt{(1+ (Nu/4*Ag*\lambda*\sqrt{f'c}))}$ =	25.77 ≥	Tu (k) =	4.52	, Therefore Torsional Effects may be Neglected

spColumn v6.50
Computer program for the Strength Design of Reinforced Concrete Sections



StructurePoint

Contents

List of Figures

1. General Information

File Name	c:\senior project\lateral\beam design\b2.col
Project	---
Column	---
Engineer	---
Code	ACI 318-14
Bar Set	ASTM A615
Units	English
Run Option	Design
Run Axis	Biaxial
Slenderness	Not Considered
Column Type	Structural
Capacity Method	Critical capacity

2. Material Properties

2.1. Concrete

Type	Standard	
f'_c	3	ksi
E_c	3122.02	ksi
f_c	2.55	ksi
ε_u	0.003	in/in
β_1	0.85	

2.2. Steel

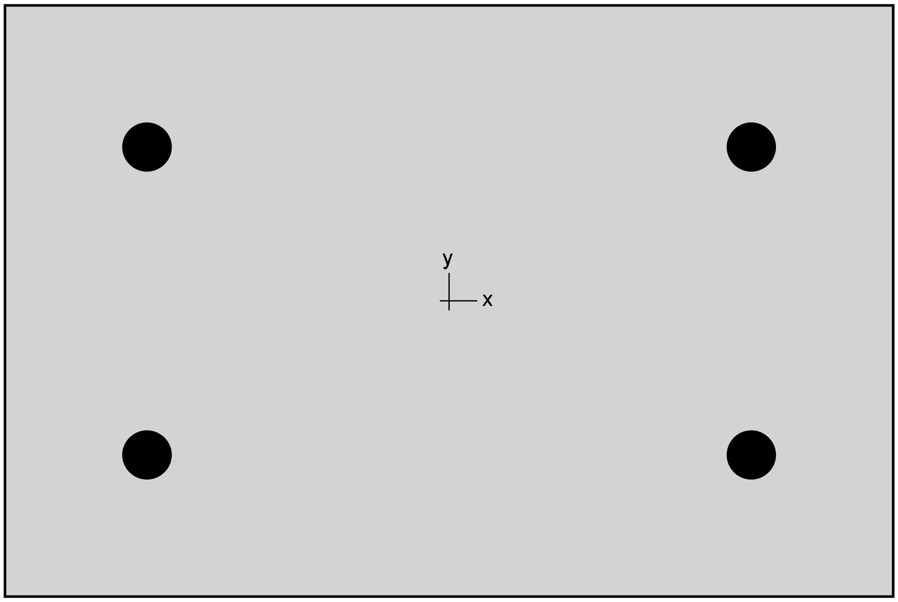
Type	Standard	
f_y	40	ksi
E_s	29000	ksi
ε_{yt}	0.00137931	in/in

3. Section

3.1. Shape and Properties

Type	Rectangular	
Width	18	in
Depth	12	in
A_g	216	in^2
I_x	2592	in^4
I_y	5832	in^4
r_x	3.4641	in
r_y	5.19615	in
X_o	0	in
Y_o	0	in

3.2. Section Figure



Rectangular 18 x 12 in 1.46% reinf.

Figure 1: Column section

4. Reinforcement

4.1. Bar Set: ASTM A615

Bar	Diameter	Area	Bar	Diameter	Area	Bar	Diameter	Area
	in	in²		in	in²		in	in²
#3	0.38	0.11	#4	0.50	0.20	#5	0.63	0.31
#6	0.75	0.44	#7	0.88	0.60	#8	1.00	0.79
#9	1.13	1.00	#10	1.27	1.27	#11	1.41	1.56
#14	1.69	2.25	#18	2.26	4.00			

4.2. Design Criteria

Bar selection	Min. number of bars
$A_{s,min}$ = 0.01 x A_g	2.16 in²
$A_{s,max}$ = 0.08 x A_g	17.28 in²
Allowable Capacity Ratio (<1 is safe)	1.00

4.3. Confinement and Factors

Confinement type	Tied
For #10 bars or less	#3 ties
For larger bars	#4 ties
Capacity Reduction Factors	
Axial compression, (a)	0.8
Tension controlled ϕ, (b)	0.9
Compression controlled ϕ, (c)	0.65

4.4. Arrangement

Pattern	All sides equal	
Bar layout	Rectangular	
Cover to	Transverse bars	
Clear cover	2	in
Bars	4 #8	
Total steel area, A_s	3.16	in^2
Rho	1.46	%
Minimum clear spacing	5.25	in

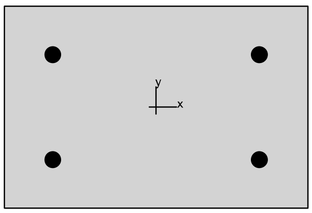
5. Factored Loads and Moments with Corresponding Capacity Ratios

NOTE: Calculations are based on "Critical Capacity" Method.
Allowable Capacity (Ratio) <= 1.00

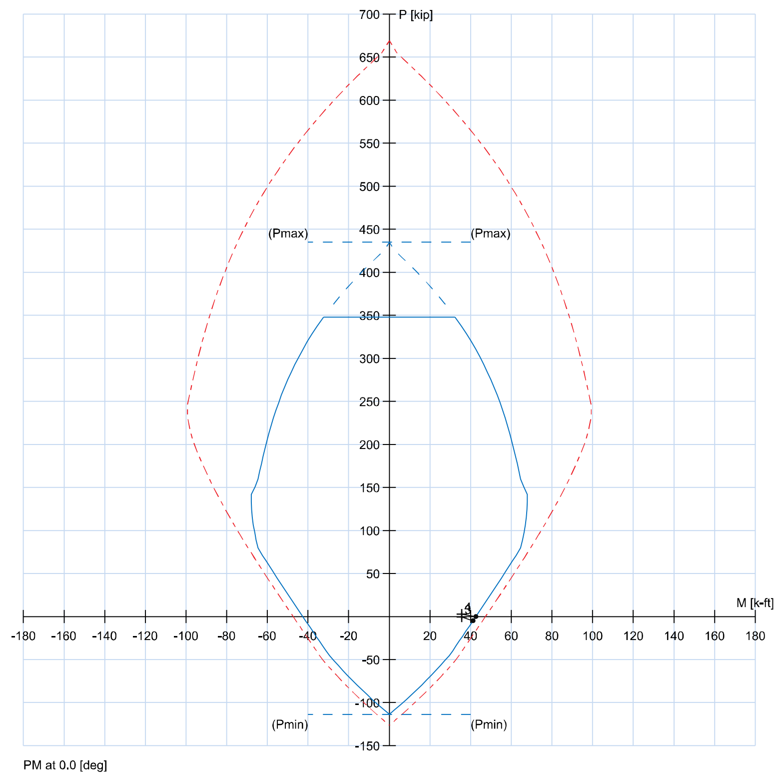
No.	Demand			Capacity			Parameters at Capacity			Capacity
	P_u	M_{ux}	M_{uy}	ϕP_n	ϕM_{nx}	ϕM_{ny}	NA Depth	ε_t	ϕ	Ratio
	kip	k-ft	k-ft	kip	k-ft	k-ft	in			
1	1.49	17.36	2.24	0.00	42.21	5.45	2.62	0.00813	0.900	0.62
2	-1.31	17.36	2.24	-18.68	36.80	4.75	2.39	0.00910	0.900	0.67
3	-0.45	35.60	0.00	-4.91	41.17	0.00	2.32	0.00879	0.900	0.91
4	2.65	35.60	0.00	0.00	42.57	0.00	2.37	0.00855	0.900	0.90

6. Diagrams

6.1. PM at θ=0 [deg]



18 x 12 in



General Information	
Project	---
Column	---
Engineer	---
Code	ACI 318-14
Bar Set	ASTM A615
Units	English
Run Option	Design
Run Axis	Biaxial
Slenderness	Not Considered
Column Type	Structural
Capacity Method	Critical capacity

Materials	
f'_c	3 ksi
E_c	3122.02 ksi
f_y	40 ksi
E_s	29000 ksi

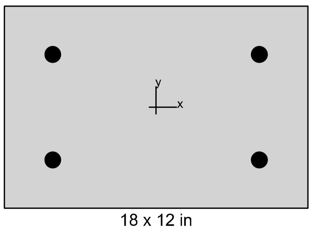
Section	
Type	Rectangular
Width	18 in
Depth	12 in
A_g	216 in²
I_x	2592 in⁴
I_y	5832 in⁴

Reinforcement	
Pattern	All sides equal
Bar layout	Rectangular
Cover to	Transverse bars
Clear cover	2 in
Bars	4 #8
Confinement type	Tied
Total steel area, A_s	3.16 in²
Rho	1.46 %
Min. clear spacing	5.25 in

No.	P_u	M_{ux}	M_{uy}	ϕP_n	ϕM_{nx}	ϕM_{ny}	Capacity
	kip	k-ft	k-ft	kip	k-ft	k-ft	Ratio
3	-0.4	35.6	0.0	-4.91	41.17	0.00	0.91
4	2.7	35.6	0.0	0.00	42.57	0.00	0.90

Max. Capacity Ratio: 0.91

6.2. MM at P=0 [kip]



General Information

Project	---
Column	---
Engineer	---
Code	ACI 318-14
Bar Set	ASTM A615
Units	English
Run Option	Design
Run Axis	Biaxial
Slenderness	Not Considered
Column Type	Structural
Capacity Method	Critical capacity

Materials

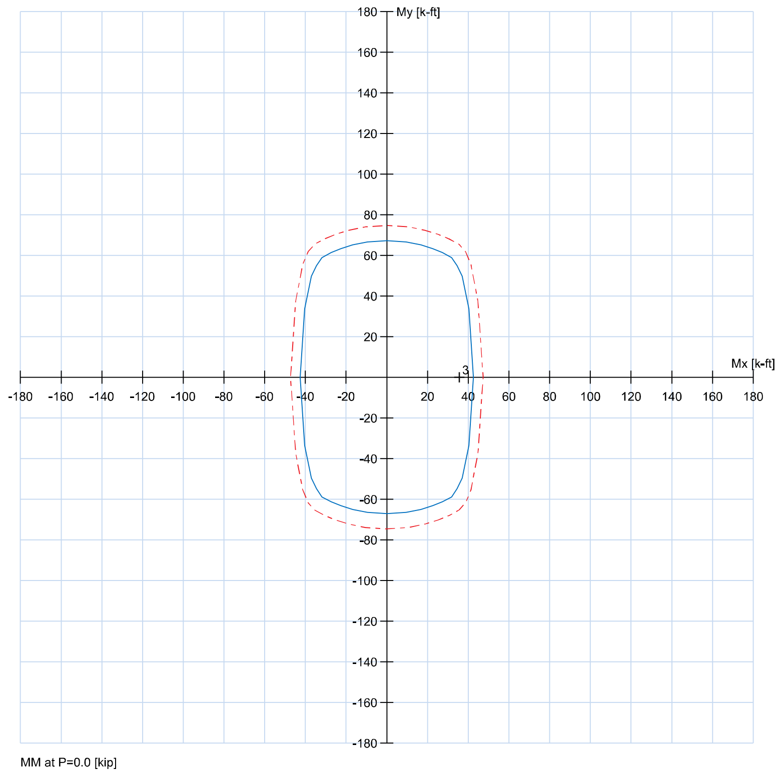
f'_c	3 ksi
E_c	3122.02 ksi
f_y	40 ksi
E_s	29000 ksi

Section

Type	Rectangular
Width	18 in
Depth	12 in
A_g	216 in²
I_x	2592 in⁴
I_y	5832 in⁴

Reinforcement

Pattern	All sides equal
Bar layout	Rectangular
Cover to	Transverse bars
Clear cover	2 in
Bars	4 #8
Confinement type	Tied
Total steel area, A_s	3.16 in²
Rho	1.46 %
Min. clear spacing	5.25 in



No.	P_u	M_{ux}	M_{uy}	ϕP_n	ϕM_{nx}	ϕM_{ny}	Capacity
	kip	k-ft	k-ft	kip	k-ft	k-ft	Ratio
3	-0.4	35.6	0.0	-4.91	41.17	0.00	0.91

Max. Capacity Ratio: 0.91

Beam Design — B2 - Special Moment Frame Beam

IN PLANE BENDING

Bending Axis	Shear Axis	
X-X/3-3	Y-Y/2-2	
lu (out of plane span) (in) =	294	
ln (in plane span) (in) =	294	
b (in) =	16	
h (in) =	12	
long bar size =	8	
Tie size =	3	
number of longitudinal bars =	4	
d' =	2.375	
f'c (psi) =	3000	
fy (psi) =	40000	
Pu Compression (k) =	1.49	
Pu Tension (k) =	1.310	
Tu (k-ft) =	0.47	
Max NA depth (in) =	2.6	1 layer in tension
Min NA depth (in) =	2.3	2 layers in tension
Mu Strong (k-ft) =	17.36	
Mu Weak (k-ft) =	2.24	

Beam Design Requirements

Stability					
ACI 318-14 (Sec. 9.2.3.1a)	lu ≤ 50*b				
	lu (in) =	294 ≤	50*b (in) =	800	, Therefore OK
Minimum Beam Depth					
ACI 318-14 (T. 9.3.1.1)	hmin (one end continuous) = ln/18.5*(0.4+fy/100,000)				
	hmin =	7.26 ≤	h=	12	, Therefore OK
Moment					
ACI 318-14 (Sec. 9.5.2.1)	Ag*f'c/10 (k) =	56.66 ≥	Pu (k) =	1.49	, Therefore Slenderness can be Neglected, Mn shall be calculated in accordance with Section 22.3, and design of combined flexural and axial strength is not required
Reinforcement Strain Limit in Nonprestressed Beams					
ACI 318-14 (Sec. 9.3.3.1)	εt ≥ 0.004				
SP Column Results	εt (compression) =	0.00813 ≥		0.004	, Therefore OK
SP Column Results	εt (tension) =	0.0091 ≥		0.004	, Therefore OK

Special Moment Frame Beam Design Requirements

Dimensional Limits							
ACI 318-14 (Sec. 18.6.2.1a)	ln ≥ 4d						
	ln (in) =	294 ≥		4d (in) =	44.86		, Therefore OK
ACI 318-14 (Sec. 18.6.2.1b)	b ≥ min (0.3*h, 10in)						
	b (in) =	16 ≥		0.3*h (in) =	3.6 &	10	, Therefore OK
ACI 318-14 (Sec. 18.6.2.1c)	Beam width is to be less than or equal to column width	, Therefore OK					
Longitudinal Reinforcement							
ACI 318-14 (Eq. 9.6.1.2a)	As min = (3*√f'c*b*d)/fy =	0.737	in^2	≤	As provided =	3.142 in^2	, Therefore OK
ACI 318-14 (Eq. 9.6.1.2b)	As min = (200*b*d)/fy =	0.449	in^2	≤	As provided =	3.142 in^2	, Therefore OK
Longitudinal Reinforcement							
ACI 318-14 (Sec. 18.6.3.1)	ρ max =	0.025	in^2/in^2	≥	ρ provided =	0.016	, Therefore OK
ACI 318-14 (Sec. 18.6.3.2)	Beam is symmetric about x axis and flexural design is uniform throughout section	, Therefore OK					
ACI 318-14 (Sec. 18.6.4.2)	spacing between longitudinal bars with ties ≤ 14 in	spacing provided =	11.25 in		, Therefore OK		
Distribution of Flexural Reinforcement in one-way Slabs and Beams							
ACI 318-14 (T. 24.3.2)	Smax, H (in) = 15*(40,000/0.66*fy) - 2.5*Cc =	16.6 ≥		spacing provided =	12 in		
ACI 318-14 (T. 24.3.2)	Smax, H (in) = 12*(40,000/0.66*fy) =	18.0 ≥		spacing provided =	12 in		

OUT OF PLANE BENDING

	Bending Axis	Shear Axis		
	Y-Y/2-2	X-X/3-3		
	lu (out of plane span) (in) =	294		
	ln (in plane span) (in) =	294		
	b (in) =	12		
	h (in) =	16		
	long bar size =	6		
	Tie size =	3		
	d bar long. =	0.75		
	d Tie =	0.375		
	number of longitudinal bars =	4		
	Area of long bars =	0.442		
	f'c (psi) =	3000		
	fy (psi) =	40000		
	Pu Compression (k) =	1.49		
	Pu Tension (k) =	1.31		
	Tu (k) =	0.47		
	εy =	0.00138		
	Ag (in^2) =	190.2		

	Beam Design Requirements			
Stability				
ACI 318-14 (Sec. 9.2.3.1a)	lu ≤ 50*b			
	lu (in) =	294 ≤	50*b (in) =	600 , Therefore OK
Minimum Beam Depth				
ACI 318-14 (T. 9.3.1.1)	hmin (one end continuous) = ln/18.5*(0.4+fy/100,000)			
	hmin =	7.26 ≤	h=	16 , Therefore OK
Moment				
ACI 318-14 (Sec. 9.5.2.1)	Ag*f'c/10 (k) =	57.07 ≥	Pu (k) =	1.49 , Therefore Slenderness can be Neglected, Mn shall be calculated in accordance with Section 22.3, and design of combined flexural and axial strength is not required
Reinforcement Strain Limit in Nonprestressed Beams				
ACI 318-14 (Sec. 9.3.3.1)	εt ≥ 0.004			
SP Column Results	εt (compression) =	0.00837 ≥	0.004 , Therefore OK	
SP Column Results	εt (tension) =	0.00909 ≥	0.004 , Therefore OK	
	Diaphragm Design Requirements			
Reinforcement				
ACI 318-14 (Sec. 18.12.7.3)	εt (tension) =	0.00910 ≥	εy =	0.00138 , Therefore Tension Steel has Yielded

IN PLANE SHEAR

	Beam Design Requirements			
	Vu (k) =	4.5 +/-		
Nonprestressed Members with Axial Compression				
ACI 318-14 (Eq.22.5.6.1)	Vc Compression (k) = 2*(1+(Pu/2000*Ag))*λ*√f'c*b*d =	10.56		
Nonprestressed Members with Significant Axial Tension				
ACI 318-14 (Eq.22.5.7.1)	Vc Tension (k) = 2*(1+(Pu/500*Ag))*λ*√f'c*b*d =	14251 ≥	Vc Compression (k) =	4.5 , Therefore Vc compression controls
Minimum Shear Reinforcement				
ACI 318-14 (Sec. 9.6.3.1)	0.5*ϕv*Vc compression (k) =	3.959 ≤	Vu (k) =	4.5 , Therefore Av, min Required
	ϕv*Vc compression (k) =	7.918 ≥	Vu (k) =	4.50 , Therefore No Additional Shear Reinforcement Required
ACI 318-14 (T. 9.6.3.3a)	Av, min/s (in^2/in) = (0.75*√f'c*b)/fyt =	0.016		
ACI 318-14 (T. 9.6.3.3b)	Av,min/s (in^2/in) = (50*b)/fyt) =	0.020 Controls		
	Av, provided =	0.221		
One-way Shear Strength Provided by Transverse Reinforcement				
ACI 318-14 (Eq. 22.5.10.5.3)	Vs (lbs) = (Av/s)*fyt*d =	13254		
Shear				
ACI 318-14 (T. 9.7.6.2.2)	4*√f'c*b*d (lbs) =	21033 ≥	Vs =	13254 , Therefore sv max = Min (d/2 , 24)
	sv max (in) = Min (d/2 , 24) =	5.6 , Therefore use ties spaced @ 5.5" o.c.		

Special Moment Frame Beam Design Requirements

Transverse Reinforcement					
ACI 318-14 (Sec. 18.6.4.1a & 18.6.4.4)	Ties to be provided at least	32.0	in from each side of support starting ≤ 2in from face of column		
ACI 318-14 (Sec. 18.6.4.1b)	Ties to be provided where flexural reinforcement is anticipated to yield out-of-plane = center	64.0	in within the beam		
ACI 318-14 (Sec. 18.6.4.4)	sv, max (in) where hoops required = Min(d/4, 6df, 6) =	1.5	in		, Therefore use spacing of 1.5" at locations required by 18.6.4.1
ACI 318-14 (Sec. 18.6.4.6)	sv, max (in) where hoops not required = d/2 =	3.0	in		, Therefore use spacing of 3" at all locations other than those required by 18.6.4.1
ACI 318-14 (Sec. 18.6.4.7)	Ag*f'c/10 (k) =	56.66 ≥	Pu (k) =	1.49	, Therefore Additional Shear Reinforcement Not Required
Shear Strength					
ACI 318-14 (Sec. 18.6.5.2)	Ve (k) = Max Seismic Shear =	8.73 ≥	Vu/2 (k) =	2.25	
	Ag*f'c/20 (k) =	28.33 ≥	Pu (k) =	1.49	, Therefore Shear Reinforcement Shall be designed assuming Vc=0 for locations specified in Sec. 18.6.4.1
ACI 318-14 (Eq. 22.5.10.5.3)	ϕv*Vn (k) = ϕv*Vs = ϕv*(Av/s)*fyt*d =	64 ≥	Vu (k) =	4.50	, Therefore #3 ties spaced @ 1.5" o.c. are adequate

OUT OF PLANE SHEAR

Beam Design Requirements

Vu out-of-plane	≤	Vu min in-plane	, Therefore No Additional Shear Reinforcement Required

Diaphragm Design Requirements

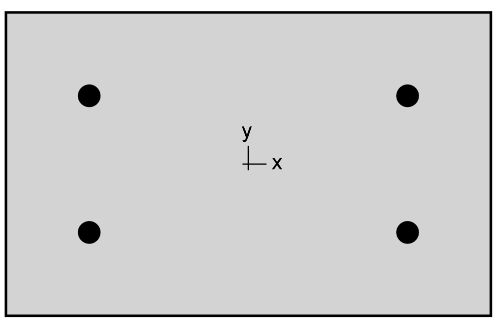
Shear					
ACI 318-14 (Eq. 12.5.3.3, Eq.18.12.9.1)	Vn (k) = Acv*(2* λ*√f'c + ρt*fy) =	23.03			
	ϕVn (k) =	17.27 ≥	Vu (k) =	4.5	, Therefore Ok
ACI 318-14 (Eq. 12.5.3.4)	ϕ8*Acv*√f'c (k) =	63 ≥	Vn (k) =	23.03	, Therefore Ok
Reinforcement					
ACI 318-14 (Sec. 18.12.7.5)	(Pu/A)/f'c =	0.003 ≤		0.4	, Therefore Additional Transverse Reinforcement Not Required
Shear Strength					
ACI 318-14 (Sec.18.12.9.2)	Vn, max (k) = 8*Acv*√f'c =	83 ≥		23.03	, Therefore Ok

TORSION

Torsional Strength

Threshold Torsion					
ACI 318-14 (Sec. 22.7.4.1a & 22.7.1.1)	ϕT_{th} compression (k) = $(\lambda*\sqrt{f'c}*A_{cp}^2)/p_{cp} * \sqrt{(1+ (Nu/4*Ag*\lambda*\sqrt{f'c}))}$ =	27.52 ≥	Tu (k) =	0.47	, Therefore Torsional Effects may be Neglected
	ϕT_{th} tension (k) = $(\lambda*\sqrt{f'c}*A_{cp}^2)/p_{cp} * \sqrt{(1+ (Nu/4*Ag*\lambda*\sqrt{f'c}))}$ =	26.61 ≥	Tu (k) =	0.47	, Therefore Torsional Effects may be Neglected

spColumn v6.50
Computer program for the Strength Design of Reinforced Concrete Sections



Contents

List of Figures

1. General Information

File Name	c:\senior project\lateral\beam design\b3.col
Project	---
Column	---
Engineer	---
Code	ACI 318-14
Bar Set	ASTM A615
Units	English
Run Option	Design
Run Axis	X - axis
Slenderness	Not Considered
Column Type	Structural
Capacity Method	Critical capacity

2. Material Properties

2.1. Concrete

Type	Standard	
f'_c	3	ksi
E_c	3122.02	ksi
f_c	2.55	ksi
ε_u	0.003	in/in
β_1	0.85	

2.2. Steel

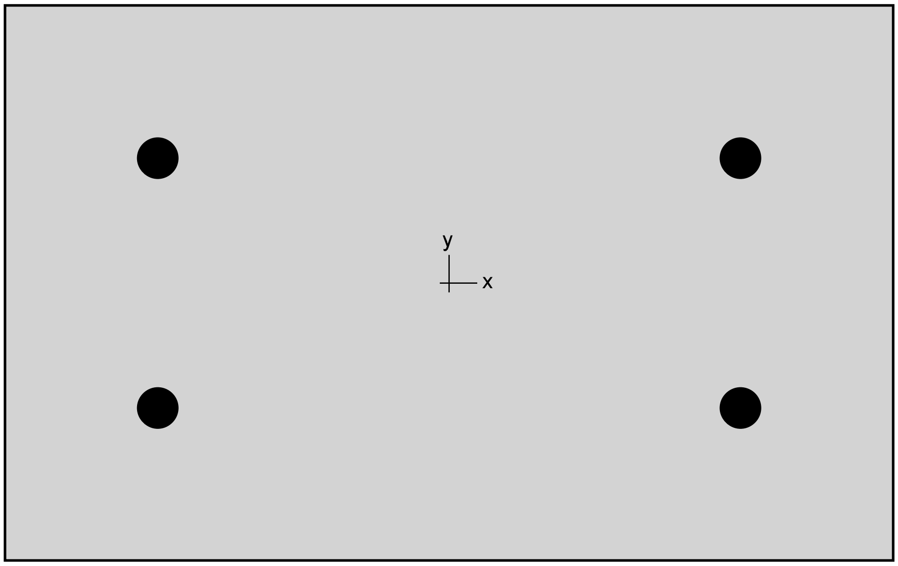
Type	Standard	
f_y	40	ksi
E_s	29000	ksi
ε_{yt}	0.00137931	in/in

3. Section

3.1. Shape and Properties

Type	Rectangular	
Width	16	in
Depth	10	in
A_g	160	in^2
I_x	1333.33	in^4
I_y	3413.33	in^4
r_x	2.88675	in
r_y	4.6188	in
X_o	0	in
Y_o	0	in

3.2. Section Figure



Rectangular 16 x 10 in
1.10% reinf.

Figure 1: Column section

4. Reinforcement

4.1. Bar Set: ASTM A615

Bar	Diameter	Area	Bar	Diameter	Area	Bar	Diameter	Area
	in	in²		in	in²		in	in²
#3	0.38	0.11	#4	0.50	0.20	#5	0.63	0.31
#6	0.75	0.44	#7	0.88	0.60	#8	1.00	0.79
#9	1.13	1.00	#10	1.27	1.27	#11	1.41	1.56
#14	1.69	2.25	#18	2.26	4.00			

4.2. Design Criteria

Bar selection	Min. number of bars
$A_{s,min}$ = 0.01 x A_g	1.6 in²
$A_{s,max}$ = 0.08 x A_g	12.8 in²
Allowable Capacity Ratio (<1 is safe)	1.00

4.3. Confinement and Factors

Confinement type	Tied
For #10 bars or less	#3 ties
For larger bars	#4 ties
Capacity Reduction Factors	
Axial compression, (a)	0.8
Tension controlled ϕ, (b)	0.9
Compression controlled ϕ, (c)	0.65

4.4. Arrangement

Pattern	Equal spacing

Bar layout	Rectangular
Cover to	Transverse bars
Clear cover	2 in
Bars	4 #6
Total steel area, A_s	1.76 in^2
Rho	1.10 %
Minimum clear spacing	3.75 in

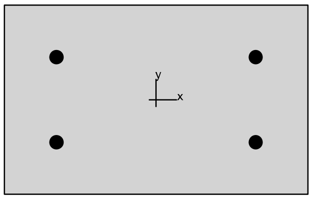
5. Factored Loads and Moments with Corresponding Capacity Ratios

NOTE: Calculations are based on "Critical Capacity" Method.
Allowable Capacity (Ratio) <= 1.00

No.	Demand		Capacity		Parameters at Capacity			Capacity
	P_u	M_{ux}	ϕP_n	ϕM_{nx}	NA Depth	ε_t	ϕ	Ratio
	kip	k-ft	kip	k-ft	in			
1	1.91	5.30	0.00	21.60	1.94	0.00822	0.900	0.54
2	-3.62	5.30	-15.40	17.37	1.54	0.01116	0.900	0.61

6. Diagrams

6.1. PM at θ=0 [deg]



16 x 10 in

General Information

Project	---
Column	---
Engineer	---
Code	ACI 318-14
Bar Set	ASTM A615
Units	English
Run Option	Design
Run Axis	X - axis
Slenderness	Not Considered
Column Type	Structural
Capacity Method	Critical capacity

Materials

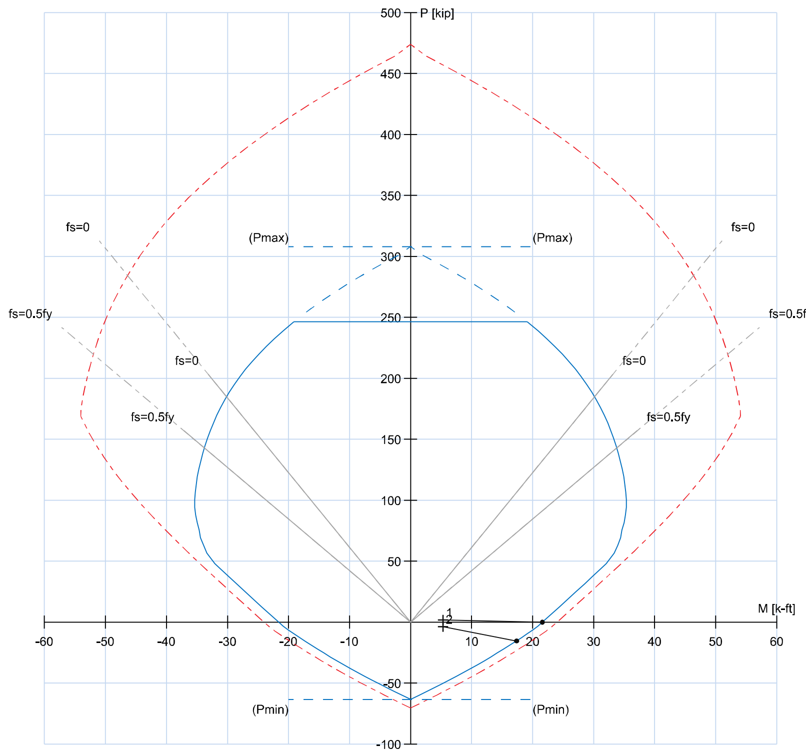
f'_c	3 ksi
E_c	3122.02 ksi
f_y	40 ksi
E_s	29000 ksi

Section

Type	Rectangular
Width	16 in
Depth	10 in
A_g	160 in²
I_x	1333.33 in⁴
I_y	3413.33 in⁴

Reinforcement

Pattern	Equal spacing
Bar layout	Rectangular
Cover to	Transverse bars
Clear cover	2 in
Bars	4 #6
Confinement type	Tied
Total steel area, A_s	1.76 in²
Rho	1.10 %
Min. clear spacing	3.75 in



PM at 0.0 [deg]

No.	P_u	M_{ux}	ϕP_n	ϕM_{nx}	Capacity
	kip	k-ft	kip	k-ft	Ratio
2	-3.6	5.3	-15.40	17.37	0.61
1	1.9	5.3	0.00	21.60	0.54

Max. Capacity Ratio: 0.61

Beam Design — B3 - Gravity Beam

IN PLANE BENDING

Bending Axis	Shear Axis	
X-X/3-3	Y-Y/2-2	
lu (out of plane span) (in) =	168	
ln (in plane span) (in) =	168	
b (in) =	16	
h (in) =	10	
long bar size =	6	
Stirrup size =	3	
number of longitudinal bars =	4	
d' =	2.375	
f'c (psi) =	3000	
fy (psi) =	40000	
Pu Compression (k) =	1.91	
Pu Tension (k) =	3.620	
Tu (k-ft) =	0.00	
Max NA depth (in) =	1.8	2 layers in tension
Min NA depth (in) =	1.3	2 layers in tension
Mu Strong (k-ft) =	5.30	
Mu Weak (k-ft) =	0.00	

Beam Design Requirements

Stability

ACI 318-14 (Sec. 9.2.3.1a) — lu ≤ 50*b

lu (in) = 168 ≤ 50*b (in) = 800 , Therefore OK

Minimum Beam Depth

ACI 318-14 (T. 9.3.1.1) — hmin (one end continuous) = ln/18.5*(0.4+fy/100,000)

hmin = 7.26 ≤ h= 10 , Therefore OK

Reinforcement Strain Limit in Nonprestressed Beams

ACI 318-14 (Sec. 9.3.3.1) — εt ≥ 0.004

SP Column Results — εt (compression) = 0.00573 ≥ 0.004 , Therefore OK

SP Column Results — εt (tension) = 0.00924 ≥ 0.004 , Therefore OK

Minimum Flexural Reinforcement in Nonprestressed Beams

ACI 318-14 (Sec. 9.6.1.2) — As, min= max((3*√f'c*b*d)/fy , (200*b*d)/fy) = 0.4 in^2 ≤ As, provided = 0.88 , Therefore OK

Longitudinal Reinforcement

ACI 318-14 (Sec. 18.6.3.1) — ρ max = 0.025 in^2/in^2 ≥ ρ, provided = 0.011 , Therefore OK

IN PLANE SHEAR

Beam Design Requirements

Vu (k) = 1.55 +/-

Nonprestressed Members with Axial Compression

ACI 318-14 (Eq.22.5.6.1) — Vc Compression (k) =
2*(1+(Pu/2000*Ag))*λ*√f'c*b*d = 8.82

Nonprestressed Members with Significant Axial Tension

ACI 318-14 (Eq.22.5.7.1) — Vc Tension (k) = 2*(1+(Pu/500*Ag))*λ*√f'c*b*d =

12000 ≥ Vc Compression (k) = 1.55 , Therefore Vc compression controls

Minimum Shear Reinforcement

ACI 318-14 (Sec. 9.6.3.1) — 0.5*ϕv*Vc compression (k) = 3.306 ≥ Vu (k) = 1.55 , Therefore Av, min Not Required

Members not designated as part of the seismic-force-resisting system

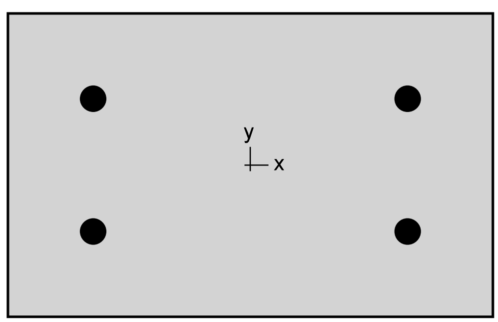
ACI 318-14 (Sec. 18.14.3.1) — Members have been designed for controling values in ETABS model including δu effects, Therefore Section 18.14.3.2 applies

ACI 318-14 (Sec. 18.14.3.2a) — Ag*f'c/10 (k) = 47.47 ≥ Pu (k) = 3.62 , Therefore transverse reinforcejment is to be provided at smax = d/2

smax = d/2= 2.5 , Therefore Av,min to be provided at a maxmum spacing of 2.5" o.c.

ACI 318-14 (Sec. 25.7.2.2) — Minimum Stirrup Size = 3 ,Therefore use #3 Stirrups at 2.5" o.c. Throughout Beam

spColumn v6.50
Computer program for the Strength Design of Reinforced Concrete Sections



Contents

List of Figures

1. General Information

File Name	c:\senior project\lateral\beam design\b4.col
Project	---
Column	---
Engineer	---
Code	ACI 318-14
Bar Set	ASTM A615
Units	English
Run Option	Design
Run Axis	X - axis
Slenderness	Not Considered
Column Type	Structural
Capacity Method	Critical capacity

2. Material Properties

2.1. Concrete

Type	Standard	
f'_c	3	ksi
E_c	3122.02	ksi
f_c	2.55	ksi
ε_u	0.003	in/in
β_1	0.85	

2.2. Steel

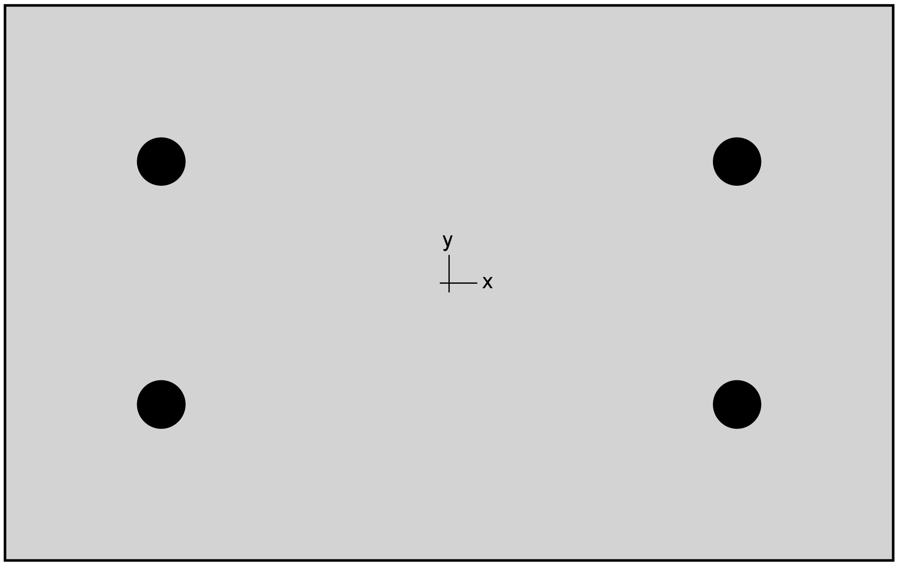
Type	Standard	
f_y	40	ksi
E_s	29000	ksi
ε_{yt}	0.00137931	in/in

3. Section

3.1. Shape and Properties

Type	Rectangular	
Width	16	in
Depth	10	in
A_g	160	in^2
I_x	1333.33	in^4
I_y	3413.33	in^4
r_x	2.88675	in
r_y	4.6188	in
X_o	0	in
Y_o	0	in

3.2. Section Figure



Rectangular 16 x 10 in   1.50% reinf.

Figure 1: Column section

4. Reinforcement

4.1. Bar Set: ASTM A615

Bar	Diameter	Area	Bar	Diameter	Area	Bar	Diameter	Area
	in	in²		in	in²		in	in²
#3	0.38	0.11	#4	0.50	0.20	#5	0.63	0.31
#6	0.75	0.44	#7	0.88	0.60	#8	1.00	0.79
#9	1.13	1.00	#10	1.27	1.27	#11	1.41	1.56
#14	1.69	2.25	#18	2.26	4.00			

4.2. Design Criteria

Bar selection	Min. number of bars
$A_{s,min}$ = 0.01 x A_g	1.6 in²
$A_{s,max}$ = 0.08 x A_g	12.8 in²
Allowable Capacity Ratio (<1 is safe)	1.00

4.3. Confinement and Factors

Confinement type	Tied
For #10 bars or less	#3 ties
For larger bars	#4 ties
Capacity Reduction Factors	
Axial compression, (a)	0.8
Tension controlled ϕ, (b)	0.9
Compression controlled ϕ, (c)	0.65

4.4. Arrangement

Pattern	All sides equal

Bar layout	Rectangular
Cover to	Transverse bars
Clear cover	2 in
Bars	4 #7
Total steel area, A_s	2.40 in^2
Rho	1.50 %
Minimum clear spacing	3.50 in

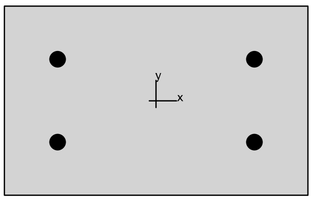
5. Factored Loads and Moments with Corresponding Capacity Ratios

NOTE: Calculations are based on "Critical Capacity" Method.
Allowable Capacity (Ratio) <= 1.00

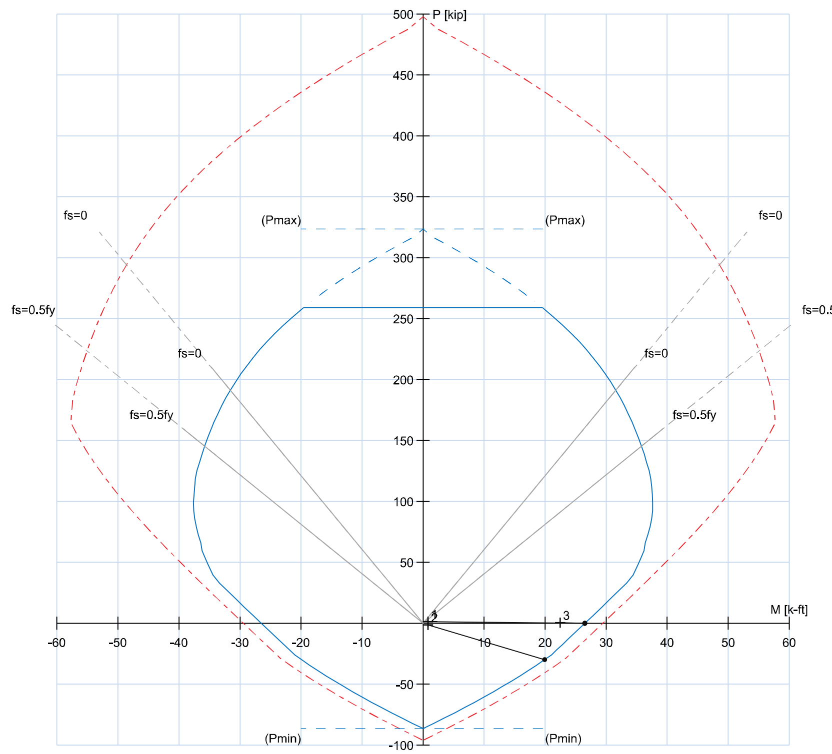
No.	Demand		Capacity		Parameters at Capacity			Capacity
	P_u	M_{ux}	ϕP_n	ϕM_{nx}	NA Depth	ε_t	ϕ	Ratio
	kip	k-ft	kip	k-ft	in			
1	1.33	0.82	0.00	26.51	2.21	0.00677	0.900	0.32
2	-1.33	0.82	-29.83	19.92	1.81	0.00891	0.900	0.39
3	0.48	22.45	0.00	26.51	2.21	0.00677	0.900	0.89

6. Diagrams

6.1. PM at θ=0 [deg]



16 x 10 in



PM at 0.0 [deg]

General Information	
Project	---
Column	---
Engineer	---
Code	ACI 318-14
Bar Set	ASTM A615
Units	English
Run Option	Design
Run Axis	X - axis
Slenderness	Not Considered
Column Type	Structural
Capacity Method	Critical capacity

Materials	
f'_c	3 ksi
E_c	3122.02 ksi
f_y	40 ksi
E_s	29000 ksi

Section	
Type	Rectangular
Width	16 in
Depth	10 in
A_g	160 in^2
I_x	1333.33 in^4
I_y	3413.33 in^4

Reinforcement	
Pattern	All sides equal
Bar layout	Rectangular
Cover to	Transverse bars
Clear cover	2 in
Bars	4 #7
Confinement type	Tied
Total steel area, A_s	2.40 in^2
Rho	1.50 %
Min. clear spacing	3.50 in

No.	P_u	M_{ux}	ϕP_n	ϕM_{nx}	Capacity
	kip	k-ft	kip	k-ft	Ratio
3	0.5	22.5	0.00	26.51	0.89
2	-1.3	0.8	-29.83	19.92	0.39
1	1.3	0.8	0.00	26.51	0.32

Max. Capacity Ratio: 0.89

Beam Design B4 - Gravity Beam

IN PLANE BENDING

Bending Axis	Shear Axis	
X-X/3-3	Y-Y/2-2	
lu (out of plane span) (in) =	252	
ln (in plane span) (in) =	252	
b (in) =	16	
h (in) =	10	
long bar size =	7	
Stirrup size =	3	
d bar long. =	0.875	
d stirrup =	0.375	
number of longitudinal bars =	4	
d' =	2.375	
f'c (psi) =	3000	
fy (psi) =	40000	
Pu Compression (k) =	1.33	
Pu Tension (k) =	1.330	
Tu (k-ft) =	0.00	
Max NA depth (in) =	1.8	2 layers in tension
Min NA depth (in) =	1.3	2 layers in tension
Mu Strong (k-ft) =	22.45	
Mu Weak (k-ft) =	0.00	

Beam Design Requirements

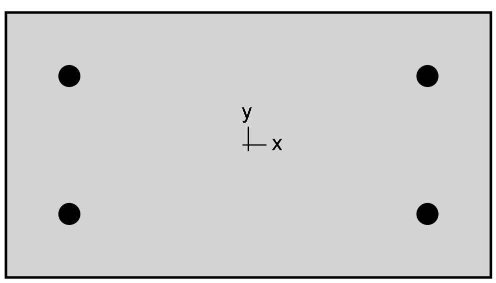
Stability						
ACI 318-14 (Sec. 9.2.3.1a)	lu ≤ 50*b					
	lu (in) =	252	≤	50*b (in) =	800	, Therefore OK
Minimum Beam Depth						
ACI 318-14 (T. 9.3.1.1)	hmin (one end continuous) = ln/18.5*(0.4+fy/100,000)					
	hmin =	7.26	≤	h=	10	, Therefore OK
Reinforcement Strain Limit in Nonprestressed Beams						
ACI 318-14 (Sec. 9.3.3.1)	εt ≥ 0.004					
SP Column Results	εt (compression) =	0.00677	≥	0.004	, Therefore OK	
SP Column Results	εt (tension) =	0.00891	≥	0.004	, Therefore OK	
Minimum Flexural Reinforcement in Nonprestressed Beams						
ACI 318-14 (Sec. 9.6.1.2)	As, min= max((3*√f'c*b*d)/fy , (200*b*d)/fy) =	0.44 in^2	≤	As, provided =	1.20	, Therefore OK
Longitudinal Reinforcement						
ACI 318-14 (Sec. 18.6.3.1)	ρ max =	0.025 in^2/in^2	≥	ρ, provided =	0.015	, Therefore OK

IN PLANE SHEAR

Beam Design Requirements

	Vu (k) =	4.57	+/-			
Nonprestressed Members with Axial Compression						
ACI 318-14 (Eq.22.5.6.1)	Vc Compression (k) =					
	2*(1+(Pu/2000*Ag))*λ*√f'c*b*d =	8.80				
Nonprestressed Members with Significant Axial Tension						
ACI 318-14 (Eq.22.5.7.1)						
	Vc Tension (k) = 2*(1+(Pu/500*Ag))*λ*√f'c*b*d =	12000	≥	Vc Compression (	4.57	, Therefore Vc compression controls
Minimum Shear Reinforcement						
ACI 318-14 (Sec. 9.6.3.1)	0.5*ϕv*Vc compression (k) =	3.300	≥	Vu (k) =	4.57	, Therefore Av, min Not Required
Members not designated as part of the seismic-force-resisting system						
ACI 318-14 (Sec. 18.14.3.1)	Members have been designed for controling values in ETABS model including δu effects, Therefore Section 18.14.3.2 applies					
ACI 318-14 (Sec. 18.14.3.2a)	Ag*f'c/10 (k) =	47.28	≥	Pu (k) =	1.33	, Therefore transverse reinforcejment is to be provided at smax = d/2
	smax = d/2=	2.75	, Therefore Av,min to be provided at a maxmum spacing of 2.5" o.c.			
ACI 318-14 (Sec. 25.7.2.2)	Minimum Stirrup Size =	3	Therefore use #3 Stirrups at 2.5" o.c. Throughout Beam			

spColumn v6.50
Computer program for the Strength Design of Reinforced Concrete Sections



StructurePoint

Contents

List of Figures

1. General Information

File Name	c:\senior project\lateral\beam d...\b2 middle.col
Project	---
Column	---
Engineer	---
Code	ACI 318-14
Bar Set	ASTM A615
Units	English
Run Option	Design
Run Axis	Biaxial
Slenderness	Not Considered
Column Type	Structural
Capacity Method	Critical capacity

2. Material Properties

2.1. Concrete

Type	Standard	
f'_c	3	ksi
E_c	3122.02	ksi
f_c	2.55	ksi
ε_u	0.003	in/in
β_1	0.85	

2.2. Steel

Type	Standard	
f_y	40	ksi
E_s	29000	ksi
ε_{yt}	0.00137931	in/in

3. Section

3.1. Shape and Properties

Type	Rectangular	
Width	22	in
Depth	12	in
A_g	264	in^2
I_x	3168	in^4
I_y	10648	in^4
r_x	3.4641	in
r_y	6.35085	in
X_o	0	in
Y_o	0	in

3.2. Section Figure

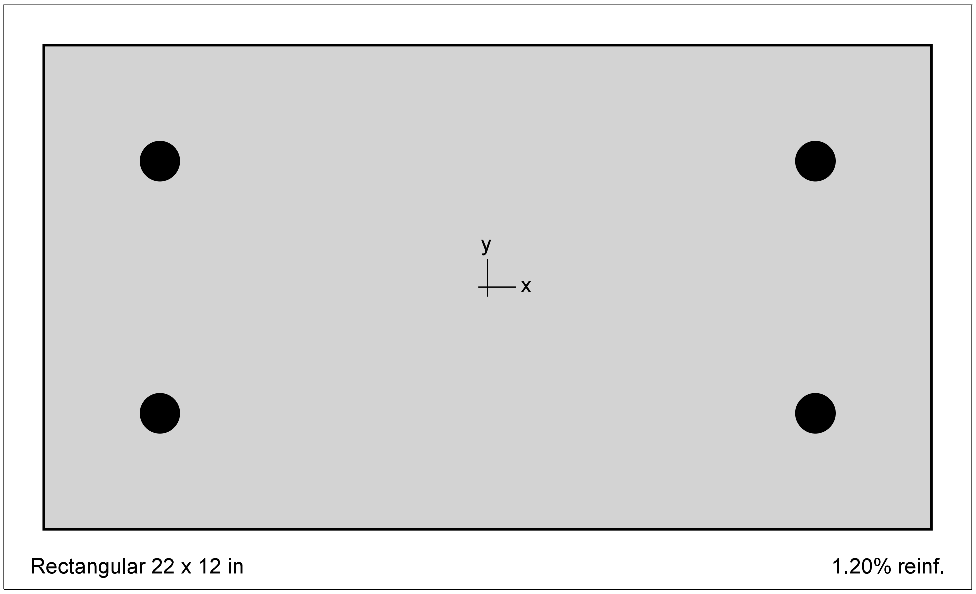


Figure 1: Column section

4. Reinforcement

4.1. Bar Set: ASTM A615

Bar	Diameter	Area	Bar	Diameter	Area	Bar	Diameter	Area
	in	in^2		in	in^2		in	in^2
#3	0.38	0.11	#4	0.50	0.20	#5	0.63	0.31
#6	0.75	0.44	#7	0.88	0.60	#8	1.00	0.79
#9	1.13	1.00	#10	1.27	1.27	#11	1.41	1.56
#14	1.69	2.25	#18	2.26	4.00			

4.2. Design Criteria

Bar selection	Min. number of bars
$A_{s,min}$ = 0.01 x A_g	2.64 in^2
$A_{s,max}$ = 0.08 x A_g	21.12 in^2
Allowable Capacity Ratio (<1 is safe)	0.98

4.3. Confinement and Factors

Confinement type	Tied
For #10 bars or less	#3 ties
For larger bars	#4 ties
Capacity Reduction Factors	
Axial compression, (a)	0.8
Tension controlled ϕ, (b)	0.9
Compression controlled ϕ, (c)	0.65

4.4. Arrangement

Pattern	All sides equal
Bar layout	Rectangular
Cover to	Transverse bars

Clear cover	2 in
Bars	4 #8
Total steel area, A_s	3.16 in^2
Rho	1.20 %
Minimum clear spacing	5.25 in

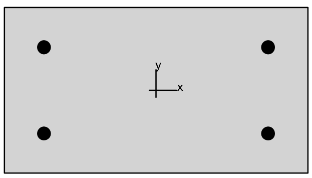
5. Factored Loads and Moments with Corresponding Capacity Ratios

NOTE: Calculations are based on "Critical Capacity" Method.
Allowable Capacity (Ratio) <= 0.98

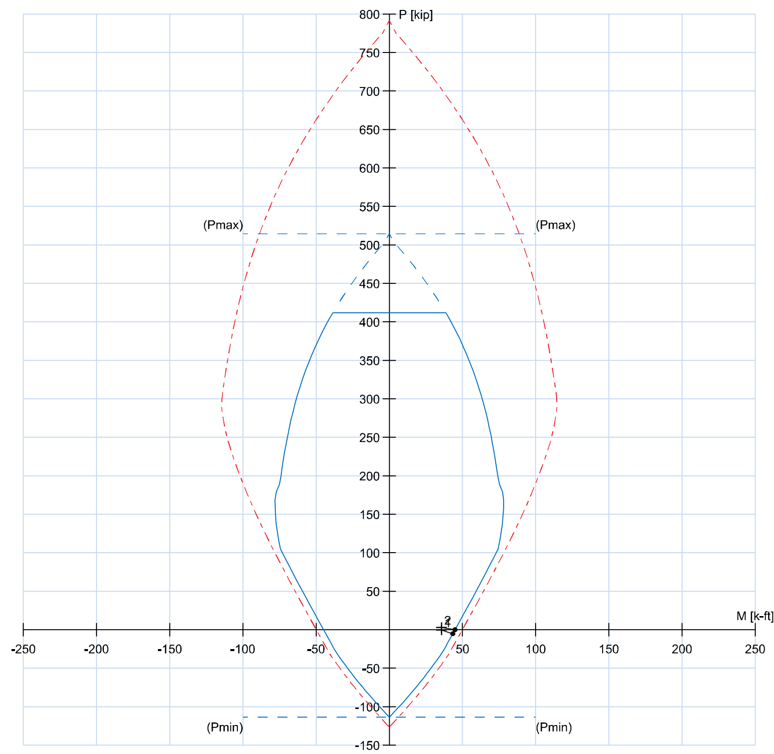
No.	Demand			Capacity			Parameters at Capacity			Capacity
	P_u	M_{ux}	M_{uy}	ϕP_n	ϕM_{nx}	ϕM_{ny}	NA Depth	ε_t	ϕ	Ratio
	kip	k-ft	k-ft	kip	k-ft	k-ft	in			
1	-0.44	35.60	0.00	-5.25	43.37	0.00	2.16	0.00968	0.900	0.89
2	2.70	35.60	0.00	0.00	44.90	0.00	2.20	0.00942	0.900	0.88

6. Diagrams

6.1. PM at θ=0 [deg]



22 x 12 in



PM at 0.0 [deg]

General Information	
Project	---
Column	---
Engineer	---
Code	ACI 318-14
Bar Set	ASTM A615
Units	English
Run Option	Design
Run Axis	Biaxial
Slenderness	Not Considered
Column Type	Structural
Capacity Method	Critical capacity

Materials	
f'_c	3 ksi
E_c	3122.02 ksi
f_y	40 ksi
E_s	29000 ksi

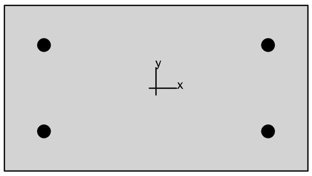
Section	
Type	Rectangular
Width	22 in
Depth	12 in
A_g	264 in²
I_x	3168 in⁴
I_y	10648 in⁴

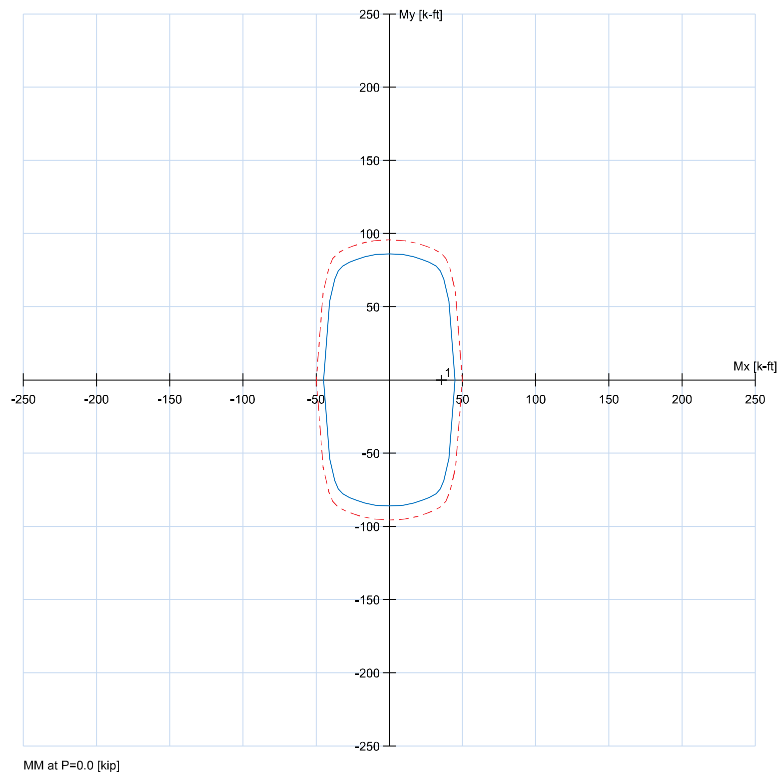
Reinforcement	
Pattern	All sides equal
Bar layout	Rectangular
Cover to	Transverse bars
Clear cover	2 in
Bars	4 #8
Confinement type	Tied
Total steel area, A_s	3.16 in²
Rho	1.20 %
Min. clear spacing	5.25 in

No.	P_u	M_{ux}	M_{uy}	ϕP_n	ϕM_{nx}	ϕM_{ny}	Capacity
	kip	k-ft	k-ft	kip	k-ft	k-ft	Ratio
1	-0.4	35.6	0.0	-5.25	43.37	0.00	0.89
2	2.7	35.6	0.0	0.00	44.90	0.00	0.88

Max. Capacity Ratio: 0.89

6.2. MM at P=0 [kip]





General Information

Project	---
Column	---
Engineer	---
Code	ACI 318-14
Bar Set	ASTM A615
Units	English
Run Option	Design
Run Axis	Biaxial
Slenderness	Not Considered
Column Type	Structural
Capacity Method	Critical capacity

Materials

f'_c	3 ksi
E_c	3122.02 ksi
f_y	40 ksi
E_s	29000 ksi

Section

Type	Rectangular
Width	22 in
Depth	12 in
A_g	264 in²
I_x	3168 in⁴
I_y	10648 in⁴

Reinforcement

Pattern	All sides equal
Bar layout	Rectangular
Cover to	Transverse bars
Clear cover	2 in
Bars	4 #8
Confinement type	Tied
Total steel area, A_s	3.16 in²
Rho	1.20 %
Min. clear spacing	5.25 in

No.	P_u	M_{ux}	M_{uy}	ϕP_n	ϕM_{nx}	ϕM_{ny}	Capacity
	kip	k-ft	k-ft	kip	k-ft	k-ft	Ratio
1	-0.4	35.6	0.0	-5.25	43.37	0.00	0.89

Max. Capacity Ratio: 0.89

Beam Design — B5 - Special Moment Frame Beam

IN PLANE BENDING

Bending Axis	Shear Axis	
X-X/3-3	Y-Y/2-2	
lu (out of plane span) (in) =	294	
ln (in plane span) (in) =	294	
b (in) =	22	
h (in) =	12	
long bar size =	8	
Tie size =	3	
number of longitudinal bars =	4	
d' =	2.375	
f'c (psi) =	3000	
fy (psi) =	40000	
Pu Compression (k) =	2.7	
Pu Tension (k) =	0.440	
Tu (k-ft) =	0.48	
Max NA depth (in) =	2.3	2 layers in tension
Min NA depth (in) =	2.2	2 layers in tension
Mu Strong (k-ft) =	35.60	
Mu Weak (k-ft) =	0.00	

Beam Design Requirements

Stability

ACI 318-14 (Sec. 9.2.3.1a) — lu ≤ 50*b

lu (in) = 294 ≤ 50*b (in) = 1100 , Therefore OK

Minimum Beam Depth

ACI 318-14 (T. 9.3.1.1) — hmin (one end continuous) = ln/18.5*(0.4+fy/100,000)

hmin = 7.26 ≤ h= 12 , Therefore OK

Moment

ACI 318-14 (Sec. 9.5.2.1) — Ag*f'c/10 (k) = 78.26 ≥ Pu (k) = 2.7 , Therefore Slenderness can be neglected, Mn shall be calculated in accordance with Section 22.3, and design of combined flexural and axial strength is not required

Reinforcement Strain Limit in Nonprestressed Beams

ACI 318-14 (Sec. 9.3.3.1) — εt ≥ 0.004

SP Column Results — εt (compression) = 0.009 ≥ 0.004 , Therefore OK

SP Column Results — εt (tension) = 0.00925 ≥ 0.004 , Therefore OK

Special Moment Frame Beam Design Requirements

Dimensional Limits

ACI 318-14 (Sec. 18.6.2.1a) — ln ≥ 4d

ln (in) = 294 ≥ 4d (in) = 24.00 , Therefore OK

ACI 318-14 (Sec. 18.6.2.1b) — b ≥ min (0.3*h, 10in)

b (in) = 22 ≥ 0.3*h (in) = 3.6 & 10 , Therefore OK

ACI 318-14 (Sec. 18.6.2.1c) — Beam width is to be equal to column width , Therefore OK

Longitudinal Reinforcement

ACI 318-14 (Eq. 9.6.1.2a) — As min = (3*√f'c*b*d)/fy = 0.542 in^2 ≤ As provided = 3.142 in^2 , Therefore OK

ACI 318-14 (Eq. 9.6.1.2b) — As min = (200*b*d)/fy = 0.240 in^2 ≤ As provided = 3.142 in^2 , Therefore OK

Longitudinal Reinforcement

ACI 318-14 (Sec. 18.6.3.1) — ρ max = 0.025 in^2/in^2 ≥ ρ provided = 0.012 , Therefore OK

ACI 318-14 (Sec. 18.6.3.2) — Beam is symmetric about x axis and flexural design is uniform throughout section , Therefore OK

ACI 318-14 (Sec. 18.6.4.2) — spacing between longitudinal bars with ties ≤ 14 in — spacing provided = 17.25 in , Therefore OK

Distribution of Flexural Reinforcement in one-way Slabs and Beams

ACI 318-14 (T. 24.3.2) — Smax, H (in) = 15*(40,000/0.66*fy) - 2.5*Cc = 16.6 ≥ spacing provided = 18 in

ACI 318-14 (T. 24.3.2) — Smax, H (in) = 12*(40,000/0.66*fy) = 18.0 ≥ spacing provided = 18 in

OUT OF PLANE BENDING

	Bending Axis	Shear Axis
	Y-Y/2-2	X-X/3-3

lu (out of plane span) (in) =	294
ln (in plane span) (in) =	294
b (in) =	12
h (in) =	22
long bar size =	7
Tie size =	3
d bar long. =	0.875
d Tie =	0.375
number of longitudinal bars =	4
Area of long bars =	0.601
f'c (psi) =	3000
fy (psi) =	40000
Pu Compression (k) =	2.7
Pu Tension (k) =	0.44
Tu (k) =	0.48
εy =	0.00138
Ag (in^2) =	261.6

Beam Design Requirements

Stability						
ACI 318-14 (Sec. 9.2.3.1a)	lu ≤ 50*b					
	lu (in) =	294	≤	50*b (in) =	600	, Therefore OK
Minimum Beam Depth						
ACI 318-14 (T. 9.3.1.1)	hmin (one end continuous) = ln/18.5*(0.4+fy/100,000)					
	hmin =	7.26	≤	h=	22	, Therefore OK
Moment						
ACI 318-14 (Sec. 9.5.2.1)	Ag*f'c/10 (k) =	78.48	≥	Pu (k) =	2.7	, Therefore Slenderness can be Neglected, Mn shall be calculated in accordance with Section 22.3, and design of combined flexural and axial strength is not required
Reinforcement Strain Limit in Nonprestressed Beams						
ACI 318-14 (Sec. 9.3.3.1)	εt ≥ 0.004					
SP Column Results	εt (compression) =	0.009	≥	0.004		, Therefore OK
SP Column Results	εt (tension) =	0.00925	≥	0.004		, Therefore OK

Diaphragm Design Requirements

Reinforcement						
ACI 318-14 (Sec. 18.12.7.3)	εt (tension) =	0.00925	≥	εy =	0.00138	, Therefore Tension Steel has Yielded

IN PLANE SHEAR

Beam Design Requirements

	Vu (k) =	10.25	+/-			
Nonprestressed Members with Axial Compression						
ACI 318-14 (Eq.22.5.6.1)	Vc Compression (k) = 2*(1+(Pu/2000*Ag))*λ*√f'c*b*d =	14.53				
Nonprestressed Members with Significant Axial Tension						
ACI 318-14 (Eq.22.5.7.1)	Vc Tension (k) = 2*(1+(Pu/500*Ag))*λ*√f'c*b*d =	14250	≥	Vc Compression (k) =	10.25	, Therefore Vc compression controls
Minimum Shear Reinforcement						
ACI 318-14 (Sec. 9.6.3.1)	0.5*ϕv*Vc compression (k) =	5.451	≤	Vu (k) =	10.25	, Therefore Av, min Required
	ϕv*Vc compression (k) =	10.901	≤	Vu (k) =	10.25	, Therefore Additional Shear Reinforcement Required
ACI 318-14 (T. 9.6.3.3a)	Av, min/s (in^2/in) = (0.75*√f'c*b)/fyt =	0.023				
ACI 318-14 (T. 9.6.3.3b)	Av,min/s (in^2/in) = (50*b)/fyt) =	0.028	Controls			
	Av, provided =	0.221				
One-way Shear Strength Provided by Transverse Reinforcement						
ACI 318-14 (Eq. 22.5.10.5.3)	Vs (lbs) = (Av/s)*fyt*d =	13254				
Shear						
ACI 318-14 (T. 9.7.6.2.2)	4*√f'c*b*d (lbs) =	28920	≥	Vs =	13254	, Therefore sv max = Min (d/2 , 24)
	sv max (in) = Min (d/2 , 24) =	3.0	, Therefore use ties spaced @ 5.5" o.c.			
ACI 318-14 (Eq. 22.5.10.5.3)	ϕv*Vn (k) = ϕv*Vs = ϕv*(Av/s)*fyt*d =	7.23	≤	Vu (k) =	10.25	, Therefore Additional Shear Reinforcement Required, decrease spacing to 3.5" o.c.
	ϕv*Vn (k) = ϕv*Vs = ϕv*(Av/s)*fyt*d =	11.36	≥	Vu (k) =	10.25	, Therefore Ok, Use #3 Ties Spaced @ 3.5" o.c. where Vu ≥ 3.4 k

Special Moment Frame Beam Design Requirements

Transverse Reinforcement

ACI 318-14 (Sec. 18.6.4.1a & 18.6.4.4)	Ties to be provided at least	44.0	in from each side of support starting ≤ 2in from face of column
ACI 318-14 (Sec. 18.6.4.1b)	Ties to be provided where flexural reinforcement is anticipated to yield out-of-plane = center	88.0	in within the beam
ACI 318-14 (Sec. 18.6.4.4)	sv, max (in) where hoops required = Min(d/4, 6df, 6) =	1.5 in	, Therefore use spacing of 1.5" at locations required by 18.6.4.1
ACI 318-14 (Sec. 18.6.4.6)	sv, max (in) where hoops not required = d/2 =	3.0 in	, Therefore use spacing of 3" at all locations other than those required by 18.6.4.1
ACI 318-14 (Sec. 18.6.4.7)	Ag*f'c/10 (k) =	78.26 ≥	Pu (k) = 2.7 , Therefore Additional Shear Reinforcement Not Required

Shear Strength

ACI 318-14 (Sec. 18.6.5.2)	Ve (k) = Max Seismic Shear =	14.29 ≥	Vu/2 (k) = 5.13
	Ag*f'c/20 (k) =	39.13 ≥	Pu (k) = 2.7 , Therefore Shear Reinforcement Shall be designed assuming Vc=0 for locations specified in Sec. 18.6.4.1
ACI 318-14 (Eq. 22.5.10.5.3)	ϕv*Vn (k) = ϕv*Vs = ϕv*(Av/s)*fyt*d =	64 ≥	Vu (k) = 10.25 , Therefore #3 ties spaced @ 1.5" o.c. are adequate

OUT OF PLANE SHEAR

Beam Design Requirements

Vu out-of-plane ≤ Vu min in-plane , Therefore No Additional Shear Reinforcement Required

Diaphragm Design Requirements

Shear

ACI 318-14 (Eq. 12.5.3.3, Eq.18.12.9.1)	Vn (k) = Acv*(2* λ*√f'c + ρt*fy) =	30.85	
	ϕVn (k) =	23.13 ≥	Vu (k) = 10.25 , Therefore Ok
ACI 318-14 (Eq. 12.5.3.4)	ϕ8*Acv*√f'c (k) =	86 ≥	Vn (k) = 30.85 , Therefore Ok

Reinforcement

ACI 318-14 (Sec. 18.12.7.5)	(Pu/A)/f'c =	0.003 ≤	0.4 , Therefore Additional Transverse Reinforcement Not Required

Shear Strength

ACI 318-14 (Sec.18.12.9.2)	Vn, max (k) = 8*Acv*√f'c =	115 ≥	30.85 , Therefore Ok

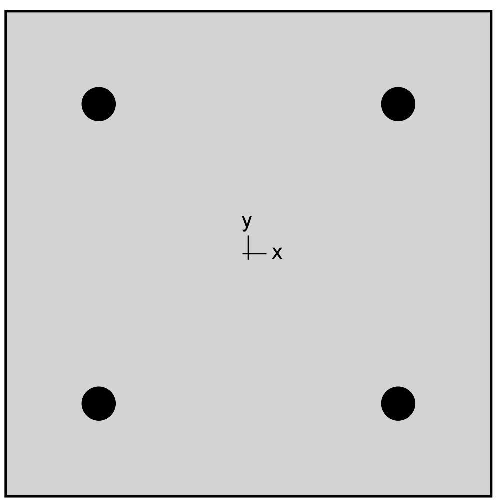
TORSION

Torsional Strength

Threshold Torsion

ACI 318-14 (Sec. 22.7.4.1a & 22.7.1.1)	ϕT_{th} compression (k) = $(\lambda*\sqrt{f'c}*A_{cp}^2)/p_{cp} * \sqrt{(1+ (Nu/4*Ag*\lambda*\sqrt{f'c}))}$ =	43.09 ≥	Tu (k) = 0.48 , Therefore Torsional Effects may be Neglected
	ϕT_{th} tension (k) = $(\lambda*\sqrt{f'c}*A_{cp}^2)/p_{cp} * \sqrt{(1+ (Nu/4*Ag*\lambda*\sqrt{f'c}))}$ =	41.94 ≥	Tu (k) = 0.48 , Therefore Torsional Effects may be Neglected

spColumn v6.50
Computer program for the Strength Design of Reinforced Concrete Sections



Contents

List of Figures

1. General Information

File Name	c:\senior project\lateral\beam design\c1.col
Project	---
Column	---
Engineer	---
Code	ACI 318-14
Bar Set	ASTM A615
Units	English
Run Option	Design
Run Axis	Biaxial
Slenderness	Considered
Column Type	Structural
Capacity Method	Moment capacity

2. Material Properties

2.1. Concrete

Type	Standard	
f'_c	3	ksi
E_c	3122.02	ksi
f_c	2.55	ksi
ε_u	0.003	in/in
β_1	0.85	

2.2. Steel

Type	Standard	
f_y	40	ksi
E_s	29000	ksi
ε_{yt}	0.00137931	in/in

3. Section

3.1. Shape and Properties

Type	Rectangular	
Width	16	in
Depth	16	in
A_g	256	in^2
I_x	5461.33	in^4
I_y	5461.33	in^4
r_x	4.6188	in
r_y	4.6188	in
X_o	0	in
Y_o	0	in

3.2. Section Figure

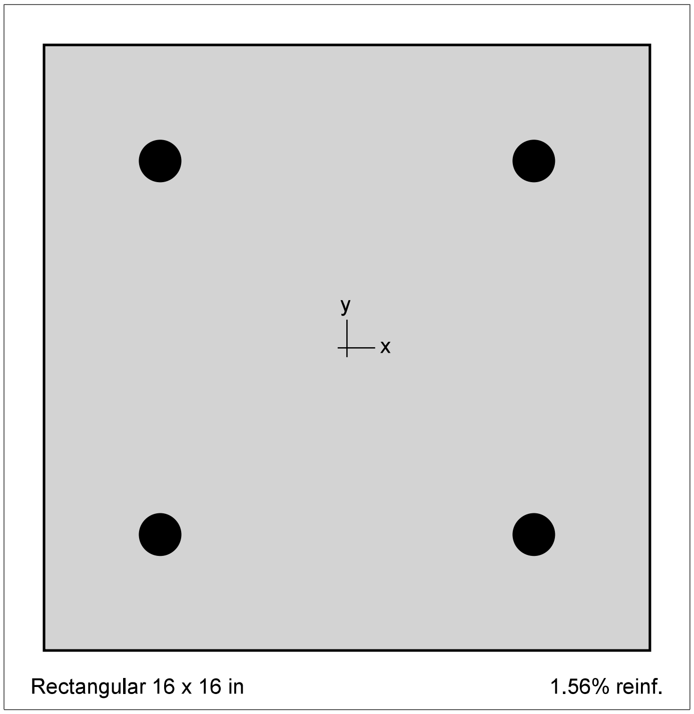


Figure 1: Column section

4. Reinforcement

4.1. Bar Set: ASTM A615

Bar	Diameter	Area	Bar	Diameter	Area	Bar	Diameter	Area
	in	in^2		in	in^2		in	in^2
#3	0.38	0.11	#4	0.50	0.20	#5	0.63	0.31
#6	0.75	0.44	#7	0.88	0.60	#8	1.00	0.79
#9	1.13	1.00	#10	1.27	1.27	#11	1.41	1.56
#14	1.69	2.25	#18	2.26	4.00			

4.2. Design Criteria

Bar selection	Min. number of bars
$A_{s,min}$ = 0.01 x A_g	2.56 in^2
$A_{s,max}$ = 0.08 x A_g	20.48 in^2
Allowable Capacity Ratio (<1 is safe)	0.98

4.3. Confinement and Factors

Confinement type	Tied
For #10 bars or less	#4 ties
For larger bars	#4 ties
Capacity Reduction Factors	
Axial compression, (a)	0.8
Tension controlled ϕ, (b)	0.9
Compression controlled ϕ, (c)	0.65

4.4. Arrangement

Pattern	All sides equal
Bar layout	Rectangular
Cover to	Transverse bars
Clear cover	2 in
Bars	4 #9
Total steel area, A_s	4.00 in^2
Rho	1.56 %
Minimum clear spacing	8.74 in

5. Loading

5.1. Load Combinations

Combination	Dead	Live	Wind	EQ	Snow
U1	1.400	0.000	0.000	0.000	1.000
U2	1.200	1.600	0.000	0.000	1.000
U3	1.200	0.500	0.000	0.000	1.000
U4	1.200	0.000	0.000	1.000	1.000
U5	0.900	0.000	0.000	1.000	1.000
U6	1.200	0.000	0.000	-1.000	1.000
U7	0.900	0.000	0.000	-1.000	1.000

5.2. Service Loads

No.	Load Case	Axial Load	Mx @ Top	Mx @ Bottom	My @ Top	My @ Bottom
		kip	k-ft	k-ft	k-ft	k-ft
1	Dead	2.59	4.38	0.00	1.00	0.00
1	Live	3.82	4.94	0.00	0.89	0.00
1	Wind	0.00	0.00	0.00	0.00	0.00
1	EQ	1.62	0.01	0.00	23.40	0.00
1	Snow	0.00	0.00	0.00	0.00	0.00
2	Dead	2.59	0.00	0.00	0.00	0.00
2	Live	3.82	0.00	0.00	0.00	0.00
2	Wind	0.00	0.00	0.00	0.00	0.00
2	EQ	1.62	0.00	0.00	0.00	0.00
2	Snow	0.00	43.00	0.00	66.00	0.00
3	Dead	2.59	0.00	0.00	0.00	0.00
3	Live	3.82	0.00	0.00	0.00	0.00
3	Wind	0.00	0.00	0.00	0.00	0.00
3	EQ	-1.62	0.00	0.00	0.00	0.00
3	Snow	0.00	43.00	0.00	66.00	0.00
4	Dead	2.59	4.38	0.00	1.00	0.00
4	Live	3.82	4.94	0.00	0.89	0.00
4	Wind	0.00	0.00	0.00	0.00	0.00
4	EQ	-1.62	0.01	0.00	23.40	0.00
4	Snow	0.00	0.00	0.00	0.00	0.00
5	Dead	2.59	4.38	0.00	1.00	0.00
5	Live	3.82	4.94	0.00	0.89	0.00
5	Wind	0.00	0.00	0.00	0.00	0.00
5	EQ	0.42	27.40	0.00	0.01	0.00
5	Snow	0.00	0.00	0.00	0.00	0.00
6	Dead	2.59	0.00	0.00	0.00	0.00
6	Live	3.82	0.00	0.00	0.00	0.00
6	Wind	0.00	0.00	0.00	0.00	0.00
6	EQ	0.42	0.00	0.00	0.00	0.00

No.	Load Case	Axial Load	Mx @ Top	Mx @ Bottom	My @ Top	My @ Bottom
		kip	k-ft	k-ft	k-ft	k-ft
6	Snow	0.00	43.00	0.00	66.00	0.00
7	Dead	2.59	0.00	0.00	0.00	0.00
7	Live	3.82	0.00	0.00	0.00	0.00
7	Wind	0.00	0.00	0.00	0.00	0.00
7	EQ	-0.42	0.00	0.00	0.00	0.00
7	Snow	0.00	43.00	0.00	66.00	0.00
8	Dead	2.59	4.38	0.00	1.00	0.00
8	Live	3.82	4.94	0.00	0.89	0.00
8	Wind	0.00	0.00	0.00	0.00	0.00
8	EQ	-0.42	27.40	0.00	0.01	0.00
8	Snow	0.00	0.00	0.00	0.00	0.00

5.3. Sustained Load Factors

Load Case	Factor
	%
Dead	0
Live	0
Wind	0
EQ	0
Snow	0

6. Slenderness

6.1. Sway Criteria

X-Axis	Sway column
2nd order effects along length	Considered
$\sum P_c$	$6.74 \times P_c$
$\sum P_u$	$9.61 \times P_u$
Y-Axis	Sway column
2nd order effects along length	Considered
$\sum P_c$	$6.74 \times P_c$
$\sum P_u$	$9.61 \times P_u$

6.2. Columns

Column	Axis	Height	Width	Depth	I	f'_c	E_c
		ft	in	in	in^4	ksi	ksi
Design	X	16.5	16	16	5461.33	3	3122.02
Design	Y	16.5	16	16	5461.33	3	3122.02
Above	X	(no column specified...)					
Above	Y	(no column specified...)					
Below	X	(no column specified...)					
Below	Y	(no column specified...)					

6.3. X - Beams

Beam	Length	Width	Depth	I	f'_c	E_c
	ft	in	in	in^4	ksi	ksi
Above Left	14	18	12	2592	3	3122.02
Above Right	(no beam specified...)					
Below Left	(no beam specified...)					
Below Right	(no beam specified...)					

6.4. Y - Beams

Beam	Length	Width	Depth	I	f'_c	E_c
	ft	in	in	in^4	ksi	ksi
Above Left	(no beam specified...)					
Above Right	24.5	18	12	2592	3	3122.02
Below Left	(no beam specified...)					
Below Right	(no beam specified...)					

7. Moment Magnification

7.1. General Parameters

Factors	Code defaults
Stiffness reduction factor, ϕ_K	0.75
Cracked section coefficients, cI(beams)	0.35
Cracked section coefficients, cI(columns)	0.7
$0.2\ E_c\ I_g + E_s\ I_{se}$ (X-axis)	6.24e+006 kip-in²
$0.2\ E_c\ I_g + E_s\ I_{se}$ (Y-axis)	6.24e+006 kip-in²
Minimum eccentricity, $e_{x\ min}$	1.08 in
Minimum eccentricity, $e_{y\ min}$	1.08 in

7.2. Effective Length Factors

Axis	Ψ_{top}	Ψ_{bottom}	k (Nonsway)	k (Sway)	kl_u/r
X	3.470	999.000	0.950	3.031	129.93
Y	6.073	999.000	0.969	3.649	156.42

Notes:
Slenderness kl_u/r is greater than 100.
A second-order frame analysis is recommended to account for slenderness.

7.3. Magnification Factors: X - axis

Load		At Ends					Along Length					
Combo		$\sum P_u$	P_c	$\sum P_c$	β_{ds}	δ_s	P_u	$k'l_u/r$	P_c	β_{dns}	C_m	δ
		kip	kip	kip			kip		kip			
1	U1	34.81	170.91	1152.60	0.000	1.042	3.62	(N/A)	1738.98	0.000	0.600	1.000
1	U2	88.55	170.91	1152.60	0.000	1.114	9.22	(N/A)	1738.98	0.000	0.600	1.000
1	U3	48.18	170.91	1152.60	0.000	1.059	5.02	(N/A)	1738.98	0.000	0.600	1.000
1	U4	45.44	170.91	1152.60	0.000	1.055	4.73	(N/A)	1738.98	0.000	0.600	1.000
1	U5	37.98	170.91	1152.60	0.000	1.046	3.95	(N/A)	1738.98	0.000	0.600	1.000
1	U6	14.23	170.91	1152.60	0.000	1.017	1.48	(N/A)	1738.98	0.000	0.600	1.000
1	U7	6.77	170.91	1152.60	0.000	1.008	0.71	(N/A)	1738.98	0.000	0.600	1.000
2	U1	34.81	170.91	1152.60	0.000	1.042	3.62	(N/A)	1738.98	0.000	0.600	1.000
2	U2	88.55	170.91	1152.60	0.000	1.114	9.22	(N/A)	1738.98	0.000	0.600	1.000
2	U3	48.18	170.91	1152.60	0.000	1.059	5.02	(N/A)	1738.98	0.000	0.600	1.000
2	U4	45.44	170.91	1152.60	0.000	1.055	4.73	(N/A)	1738.98	0.000	0.600	1.000
2	U5	37.98	170.91	1152.60	0.000	1.046	3.95	(N/A)	1738.98	0.000	0.600	1.000
2	U6	14.23	170.91	1152.60	0.000	1.017	1.48	(N/A)	1738.98	0.000	0.600	1.000
2	U7	6.77	170.91	1152.60	0.000	1.008	0.71	(N/A)	1738.98	0.000	0.600	1.000
3	U1	34.81	170.91	1152.60	0.000	1.042	3.62	(N/A)	1738.98	0.000	0.600	1.000
3	U2	88.55	170.91	1152.60	0.000	1.114	9.22	(N/A)	1738.98	0.000	0.600	1.000
3	U3	48.18	170.91	1152.60	0.000	1.059	5.02	(N/A)	1738.98	0.000	0.600	1.000
3	U4	14.23	170.91	1152.60	0.000	1.017	1.48	(N/A)	1738.98	0.000	0.600	1.000
3	U5	6.77	170.91	1152.60	0.000	1.008	0.71	(N/A)	1738.98	0.000	0.600	1.000
3	U6	45.44	170.91	1152.60	0.000	1.055	4.73	(N/A)	1738.98	0.000	0.600	1.000
3	U7	37.98	170.91	1152.60	0.000	1.046	3.95	(N/A)	1738.98	0.000	0.600	1.000

Load Combo		At Ends ∑P_u kip	P_c kip	∑P_c kip	β_{ds}	δ_s	Along Length P_u kip	$k'l_u/r$	P_c kip	β_{dns}	C_m	δ
4	U1	34.81	170.91	1152.60	0.000	1.042	3.62	(N/A)	1738.98	0.000	0.600	1.000
4	U2	88.55	170.91	1152.60	0.000	1.114	9.22	(N/A)	1738.98	0.000	0.600	1.000
4	U3	48.18	170.91	1152.60	0.000	1.059	5.02	(N/A)	1738.98	0.000	0.600	1.000
4	U4	14.23	170.91	1152.60	0.000	1.017	1.48	(N/A)	1738.98	0.000	0.600	1.000
4	U5	6.77	170.91	1152.60	0.000	1.008	0.71	(N/A)	1738.98	0.000	0.600	1.000
4	U6	45.44	170.91	1152.60	0.000	1.055	4.73	(N/A)	1738.98	0.000	0.600	1.000
4	U7	37.98	170.91	1152.60	0.000	1.046	3.95	(N/A)	1738.98	0.000	0.600	1.000
5	U1	34.81	170.91	1152.60	0.000	1.042	3.62	(N/A)	1738.98	0.000	0.600	1.000
5	U2	88.55	170.91	1152.60	0.000	1.114	9.22	(N/A)	1738.98	0.000	0.600	1.000
5	U3	48.18	170.91	1152.60	0.000	1.059	5.02	(N/A)	1738.98	0.000	0.600	1.000
5	U4	33.88	170.91	1152.60	0.000	1.041	3.53	(N/A)	1738.98	0.000	0.600	1.000
5	U5	26.42	170.91	1152.60	0.000	1.032	2.75	(N/A)	1738.98	0.000	0.600	1.000
5	U6	25.79	170.91	1152.60	0.000	1.031	2.68	(N/A)	1738.98	0.000	0.600	1.000
5	U7	18.33	170.91	1152.60	0.000	1.022	1.91	(N/A)	1738.98	0.000	0.600	1.000
6	U1	34.81	170.91	1152.60	0.000	1.042	3.62	(N/A)	1738.98	0.000	0.600	1.000
6	U2	88.55	170.91	1152.60	0.000	1.114	9.22	(N/A)	1738.98	0.000	0.600	1.000
6	U3	48.18	170.91	1152.60	0.000	1.059	5.02	(N/A)	1738.98	0.000	0.600	1.000
6	U4	33.88	170.91	1152.60	0.000	1.041	3.53	(N/A)	1738.98	0.000	0.600	1.000
6	U5	26.42	170.91	1152.60	0.000	1.032	2.75	(N/A)	1738.98	0.000	0.600	1.000
6	U6	25.79	170.91	1152.60	0.000	1.031	2.68	(N/A)	1738.98	0.000	0.600	1.000
6	U7	18.33	170.91	1152.60	0.000	1.022	1.91	(N/A)	1738.98	0.000	0.600	1.000
7	U1	34.81	170.91	1152.60	0.000	1.042	3.62	(N/A)	1738.98	0.000	0.600	1.000
7	U2	88.55	170.91	1152.60	0.000	1.114	9.22	(N/A)	1738.98	0.000	0.600	1.000
7	U3	48.18	170.91	1152.60	0.000	1.059	5.02	(N/A)	1738.98	0.000	0.600	1.000
7	U4	25.79	170.91	1152.60	0.000	1.031	2.68	(N/A)	1738.98	0.000	0.600	1.000
7	U5	18.33	170.91	1152.60	0.000	1.022	1.91	(N/A)	1738.98	0.000	0.600	1.000
7	U6	33.88	170.91	1152.60	0.000	1.041	3.53	(N/A)	1738.98	0.000	0.600	1.000
7	U7	26.42	170.91	1152.60	0.000	1.032	2.75	(N/A)	1738.98	0.000	0.600	1.000
8	U1	34.81	170.91	1152.60	0.000	1.042	3.62	(N/A)	1738.98	0.000	0.600	1.000
8	U2	88.55	170.91	1152.60	0.000	1.114	9.22	(N/A)	1738.98	0.000	0.600	1.000
8	U3	48.18	170.91	1152.60	0.000	1.059	5.02	(N/A)	1738.98	0.000	0.600	1.000
8	U4	25.79	170.91	1152.60	0.000	1.031	2.68	(N/A)	1738.98	0.000	0.600	1.000
8	U5	18.33	170.91	1152.60	0.000	1.022	1.91	(N/A)	1738.98	0.000	0.600	1.000
8	U6	33.88	170.91	1152.60	0.000	1.041	3.53	(N/A)	1738.98	0.000	0.600	1.000
8	U7	26.42	170.91	1152.60	0.000	1.032	2.75	(N/A)	1738.98	0.000	0.600	1.000

7.4. Magnification Factors: Y - axis

Load Combo		At Ends ∑P_u kip	P_c kip	∑P_c kip	β_{ds}	δ_s	Along Length P_u kip	$k'l_u/r$	P_c kip	β_{dns}	C_m	δ
1	U1	34.81	117.91	795.21	0.000	1.062	3.62	(N/A)	1670.37	0.000	0.600	1.000
1	U2	88.55	117.91	795.21	0.000	1.174	9.22	(N/A)	1670.37	0.000	0.600	1.000
1	U3	48.18	117.91	795.21	0.000	1.088	5.02	(N/A)	1670.37	0.000	0.600	1.000
1	U4	45.44	117.91	795.21	0.000	1.082	4.73	(N/A)	1670.37	0.000	0.600	1.000
1	U5	37.98	117.91	795.21	0.000	1.068	3.95	(N/A)	1670.37	0.000	0.600	1.000
1	U6	14.23	117.91	795.21	0.000	1.024	1.48	(N/A)	1670.37	0.000	0.600	1.000
1	U7	6.77	117.91	795.21	0.000	1.011	0.71	(N/A)	1670.37	0.000	0.600	1.000
2	U1	34.81	117.91	795.21	0.000	1.062	3.62	(N/A)	1670.37	0.000	0.600	1.000
2	U2	88.55	117.91	795.21	0.000	1.174	9.22	(N/A)	1670.37	0.000	0.600	1.000
2	U3	48.18	117.91	795.21	0.000	1.088	5.02	(N/A)	1670.37	0.000	0.600	1.000
2	U4	45.44	117.91	795.21	0.000	1.082	4.73	(N/A)	1670.37	0.000	0.600	1.000
2	U5	37.98	117.91	795.21	0.000	1.068	3.95	(N/A)	1670.37	0.000	0.600	1.000
2	U6	14.23	117.91	795.21	0.000	1.024	1.48	(N/A)	1670.37	0.000	0.600	1.000

Load Combo		At Ends					Along Length					
		$\sum P_u$	P_c	$\sum P_c$	β_{ds}	δ_s	P_u	$k'l_u/r$	P_c	β_{dns}	C_m	δ
		kip	kip	kip			kip		kip			
2	U7	6.77	117.91	795.21	0.000	1.011	0.71	(N/A)	1670.37	0.000	0.600	1.000
3	U1	34.81	117.91	795.21	0.000	1.062	3.62	(N/A)	1670.37	0.000	0.600	1.000
3	U2	88.55	117.91	795.21	0.000	1.174	9.22	(N/A)	1670.37	0.000	0.600	1.000
3	U3	48.18	117.91	795.21	0.000	1.088	5.02	(N/A)	1670.37	0.000	0.600	1.000
3	U4	14.23	117.91	795.21	0.000	1.024	1.48	(N/A)	1670.37	0.000	0.600	1.000
3	U5	6.77	117.91	795.21	0.000	1.011	0.71	(N/A)	1670.37	0.000	0.600	1.000
3	U6	45.44	117.91	795.21	0.000	1.082	4.73	(N/A)	1670.37	0.000	0.600	1.000
3	U7	37.98	117.91	795.21	0.000	1.068	3.95	(N/A)	1670.37	0.000	0.600	1.000
4	U1	34.81	117.91	795.21	0.000	1.062	3.62	(N/A)	1670.37	0.000	0.600	1.000
4	U2	88.55	117.91	795.21	0.000	1.174	9.22	(N/A)	1670.37	0.000	0.600	1.000
4	U3	48.18	117.91	795.21	0.000	1.088	5.02	(N/A)	1670.37	0.000	0.600	1.000
4	U4	14.23	117.91	795.21	0.000	1.024	1.48	(N/A)	1670.37	0.000	0.600	1.000
4	U5	6.77	117.91	795.21	0.000	1.011	0.71	(N/A)	1670.37	0.000	0.600	1.000
4	U6	45.44	117.91	795.21	0.000	1.082	4.73	(N/A)	1670.37	0.000	0.600	1.000
4	U7	37.98	117.91	795.21	0.000	1.068	3.95	(N/A)	1670.37	0.000	0.600	1.000
5	U1	34.81	117.91	795.21	0.000	1.062	3.62	(N/A)	1670.37	0.000	0.600	1.000
5	U2	88.55	117.91	795.21	0.000	1.174	9.22	(N/A)	1670.37	0.000	0.600	1.000
5	U3	48.18	117.91	795.21	0.000	1.088	5.02	(N/A)	1670.37	0.000	0.600	1.000
5	U4	33.88	117.91	795.21	0.000	1.060	3.53	(N/A)	1670.37	0.000	0.600	1.000
5	U5	26.42	117.91	795.21	0.000	1.046	2.75	(N/A)	1670.37	0.000	0.600	1.000
5	U6	25.79	117.91	795.21	0.000	1.045	2.68	(N/A)	1670.37	0.000	0.600	1.000
5	U7	18.33	117.91	795.21	0.000	1.032	1.91	(N/A)	1670.37	0.000	0.600	1.000
6	U1	34.81	117.91	795.21	0.000	1.062	3.62	(N/A)	1670.37	0.000	0.600	1.000
6	U2	88.55	117.91	795.21	0.000	1.174	9.22	(N/A)	1670.37	0.000	0.600	1.000
6	U3	48.18	117.91	795.21	0.000	1.088	5.02	(N/A)	1670.37	0.000	0.600	1.000
6	U4	33.88	117.91	795.21	0.000	1.060	3.53	(N/A)	1670.37	0.000	0.600	1.000
6	U5	26.42	117.91	795.21	0.000	1.046	2.75	(N/A)	1670.37	0.000	0.600	1.000
6	U6	25.79	117.91	795.21	0.000	1.045	2.68	(N/A)	1670.37	0.000	0.600	1.000
6	U7	18.33	117.91	795.21	0.000	1.032	1.91	(N/A)	1670.37	0.000	0.600	1.000
7	U1	34.81	117.91	795.21	0.000	1.062	3.62	(N/A)	1670.37	0.000	0.600	1.000
7	U2	88.55	117.91	795.21	0.000	1.174	9.22	(N/A)	1670.37	0.000	0.600	1.000
7	U3	48.18	117.91	795.21	0.000	1.088	5.02	(N/A)	1670.37	0.000	0.600	1.000
7	U4	25.79	117.91	795.21	0.000	1.045	2.68	(N/A)	1670.37	0.000	0.600	1.000
7	U5	18.33	117.91	795.21	0.000	1.032	1.91	(N/A)	1670.37	0.000	0.600	1.000
7	U6	33.88	117.91	795.21	0.000	1.060	3.53	(N/A)	1670.37	0.000	0.600	1.000
7	U7	26.42	117.91	795.21	0.000	1.046	2.75	(N/A)	1670.37	0.000	0.600	1.000
8	U1	34.81	117.91	795.21	0.000	1.062	3.62	(N/A)	1670.37	0.000	0.600	1.000
8	U2	88.55	117.91	795.21	0.000	1.174	9.22	(N/A)	1670.37	0.000	0.600	1.000
8	U3	48.18	117.91	795.21	0.000	1.088	5.02	(N/A)	1670.37	0.000	0.600	1.000
8	U4	25.79	117.91	795.21	0.000	1.045	2.68	(N/A)	1670.37	0.000	0.600	1.000
8	U5	18.33	117.91	795.21	0.000	1.032	1.91	(N/A)	1670.37	0.000	0.600	1.000
8	U6	33.88	117.91	795.21	0.000	1.060	3.53	(N/A)	1670.37	0.000	0.600	1.000
8	U7	26.42	117.91	795.21	0.000	1.046	2.75	(N/A)	1670.37	0.000	0.600	1.000

8. Factored Moments

NOTE: Each loading combination includes the following cases:
Top - At column top
Bot - At column bottom

8.1. X - axis

Load Combo			1st Order				2nd Order			Ratio
			M_{ns}	M_s	M_u	M_{min}		M_i	M_c	2nd/1st
			k-ft	k-ft	k-ft	k-ft		k-ft	k-ft	
1	U1	Top	6.13	0.00	6.13	0.33	M_2=	6.13	6.13	1.000

Load Combo			1st Order M_{ns} k-ft	M_s k-ft	M_u k-ft	M_{min} k-ft	2nd Order	M_i k-ft	M_c k-ft	Ratio 2nd/1st	
1	U1	Bot	0.00	0.00	0.00	0.33	M_1=	0.00	0.33	1.000	#
1	U1	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	13.16	0.00	13.16	0.83	M_2=	13.16	13.16	1.000	
1	U2	Top	0.00	0.00	0.00	0.83	M_1=	0.00	0.83	1.000	#
1	U2	Bot				(N/A)	M_1=	0.00	0.00	1.000	
1	U3	Top	7.72	0.00	7.72	0.45	M_2=	7.72	7.72	1.000	
1	U3	Bot	0.00	0.00	0.00	0.45	M_1=	0.00	0.45	1.000	#
1	U3	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	5.25	0.01	5.27	0.43	M_2=	5.27	5.27	1.000	
1	U4	Top	0.00	0.00	0.00	0.43	M_1=	0.00	0.43	1.000	#
1	U4	Bot				(N/A)	M_1=	0.00	0.00	1.000	
1	U5	Top	3.94	0.01	3.95	0.36	M_2=	3.95	3.95	1.000	
1	U5	Bot	0.00	0.00	0.00	0.36	M_1=	0.00	0.36	1.000	#
1	U5	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	5.25	-0.01	5.24	0.13	M_2=	5.24	5.24	1.000	
1	U6	Top	0.00	0.00	0.00	0.13	M_1=	0.00	0.13	1.000	#
1	U6	Bot				(N/A)	M_1=	0.00	0.00	1.000	
1	U7	Top	3.94	-0.01	3.93	0.06	M_2=	3.93	3.93	1.000	
1	U7	Bot	0.00	0.00	0.00	0.06	M_1=	0.00	0.06	1.000	#
1	U7	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	43.00	0.00	43.00	0.33	M_2=	43.00	43.00	1.000	
2	U1	Top	0.00	0.00	0.00	0.33	M_1=	0.00	0.33	1.000	#
2	U1	Bot				(N/A)	M_1=	0.00	0.00	1.000	
2	U2	Top	43.00	0.00	43.00	0.83	M_2=	43.00	43.00	1.000	
2	U2	Bot	0.00	0.00	0.00	0.83	M_1=	0.00	0.83	1.000	#
2	U2	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	43.00	0.00	43.00	0.45	M_2=	43.00	43.00	1.000	
2	U3	Top	0.00	0.00	0.00	0.45	M_1=	0.00	0.45	1.000	#
2	U3	Bot				(N/A)	M_1=	0.00	0.00	1.000	
2	U4	Top	43.00	0.00	43.00	0.43	M_2=	43.00	43.00	1.000	
2	U4	Bot	0.00	0.00	0.00	0.43	M_1=	0.00	0.43	1.000	#
2	U4	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	43.00	0.00	43.00	0.36	M_2=	43.00	43.00	1.000	
2	U5	Top	0.00	0.00	0.00	0.36	M_1=	0.00	0.36	1.000	#
2	U5	Bot				(N/A)	M_1=	0.00	0.00	1.000	
2	U6	Top	43.00	0.00	43.00	0.13	M_2=	43.00	43.00	1.000	
2	U6	Bot	0.00	0.00	0.00	0.13	M_1=	0.00	0.13	1.000	#
2	U6	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	43.00	0.00	43.00	0.06	M_2=	43.00	43.00	1.000	
2	U7	Top	0.00	0.00	0.00	0.06	M_1=	0.00	0.06	1.000	#
2	U7	Bot				(N/A)	M_1=	0.00	0.00	1.000	
3	U1	Top	43.00	0.00	43.00	0.33	M_2=	43.00	43.00	1.000	
3	U1	Bot	0.00	0.00	0.00	0.33	M_1=	0.00	0.33	1.000	#
3	U1	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	43.00	0.00	43.00	0.83	M_2=	43.00	43.00	1.000	
3	U2	Top	0.00	0.00	0.00	0.83	M_1=	0.00	0.83	1.000	#
3	U2	Bot				(N/A)	M_1=	0.00	0.00	1.000	
3	U3	Top	43.00	0.00	43.00	0.45	M_2=	43.00	43.00	1.000	
3	U3	Bot	0.00	0.00	0.00	0.45	M_1=	0.00	0.45	1.000	#
3	U3	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	43.00	0.00	43.00	0.13	M_2=	43.00	43.00	1.000	
3	U4	Top	0.00	0.00	0.00	0.13	M_1=	0.00	0.13	1.000	#
3	U4	Bot				(N/A)	M_1=	0.00	0.00	1.000	
3	U5	Top	43.00	0.00	43.00	0.06	M_2=	43.00	43.00	1.000	

Load			1st Order					2nd Order		Ratio	
Combo			M_{ns}	M_s	M_u	M_{min}		M_i	M_c	2nd/1st	
			k-ft	k-ft	k-ft	k-ft		k-ft	k-ft		
3	U5	Bot	0.00	0.00	0.00	0.06	M_1=	0.00	0.06	1.000	#
3	U5	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	43.00	0.00	43.00	0.43	M_2=	43.00	43.00	1.000	
3	U6	Top	0.00	0.00	0.00	0.43	M_1=	0.00	0.43	1.000	#
3	U6	Bot				(N/A)	M_1=	0.00	0.00	1.000	
3	U7	Top	43.00	0.00	43.00	0.36	M_2=	43.00	43.00	1.000	
3	U7	Bot	0.00	0.00	0.00	0.36	M_1=	0.00	0.36	1.000	#
3	U7	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	6.13	0.00	6.13	0.33	M_2=	6.13	6.13	1.000	
4	U1	Top	0.00	0.00	0.00	0.33	M_1=	0.00	0.33	1.000	#
4	U1	Bot				(N/A)	M_1=	0.00	0.00	1.000	
4	U2	Top	13.16	0.00	13.16	0.83	M_2=	13.16	13.16	1.000	
4	U2	Bot	0.00	0.00	0.00	0.83	M_1=	0.00	0.83	1.000	#
4	U2	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	7.72	0.00	7.72	0.45	M_2=	7.72	7.72	1.000	
4	U3	Top	0.00	0.00	0.00	0.45	M_1=	0.00	0.45	1.000	#
4	U3	Bot				(N/A)	M_1=	0.00	0.00	1.000	
4	U4	Top	5.25	0.01	5.27	0.13	M_2=	5.27	5.27	1.000	
4	U4	Bot	0.00	0.00	0.00	0.13	M_1=	0.00	0.13	1.000	#
4	U4	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	3.94	0.01	3.95	0.06	M_2=	3.95	3.95	1.000	
4	U5	Top	0.00	0.00	0.00	0.06	M_1=	0.00	0.06	1.000	#
4	U5	Bot				(N/A)	M_1=	0.00	0.00	1.000	
4	U6	Top	5.25	-0.01	5.24	0.43	M_2=	5.24	5.24	1.000	
4	U6	Bot	0.00	0.00	0.00	0.43	M_1=	0.00	0.43	1.000	#
4	U6	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	3.94	-0.01	3.93	0.36	M_2=	3.93	3.93	1.000	
4	U7	Top	0.00	0.00	0.00	0.36	M_1=	0.00	0.36	1.000	#
4	U7	Bot				(N/A)	M_1=	0.00	0.00	1.000	
5	U1	Top	6.13	0.00	6.13	0.33	M_2=	6.13	6.13	1.000	
5	U1	Bot	0.00	0.00	0.00	0.33	M_1=	0.00	0.33	1.000	#
5	U1	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	13.16	0.00	13.16	0.83	M_2=	13.16	13.16	1.000	
5	U2	Top	0.00	0.00	0.00	0.83	M_1=	0.00	0.83	1.000	#
5	U2	Bot				(N/A)	M_1=	0.00	0.00	1.000	
5	U3	Top	7.72	0.00	7.72	0.45	M_2=	7.72	7.72	1.000	
5	U3	Bot	0.00	0.00	0.00	0.45	M_1=	0.00	0.45	1.000	#
5	U3	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	5.25	27.40	32.65	0.32	M_2=	33.77	33.77	1.034	
5	U4	Top	0.00	0.00	0.00	0.32	M_1=	0.00	0.32	1.000	#
5	U4	Bot				(N/A)	M_1=	0.00	0.00	1.000	
5	U5	Top	3.94	27.40	31.34	0.25	M_2=	32.20	32.20	1.028	
5	U5	Bot	0.00	0.00	0.00	0.25	M_1=	0.00	0.25	1.000	#
5	U5	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	5.25	-27.40	-22.15	-0.24	M_2=	-22.99	-22.99	1.038	
5	U6	Top	0.00	0.00	0.00	0.24	M_1=	0.00	0.24	1.000	#
5	U6	Bot				(N/A)	M_1=	0.00	0.00	1.000	
5	U7	Top	3.94	-27.40	-23.46	-0.17	M_2=	-24.05	-24.05	1.025	
5	U7	Bot	0.00	0.00	0.00	0.17	M_1=	0.00	0.17	1.000	#
5	U7	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	43.00	0.00	43.00	0.33	M_2=	43.00	43.00	1.000	
6	U1	Top	0.00	0.00	0.00	0.33	M_1=	0.00	0.33	1.000	#
6	U1	Bot				(N/A)	M_1=	0.00	0.00	1.000	
6	U2	Top	43.00	0.00	43.00	0.83	M_2=	43.00	43.00	1.000	

Load Combo			1st Order M_{ns} k-ft	M_s k-ft	M_u k-ft	M_{min} k-ft		2nd Order M_i k-ft	M_c k-ft	Ratio 2nd/1st	
6	U2	Bot	0.00	0.00	0.00	0.83	M_1=	0.00	0.83	1.000	#
6	U2	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	43.00	0.00	43.00	0.45	M_2=	43.00	43.00	1.000	
6	U3	Top	0.00	0.00	0.00	0.45	M_1=	0.00	0.45	1.000	#
6	U3	Bot				(N/A)	M_1=	0.00	0.00	1.000	
6	U4	Top	43.00	0.00	43.00	0.32	M_2=	43.00	43.00	1.000	
6	U4	Bot	0.00	0.00	0.00	0.32	M_1=	0.00	0.32	1.000	#
6	U4	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	43.00	0.00	43.00	0.25	M_2=	43.00	43.00	1.000	
6	U5	Top	0.00	0.00	0.00	0.25	M_1=	0.00	0.25	1.000	#
6	U5	Bot				(N/A)	M_1=	0.00	0.00	1.000	
6	U6	Top	43.00	0.00	43.00	0.24	M_2=	43.00	43.00	1.000	
6	U6	Bot	0.00	0.00	0.00	0.24	M_1=	0.00	0.24	1.000	#
6	U6	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	43.00	0.00	43.00	0.17	M_2=	43.00	43.00	1.000	
6	U7	Top	0.00	0.00	0.00	0.17	M_1=	0.00	0.17	1.000	#
6	U7	Bot				(N/A)	M_1=	0.00	0.00	1.000	
7	U1	Top	43.00	0.00	43.00	0.33	M_2=	43.00	43.00	1.000	
7	U1	Bot	0.00	0.00	0.00	0.33	M_1=	0.00	0.33	1.000	#
7	U1	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	43.00	0.00	43.00	0.83	M_2=	43.00	43.00	1.000	
7	U2	Top	0.00	0.00	0.00	0.83	M_1=	0.00	0.83	1.000	#
7	U2	Bot				(N/A)	M_1=	0.00	0.00	1.000	
7	U3	Top	43.00	0.00	43.00	0.45	M_2=	43.00	43.00	1.000	
7	U3	Bot	0.00	0.00	0.00	0.45	M_1=	0.00	0.45	1.000	#
7	U3	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	43.00	0.00	43.00	0.24	M_2=	43.00	43.00	1.000	
7	U4	Top	0.00	0.00	0.00	0.24	M_1=	0.00	0.24	1.000	#
7	U4	Bot				(N/A)	M_1=	0.00	0.00	1.000	
7	U5	Top	43.00	0.00	43.00	0.17	M_2=	43.00	43.00	1.000	
7	U5	Bot	0.00	0.00	0.00	0.17	M_1=	0.00	0.17	1.000	#
7	U5	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	43.00	0.00	43.00	0.32	M_2=	43.00	43.00	1.000	
7	U6	Top	0.00	0.00	0.00	0.32	M_1=	0.00	0.32	1.000	#
7	U6	Bot				(N/A)	M_1=	0.00	0.00	1.000	
7	U7	Top	43.00	0.00	43.00	0.25	M_2=	43.00	43.00	1.000	
7	U7	Bot	0.00	0.00	0.00	0.25	M_1=	0.00	0.25	1.000	#
7	U7	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	6.13	0.00	6.13	0.33	M_2=	6.13	6.13	1.000	
8	U1	Top	0.00	0.00	0.00	0.33	M_1=	0.00	0.33	1.000	#
8	U1	Bot				(N/A)	M_1=	0.00	0.00	1.000	
8	U2	Top	13.16	0.00	13.16	0.83	M_2=	13.16	13.16	1.000	
8	U2	Bot	0.00	0.00	0.00	0.83	M_1=	0.00	0.83	1.000	#
8	U2	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	7.72	0.00	7.72	0.45	M_2=	7.72	7.72	1.000	
8	U3	Top	0.00	0.00	0.00	0.45	M_1=	0.00	0.45	1.000	#
8	U3	Bot				(N/A)	M_1=	0.00	0.00	1.000	
8	U4	Top	5.25	27.40	32.65	0.24	M_2=	33.50	33.50	1.026	
8	U4	Bot	0.00	0.00	0.00	0.24	M_1=	0.00	0.24	1.000	#
8	U4	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	3.94	27.40	31.34	0.17	M_2=	31.93	31.93	1.019	
8	U5	Top	0.00	0.00	0.00	0.17	M_1=	0.00	0.17	1.000	#
8	U5	Bot				(N/A)	M_1=	0.00	0.00	1.000	
8	U6	Top	5.25	-27.40	-22.15	-0.32	M_2=	-23.26	-23.26	1.050	

Load Combo			1st Order M_{ns} k-ft	M_s k-ft	M_u k-ft	M_{min} k-ft		2nd Order M_i k-ft	M_c k-ft	Ratio 2nd/1st	
8	U6	Bot	0.00	0.00	0.00	0.32	M_1=	0.00	0.32	1.000	#
8	U6	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	3.94	-27.40	-23.46	-0.25	M_2=	-24.32	-24.32	1.037	
8	U7	Top	0.00	0.00	0.00	0.25	M_1=	0.00	0.25	1.000	#
8	U7	Bot				(N/A)	M_1=	0.00	0.00	1.000	

M_{min} exceeds M_i for X and Y - axis bending but shall be applied to each axis separately for capacity check.

8.2. Y - axis

Load Combo			1st Order M_{ns} k-ft	M_s k-ft	M_u k-ft	M_{min} k-ft		2nd Order M_i k-ft	M_c k-ft	Ratio 2nd/1st	
1	U1	Top	1.40	0.00	1.40	0.33	M_2=	1.40	1.40	1.000	
1	U1	Bot	0.00	0.00	0.00	0.33	M_1=	0.00	0.33	1.000	#
1	U1	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	2.62	0.00	2.62	0.83	M_2=	2.62	2.62	1.000	
1	U2	Top	0.00	0.00	0.00	0.83	M_1=	0.00	0.83	1.000	#
1	U2	Bot				(N/A)	M_1=	0.00	0.00	1.000	
1	U3	Top	1.64	0.00	1.64	0.45	M_2=	1.64	1.64	1.000	
1	U3	Bot	0.00	0.00	0.00	0.45	M_1=	0.00	0.45	1.000	#
1	U3	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	1.20	23.40	24.60	0.43	M_2=	26.53	26.53	1.078	
1	U4	Top	0.00	0.00	0.00	0.43	M_1=	0.00	0.43	1.000	#
1	U4	Bot				(N/A)	M_1=	0.00	0.00	1.000	
1	U5	Top	0.90	23.40	24.30	0.36	M_2=	25.89	25.89	1.065	
1	U5	Bot	0.00	0.00	0.00	0.36	M_1=	0.00	0.36	1.000	#
1	U5	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	1.20	-23.40	-22.20	-0.13	M_2=	-22.77	-22.77	1.026	
1	U6	Top	0.00	0.00	0.00	0.13	M_1=	0.00	0.13	1.000	#
1	U6	Bot				(N/A)	M_1=	0.00	0.00	1.000	
1	U7	Top	0.90	-23.40	-22.50	-0.06	M_2=	-22.77	-22.77	1.012	
1	U7	Bot	0.00	0.00	0.00	0.06	M_1=	0.00	0.06	1.000	#
1	U7	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	66.00	0.00	66.00	0.33	M_2=	66.00	66.00	1.000	
2	U1	Top	0.00	0.00	0.00	0.33	M_1=	0.00	0.33	1.000	#
2	U1	Bot				(N/A)	M_1=	0.00	0.00	1.000	
2	U2	Top	66.00	0.00	66.00	0.83	M_2=	66.00	66.00	1.000	
2	U2	Bot	0.00	0.00	0.00	0.83	M_1=	0.00	0.83	1.000	#
2	U2	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	66.00	0.00	66.00	0.45	M_2=	66.00	66.00	1.000	
2	U3	Top	0.00	0.00	0.00	0.45	M_1=	0.00	0.45	1.000	#
2	U3	Bot				(N/A)	M_1=	0.00	0.00	1.000	
2	U4	Top	66.00	0.00	66.00	0.43	M_2=	66.00	66.00	1.000	
2	U4	Bot	0.00	0.00	0.00	0.43	M_1=	0.00	0.43	1.000	#
2	U4	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	66.00	0.00	66.00	0.36	M_2=	66.00	66.00	1.000	
2	U5	Top	0.00	0.00	0.00	0.36	M_1=	0.00	0.36	1.000	#
2	U5	Bot				(N/A)	M_1=	0.00	0.00	1.000	
2	U6	Top	66.00	0.00	66.00	0.13	M_2=	66.00	66.00	1.000	
2	U6	Bot	0.00	0.00	0.00	0.13	M_1=	0.00	0.13	1.000	#
2	U6	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	66.00	0.00	66.00	0.06	M_2=	66.00	66.00	1.000	
2	U7	Top	0.00	0.00	0.00	0.06	M_1=	0.00	0.06	1.000	#
2	U7	Bot				(N/A)	M_1=	0.00	0.00	1.000	

Load Combo			1st Order M_{ns} k-ft	M_s k-ft	M_u k-ft	M_{min} k-ft		2nd Order M_i k-ft	M_c k-ft	Ratio 2nd/1st	
3	U1	Top	66.00	0.00	66.00	0.33	M_2=	66.00	66.00	1.000	
3	U1	Bot	0.00	0.00	0.00	0.33	M_1=	0.00	0.33	1.000	#
3	U1	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	66.00	0.00	66.00	0.83	M_2=	66.00	66.00	1.000	
3	U2	Top	0.00	0.00	0.00	0.83	M_1=	0.00	0.83	1.000	#
3	U2	Bot				(N/A)	M_1=	0.00	0.00	1.000	
3	U3	Top	66.00	0.00	66.00	0.45	M_2=	66.00	66.00	1.000	
3	U3	Bot	0.00	0.00	0.00	0.45	M_1=	0.00	0.45	1.000	#
3	U3	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	66.00	0.00	66.00	0.13	M_2=	66.00	66.00	1.000	
3	U4	Top	0.00	0.00	0.00	0.13	M_1=	0.00	0.13	1.000	#
3	U4	Bot				(N/A)	M_1=	0.00	0.00	1.000	
3	U5	Top	66.00	0.00	66.00	0.06	M_2=	66.00	66.00	1.000	
3	U5	Bot	0.00	0.00	0.00	0.06	M_1=	0.00	0.06	1.000	#
3	U5	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	66.00	0.00	66.00	0.43	M_2=	66.00	66.00	1.000	
3	U6	Top	0.00	0.00	0.00	0.43	M_1=	0.00	0.43	1.000	#
3	U6	Bot				(N/A)	M_1=	0.00	0.00	1.000	
3	U7	Top	66.00	0.00	66.00	0.36	M_2=	66.00	66.00	1.000	
3	U7	Bot	0.00	0.00	0.00	0.36	M_1=	0.00	0.36	1.000	#
3	U7	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	1.40	0.00	1.40	0.33	M_2=	1.40	1.40	1.000	
4	U1	Top	0.00	0.00	0.00	0.33	M_1=	0.00	0.33	1.000	#
4	U1	Bot				(N/A)	M_1=	0.00	0.00	1.000	
4	U2	Top	2.62	0.00	2.62	0.83	M_2=	2.62	2.62	1.000	
4	U2	Bot	0.00	0.00	0.00	0.83	M_1=	0.00	0.83	1.000	#
4	U2	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	1.64	0.00	1.64	0.45	M_2=	1.64	1.64	1.000	
4	U3	Top	0.00	0.00	0.00	0.45	M_1=	0.00	0.45	1.000	#
4	U3	Bot				(N/A)	M_1=	0.00	0.00	1.000	
4	U4	Top	1.20	23.40	24.60	0.13	M_2=	25.17	25.17	1.023	
4	U4	Bot	0.00	0.00	0.00	0.13	M_1=	0.00	0.13	1.000	#
4	U4	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	0.90	23.40	24.30	0.06	M_2=	24.57	24.57	1.011	
4	U5	Top	0.00	0.00	0.00	0.06	M_1=	0.00	0.06	1.000	#
4	U5	Bot				(N/A)	M_1=	0.00	0.00	1.000	
4	U6	Top	1.20	-23.40	-22.20	-0.43	M_2=	-24.13	-24.13	1.087	
4	U6	Bot	0.00	0.00	0.00	0.43	M_1=	0.00	0.43	1.000	#
4	U6	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	0.90	-23.40	-22.50	-0.36	M_2=	-24.09	-24.09	1.071	
4	U7	Top	0.00	0.00	0.00	0.36	M_1=	0.00	0.36	1.000	#
4	U7	Bot				(N/A)	M_1=	0.00	0.00	1.000	
5	U1	Top	1.40	0.00	1.40	0.33	M_2=	1.40	1.40	1.000	
5	U1	Bot	0.00	0.00	0.00	0.33	M_1=	0.00	0.33	1.000	#
5	U1	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	2.62	0.00	2.62	0.83	M_2=	2.62	2.62	1.000	
5	U2	Top	0.00	0.00	0.00	0.83	M_1=	0.00	0.83	1.000	#
5	U2	Bot				(N/A)	M_1=	0.00	0.00	1.000	
5	U3	Top	1.64	0.00	1.64	0.45	M_2=	1.64	1.64	1.000	
5	U3	Bot	0.00	0.00	0.00	0.45	M_1=	0.00	0.45	1.000	#
5	U3	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	1.20	0.01	1.21	0.32	M_2=	1.21	1.21	1.000	
5	U4	Top	0.00	0.00	0.00	0.32	M_1=	0.00	0.32	1.000	#
5	U4	Bot				(N/A)	M_1=	0.00	0.00	1.000	

Load Combo			1st Order M_{ns} k-ft	M_s k-ft	M_u k-ft	M_{min} k-ft		2nd Order M_i k-ft	M_c k-ft	Ratio 2nd/1st	
5	U5	Top	0.90	0.01	0.91	0.25	M_2=	0.91	0.91	1.000	
5	U5	Bot	0.00	0.00	0.00	0.25	M_1=	0.00	0.25	1.000	#
5	U5	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	1.20	-0.01	1.19	0.24	M_2=	1.19	1.19	1.000	
5	U6	Top	0.00	0.00	0.00	0.24	M_1=	0.00	0.24	1.000	#
5	U6	Bot				(N/A)	M_1=	0.00	0.00	1.000	
5	U7	Top	0.90	-0.01	0.89	0.17	M_2=	0.89	0.89	1.000	
5	U7	Bot	0.00	0.00	0.00	0.17	M_1=	0.00	0.17	1.000	#
5	U7	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	66.00	0.00	66.00	0.33	M_2=	66.00	66.00	1.000	
6	U1	Top	0.00	0.00	0.00	0.33	M_1=	0.00	0.33	1.000	#
6	U1	Bot				(N/A)	M_1=	0.00	0.00	1.000	
6	U2	Top	66.00	0.00	66.00	0.83	M_2=	66.00	66.00	1.000	
6	U2	Bot	0.00	0.00	0.00	0.83	M_1=	0.00	0.83	1.000	#
6	U2	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	66.00	0.00	66.00	0.45	M_2=	66.00	66.00	1.000	
6	U3	Top	0.00	0.00	0.00	0.45	M_1=	0.00	0.45	1.000	#
6	U3	Bot				(N/A)	M_1=	0.00	0.00	1.000	
6	U4	Top	66.00	0.00	66.00	0.32	M_2=	66.00	66.00	1.000	
6	U4	Bot	0.00	0.00	0.00	0.32	M_1=	0.00	0.32	1.000	#
6	U4	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	66.00	0.00	66.00	0.25	M_2=	66.00	66.00	1.000	
6	U5	Top	0.00	0.00	0.00	0.25	M_1=	0.00	0.25	1.000	#
6	U5	Bot				(N/A)	M_1=	0.00	0.00	1.000	
6	U6	Top	66.00	0.00	66.00	0.24	M_2=	66.00	66.00	1.000	
6	U6	Bot	0.00	0.00	0.00	0.24	M_1=	0.00	0.24	1.000	#
6	U6	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	66.00	0.00	66.00	0.17	M_2=	66.00	66.00	1.000	
6	U7	Top	0.00	0.00	0.00	0.17	M_1=	0.00	0.17	1.000	#
6	U7	Bot				(N/A)	M_1=	0.00	0.00	1.000	
7	U1	Top	66.00	0.00	66.00	0.33	M_2=	66.00	66.00	1.000	
7	U1	Bot	0.00	0.00	0.00	0.33	M_1=	0.00	0.33	1.000	#
7	U1	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	66.00	0.00	66.00	0.83	M_2=	66.00	66.00	1.000	
7	U2	Top	0.00	0.00	0.00	0.83	M_1=	0.00	0.83	1.000	#
7	U2	Bot				(N/A)	M_1=	0.00	0.00	1.000	
7	U3	Top	66.00	0.00	66.00	0.45	M_2=	66.00	66.00	1.000	
7	U3	Bot	0.00	0.00	0.00	0.45	M_1=	0.00	0.45	1.000	#
7	U3	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	66.00	0.00	66.00	0.24	M_2=	66.00	66.00	1.000	
7	U4	Top	0.00	0.00	0.00	0.24	M_1=	0.00	0.24	1.000	#
7	U4	Bot				(N/A)	M_1=	0.00	0.00	1.000	
7	U5	Top	66.00	0.00	66.00	0.17	M_2=	66.00	66.00	1.000	
7	U5	Bot	0.00	0.00	0.00	0.17	M_1=	0.00	0.17	1.000	#
7	U5	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	66.00	0.00	66.00	0.32	M_2=	66.00	66.00	1.000	
7	U6	Top	0.00	0.00	0.00	0.32	M_1=	0.00	0.32	1.000	#
7	U6	Bot				(N/A)	M_1=	0.00	0.00	1.000	
7	U7	Top	66.00	0.00	66.00	0.25	M_2=	66.00	66.00	1.000	
7	U7	Bot	0.00	0.00	0.00	0.25	M_1=	0.00	0.25	1.000	#
7	U7	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	1.40	0.00	1.40	0.33	M_2=	1.40	1.40	1.000	
8	U1	Top	0.00	0.00	0.00	0.33	M_1=	0.00	0.33	1.000	#
8	U1	Bot				(N/A)	M_1=	0.00	0.00	1.000	

Load Combo			1st Order M_{ns} k-ft	M_s k-ft	M_u k-ft	M_{min} k-ft	2nd Order	M_i k-ft	M_c k-ft	Ratio 2nd/1st	
8	U2	Top	2.62	0.00	2.62	0.83	M_2=	2.62	2.62	1.000	
8	U2	Bot	0.00	0.00	0.00	0.83	M_1=	0.00	0.83	1.000	#
8	U2	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	1.64	0.00	1.64	0.45	M_2=	1.64	1.64	1.000	
8	U3	Top	0.00	0.00	0.00	0.45	M_1=	0.00	0.45	1.000	#
8	U3	Bot				(N/A)	M_1=	0.00	0.00	1.000	
8	U4	Top	1.20	0.01	1.21	0.24	M_2=	1.21	1.21	1.000	
8	U4	Bot	0.00	0.00	0.00	0.24	M_1=	0.00	0.24	1.000	#
8	U4	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	0.90	0.01	0.91	0.17	M_2=	0.91	0.91	1.000	
8	U5	Top	0.00	0.00	0.00	0.17	M_1=	0.00	0.17	1.000	#
8	U5	Bot				(N/A)	M_1=	0.00	0.00	1.000	
8	U6	Top	1.20	-0.01	1.19	0.32	M_2=	1.19	1.19	1.000	
8	U6	Bot	0.00	0.00	0.00	0.32	M_1=	0.00	0.32	1.000	#
8	U6	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	0.90	-0.01	0.89	0.25	M_2=	0.89	0.89	1.000	
8	U7	Top	0.00	0.00	0.00	0.25	M_1=	0.00	0.25	1.000	#
8	U7	Bot				(N/A)	M_1=	0.00	0.00	1.000	

M_{min} exceeds M_i for X and Y - axis bending but shall be applied to each axis separately for capacity check.

9. Factored Loads and Moments with Corresponding Capacity Ratios

NOTE: Calculations are based on "Moment Capacity" Method.
Allowable Capacity (Ratio) <= 0.98
Each loading combination includes the following cases:
Top - At column top
Bot - At column bottom

No.	Load Combo			Demand P_u kip	M_{ux} k-ft	M_{uy} k-ft	Capacity ϕP_n kip	ϕM_{nx} k-ft	ϕM_{ny} k-ft	Parameters at Capacity NA Depth in	ε_t	ϕ	Capacity Ratio
1	1	U1	Top	3.62	6.13	1.40	3.62	73.49	16.80	3.85	0.00845	0.900	0.08
2	1	U1	Bot	3.62	0.33	0.00	3.62	74.43	0.00	2.83	0.01070	0.900	0.00
3	1	U1	Bot	3.62	0.00	0.33	3.62	0.00	74.43	2.83	0.01070	0.900	0.00
4	1	U2	Top	9.22	13.16	2.62	9.22	76.01	15.13	3.84	0.00842	0.900	0.17
5	1	U2	Bot	9.22	0.83	0.00	9.22	76.83	0.00	2.90	0.01040	0.900	0.01
6	1	U2	Bot	9.22	0.00	0.83	9.22	0.00	76.83	2.90	0.01040	0.900	0.01
7	1	U3	Top	5.02	7.72	1.64	5.02	74.16	15.79	3.81	0.00852	0.900	0.10
8	1	U3	Bot	5.02	0.45	0.00	5.02	75.03	0.00	2.85	0.01063	0.900	0.01
9	1	U3	Bot	5.02	0.00	0.45	5.02	0.00	75.03	2.85	0.01063	0.900	0.01
10	1	U4	Top	4.73	5.27	26.53	4.73	14.71	74.09	3.74	0.00868	0.900	0.36
11	1	U4	Bot	4.73	0.43	0.00	4.73	74.90	0.00	2.84	0.01064	0.900	0.01
12	1	U4	Bot	4.73	0.00	0.43	4.73	0.00	74.90	2.84	0.01064	0.900	0.01
13	1	U5	Top	3.95	3.95	25.89	3.95	11.29	73.94	3.52	0.00917	0.900	0.35
14	1	U5	Bot	3.95	0.36	0.00	3.95	74.57	0.00	2.84	0.01068	0.900	0.00
15	1	U5	Bot	3.95	0.00	0.36	3.95	0.00	74.57	2.84	0.01068	0.900	0.00
16	1	U6	Top	1.48	5.24	-22.77	1.48	16.71	-72.55	3.81	0.00856	0.900	0.31
17	1	U6	Bot	1.48	0.13	0.00	1.48	73.51	0.00	2.81	0.01081	0.900	0.00
18	1	U6	Bot	1.48	0.00	0.13	1.48	0.00	73.51	2.81	0.01081	0.900	0.00
19	1	U7	Top	0.71	3.93	-22.77	0.71	12.50	-72.45	3.55	0.00916	0.900	0.31
20	1	U7	Bot	0.71	0.06	0.00	0.71	73.17	0.00	2.80	0.01086	0.900	0.00
21	1	U7	Bot	0.71	0.00	0.06	0.71	0.00	73.17	2.80	0.01086	0.900	0.00
22	2	U1	Top	3.62	43.00	66.00	3.62	44.95	68.99	5.87	0.00568	0.900	0.96
23	2	U1	Bot	3.62	0.33	0.00	3.62	74.43	0.00	2.83	0.01070	0.900	0.00
24	2	U1	Bot	3.62	0.00	0.33	3.62	0.00	74.43	2.83	0.01070	0.900	0.00
25	2	U2	Top	9.22	43.00	66.00	9.22	46.27	71.01	6.09	0.00544	0.900	0.93

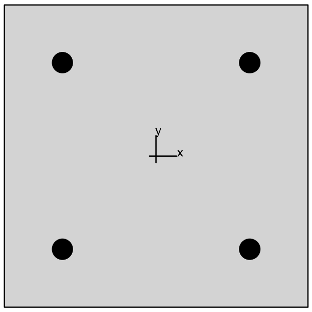
No.	Load Combo			Demand P_u kip	M_{ux} k-ft	M_{uy} k-ft	Capacity ϕP_n kip	ϕM_{nx} k-ft	ϕM_{ny} k-ft	Parameters at Capacity NA Depth in	ε_t	ϕ	Capacity Ratio
26	2	U2	Bot	9.22	0.83	0.00	9.22	76.83	0.00	2.90	0.01040	0.900	0.01
27	2	U2	Bot	9.22	0.00	0.83	9.22	0.00	76.83	2.90	0.01040	0.900	0.01
28	2	U3	Top	5.02	43.00	66.00	5.02	45.28	69.49	5.92	0.00562	0.900	0.95
29	2	U3	Bot	5.02	0.45	0.00	5.02	75.03	0.00	2.85	0.01063	0.900	0.01
30	2	U3	Bot	5.02	0.00	0.45	5.02	0.00	75.03	2.85	0.01063	0.900	0.01
31	2	U4	Top	4.73	43.00	66.00	4.73	45.21	69.39	5.91	0.00564	0.900	0.95
32	2	U4	Bot	4.73	0.43	0.00	4.73	74.90	0.00	2.84	0.01064	0.900	0.01
33	2	U4	Bot	4.73	0.00	0.43	4.73	0.00	74.90	2.84	0.01064	0.900	0.01
34	2	U5	Top	3.95	43.00	66.00	3.95	45.02	69.11	5.88	0.00567	0.900	0.96
35	2	U5	Bot	3.95	0.36	0.00	3.95	74.57	0.00	2.84	0.01068	0.900	0.00
36	2	U5	Bot	3.95	0.00	0.36	3.95	0.00	74.57	2.84	0.01068	0.900	0.00
37	2	U6	Top	1.48	43.00	66.00	1.48	44.43	68.20	5.79	0.00578	0.900	0.97
38	2	U6	Bot	1.48	0.13	0.00	1.48	73.51	0.00	2.81	0.01081	0.900	0.00
39	2	U6	Bot	1.48	0.00	0.13	1.48	0.00	73.51	2.81	0.01081	0.900	0.00
40	2	U7	Top	0.71	43.00	66.00	0.71	44.25	67.92	5.76	0.00582	0.900	0.97
41	2	U7	Bot	0.71	0.06	0.00	0.71	73.17	0.00	2.80	0.01086	0.900	0.00
42	2	U7	Bot	0.71	0.00	0.06	0.71	0.00	73.17	2.80	0.01086	0.900	0.00
43	3	U1	Top	3.62	43.00	66.00	3.62	44.95	68.99	5.87	0.00568	0.900	0.96
44	3	U1	Bot	3.62	0.33	0.00	3.62	74.43	0.00	2.83	0.01070	0.900	0.00
45	3	U1	Bot	3.62	0.00	0.33	3.62	0.00	74.43	2.83	0.01070	0.900	0.00
46	3	U2	Top	9.22	43.00	66.00	9.22	46.27	71.01	6.09	0.00544	0.900	0.93
47	3	U2	Bot	9.22	0.83	0.00	9.22	76.83	0.00	2.90	0.01040	0.900	0.01
48	3	U2	Bot	9.22	0.00	0.83	9.22	0.00	76.83	2.90	0.01040	0.900	0.01
49	3	U3	Top	5.02	43.00	66.00	5.02	45.28	69.49	5.92	0.00562	0.900	0.95
50	3	U3	Bot	5.02	0.45	0.00	5.02	75.03	0.00	2.85	0.01063	0.900	0.01
51	3	U3	Bot	5.02	0.00	0.45	5.02	0.00	75.03	2.85	0.01063	0.900	0.01
52	3	U4	Top	1.48	43.00	66.00	1.48	44.43	68.20	5.79	0.00578	0.900	0.97
53	3	U4	Bot	1.48	0.13	0.00	1.48	73.51	0.00	2.81	0.01081	0.900	0.00
54	3	U4	Bot	1.48	0.00	0.13	1.48	0.00	73.51	2.81	0.01081	0.900	0.00
55	3	U5	Top	0.71	43.00	66.00	0.71	44.25	67.92	5.76	0.00582	0.900	0.97
56	3	U5	Bot	0.71	0.06	0.00	0.71	73.17	0.00	2.80	0.01086	0.900	0.00
57	3	U5	Bot	0.71	0.00	0.06	0.71	0.00	73.17	2.80	0.01086	0.900	0.00
58	3	U6	Top	4.73	43.00	66.00	4.73	45.21	69.39	5.91	0.00564	0.900	0.95
59	3	U6	Bot	4.73	0.43	0.00	4.73	74.90	0.00	2.84	0.01064	0.900	0.01
60	3	U6	Bot	4.73	0.00	0.43	4.73	0.00	74.90	2.84	0.01064	0.900	0.01
61	3	U7	Top	3.95	43.00	66.00	3.95	45.02	69.11	5.88	0.00567	0.900	0.96
62	3	U7	Bot	3.95	0.36	0.00	3.95	74.57	0.00	2.84	0.01068	0.900	0.00
63	3	U7	Bot	3.95	0.00	0.36	3.95	0.00	74.57	2.84	0.01068	0.900	0.00
64	4	U1	Top	3.62	6.13	1.40	3.62	73.49	16.80	3.85	0.00845	0.900	0.08
65	4	U1	Bot	3.62	0.33	0.00	3.62	74.43	0.00	2.83	0.01070	0.900	0.00
66	4	U1	Bot	3.62	0.00	0.33	3.62	0.00	74.43	2.83	0.01070	0.900	0.00
67	4	U2	Top	9.22	13.16	2.62	9.22	76.01	15.13	3.84	0.00842	0.900	0.17
68	4	U2	Bot	9.22	0.83	0.00	9.22	76.83	0.00	2.90	0.01040	0.900	0.01
69	4	U2	Bot	9.22	0.00	0.83	9.22	0.00	76.83	2.90	0.01040	0.900	0.01
70	4	U3	Top	5.02	7.72	1.64	5.02	74.16	15.79	3.81	0.00852	0.900	0.10
71	4	U3	Bot	5.02	0.45	0.00	5.02	75.03	0.00	2.85	0.01063	0.900	0.01
72	4	U3	Bot	5.02	0.00	0.45	5.02	0.00	75.03	2.85	0.01063	0.900	0.01
73	4	U4	Top	1.48	5.27	25.17	1.48	15.20	72.64	3.72	0.00876	0.900	0.35
74	4	U4	Bot	1.48	0.13	0.00	1.48	73.51	0.00	2.81	0.01081	0.900	0.00
75	4	U4	Bot	1.48	0.00	0.13	1.48	0.00	73.51	2.81	0.01081	0.900	0.00
76	4	U5	Top	0.71	3.95	24.57	0.71	11.66	72.50	3.50	0.00928	0.900	0.34
77	4	U5	Bot	0.71	0.06	0.00	0.71	73.17	0.00	2.80	0.01086	0.900	0.00
78	4	U5	Bot	0.71	0.00	0.06	0.71	0.00	73.17	2.80	0.01086	0.900	0.00
79	4	U6	Top	4.73	5.24	-24.13	4.73	16.08	-74.02	3.83	0.00850	0.900	0.33

No.	Load Combo			Demand P_u kip	M_{ux} k-ft	M_{uy} k-ft	Capacity ϕP_n kip	ϕM_{nx} k-ft	ϕM_{ny} k-ft	Parameters at Capacity NA Depth in	ε_t	ϕ	Capacity Ratio
80	4	U6	Bot	4.73	0.43	0.00	4.73	74.90	0.00	2.84	0.01064	0.900	0.01
81	4	U6	Bot	4.73	0.00	0.43	4.73	0.00	74.90	2.84	0.01064	0.900	0.01
82	4	U7	Top	3.95	3.93	-24.09	3.95	12.05	-73.90	3.57	0.00907	0.900	0.33
83	4	U7	Bot	3.95	0.36	0.00	3.95	74.57	0.00	2.84	0.01068	0.900	0.00
84	4	U7	Bot	3.95	0.00	0.36	3.95	0.00	74.57	2.84	0.01068	0.900	0.00
85	5	U1	Top	3.62	6.13	1.40	3.62	73.49	16.80	3.85	0.00845	0.900	0.08
86	5	U1	Bot	3.62	0.33	0.00	3.62	74.43	0.00	2.83	0.01070	0.900	0.00
87	5	U1	Bot	3.62	0.00	0.33	3.62	0.00	74.43	2.83	0.01070	0.900	0.00
88	5	U2	Top	9.22	13.16	2.62	9.22	76.01	15.13	3.84	0.00842	0.900	0.17
89	5	U2	Bot	9.22	0.83	0.00	9.22	76.83	0.00	2.90	0.01040	0.900	0.01
90	5	U2	Bot	9.22	0.00	0.83	9.22	0.00	76.83	2.90	0.01040	0.900	0.01
91	5	U3	Top	5.02	7.72	1.64	5.02	74.16	15.79	3.81	0.00852	0.900	0.10
92	5	U3	Bot	5.02	0.45	0.00	5.02	75.03	0.00	2.85	0.01063	0.900	0.01
93	5	U3	Bot	5.02	0.00	0.45	5.02	0.00	75.03	2.85	0.01063	0.900	0.01
94	5	U4	Top	3.53	33.77	1.21	3.53	74.24	2.66	2.99	0.01035	0.900	0.45
95	5	U4	Bot	3.53	0.32	0.00	3.53	74.39	0.00	2.83	0.01071	0.900	0.00
96	5	U4	Bot	3.53	0.00	0.32	3.53	0.00	74.39	2.83	0.01071	0.900	0.00
97	5	U5	Top	2.75	32.20	0.91	2.75	73.95	2.08	2.95	0.01046	0.900	0.44
98	5	U5	Bot	2.75	0.25	0.00	2.75	74.07	0.00	2.82	0.01074	0.900	0.00
99	5	U5	Bot	2.75	0.00	0.25	2.75	0.00	74.07	2.82	0.01074	0.900	0.00
100	5	U6	Top	2.68	-22.99	1.19	2.68	-73.82	3.84	3.05	0.01023	0.900	0.31
101	5	U6	Bot	2.68	0.24	0.00	2.68	74.04	0.00	2.82	0.01075	0.900	0.00
102	5	U6	Bot	2.68	0.00	0.24	2.68	0.00	74.04	2.82	0.01075	0.900	0.00
103	5	U7	Top	1.91	-24.05	0.89	1.91	-73.54	2.73	2.98	0.01042	0.900	0.33
104	5	U7	Bot	1.91	0.17	0.00	1.91	73.70	0.00	2.81	0.01079	0.900	0.00
105	5	U7	Bot	1.91	0.00	0.17	1.91	0.00	73.70	2.81	0.01079	0.900	0.00
106	6	U1	Top	3.62	43.00	66.00	3.62	44.95	68.99	5.87	0.00568	0.900	0.96
107	6	U1	Bot	3.62	0.33	0.00	3.62	74.43	0.00	2.83	0.01070	0.900	0.00
108	6	U1	Bot	3.62	0.00	0.33	3.62	0.00	74.43	2.83	0.01070	0.900	0.00
109	6	U2	Top	9.22	43.00	66.00	9.22	46.27	71.01	6.09	0.00544	0.900	0.93
110	6	U2	Bot	9.22	0.83	0.00	9.22	76.83	0.00	2.90	0.01040	0.900	0.01
111	6	U2	Bot	9.22	0.00	0.83	9.22	0.00	76.83	2.90	0.01040	0.900	0.01
112	6	U3	Top	5.02	43.00	66.00	5.02	45.28	69.49	5.92	0.00562	0.900	0.95
113	6	U3	Bot	5.02	0.45	0.00	5.02	75.03	0.00	2.85	0.01063	0.900	0.01
114	6	U3	Bot	5.02	0.00	0.45	5.02	0.00	75.03	2.85	0.01063	0.900	0.01
115	6	U4	Top	3.53	43.00	66.00	3.53	44.92	68.95	5.87	0.00569	0.900	0.96
116	6	U4	Bot	3.53	0.32	0.00	3.53	74.39	0.00	2.83	0.01071	0.900	0.00
117	6	U4	Bot	3.53	0.00	0.32	3.53	0.00	74.39	2.83	0.01071	0.900	0.00
118	6	U5	Top	2.75	43.00	66.00	2.75	44.74	68.67	5.84	0.00572	0.900	0.96
119	6	U5	Bot	2.75	0.25	0.00	2.75	74.07	0.00	2.82	0.01074	0.900	0.00
120	6	U5	Bot	2.75	0.00	0.25	2.75	0.00	74.07	2.82	0.01074	0.900	0.00
121	6	U6	Top	2.68	43.00	66.00	2.68	44.72	68.64	5.83	0.00573	0.900	0.96
122	6	U6	Bot	2.68	0.24	0.00	2.68	74.04	0.00	2.82	0.01075	0.900	0.00
123	6	U6	Bot	2.68	0.00	0.24	2.68	0.00	74.04	2.82	0.01075	0.900	0.00
124	6	U7	Top	1.91	43.00	66.00	1.91	44.54	68.36	5.81	0.00576	0.900	0.97
125	6	U7	Bot	1.91	0.17	0.00	1.91	73.70	0.00	2.81	0.01079	0.900	0.00
126	6	U7	Bot	1.91	0.00	0.17	1.91	0.00	73.70	2.81	0.01079	0.900	0.00
127	7	U1	Top	3.62	43.00	66.00	3.62	44.95	68.99	5.87	0.00568	0.900	0.96
128	7	U1	Bot	3.62	0.33	0.00	3.62	74.43	0.00	2.83	0.01070	0.900	0.00
129	7	U1	Bot	3.62	0.00	0.33	3.62	0.00	74.43	2.83	0.01070	0.900	0.00
130	7	U2	Top	9.22	43.00	66.00	9.22	46.27	71.01	6.09	0.00544	0.900	0.93
131	7	U2	Bot	9.22	0.83	0.00	9.22	76.83	0.00	2.90	0.01040	0.900	0.01
132	7	U2	Bot	9.22	0.00	0.83	9.22	0.00	76.83	2.90	0.01040	0.900	0.01
133	7	U3	Top	5.02	43.00	66.00	5.02	45.28	69.49	5.92	0.00562	0.900	0.95

No.	Load Combo			Demand P_u kip	M_{ux} k-ft	M_{uy} k-ft	Capacity ϕP_n kip	ϕM_{nx} k-ft	ϕM_{ny} k-ft	Parameters at Capacity NA Depth in	ε_t	ϕ	Capacity Ratio
134	7	U3	Bot	5.02	0.45	0.00	5.02	75.03	0.00	2.85	0.01063	0.900	0.01
135	7	U3	Bot	5.02	0.00	0.45	5.02	0.00	75.03	2.85	0.01063	0.900	0.01
136	7	U4	Top	2.68	43.00	66.00	2.68	44.72	68.64	5.83	0.00573	0.900	0.96
137	7	U4	Bot	2.68	0.24	0.00	2.68	74.04	0.00	2.82	0.01075	0.900	0.00
138	7	U4	Bot	2.68	0.00	0.24	2.68	0.00	74.04	2.82	0.01075	0.900	0.00
139	7	U5	Top	1.91	43.00	66.00	1.91	44.54	68.36	5.81	0.00576	0.900	0.97
140	7	U5	Bot	1.91	0.17	0.00	1.91	73.70	0.00	2.81	0.01079	0.900	0.00
141	7	U5	Bot	1.91	0.00	0.17	1.91	0.00	73.70	2.81	0.01079	0.900	0.00
142	7	U6	Top	3.53	43.00	66.00	3.53	44.92	68.95	5.87	0.00569	0.900	0.96
143	7	U6	Bot	3.53	0.32	0.00	3.53	74.39	0.00	2.83	0.01071	0.900	0.00
144	7	U6	Bot	3.53	0.00	0.32	3.53	0.00	74.39	2.83	0.01071	0.900	0.00
145	7	U7	Top	2.75	43.00	66.00	2.75	44.74	68.67	5.84	0.00572	0.900	0.96
146	7	U7	Bot	2.75	0.25	0.00	2.75	74.07	0.00	2.82	0.01074	0.900	0.00
147	7	U7	Bot	2.75	0.00	0.25	2.75	0.00	74.07	2.82	0.01074	0.900	0.00
148	8	U1	Top	3.62	6.13	1.40	3.62	73.49	16.80	3.85	0.00845	0.900	0.08
149	8	U1	Bot	3.62	0.33	0.00	3.62	74.43	0.00	2.83	0.01070	0.900	0.00
150	8	U1	Bot	3.62	0.00	0.33	3.62	0.00	74.43	2.83	0.01070	0.900	0.00
151	8	U2	Top	9.22	13.16	2.62	9.22	76.01	15.13	3.84	0.00842	0.900	0.17
152	8	U2	Bot	9.22	0.83	0.00	9.22	76.83	0.00	2.90	0.01040	0.900	0.01
153	8	U2	Bot	9.22	0.00	0.83	9.22	0.00	76.83	2.90	0.01040	0.900	0.01
154	8	U3	Top	5.02	7.72	1.64	5.02	74.16	15.79	3.81	0.00852	0.900	0.10
155	8	U3	Bot	5.02	0.45	0.00	5.02	75.03	0.00	2.85	0.01063	0.900	0.01
156	8	U3	Bot	5.02	0.00	0.45	5.02	0.00	75.03	2.85	0.01063	0.900	0.01
157	8	U4	Top	2.68	33.50	1.21	2.68	73.89	2.66	2.98	0.01039	0.900	0.45
158	8	U4	Bot	2.68	0.24	0.00	2.68	74.04	0.00	2.82	0.01075	0.900	0.00
159	8	U4	Bot	2.68	0.00	0.24	2.68	0.00	74.04	2.82	0.01075	0.900	0.00
160	8	U5	Top	1.91	31.93	0.91	1.91	73.58	2.09	2.94	0.01051	0.900	0.43
161	8	U5	Bot	1.91	0.17	0.00	1.91	73.70	0.00	2.81	0.01079	0.900	0.00
162	8	U5	Bot	1.91	0.00	0.17	1.91	0.00	73.70	2.81	0.01079	0.900	0.00
163	8	U6	Top	3.53	-23.26	1.19	3.53	-74.17	3.81	3.06	0.01020	0.900	0.31
164	8	U6	Bot	3.53	0.32	0.00	3.53	74.39	0.00	2.83	0.01071	0.900	0.00
165	8	U6	Bot	3.53	0.00	0.32	3.53	0.00	74.39	2.83	0.01071	0.900	0.00
166	8	U7	Top	2.75	-24.32	0.89	2.75	-73.91	2.72	2.99	0.01038	0.900	0.33
167	8	U7	Bot	2.75	0.25	0.00	2.75	74.07	0.00	2.82	0.01074	0.900	0.00
168	8	U7	Bot	2.75	0.00	0.25	2.75	0.00	74.07	2.82	0.01074	0.900	0.00

10. Diagrams

10.1. PM at θ=57 [deg]



16 x 16 in

General Information

Project	---
Column	---
Engineer	---
Code	ACI 318-14
Bar Set	ASTM A615
Units	English
Run Option	Design
Run Axis	Biaxial
Slenderness	Considered
Column Type	Structural
Capacity Method	Moment capacity

Materials

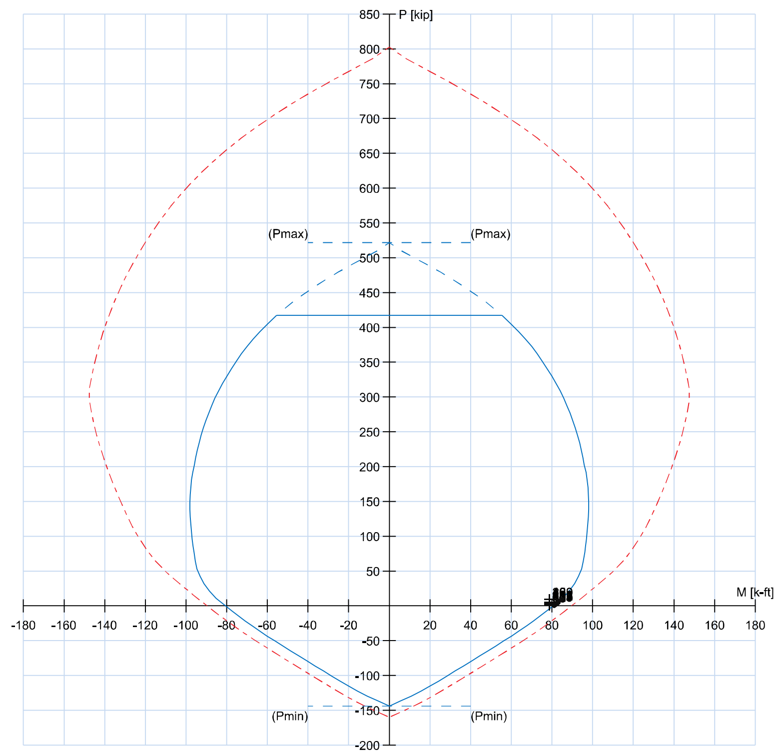
f'_c	3 ksi
E_c	3122.02 ksi
f_y	40 ksi
E_s	29000 ksi

Section

Type	Rectangular
Width	16 in
Depth	16 in
A_g	256 in²
I_x	5461.33 in⁴
I_y	5461.33 in⁴

Reinforcement

Pattern	All sides equal
Bar layout	Rectangular
Cover to	Transverse bars
Clear cover	2 in
Bars	4 #9
Confinement type	Tied
Total steel area, A_s	4.00 in²
Rho	1.56 %
Min. clear spacing	8.74 in



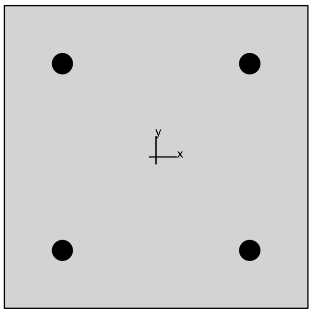
PM at 57.0 [deg]

No.	Load Combo			P_u kip	M_{ux} k-ft	M_{uy} k-ft	ϕP_n kip	ϕM_{nx} k-ft	ϕM_{ny} k-ft	Capacity Ratio
37	2	U6	Top	1.5	43.0	66.0	1.48	44.43	68.20	0.97
40	2	U7	Top	0.7	43.0	66.0	0.71	44.25	67.92	0.97
52	3	U4	Top	1.5	43.0	66.0	1.48	44.43	68.20	0.97
55	3	U5	Top	0.7	43.0	66.0	0.71	44.25	67.92	0.97
124	6	U7	Top	1.9	43.0	66.0	1.91	44.54	68.36	0.97
139	7	U5	Top	1.9	43.0	66.0	1.91	44.54	68.36	0.97
22	2	U1	Top	3.6	43.0	66.0	3.62	44.95	68.99	0.96
34	2	U5	Top	4.0	43.0	66.0	3.95	45.02	69.11	0.96
43	3	U1	Top	3.6	43.0	66.0	3.62	44.95	68.99	0.96
61	3	U7	Top	4.0	43.0	66.0	3.95	45.02	69.11	0.96
106	6	U1	Top	3.6	43.0	66.0	3.62	44.95	68.99	0.96
115	6	U4	Top	3.5	43.0	66.0	3.53	44.92	68.95	0.96
118	6	U5	Top	2.8	43.0	66.0	2.75	44.74	68.67	0.96
121	6	U6	Top	2.7	43.0	66.0	2.68	44.72	68.64	0.96
127	7	U1	Top	3.6	43.0	66.0	3.62	44.95	68.99	0.96

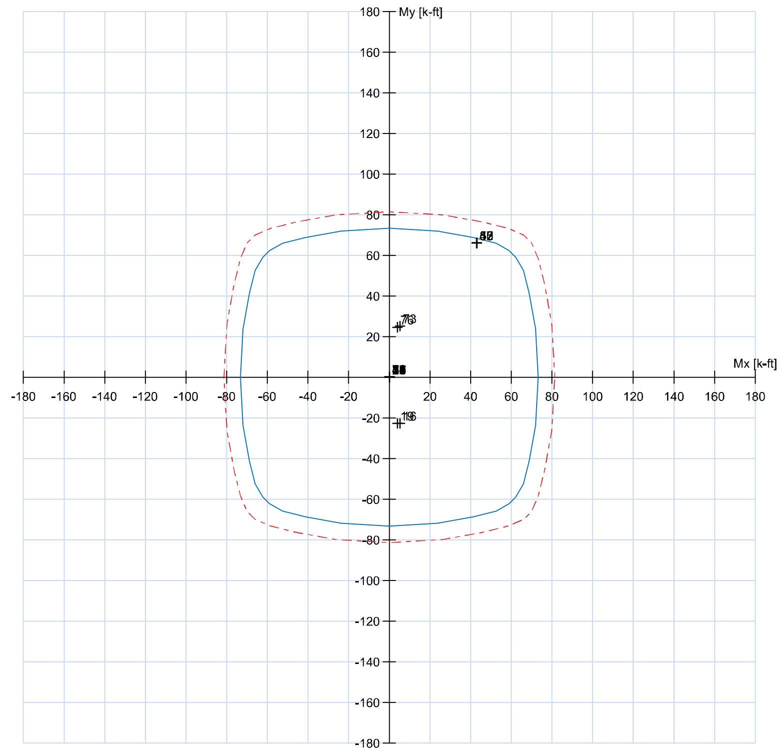
Only 15 points out of 28 are listed.

Max. Capacity Ratio: 0.97

10.2. MM at P=1 [kip]



16 x 16 in



MM at P=1.0 [kip]

General Information

Project	---
Column	---
Engineer	---
Code	ACI 318-14
Bar Set	ASTM A615
Units	English
Run Option	Design
Run Axis	Biaxial
Slenderness	Considered
Column Type	Structural
Capacity Method	Moment capacity

Materials

f'_c	3 ksi
E_c	3122.02 ksi
f_y	40 ksi
E_s	29000 ksi

Section

Type	Rectangular
Width	16 in
Depth	16 in
A_g	256 in²
I_x	5461.33 in⁴
I_y	5461.33 in⁴

Reinforcement

Pattern	All sides equal
Bar layout	Rectangular
Cover to	Transverse bars
Clear cover	2 in
Bars	4 #9
Confinement type	Tied
Total steel area, A_s	4.00 in²
Rho	1.56 %
Min. clear spacing	8.74 in

No.	Load Combo			P_u kip	M_{ux} k-ft	M_{uy} k-ft	ϕP_n kip	ϕM_{nx} k-ft	ϕM_{ny} k-ft	Capacity Ratio
37	2	U6	Top	1.5	43.0	66.0	1.48	44.43	68.20	0.97
40	2	U7	Top	0.7	43.0	66.0	0.71	44.25	67.92	0.97
52	3	U4	Top	1.5	43.0	66.0	1.48	44.43	68.20	0.97
55	3	U5	Top	0.7	43.0	66.0	0.71	44.25	67.92	0.97
73	4	U4	Top	1.5	5.3	25.2	1.48	15.20	72.64	0.35
76	4	U5	Top	0.7	4.0	24.6	0.71	11.66	72.50	0.34
16	1	U6	Top	1.5	5.2	-22.8	1.48	16.71	-72.55	0.31
19	1	U7	Top	0.7	3.9	-22.8	0.71	12.50	-72.45	0.31
17	1	U6	Bot	1.5	0.1	0.0	1.48	73.51	0.00	0.00
18	1	U6	Bot	1.5	0.0	0.1	1.48	0.00	73.51	0.00
20	1	U7	Bot	0.7	0.1	0.0	0.71	73.17	0.00	0.00
21	1	U7	Bot	0.7	0.0	0.1	0.71	0.00	73.17	0.00
38	2	U6	Bot	1.5	0.1	0.0	1.48	73.51	0.00	0.00
39	2	U6	Bot	1.5	0.0	0.1	1.48	0.00	73.51	0.00
41	2	U7	Bot	0.7	0.1	0.0	0.71	73.17	0.00	0.00

Only 15 points out of 24 are listed.

Max. Capacity Ratio: 0.97

Column Design   C1 - Special Moment Frame Column

Bending Axis	Shear Axis	
X-X/3-3	Y-Y/2-2	
lux (out of plane span) (in) =	198	
luy (in plane span) (in) =	198	
b (in) =	16	
h (in) =	16	
long bar size =	9	
Tie size =	4	
number of longitudinal bars =	4	
d' =	2.500	
f'c (psi) =	3000	
fy (psi) =	40000	
Pu Compression (k) =	9.002	
Pu Tension (k) =	2.045	
Tu (k-ft) =	0.86	
Max NA depth (in) =	3.7	6 bars in tension
Min NA depth (in) =	2.2	3 layers in tension
Mu Strong x (k-ft) =	51.00	
Mu Weak y (k-ft) =	64.32	

BENDING DESIGN

Slenderness

ACI 318-14 (Sec. 6.2.5 & 6.2.6)	(k*l)/0.3*b =	41.25 ≥		22	Therefore, slenderness effects must be accounted for in SP Column Analysis

Special Moment Frame Column Design Requirements

Dimensional Limits					
ACI 318-14 (Sec. 18.7.2.1a)	bmin = 12"	≤		16	, Therefore OK
	hmin = 12"	≤		16	, Therefore OK
ACI 318-14 (Sec. 18.6.2.1b)	Min(b,h)/Max(b,h) =	1 ≥		0.4	, Therefore OK
Minimum Flexural Strength of Columns					
ACI 318-14 (Eq. 18.7.3.2)	ΣMnc ≥ (6/5)ΣMnb				
	(6/5)ΣMnb x (k-ft) =	66.00 ≥	Mu =	51.00	, Therefore (5/6)ΣMnb controls column demand
	(6/5)ΣMnb y (k-ft) =	43.20 ≤	Mu =	64.32	, Therefore Mu controls column demand
Longitudinal Reinforcement					
ACI 318-14 (Sec. 18.7.4.1)	0.01Ag ≤ Ast ≤ 0.06Ag				
	Ast (in^2) =	3.976 ≥	0.01Ag =	2.520239	, Therefore OK
	Ast (in^2) =	3.976 ≤	0.06Ag =	15.12144	, Therefore OK

SHEAR DESIGN

Special Moment Frame Column Design Requirements

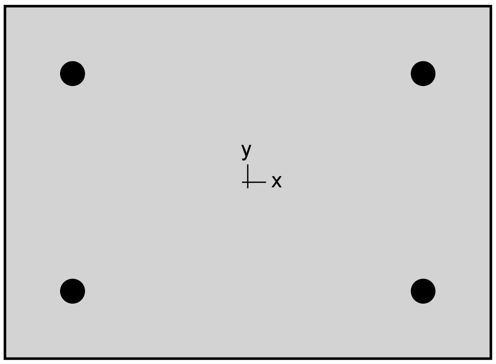
Transverse Reinforcement					
ACI 318-14 (Sec. 18.7.5.1a)	l_o (in) =	16.0			
ACI 318-14 (Sec. 18.7.5.1b)	l_o (in) =	33.0 Controls			
ACI 318-14 (Sec. 18.7.5.1c)	l_o (in) =	18.0			
ACI 318-14 (Sec. 18.7.5.2e)	hx (in) =	11.0 ≤	14 in		, Therefore OK
ACI 318-14 (Sec. 18.7.5.2f)	0.03Ag*f'c (k) =	22.7 ≥	Pu (k) =	9.002	, Therefore hx is notrequired to be reduced
ACI 318-14 (Sec. 18.7.5.2f)	f'c (psi) =	3000 ≤		10000	, Therefore hx is notrequired to be reduced
ACI 318-14 (Sec. 18.7.5.3a)	s_o (in) =	4 Controls			, Therefore Use #4 Ties @ 4" o.c. in l_o regions
ACI 318-14 (Sec. 18.7.5.3b)	s_o (in) =	7			
ACI 318-14 (Sec. 18.7.5.3c)	s_o (in) = 4 +(14-hx / 3) =	5			
ACI 318-14 (Sec. 18.7.5.3)	s_o ,max (in) =	6.0 ≥		5	, Therefore OK
ACI 318-14 (Sec. 18.7.5.3)	s_o ,min (in) =	4.0 ≤		5	, Therefore OK
ACI 318-14 (Table. 18.7.5.4a)	Ash/sbh = 0.3*(Ag/Ach - 1)*(f'c/fyt) =	0.0244 Controls			
ACI 318-14 (Table. 18.7.5.4b)	Ash/sbh = 0.09*(f'c/fyt) =	0.0068			
	Ash/sbh, provided =	0.0227 ≤	Ash/sbh, control =	0.0244	, Therefore #4 Ties @ 4" o.c. is not Adequate, Try #4 Ties @ 3.5" o.c.
	Ash/sbh, provided =	0.0260 ≥	Ash/sbh, control =	0.0244	, Therefore OK, Use #4 Ties @ 3.5" o.c. in l_o regions
ACI 318-14 (Table. 18.7.5.5)	sv, max (in) beyond l_o regions = Min(6*db, 6) =	6 Controls			, Therefore Use #4 Ties @ 6" o.c. beyond l_o regions
Joints of Special Moment Frames					
ACI 318-14 (Sec. 18.3.3.1)	Use Tie Reinforcement as Required in Lo regions				, Therefore use #4 Ties @ 3.5" o.c. in at SMF Joints
ACI 318-14 (Table 18.8.4.1)	ϕv*Vn (k) = ϕv*12*√f'c*Aj (conservative) =	124 ≥	Vu=	5.331	
Ties					
ACI 318-14 (Sec. 25.7.2.1a)	sv, min (in) beyond l_o regions = (4/3)*dagg+ds =	1.5 ≤		3.5	, Therefore Minimum Tie Spacing is Adequate
ACI 318-14 (Sec. 25.7.2.1b)	sv, max (in) beyond l_o regions = Min(16db, 48ds, dc,min)	16 ≥		6	, Therefore Maximum Tie Spacing is Adequate
ACI 318-14 (Sec. 25.7.2.2)	Tie Size =	4 ≥		3	, Therefore Tie Size is Adequate
Transverse Reinforcement					
ACI 318-14 (Sec. 18.7.6.2.1a)	Ve (k) = Max Seismic Shear =	3.62 ≥	Vu/2 (k) =	2.67	
ACI 318-14 (Sec. 18.7.6.2.1b)	Ag*f'c/20 (k) =	37.80 ≥	Pu (k) =	9.002	, Therefore Shear Reinforcement Shall be designed assuming Vc=0 for locations specified in Sec. 18.7.5.1
ACI 318-14 (Eq. 22.5.2.2)	For Calculaton of Vc an Vs, d is to be taken as 0.8*h =	12.80 in			
ACI 318-14 (Eq. 22.5.10.5.3)	ϕv*Vn (k) = ϕv*Vs = ϕv*(Av/s)*fyt*d =	109.7 ≥	Vu (k) =	5.33	, Therefore #4 ties spaced @ 3.5" o.c. are adequate

TORSION

Torsional Strength

Threshold Torsion					
ACI 318-14 (Sec. 22.7.4.1a & 22.7.1.1)	ϕT_{th} compression (k) = $(\lambda*\sqrt{f'c}*A_{cp}^2)/p_{cp} * \sqrt{(1+(Nu/4*Ag*\lambda*\sqrt{f'c}))}$ =	45.36 ≤	Tu (k) =	0.86	, Therefore Torsional Effects may be Neglected
	ϕT_{th} tension (k) = $(\lambda*\sqrt{f'c}*A_{cp}^2)/p_{cp} * \sqrt{(1+(Nu/4*Ag*\lambda*\sqrt{f'c}))}$ =	41.28 ≤	Tu (k) =	0.86	, Therefore Torsional Effects may be Neglected

spColumn v6.50
Computer program for the Strength Design of Reinforced Concrete Sections



Contents

List of Figures

1. General Information

File Name	c:\senior project\lateral\beam design\c2.col
Project	---
Column	---
Engineer	---
Code	ACI 318-14
Bar Set	ASTM A615
Units	English
Run Option	Design
Run Axis	Biaxial
Slenderness	Considered
Column Type	Structural
Capacity Method	Moment capacity

2. Material Properties

2.1. Concrete

Type	Standard	
f'_c	3	ksi
E_c	3122.02	ksi
f_c	2.55	ksi
ε_u	0.003	in/in
β_1	0.85	

2.2. Steel

Type	Standard	
f_y	40	ksi
E_s	29000	ksi
ε_{yt}	0.00137931	in/in

3. Section

3.1. Shape and Properties

Type	Rectangular	
Width	22	in
Depth	16	in
A_g	352	in^2
I_x	7509.33	in^4
I_y	14197.3	in^4
r_x	4.6188	in
r_y	6.35085	in
X_o	0	in
Y_o	0	in

3.2. Section Figure

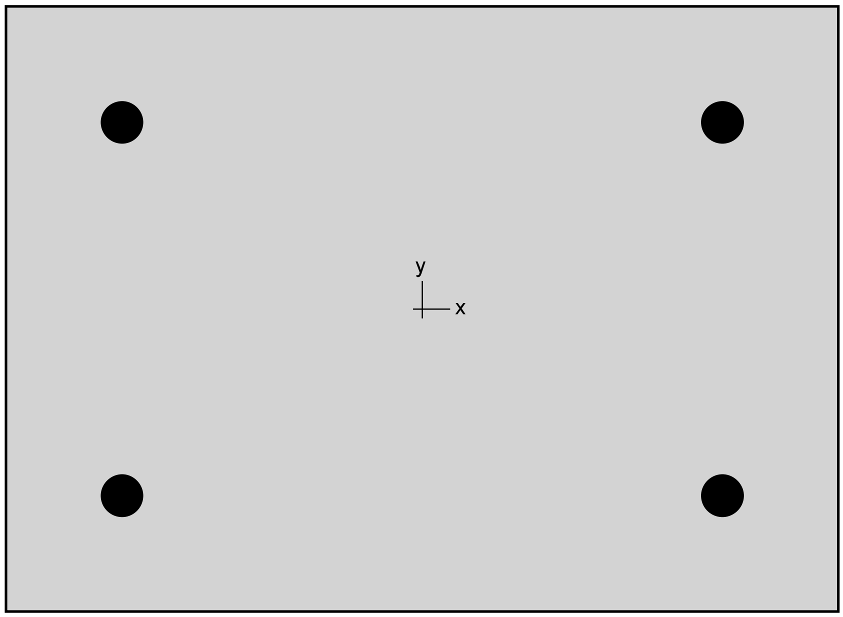


Figure 1: Column section

4. Reinforcement

4.1. Bar Set: ASTM A615

Bar	Diameter	Area	Bar	Diameter	Area	Bar	Diameter	Area
	in	in^2		in	in^2		in	in^2
#3	0.38	0.11	#4	0.50	0.20	#5	0.63	0.31
#6	0.75	0.44	#7	0.88	0.60	#8	1.00	0.79
#9	1.13	1.00	#10	1.27	1.27	#11	1.41	1.56
#14	1.69	2.25	#18	2.26	4.00			

4.2. Design Criteria

Bar selection	Min. number of bars
$A_{s,min}$ = 0.01 x A_g	3.52 in^2
$A_{s,max}$ = 0.08 x A_g	28.16 in^2
Allowable Capacity Ratio (<1 is safe)	0.98

4.3. Confinement and Factors

Confinement type	Tied
For #10 bars or less	#4 ties
For larger bars	#4 ties
Capacity Reduction Factors	
Axial compression, (a)	0.8
Tension controlled ϕ, (b)	0.9
Compression controlled ϕ, (c)	0.65

4.4. Arrangement

Pattern	All sides equal
Bar layout	Rectangular
Cover to	Transverse bars
Clear cover	2 in
Bars	4 #9
Total steel area, A_s	4.00 in^2
Rho	1.14 %
Minimum clear spacing	8.74 in

5. Loading

5.1. Load Combinations

Combination	Dead	Live	Wind	EQ	Snow
U1	1.400	0.000	0.000	0.000	1.000
U2	1.200	1.600	0.000	0.000	1.000
U3	1.200	0.500	0.000	0.000	1.000
U4	1.200	0.000	0.000	1.000	1.000
U5	0.900	0.000	0.000	1.000	1.000
U6	1.200	0.000	0.000	-1.000	1.000
U7	0.900	0.000	0.000	-1.000	1.000

5.2. Service Loads

No.	Load Case	Axial Load	Mx @ Top	Mx @ Bottom	My @ Top	My @ Bottom
		kip	k-ft	k-ft	k-ft	k-ft
1	Dead	7.81	18.07	0.00	0.02	0.00
1	Live	9.85	12.93	0.00	0.02	0.00
1	Wind	0.00	0.00	0.00	0.00	0.00
1	EQ	0.66	37.44	0.00	0.00	0.00
1	Snow	0.00	0.00	0.00	0.00	0.00
2	Dead	7.81	18.07	0.00	0.02	0.00
2	Live	9.85	12.93	0.00	0.02	0.00
2	Wind	0.00	0.00	0.00	0.00	0.00
2	EQ	-0.66	37.44	0.00	0.00	0.00
2	Snow	0.00	0.00	0.00	0.00	0.00
3	Dead	7.81	0.00	0.00	0.00	0.00
3	Live	9.85	0.00	0.00	0.00	0.00
3	Wind	0.00	0.00	0.00	0.00	0.00
3	EQ	-0.66	0.00	0.00	0.00	0.00
3	Snow	0.00	52.90	0.00	96.40	0.00
4	Dead	7.81	0.00	0.00	0.00	0.00
4	Live	9.85	0.00	0.00	0.00	0.00
4	Wind	0.00	0.00	0.00	0.00	0.00
4	EQ	0.66	0.00	0.00	0.00	0.00
4	Snow	0.00	62.90	0.00	96.40	0.00
5	Dead	7.81	18.07	0.00	0.02	0.00
5	Live	9.85	12.93	0.00	0.02	0.00
5	Wind	0.00	0.00	0.00	0.00	0.00
5	EQ	-0.06	0.00	0.00	37.37	0.00
5	Snow	0.00	0.00	0.00	0.00	0.00
6	Dead	7.81	0.00	0.00	0.00	0.00
6	Live	9.85	0.00	0.00	0.00	0.00
6	Wind	0.00	0.00	0.00	0.00	0.00
6	EQ	-0.06	0.00	0.00	0.00	0.00

No.	Load Case	Axial Load	Mx @ Top	Mx @ Bottom	My @ Top	My @ Bottom
		kip	k-ft	k-ft	k-ft	k-ft
6	Snow	0.00	62.90	0.00	96.40	0.00

5.3. Sustained Load Factors

Load Case	Factor
	%
Dead	0
Live	0
Wind	0
EQ	0
Snow	0

6. Slenderness

6.1. Sway Criteria

X-Axis	Sway column
2^{nd} order effects along length	Considered
ΣP_c	$4.92 \times P_c$
ΣP_u	$3.51 \times P_u$
Y-Axis	Sway column
2^{nd} order effects along length	Considered
ΣP_c	$4.92 \times P_c$
ΣP_u	$3.51 \times P_u$

6.2. Columns

Column	Axis	Height	Width	Depth	I	f'_c	E_c
		ft	in	in	in^4	ksi	ksi
Design	X	16.5	22	16	7509.33	3	3122.02
Design	Y	16.5	22	16	14197.3	3	3122.02
Above	X	(no column specified...)					
Above	Y	(no column specified...)					
Below	X	(no column specified...)					
Below	Y	(no column specified...)					

6.3. X - Beams

Beam	Length	Width	Depth	I	f'_c	E_c
	ft	in	in	in^4	ksi	ksi
Above Left	14	18	12	2592	3	3122.02
Above Right	14	18	12	2592	3	3122.02
Below Left	(no beam specified...)					
Below Right	(no beam specified...)					

6.4. Y - Beams

Beam	Length	Width	Depth	I	f'_c	E_c
	ft	in	in	in^4	ksi	ksi
Above Left	(no beam specified...)					
Above Right	24.5	20	12	2880	3	3122.02
Below Left	(no beam specified...)					
Below Right	(no beam specified...)					

7. Moment Magnification

7.1. General Parameters

Factors	Code defaults
Stiffness reduction factor, ϕ_K	0.75
Cracked section coefficients, cI(beams)	0.35
Cracked section coefficients, cI(columns)	0.7
$0.2\ E_c\ I_g + E_s\ I_{se}$ (X-axis)	7.52e+006 kip-in^2
$0.2\ E_c\ I_g + E_s\ I_{se}$ (Y-axis)	1.62e+007 kip-in^2
Minimum eccentricity, $e_{x\ min}$	1.08 in
Minimum eccentricity, $e_{y\ min}$	1.26 in

7.2. Effective Length Factors

Axis	Ψ_{top}	Ψ_{bottom}	k (Nonsway)	k (Sway)	kl_u/r
X	2.386	999.000	0.932	2.737	117.33
Y	14.209	999.000	0.986	5.125	159.78

Notes:
Slenderness kl_u/r is greater than 100.
A second-order frame analysis is recommended to account for slenderness.

7.3. Magnification Factors: X - axis

Load Combo		At Ends					Along Length					
		$\sum P_u$ kip	P_c kip	$\sum P_c$ kip	β_{ds}	δ_s	P_u kip	$k'l_u/r$	P_c kip	β_{dns}	C_m	δ
1	U1	38.30	252.56	1242.59	0.000	1.043	10.93	(N/A)	2176.91	0.000	0.600	1.000
1	U2	88.10	252.56	1242.59	0.000	1.104	25.14	(N/A)	2176.91	0.000	0.600	1.000
1	U3	50.10	252.56	1242.59	0.000	1.057	14.29	(N/A)	2176.91	0.000	0.600	1.000
1	U4	35.15	252.56	1242.59	0.000	1.039	10.03	(N/A)	2176.91	0.000	0.600	1.000
1	U5	26.94	252.56	1242.59	0.000	1.030	7.69	(N/A)	2176.91	0.000	0.600	1.000
1	U6	30.52	252.56	1242.59	0.000	1.034	8.71	(N/A)	2176.91	0.000	0.600	1.000
1	U7	22.31	252.56	1242.59	0.000	1.025	6.37	(N/A)	2176.91	0.000	0.600	1.000
2	U1	38.30	252.56	1242.59	0.000	1.043	10.93	(N/A)	2176.91	0.000	0.600	1.000
2	U2	88.10	252.56	1242.59	0.000	1.104	25.14	(N/A)	2176.91	0.000	0.600	1.000
2	U3	50.10	252.56	1242.59	0.000	1.057	14.29	(N/A)	2176.91	0.000	0.600	1.000
2	U4	30.52	252.56	1242.59	0.000	1.034	8.71	(N/A)	2176.91	0.000	0.600	1.000
2	U5	22.31	252.56	1242.59	0.000	1.025	6.37	(N/A)	2176.91	0.000	0.600	1.000
2	U6	35.15	252.56	1242.59	0.000	1.039	10.03	(N/A)	2176.91	0.000	0.600	1.000
2	U7	26.94	252.56	1242.59	0.000	1.030	7.69	(N/A)	2176.91	0.000	0.600	1.000
3	U1	38.30	252.56	1242.59	0.000	1.043	10.93	(N/A)	2176.91	0.000	0.600	1.000
3	U2	88.10	252.56	1242.59	0.000	1.104	25.14	(N/A)	2176.91	0.000	0.600	1.000
3	U3	50.10	252.56	1242.59	0.000	1.057	14.29	(N/A)	2176.91	0.000	0.600	1.000
3	U4	30.52	252.56	1242.59	0.000	1.034	8.71	(N/A)	2176.91	0.000	0.600	1.000
3	U5	22.31	252.56	1242.59	0.000	1.025	6.37	(N/A)	2176.91	0.000	0.600	1.000
3	U6	35.15	252.56	1242.59	0.000	1.039	10.03	(N/A)	2176.91	0.000	0.600	1.000
3	U7	26.94	252.56	1242.59	0.000	1.030	7.69	(N/A)	2176.91	0.000	0.600	1.000
4	U1	38.30	252.56	1242.59	0.000	1.043	10.93	(N/A)	2176.91	0.000	0.600	1.000
4	U2	88.10	252.56	1242.59	0.000	1.104	25.14	(N/A)	2176.91	0.000	0.600	1.000
4	U3	50.10	252.56	1242.59	0.000	1.057	14.29	(N/A)	2176.91	0.000	0.600	1.000
4	U4	35.15	252.56	1242.59	0.000	1.039	10.03	(N/A)	2176.91	0.000	0.600	1.000
4	U5	26.94	252.56	1242.59	0.000	1.030	7.69	(N/A)	2176.91	0.000	0.600	1.000
4	U6	30.52	252.56	1242.59	0.000	1.034	8.71	(N/A)	2176.91	0.000	0.600	1.000
4	U7	22.31	252.56	1242.59	0.000	1.025	6.37	(N/A)	2176.91	0.000	0.600	1.000
5	U1	38.30	252.56	1242.59	0.000	1.043	10.93	(N/A)	2176.91	0.000	0.600	1.000
5	U2	88.10	252.56	1242.59	0.000	1.104	25.14	(N/A)	2176.91	0.000	0.600	1.000

Load Combo		At Ends					Along Length					
		$\sum P_u$ kip	P_c kip	$\sum P_c$ kip	β_{ds}	δ_s	P_u kip	$k'l_u/r$	P_c kip	β_{dns}	C_m	δ
5	U3	50.10	252.56	1242.59	0.000	1.057	14.29	(N/A)	2176.91	0.000	0.600	1.000
5	U4	32.61	252.56	1242.59	0.000	1.036	9.31	(N/A)	2176.91	0.000	0.600	1.000
5	U5	24.41	252.56	1242.59	0.000	1.027	6.96	(N/A)	2176.91	0.000	0.600	1.000
5	U6	33.05	252.56	1242.59	0.000	1.037	9.43	(N/A)	2176.91	0.000	0.600	1.000
5	U7	24.84	252.56	1242.59	0.000	1.027	7.09	(N/A)	2176.91	0.000	0.600	1.000
6	U1	38.30	252.56	1242.59	0.000	1.043	10.93	(N/A)	2176.91	0.000	0.600	1.000
6	U2	88.10	252.56	1242.59	0.000	1.104	25.14	(N/A)	2176.91	0.000	0.600	1.000
6	U3	50.10	252.56	1242.59	0.000	1.057	14.29	(N/A)	2176.91	0.000	0.600	1.000
6	U4	32.61	252.56	1242.59	0.000	1.036	9.31	(N/A)	2176.91	0.000	0.600	1.000
6	U5	24.41	252.56	1242.59	0.000	1.027	6.96	(N/A)	2176.91	0.000	0.600	1.000
6	U6	33.05	252.56	1242.59	0.000	1.037	9.43	(N/A)	2176.91	0.000	0.600	1.000
6	U7	24.84	252.56	1242.59	0.000	1.027	7.09	(N/A)	2176.91	0.000	0.600	1.000

7.4. Magnification Factors: Y - axis

Load Combo		At Ends					Along Length					
		$\sum P_u$ kip	P_c kip	$\sum P_c$ kip	β_{ds}	δ_s	P_u kip	$k'l_u/r$	P_c kip	β_{dns}	C_m	δ
1	U1	38.30	155.00	762.58	0.000	1.072	10.93	(N/A)	4186.29	0.000	0.600	1.000
1	U2	88.10	155.00	762.58	0.000	1.182	25.14	(N/A)	4186.29	0.000	0.600	1.000
1	U3	50.10	155.00	762.58	0.000	1.096	14.29	(N/A)	4186.29	0.000	0.600	1.000
1	U4	35.15	155.00	762.58	0.000	1.065	10.03	(N/A)	4186.29	0.000	0.600	1.000
1	U5	26.94	155.00	762.58	0.000	1.049	7.69	(N/A)	4186.29	0.000	0.600	1.000
1	U6	30.52	155.00	762.58	0.000	1.056	8.71	(N/A)	4186.29	0.000	0.600	1.000
1	U7	22.31	155.00	762.58	0.000	1.041	6.37	(N/A)	4186.29	0.000	0.600	1.000
2	U1	38.30	155.00	762.58	0.000	1.072	10.93	(N/A)	4186.29	0.000	0.600	1.000
2	U2	88.10	155.00	762.58	0.000	1.182	25.14	(N/A)	4186.29	0.000	0.600	1.000
2	U3	50.10	155.00	762.58	0.000	1.096	14.29	(N/A)	4186.29	0.000	0.600	1.000
2	U4	30.52	155.00	762.58	0.000	1.056	8.71	(N/A)	4186.29	0.000	0.600	1.000
2	U5	22.31	155.00	762.58	0.000	1.041	6.37	(N/A)	4186.29	0.000	0.600	1.000
2	U6	35.15	155.00	762.58	0.000	1.065	10.03	(N/A)	4186.29	0.000	0.600	1.000
2	U7	26.94	155.00	762.58	0.000	1.049	7.69	(N/A)	4186.29	0.000	0.600	1.000
3	U1	38.30	155.00	762.58	0.000	1.072	10.93	(N/A)	4186.29	0.000	0.600	1.000
3	U2	88.10	155.00	762.58	0.000	1.182	25.14	(N/A)	4186.29	0.000	0.600	1.000
3	U3	50.10	155.00	762.58	0.000	1.096	14.29	(N/A)	4186.29	0.000	0.600	1.000
3	U4	30.52	155.00	762.58	0.000	1.056	8.71	(N/A)	4186.29	0.000	0.600	1.000
3	U5	22.31	155.00	762.58	0.000	1.041	6.37	(N/A)	4186.29	0.000	0.600	1.000
3	U6	35.15	155.00	762.58	0.000	1.065	10.03	(N/A)	4186.29	0.000	0.600	1.000
3	U7	26.94	155.00	762.58	0.000	1.049	7.69	(N/A)	4186.29	0.000	0.600	1.000
4	U1	38.30	155.00	762.58	0.000	1.072	10.93	(N/A)	4186.29	0.000	0.600	1.000
4	U2	88.10	155.00	762.58	0.000	1.182	25.14	(N/A)	4186.29	0.000	0.600	1.000
4	U3	50.10	155.00	762.58	0.000	1.096	14.29	(N/A)	4186.29	0.000	0.600	1.000
4	U4	35.15	155.00	762.58	0.000	1.065	10.03	(N/A)	4186.29	0.000	0.600	1.000
4	U5	26.94	155.00	762.58	0.000	1.049	7.69	(N/A)	4186.29	0.000	0.600	1.000
4	U6	30.52	155.00	762.58	0.000	1.056	8.71	(N/A)	4186.29	0.000	0.600	1.000
4	U7	22.31	155.00	762.58	0.000	1.041	6.37	(N/A)	4186.29	0.000	0.600	1.000
5	U1	38.30	155.00	762.58	0.000	1.072	10.93	(N/A)	4186.29	0.000	0.600	1.000
5	U2	88.10	155.00	762.58	0.000	1.182	25.14	(N/A)	4186.29	0.000	0.600	1.000
5	U3	50.10	155.00	762.58	0.000	1.096	14.29	(N/A)	4186.29	0.000	0.600	1.000
5	U4	32.61	155.00	762.58	0.000	1.060	9.31	(N/A)	4186.29	0.000	0.600	1.000
5	U5	24.41	155.00	762.58	0.000	1.045	6.96	(N/A)	4186.29	0.000	0.600	1.000
5	U6	33.05	155.00	762.58	0.000	1.061	9.43	(N/A)	4186.29	0.000	0.600	1.000
5	U7	24.84	155.00	762.58	0.000	1.045	7.09	(N/A)	4186.29	0.000	0.600	1.000
6	U1	38.30	155.00	762.58	0.000	1.072	10.93	(N/A)	4186.29	0.000	0.600	1.000

Load Combo		At Ends					Along Length					
		$\sum P_u$	P_c	$\sum P_c$	β_{ds}	δ_s	P_u	$k'l_u/r$	P_c	β_{dns}	C_m	δ
		kip	kip	kip			kip		kip			
6	U2	88.10	155.00	762.58	0.000	1.182	25.14	(N/A)	4186.29	0.000	0.600	1.000
6	U3	50.10	155.00	762.58	0.000	1.096	14.29	(N/A)	4186.29	0.000	0.600	1.000
6	U4	32.61	155.00	762.58	0.000	1.060	9.31	(N/A)	4186.29	0.000	0.600	1.000
6	U5	24.41	155.00	762.58	0.000	1.045	6.96	(N/A)	4186.29	0.000	0.600	1.000
6	U6	33.05	155.00	762.58	0.000	1.061	9.43	(N/A)	4186.29	0.000	0.600	1.000
6	U7	24.84	155.00	762.58	0.000	1.045	7.09	(N/A)	4186.29	0.000	0.600	1.000

8. Factored Moments

NOTE: Each loading combination includes the following cases:
Top - At column top
Bot - At column bottom

8.1. X - axis

Load Combo			1st Order				2nd Order			Ratio	
			M_{ns}	M_s	M_u	M_{min}		M_i	M_c	$2^{nd}/1^{st}$	
			k-ft	k-ft	k-ft	k-ft		k-ft	k-ft		
1	U1	Top	25.29	0.00	25.29	0.98	M_2=	25.29	25.29	1.000	
1	U1	Bot	0.00	0.00	0.00	0.98	M_1=	0.00	0.98	1.000	#
1	U1	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	42.37	0.00	42.37	2.26	M_2=	42.37	42.37	1.000	
1	U2	Top	0.00	0.00	0.00	2.26	M_1=	0.00	2.26	1.000	#
1	U2	Bot				(N/A)	M_1=	0.00	0.00	1.000	
1	U3	Top	28.14	0.00	28.14	1.29	M_2=	28.14	28.14	1.000	
1	U3	Bot	0.00	0.00	0.00	1.29	M_1=	0.00	1.29	1.000	#
1	U3	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	21.68	37.44	59.11	0.90	M_2=	60.58	60.58	1.025	
1	U4	Top	0.00	0.00	0.00	0.90	M_1=	0.00	0.90	1.000	#
1	U4	Bot				(N/A)	M_1=	0.00	0.00	1.000	
1	U5	Top	16.26	37.44	53.69	0.69	M_2=	54.81	54.81	1.021	
1	U5	Bot	0.00	0.00	0.00	0.69	M_1=	0.00	0.69	1.000	#
1	U5	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	21.68	-37.44	-15.76	-0.78	M_2=	-17.02	-17.02	1.080	
1	U6	Top	0.00	0.00	0.00	0.78	M_1=	0.00	0.78	1.000	#
1	U6	Bot				(N/A)	M_1=	0.00	0.00	1.000	
1	U7	Top	16.26	-37.44	-21.18	-0.57	M_2=	-22.09	-22.09	1.043	
1	U7	Bot	0.00	0.00	0.00	0.57	M_1=	0.00	0.57	1.000	#
1	U7	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	25.29	0.00	25.29	0.98	M_2=	25.29	25.29	1.000	
2	U1	Top	0.00	0.00	0.00	0.98	M_1=	0.00	0.98	1.000	#
2	U1	Bot				(N/A)	M_1=	0.00	0.00	1.000	
2	U2	Top	42.37	0.00	42.37	2.26	M_2=	42.37	42.37	1.000	
2	U2	Bot	0.00	0.00	0.00	2.26	M_1=	0.00	2.26	1.000	#
2	U2	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	28.14	0.00	28.14	1.29	M_2=	28.14	28.14	1.000	
2	U3	Top	0.00	0.00	0.00	1.29	M_1=	0.00	1.29	1.000	#
2	U3	Bot				(N/A)	M_1=	0.00	0.00	1.000	
2	U4	Top	21.68	37.44	59.11	0.78	M_2=	60.38	60.38	1.021	
2	U4	Bot	0.00	0.00	0.00	0.78	M_1=	0.00	0.78	1.000	#
2	U4	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	16.26	37.44	53.69	0.57	M_2=	54.61	54.61	1.017	
2	U5	Top	0.00	0.00	0.00	0.57	M_1=	0.00	0.57	1.000	#
2	U5	Bot				(N/A)	M_1=	0.00	0.00	1.000	
2	U6	Top	21.68	-37.44	-15.76	-0.90	M_2=	-17.22	-17.22	1.093	
2	U6	Bot	0.00	0.00	0.00	0.90	M_1=	0.00	0.90	1.000	#

Load Combo			1st Order M_{ns} k-ft	M_s k-ft	M_u k-ft	M_{min} k-ft	2nd Order	M_i k-ft	M_c k-ft	Ratio 2nd/1st	
2	U6	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	16.26	-37.44	-21.18	-0.69	M_2=	-22.29	-22.29	1.053	
2	U7	Top	0.00	0.00	0.00	0.69	M_1=	0.00	0.69	1.000	#
2	U7	Bot				(N/A)	M_1=	0.00	0.00	1.000	
3	U1	Top	52.90	0.00	52.90	0.98	M_2=	52.90	52.90	1.000	
3	U1	Bot	0.00	0.00	0.00	0.98	M_1=	0.00	0.98	1.000	#
3	U1	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	52.90	0.00	52.90	2.26	M_2=	52.90	52.90	1.000	
3	U2	Top	0.00	0.00	0.00	2.26	M_1=	0.00	2.26	1.000	#
3	U2	Bot				(N/A)	M_1=	0.00	0.00	1.000	
3	U3	Top	52.90	0.00	52.90	1.29	M_2=	52.90	52.90	1.000	
3	U3	Bot	0.00	0.00	0.00	1.29	M_1=	0.00	1.29	1.000	#
3	U3	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	52.90	0.00	52.90	0.78	M_2=	52.90	52.90	1.000	
3	U4	Top	0.00	0.00	0.00	0.78	M_1=	0.00	0.78	1.000	#
3	U4	Bot				(N/A)	M_1=	0.00	0.00	1.000	
3	U5	Top	52.90	0.00	52.90	0.57	M_2=	52.90	52.90	1.000	
3	U5	Bot	0.00	0.00	0.00	0.57	M_1=	0.00	0.57	1.000	#
3	U5	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	52.90	0.00	52.90	0.90	M_2=	52.90	52.90	1.000	
3	U6	Top	0.00	0.00	0.00	0.90	M_1=	0.00	0.90	1.000	#
3	U6	Bot				(N/A)	M_1=	0.00	0.00	1.000	
3	U7	Top	52.90	0.00	52.90	0.69	M_2=	52.90	52.90	1.000	
3	U7	Bot	0.00	0.00	0.00	0.69	M_1=	0.00	0.69	1.000	#
3	U7	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	62.90	0.00	62.90	0.98	M_2=	62.90	62.90	1.000	
4	U1	Top	0.00	0.00	0.00	0.98	M_1=	0.00	0.98	1.000	#
4	U1	Bot				(N/A)	M_1=	0.00	0.00	1.000	
4	U2	Top	62.90	0.00	62.90	2.26	M_2=	62.90	62.90	1.000	
4	U2	Bot	0.00	0.00	0.00	2.26	M_1=	0.00	2.26	1.000	#
4	U2	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	62.90	0.00	62.90	1.29	M_2=	62.90	62.90	1.000	
4	U3	Top	0.00	0.00	0.00	1.29	M_1=	0.00	1.29	1.000	#
4	U3	Bot				(N/A)	M_1=	0.00	0.00	1.000	
4	U4	Top	62.90	0.00	62.90	0.90	M_2=	62.90	62.90	1.000	
4	U4	Bot	0.00	0.00	0.00	0.90	M_1=	0.00	0.90	1.000	#
4	U4	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	62.90	0.00	62.90	0.69	M_2=	62.90	62.90	1.000	
4	U5	Top	0.00	0.00	0.00	0.69	M_1=	0.00	0.69	1.000	#
4	U5	Bot				(N/A)	M_1=	0.00	0.00	1.000	
4	U6	Top	62.90	0.00	62.90	0.78	M_2=	62.90	62.90	1.000	
4	U6	Bot	0.00	0.00	0.00	0.78	M_1=	0.00	0.78	1.000	#
4	U6	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	62.90	0.00	62.90	0.57	M_2=	62.90	62.90	1.000	
4	U7	Top	0.00	0.00	0.00	0.57	M_1=	0.00	0.57	1.000	#
4	U7	Bot				(N/A)	M_1=	0.00	0.00	1.000	
5	U1	Top	25.29	0.00	25.29	0.98	M_2=	25.29	25.29	1.000	
5	U1	Bot	0.00	0.00	0.00	0.98	M_1=	0.00	0.98	1.000	#
5	U1	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	42.37	0.00	42.37	2.26	M_2=	42.37	42.37	1.000	
5	U2	Top	0.00	0.00	0.00	2.26	M_1=	0.00	2.26	1.000	#
5	U2	Bot				(N/A)	M_1=	0.00	0.00	1.000	
5	U3	Top	28.14	0.00	28.14	1.29	M_2=	28.14	28.14	1.000	
5	U3	Bot	0.00	0.00	0.00	1.29	M_1=	0.00	1.29	1.000	#

Load Combo			1st Order M_{ns} k-ft	M_s k-ft	M_u k-ft	M_{min} k-ft		2nd Order M_i k-ft	M_c k-ft	Ratio 2nd/1st	
5	U3	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	21.68	0.00	21.68	0.84	M_2=	21.68	21.68	1.000	
5	U4	Top	0.00	0.00	0.00	0.84	M_1=	0.00	0.84	1.000	#
5	U4	Bot				(N/A)	M_1=	0.00	0.00	1.000	
5	U5	Top	16.26	0.00	16.26	0.63	M_2=	16.26	16.26	1.000	
5	U5	Bot	0.00	0.00	0.00	0.63	M_1=	0.00	0.63	1.000	#
5	U5	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	21.68	0.00	21.68	0.85	M_2=	21.68	21.68	1.000	
5	U6	Top	0.00	0.00	0.00	0.85	M_1=	0.00	0.85	1.000	#
5	U6	Bot				(N/A)	M_1=	0.00	0.00	1.000	
5	U7	Top	16.26	0.00	16.26	0.64	M_2=	16.26	16.26	1.000	
5	U7	Bot	0.00	0.00	0.00	0.64	M_1=	0.00	0.64	1.000	#
5	U7	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	62.90	0.00	62.90	0.98	M_2=	62.90	62.90	1.000	
6	U1	Top	0.00	0.00	0.00	0.98	M_1=	0.00	0.98	1.000	#
6	U1	Bot				(N/A)	M_1=	0.00	0.00	1.000	
6	U2	Top	62.90	0.00	62.90	2.26	M_2=	62.90	62.90	1.000	
6	U2	Bot	0.00	0.00	0.00	2.26	M_1=	0.00	2.26	1.000	#
6	U2	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	62.90	0.00	62.90	1.29	M_2=	62.90	62.90	1.000	
6	U3	Top	0.00	0.00	0.00	1.29	M_1=	0.00	1.29	1.000	#
6	U3	Bot				(N/A)	M_1=	0.00	0.00	1.000	
6	U4	Top	62.90	0.00	62.90	0.84	M_2=	62.90	62.90	1.000	
6	U4	Bot	0.00	0.00	0.00	0.84	M_1=	0.00	0.84	1.000	#
6	U4	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	62.90	0.00	62.90	0.63	M_2=	62.90	62.90	1.000	
6	U5	Top	0.00	0.00	0.00	0.63	M_1=	0.00	0.63	1.000	#
6	U5	Bot				(N/A)	M_1=	0.00	0.00	1.000	
6	U6	Top	62.90	0.00	62.90	0.85	M_2=	62.90	62.90	1.000	
6	U6	Bot	0.00	0.00	0.00	0.85	M_1=	0.00	0.85	1.000	#
6	U6	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	62.90	0.00	62.90	0.64	M_2=	62.90	62.90	1.000	
6	U7	Top	0.00	0.00	0.00	0.64	M_1=	0.00	0.64	1.000	#
6	U7	Bot				(N/A)	M_1=	0.00	0.00	1.000	

M_{min} exceeds M_i for X and Y - axis bending but shall be applied to each axis separately for capacity check.

8.2. Y - axis

Load Combo			1st Order M_{ns} k-ft	M_s k-ft	M_u k-ft	M_{min} k-ft		2nd Order M_i k-ft	M_c k-ft	Ratio 2nd/1st	
1	U1	Top	0.02	0.00	0.02	1.15	M_2=	0.02	1.15	1.000	
1	U1	Bot	0.00	0.00	0.00	1.15	M_1=	0.00	1.15	1.000	#
1	U1	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	0.05	0.00	0.05	2.64	M_2=	0.05	2.64	1.000	
1	U2	Top	0.00	0.00	0.00	2.64	M_1=	0.00	2.64	1.000	#
1	U2	Bot				(N/A)	M_1=	0.00	0.00	1.000	
1	U3	Top	0.03	0.00	0.03	1.50	M_2=	0.03	1.50	1.000	
1	U3	Bot	0.00	0.00	0.00	1.50	M_1=	0.00	1.50	1.000	#
1	U3	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	0.02	0.00	0.02	1.05	M_2=	0.02	1.05	1.000	
1	U4	Top	0.00	0.00	0.00	1.05	M_1=	0.00	1.05	1.000	#
1	U4	Bot				(N/A)	M_1=	0.00	0.00	1.000	
1	U5	Top	0.01	0.00	0.02	0.81	M_2=	0.02	0.81	1.000	

Load				1st Order			2nd Order			Ratio	
Combo			M_{ns}	M_s	M_u	M_{min}		M_i	M_c	2nd/1st	
			k-ft	k-ft	k-ft	k-ft		k-ft	k-ft		
1	U5	Bot	0.00	0.00	0.00	0.81	M_1=	0.00	0.81	1.000	#
1	U5	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	0.02	0.00	0.02	0.91	M_2=	0.02	0.91	1.000	
1	U6	Top	0.00	0.00	0.00	0.91	M_1=	0.00	0.91	1.000	#
1	U6	Bot				(N/A)	M_1=	0.00	0.00	1.000	
1	U7	Top	0.01	0.00	0.01	0.67	M_2=	0.01	0.67	1.000	
1	U7	Bot	0.00	0.00	0.00	0.67	M_1=	0.00	0.67	1.000	#
1	U7	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	0.02	0.00	0.02	1.15	M_2=	0.02	1.15	1.000	
2	U1	Top	0.00	0.00	0.00	1.15	M_1=	0.00	1.15	1.000	#
2	U1	Bot				(N/A)	M_1=	0.00	0.00	1.000	
2	U2	Top	0.05	0.00	0.05	2.64	M_2=	0.05	2.64	1.000	
2	U2	Bot	0.00	0.00	0.00	2.64	M_1=	0.00	2.64	1.000	#
2	U2	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	0.03	0.00	0.03	1.50	M_2=	0.03	1.50	1.000	
2	U3	Top	0.00	0.00	0.00	1.50	M_1=	0.00	1.50	1.000	#
2	U3	Bot				(N/A)	M_1=	0.00	0.00	1.000	
2	U4	Top	0.02	0.00	0.02	0.91	M_2=	0.02	0.91	1.000	
2	U4	Bot	0.00	0.00	0.00	0.91	M_1=	0.00	0.91	1.000	#
2	U4	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	0.01	0.00	0.02	0.67	M_2=	0.02	0.67	1.000	
2	U5	Top	0.00	0.00	0.00	0.67	M_1=	0.00	0.67	1.000	#
2	U5	Bot				(N/A)	M_1=	0.00	0.00	1.000	
2	U6	Top	0.02	0.00	0.02	1.05	M_2=	0.02	1.05	1.000	
2	U6	Bot	0.00	0.00	0.00	1.05	M_1=	0.00	1.05	1.000	#
2	U6	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	0.01	0.00	0.01	0.81	M_2=	0.01	0.81	1.000	
2	U7	Top	0.00	0.00	0.00	0.81	M_1=	0.00	0.81	1.000	#
2	U7	Bot				(N/A)	M_1=	0.00	0.00	1.000	
3	U1	Top	96.40	0.00	96.40	1.15	M_2=	96.40	96.40	1.000	
3	U1	Bot	0.00	0.00	0.00	1.15	M_1=	0.00	1.15	1.000	#
3	U1	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	96.40	0.00	96.40	2.64	M_2=	96.40	96.40	1.000	
3	U2	Top	0.00	0.00	0.00	2.64	M_1=	0.00	2.64	1.000	#
3	U2	Bot				(N/A)	M_1=	0.00	0.00	1.000	
3	U3	Top	96.40	0.00	96.40	1.50	M_2=	96.40	96.40	1.000	
3	U3	Bot	0.00	0.00	0.00	1.50	M_1=	0.00	1.50	1.000	#
3	U3	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	96.40	0.00	96.40	0.91	M_2=	96.40	96.40	1.000	
3	U4	Top	0.00	0.00	0.00	0.91	M_1=	0.00	0.91	1.000	#
3	U4	Bot				(N/A)	M_1=	0.00	0.00	1.000	
3	U5	Top	96.40	0.00	96.40	0.67	M_2=	96.40	96.40	1.000	
3	U5	Bot	0.00	0.00	0.00	0.67	M_1=	0.00	0.67	1.000	#
3	U5	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	96.40	0.00	96.40	1.05	M_2=	96.40	96.40	1.000	
3	U6	Top	0.00	0.00	0.00	1.05	M_1=	0.00	1.05	1.000	#
3	U6	Bot				(N/A)	M_1=	0.00	0.00	1.000	
3	U7	Top	96.40	0.00	96.40	0.81	M_2=	96.40	96.40	1.000	
3	U7	Bot	0.00	0.00	0.00	0.81	M_1=	0.00	0.81	1.000	#
3	U7	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	96.40	0.00	96.40	1.15	M_2=	96.40	96.40	1.000	
4	U1	Top	0.00	0.00	0.00	1.15	M_1=	0.00	1.15	1.000	#
4	U1	Bot				(N/A)	M_1=	0.00	0.00	1.000	
4	U2	Top	96.40	0.00	96.40	2.64	M_2=	96.40	96.40	1.000	

Load Combo			1st Order M_{ns} k-ft	M_s k-ft	M_u k-ft	M_{min} k-ft	2nd Order	M_i k-ft	M_c k-ft	Ratio 2nd/1st	
4	U2	Bot	0.00	0.00	0.00	2.64	M_1=	0.00	2.64	1.000	#
4	U2	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	96.40	0.00	96.40	1.50	M_2=	96.40	96.40	1.000	
4	U3	Top	0.00	0.00	0.00	1.50	M_1=	0.00	1.50	1.000	#
4	U3	Bot				(N/A)	M_1=	0.00	0.00	1.000	
4	U4	Top	96.40	0.00	96.40	1.05	M_2=	96.40	96.40	1.000	
4	U4	Bot	0.00	0.00	0.00	1.05	M_1=	0.00	1.05	1.000	#
4	U4	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	96.40	0.00	96.40	0.81	M_2=	96.40	96.40	1.000	
4	U5	Top	0.00	0.00	0.00	0.81	M_1=	0.00	0.81	1.000	#
4	U5	Bot				(N/A)	M_1=	0.00	0.00	1.000	
4	U6	Top	96.40	0.00	96.40	0.91	M_2=	96.40	96.40	1.000	
4	U6	Bot	0.00	0.00	0.00	0.91	M_1=	0.00	0.91	1.000	#
4	U6	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	96.40	0.00	96.40	0.67	M_2=	96.40	96.40	1.000	
4	U7	Top	0.00	0.00	0.00	0.67	M_1=	0.00	0.67	1.000	#
4	U7	Bot				(N/A)	M_1=	0.00	0.00	1.000	
5	U1	Top	0.02	0.00	0.02	1.15	M_2=	0.02	1.15	1.000	
5	U1	Bot	0.00	0.00	0.00	1.15	M_1=	0.00	1.15	1.000	#
5	U1	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	0.05	0.00	0.05	2.64	M_2=	0.05	2.64	1.000	
5	U2	Top	0.00	0.00	0.00	2.64	M_1=	0.00	2.64	1.000	#
5	U2	Bot				(N/A)	M_1=	0.00	0.00	1.000	
5	U3	Top	0.03	0.00	0.03	1.50	M_2=	0.03	1.50	1.000	
5	U3	Bot	0.00	0.00	0.00	1.50	M_1=	0.00	1.50	1.000	#
5	U3	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	0.02	37.37	37.39	0.98	M_2=	39.65	39.65	1.060	
5	U4	Top	0.00	0.00	0.00	0.98	M_1=	0.00	0.98	1.000	#
5	U4	Bot				(N/A)	M_1=	0.00	0.00	1.000	
5	U5	Top	0.01	37.37	37.38	0.73	M_2=	39.05	39.05	1.045	
5	U5	Bot	0.00	0.00	0.00	0.73	M_1=	0.00	0.73	1.000	#
5	U5	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	0.02	-37.37	-37.35	-0.99	M_2=	-39.64	-39.64	1.061	
5	U6	Top	0.00	0.00	0.00	0.99	M_1=	0.00	0.99	1.000	#
5	U6	Bot				(N/A)	M_1=	0.00	0.00	1.000	
5	U7	Top	0.01	-37.37	-37.36	-0.74	M_2=	-39.05	-39.05	1.045	
5	U7	Bot	0.00	0.00	0.00	0.74	M_1=	0.00	0.74	1.000	#
5	U7	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	96.40	0.00	96.40	1.15	M_2=	96.40	96.40	1.000	
6	U1	Top	0.00	0.00	0.00	1.15	M_1=	0.00	1.15	1.000	#
6	U1	Bot				(N/A)	M_1=	0.00	0.00	1.000	
6	U2	Top	96.40	0.00	96.40	2.64	M_2=	96.40	96.40	1.000	
6	U2	Bot	0.00	0.00	0.00	2.64	M_1=	0.00	2.64	1.000	#
6	U2	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	96.40	0.00	96.40	1.50	M_2=	96.40	96.40	1.000	
6	U3	Top	0.00	0.00	0.00	1.50	M_1=	0.00	1.50	1.000	#
6	U3	Bot				(N/A)	M_1=	0.00	0.00	1.000	
6	U4	Top	96.40	0.00	96.40	0.98	M_2=	96.40	96.40	1.000	
6	U4	Bot	0.00	0.00	0.00	0.98	M_1=	0.00	0.98	1.000	#
6	U4	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	96.40	0.00	96.40	0.73	M_2=	96.40	96.40	1.000	
6	U5	Top	0.00	0.00	0.00	0.73	M_1=	0.00	0.73	1.000	#
6	U5	Bot				(N/A)	M_1=	0.00	0.00	1.000	
6	U6	Top	96.40	0.00	96.40	0.99	M_2=	96.40	96.40	1.000	

Load Combo			1st Order M_{ns} k-ft	M_s k-ft	M_u k-ft	M_{min} k-ft	2nd Order	M_i k-ft	M_c k-ft	Ratio 2nd/1st	
6	U6	Bot	0.00	0.00	0.00	0.99	M_1=	0.00	0.99	1.000	#
6	U6	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	96.40	0.00	96.40	0.74	M_2=	96.40	96.40	1.000	
6	U7	Top	0.00	0.00	0.00	0.74	M_1=	0.00	0.74	1.000	#
6	U7	Bot				(N/A)	M_1=	0.00	0.00	1.000	

M_{min} exceeds M_i for X and Y - axis bending but shall be applied to each axis separately for capacity check.

9. Factored Loads and Moments with Corresponding Capacity Ratios

NOTE: Calculations are based on "Moment Capacity" Method.
Allowable Capacity (Ratio) <= 0.98
Each loading combination includes the following cases:
Top - At column top
Bot - At column bottom

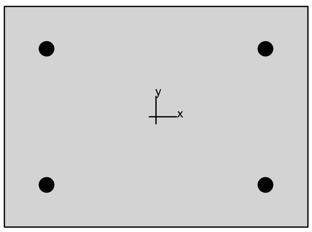
No.	Load Combo			Demand P_u kip	M_{ux} k-ft	M_{uy} k-ft	Capacity ϕP_n kip	ϕM_{nx} k-ft	ϕM_{ny} k-ft	Parameters at Capacity NA Depth in	ε_t	ϕ	Capacity Ratio
1	1	U1	Top	10.93	25.29	1.15	10.93	81.70	3.71	2.71	0.01169	0.900	0.31
2	1	U1	Bot	10.93	0.98	0.00	10.93	81.93	0.00	2.59	0.01196	0.900	0.01
3	1	U1	Bot	10.93	0.00	1.15	10.93	0.00	116.31	2.91	0.01649	0.900	0.01
4	1	U2	Top	25.14	42.37	2.64	25.14	87.83	5.47	2.91	0.01088	0.900	0.48
5	1	U2	Bot	25.14	2.26	0.00	25.14	88.14	0.00	2.72	0.01126	0.900	0.03
6	1	U2	Bot	25.14	0.00	2.64	25.14	0.00	125.93	3.08	0.01543	0.900	0.02
7	1	U3	Top	14.29	28.14	1.50	14.29	83.14	4.43	2.77	0.01148	0.900	0.34
8	1	U3	Bot	14.29	1.29	0.00	14.29	83.41	0.00	2.62	0.01179	0.900	0.02
9	1	U3	Bot	14.29	0.00	1.50	14.29	0.00	118.60	2.95	0.01623	0.900	0.01
10	1	U4	Top	10.03	60.58	1.05	10.03	81.45	1.42	2.63	0.01190	0.900	0.74
11	1	U4	Bot	10.03	0.90	0.00	10.03	81.53	0.00	2.59	0.01201	0.900	0.01
12	1	U4	Bot	10.03	0.00	1.05	10.03	0.00	115.69	2.90	0.01656	0.900	0.01
13	1	U5	Top	7.69	54.81	0.81	7.69	80.43	1.18	2.60	0.01204	0.900	0.68
14	1	U5	Bot	7.69	0.69	0.00	7.69	80.50	0.00	2.57	0.01213	0.900	0.01
15	1	U5	Bot	7.69	0.00	0.81	7.69	0.00	114.10	2.88	0.01674	0.900	0.01
16	1	U6	Top	8.71	-17.02	0.91	8.71	-80.69	4.33	2.71	0.01176	0.900	0.21
17	1	U6	Bot	8.71	0.78	0.00	8.71	80.95	0.00	2.57	0.01207	0.900	0.01
18	1	U6	Bot	8.71	0.00	0.91	8.71	0.00	114.79	2.89	0.01666	0.900	0.01
19	1	U7	Top	6.37	-22.09	0.67	6.37	-79.78	2.41	2.63	0.01202	0.900	0.28
20	1	U7	Bot	6.37	0.57	0.00	6.37	79.92	0.00	2.55	0.01219	0.900	0.01
21	1	U7	Bot	6.37	0.00	0.67	6.37	0.00	113.20	2.86	0.01684	0.900	0.01
22	2	U1	Top	10.93	25.29	1.15	10.93	81.70	3.71	2.71	0.01169	0.900	0.31
23	2	U1	Bot	10.93	0.98	0.00	10.93	81.93	0.00	2.59	0.01196	0.900	0.01
24	2	U1	Bot	10.93	0.00	1.15	10.93	0.00	116.31	2.91	0.01649	0.900	0.01
25	2	U2	Top	25.14	42.37	2.64	25.14	87.83	5.47	2.91	0.01088	0.900	0.48
26	2	U2	Bot	25.14	2.26	0.00	25.14	88.14	0.00	2.72	0.01126	0.900	0.03
27	2	U2	Bot	25.14	0.00	2.64	25.14	0.00	125.93	3.08	0.01543	0.900	0.02
28	2	U3	Top	14.29	28.14	1.50	14.29	83.14	4.43	2.77	0.01148	0.900	0.34
29	2	U3	Bot	14.29	1.29	0.00	14.29	83.41	0.00	2.62	0.01179	0.900	0.02
30	2	U3	Bot	14.29	0.00	1.50	14.29	0.00	118.60	2.95	0.01623	0.900	0.01
31	2	U4	Top	8.71	60.38	0.91	8.71	80.88	1.22	2.61	0.01198	0.900	0.75
32	2	U4	Bot	8.71	0.78	0.00	8.71	80.95	0.00	2.57	0.01207	0.900	0.01
33	2	U4	Bot	8.71	0.00	0.91	8.71	0.00	114.79	2.89	0.01666	0.900	0.01
34	2	U5	Top	6.37	54.61	0.67	6.37	79.86	0.98	2.59	0.01212	0.900	0.68
35	2	U5	Bot	6.37	0.57	0.00	6.37	79.92	0.00	2.55	0.01219	0.900	0.01
36	2	U5	Bot	6.37	0.00	0.67	6.37	0.00	113.20	2.86	0.01684	0.900	0.01
37	2	U6	Top	10.03	-17.22	1.05	10.03	-81.23	4.97	2.75	0.01165	0.900	0.21
38	2	U6	Bot	10.03	0.90	0.00	10.03	81.53	0.00	2.59	0.01201	0.900	0.01

No.	Load Combo			Demand P_u kip	Demand M_{ux} k-ft	Demand M_{uy} k-ft	Capacity ϕP_n kip	Capacity ϕM_{nx} k-ft	Capacity ϕM_{ny} k-ft	Parameters at Capacity NA Depth in	ε_t	ϕ	Capacity Ratio
39	2	U6	Bot	10.03	0.00	1.05	10.03	0.00	115.69	2.90	0.01656	0.900	0.01
40	2	U7	Top	7.69	-22.29	0.81	7.69	-80.33	2.91	2.66	0.01191	0.900	0.28
41	2	U7	Bot	7.69	0.69	0.00	7.69	80.50	0.00	2.57	0.01213	0.900	0.01
42	2	U7	Bot	7.69	0.00	0.81	7.69	0.00	114.10	2.88	0.01674	0.900	0.01
43	3	U1	Top	10.93	52.90	96.40	10.93	58.55	106.69	7.02	0.00677	0.900	0.90
44	3	U1	Bot	10.93	0.98	0.00	10.93	81.93	0.00	2.59	0.01196	0.900	0.01
45	3	U1	Bot	10.93	0.00	1.15	10.93	0.00	116.31	2.91	0.01649	0.900	0.01
46	3	U2	Top	25.14	52.90	96.40	25.14	62.71	114.27	7.54	0.00609	0.900	0.84
47	3	U2	Bot	25.14	2.26	0.00	25.14	88.14	0.00	2.72	0.01126	0.900	0.03
48	3	U2	Bot	25.14	0.00	2.64	25.14	0.00	125.93	3.08	0.01543	0.900	0.02
49	3	U3	Top	14.29	52.90	96.40	14.29	59.55	108.52	7.15	0.00660	0.900	0.89
50	3	U3	Bot	14.29	1.29	0.00	14.29	83.41	0.00	2.62	0.01179	0.900	0.02
51	3	U3	Bot	14.29	0.00	1.50	14.29	0.00	118.60	2.95	0.01623	0.900	0.01
52	3	U4	Top	8.71	52.90	96.40	8.71	57.84	105.41	6.95	0.00688	0.900	0.91
53	3	U4	Bot	8.71	0.78	0.00	8.71	80.95	0.00	2.57	0.01207	0.900	0.01
54	3	U4	Bot	8.71	0.00	0.91	8.71	0.00	114.79	2.89	0.01666	0.900	0.01
55	3	U5	Top	6.37	52.90	96.40	6.37	57.11	104.07	6.86	0.00701	0.900	0.93
56	3	U5	Bot	6.37	0.57	0.00	6.37	79.92	0.00	2.55	0.01219	0.900	0.01
57	3	U5	Bot	6.37	0.00	0.67	6.37	0.00	113.20	2.86	0.01684	0.900	0.01
58	3	U6	Top	10.03	52.90	96.40	10.03	58.26	106.17	6.99	0.00682	0.900	0.91
59	3	U6	Bot	10.03	0.90	0.00	10.03	81.53	0.00	2.59	0.01201	0.900	0.01
60	3	U6	Bot	10.03	0.00	1.05	10.03	0.00	115.69	2.90	0.01656	0.900	0.01
61	3	U7	Top	7.69	52.90	96.40	7.69	57.52	104.82	6.91	0.00694	0.900	0.92
62	3	U7	Bot	7.69	0.69	0.00	7.69	80.50	0.00	2.57	0.01213	0.900	0.01
63	3	U7	Bot	7.69	0.00	0.81	7.69	0.00	114.10	2.88	0.01674	0.900	0.01
64	4	U1	Top	10.93	62.90	96.40	10.93	66.27	101.56	7.28	0.00611	0.900	0.95
65	4	U1	Bot	10.93	0.98	0.00	10.93	81.93	0.00	2.59	0.01196	0.900	0.01
66	4	U1	Bot	10.93	0.00	1.15	10.93	0.00	116.31	2.91	0.01649	0.900	0.01
67	4	U2	Top	25.14	62.90	96.40	25.14	71.13	109.01	7.73	0.00557	0.900	0.88
68	4	U2	Bot	25.14	2.26	0.00	25.14	88.14	0.00	2.72	0.01126	0.900	0.03
69	4	U2	Bot	25.14	0.00	2.64	25.14	0.00	125.93	3.08	0.01543	0.900	0.02
70	4	U3	Top	14.29	62.90	96.40	14.29	67.44	103.35	7.39	0.00598	0.900	0.93
71	4	U3	Bot	14.29	1.29	0.00	14.29	83.41	0.00	2.62	0.01179	0.900	0.02
72	4	U3	Bot	14.29	0.00	1.50	14.29	0.00	118.60	2.95	0.01623	0.900	0.01
73	4	U4	Top	10.03	62.90	96.40	10.03	65.95	101.07	7.25	0.00615	0.900	0.95
74	4	U4	Bot	10.03	0.90	0.00	10.03	81.53	0.00	2.59	0.01201	0.900	0.01
75	4	U4	Bot	10.03	0.00	1.05	10.03	0.00	115.69	2.90	0.01656	0.900	0.01
76	4	U5	Top	7.69	62.90	96.40	7.69	65.12	99.80	7.18	0.00625	0.900	0.97
77	4	U5	Bot	7.69	0.69	0.00	7.69	80.50	0.00	2.57	0.01213	0.900	0.01
78	4	U5	Bot	7.69	0.00	0.81	7.69	0.00	114.10	2.88	0.01674	0.900	0.01
79	4	U6	Top	8.71	62.90	96.40	8.71	65.48	100.36	7.21	0.00620	0.900	0.96
80	4	U6	Bot	8.71	0.78	0.00	8.71	80.95	0.00	2.57	0.01207	0.900	0.01
81	4	U6	Bot	8.71	0.00	0.91	8.71	0.00	114.79	2.89	0.01666	0.900	0.01
82	4	U7	Top	6.37	62.90	96.40	6.37	64.65	99.08	7.14	0.00630	0.900	0.97
83	4	U7	Bot	6.37	0.57	0.00	6.37	79.92	0.00	2.55	0.01219	0.900	0.01
84	4	U7	Bot	6.37	0.00	0.67	6.37	0.00	113.20	2.86	0.01684	0.900	0.01
85	5	U1	Top	10.93	25.29	1.15	10.93	81.70	3.71	2.71	0.01169	0.900	0.31
86	5	U1	Bot	10.93	0.98	0.00	10.93	81.93	0.00	2.59	0.01196	0.900	0.01
87	5	U1	Bot	10.93	0.00	1.15	10.93	0.00	116.31	2.91	0.01649	0.900	0.01
88	5	U2	Top	25.14	42.37	2.64	25.14	87.83	5.47	2.91	0.01088	0.900	0.48
89	5	U2	Bot	25.14	2.26	0.00	25.14	88.14	0.00	2.72	0.01126	0.900	0.03
90	5	U2	Bot	25.14	0.00	2.64	25.14	0.00	125.93	3.08	0.01543	0.900	0.02
91	5	U3	Top	14.29	28.14	1.50	14.29	83.14	4.43	2.77	0.01148	0.900	0.34
92	5	U3	Bot	14.29	1.29	0.00	14.29	83.41	0.00	2.62	0.01179	0.900	0.02

No.	Load Combo			Demand P_u kip	Demand M_{ux} k-ft	Demand M_{uy} k-ft	Capacity ϕP_n kip	Capacity ϕM_{nx} k-ft	Capacity ϕM_{ny} k-ft	NA Depth in	ε_t	ϕ	Capacity Ratio
93	5	U3	Bot	14.29	0.00	1.50	14.29	0.00	118.60	2.95	0.01623	0.900	0.01
94	5	U4	Top	9.31	21.68	39.65	9.31	57.86	105.82	6.96	0.00687	0.900	0.37
95	5	U4	Bot	9.31	0.84	0.00	9.31	81.22	0.00	2.58	0.01204	0.900	0.01
96	5	U4	Bot	9.31	0.00	0.98	9.31	0.00	115.20	2.90	0.01662	0.900	0.01
97	5	U5	Top	6.96	16.26	39.05	6.96	45.02	108.14	5.94	0.00838	0.900	0.36
98	5	U5	Bot	6.96	0.63	0.00	6.96	80.19	0.00	2.56	0.01216	0.900	0.01
99	5	U5	Bot	6.96	0.00	0.73	6.96	0.00	113.61	2.87	0.01680	0.900	0.01
100	5	U6	Top	9.43	21.68	-39.64	9.43	57.90	-105.89	6.96	0.00686	0.900	0.37
101	5	U6	Bot	9.43	0.85	0.00	9.43	81.27	0.00	2.58	0.01204	0.900	0.01
102	5	U6	Bot	9.43	0.00	0.99	9.43	0.00	115.29	2.90	0.01661	0.900	0.01
103	5	U7	Top	7.09	16.26	-39.05	7.09	45.05	-108.21	5.94	0.00838	0.900	0.36
104	5	U7	Bot	7.09	0.64	0.00	7.09	80.24	0.00	2.56	0.01216	0.900	0.01
105	5	U7	Bot	7.09	0.00	0.74	7.09	0.00	113.69	2.87	0.01679	0.900	0.01
106	6	U1	Top	10.93	62.90	96.40	10.93	66.27	101.56	7.28	0.00611	0.900	0.95
107	6	U1	Bot	10.93	0.98	0.00	10.93	81.93	0.00	2.59	0.01196	0.900	0.01
108	6	U1	Bot	10.93	0.00	1.15	10.93	0.00	116.31	2.91	0.01649	0.900	0.01
109	6	U2	Top	25.14	62.90	96.40	25.14	71.13	109.01	7.73	0.00557	0.900	0.88
110	6	U2	Bot	25.14	2.26	0.00	25.14	88.14	0.00	2.72	0.01126	0.900	0.03
111	6	U2	Bot	25.14	0.00	2.64	25.14	0.00	125.93	3.08	0.01543	0.900	0.02
112	6	U3	Top	14.29	62.90	96.40	14.29	67.44	103.35	7.39	0.00598	0.900	0.93
113	6	U3	Bot	14.29	1.29	0.00	14.29	83.41	0.00	2.62	0.01179	0.900	0.02
114	6	U3	Bot	14.29	0.00	1.50	14.29	0.00	118.60	2.95	0.01623	0.900	0.01
115	6	U4	Top	9.31	62.90	96.40	9.31	65.70	100.68	7.23	0.00618	0.900	0.96
116	6	U4	Bot	9.31	0.84	0.00	9.31	81.22	0.00	2.58	0.01204	0.900	0.01
117	6	U4	Bot	9.31	0.00	0.98	9.31	0.00	115.20	2.90	0.01662	0.900	0.01
118	6	U5	Top	6.96	62.90	96.40	6.96	64.86	99.41	7.15	0.00628	0.900	0.97
119	6	U5	Bot	6.96	0.63	0.00	6.96	80.19	0.00	2.56	0.01216	0.900	0.01
120	6	U5	Bot	6.96	0.00	0.73	6.96	0.00	113.61	2.87	0.01680	0.900	0.01
121	6	U6	Top	9.43	62.90	96.40	9.43	65.74	100.75	7.23	0.00617	0.900	0.96
122	6	U6	Bot	9.43	0.85	0.00	9.43	81.27	0.00	2.58	0.01204	0.900	0.01
123	6	U6	Bot	9.43	0.00	0.99	9.43	0.00	115.29	2.90	0.01661	0.900	0.01
124	6	U7	Top	7.09	62.90	96.40	7.09	64.91	99.48	7.16	0.00627	0.900	0.97
125	6	U7	Bot	7.09	0.64	0.00	7.09	80.24	0.00	2.56	0.01216	0.900	0.01
126	6	U7	Bot	7.09	0.00	0.74	7.09	0.00	113.69	2.87	0.01679	0.900	0.01

10. Diagrams

10.1. PM at θ=57 [deg]



22 x 16 in

General Information

Project	---
Column	---
Engineer	---
Code	ACI 318-14
Bar Set	ASTM A615
Units	English
Run Option	Design
Run Axis	Biaxial
Slenderness	Considered
Column Type	Structural
Capacity Method	Moment capacity

Materials

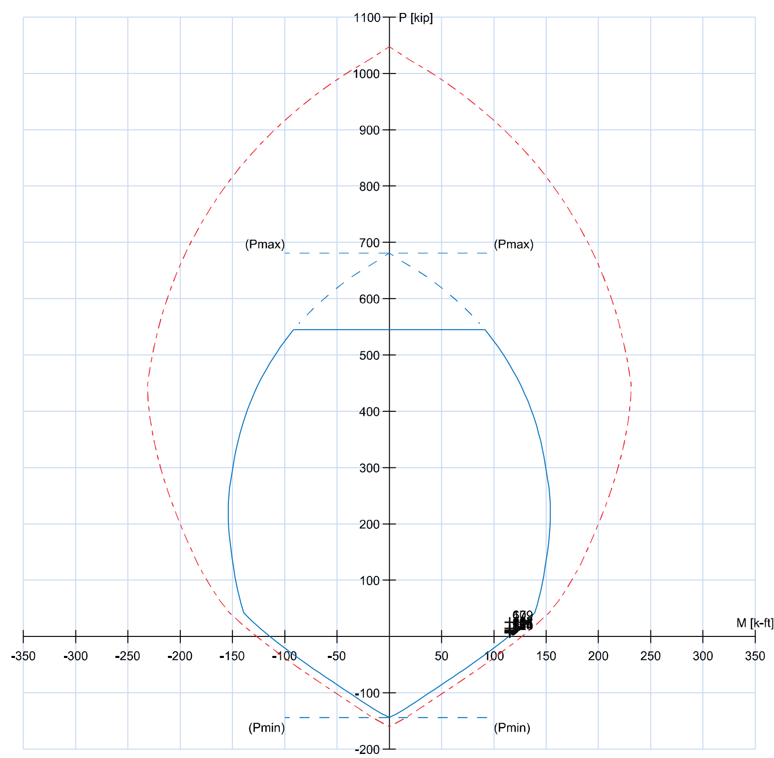
f'_c	3 ksi
E_c	3122.02 ksi
f_y	40 ksi
E_s	29000 ksi

Section

Type	Rectangular
Width	22 in
Depth	16 in
A_g	352 in²
I_x	7509.33 in⁴
I_y	14197.3 in⁴

Reinforcement

Pattern	All sides equal
Bar layout	Rectangular
Cover to	Transverse bars
Clear cover	2 in
Bars	4 #9
Confinement type	Tied
Total steel area, A_s	4.00 in²
Rho	1.14 %
Min. clear spacing	8.74 in

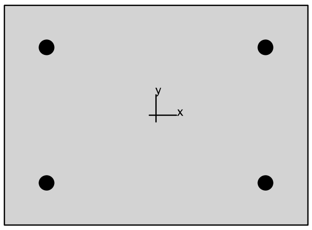


PM at 57.0 [deg]

No.	Load Combo			P_u kip	M_{ux} k-ft	M_{uy} k-ft	ϕP_n kip	ϕM_{nx} k-ft	ϕM_{ny} k-ft	Capacity Ratio
76	4	U5	Top	7.7	62.9	96.4	7.69	65.12	99.80	0.97
82	4	U7	Top	6.4	62.9	96.4	6.37	64.65	99.08	0.97
118	6	U5	Top	7.0	62.9	96.4	6.96	64.86	99.41	0.97
124	6	U7	Top	7.1	62.9	96.4	7.09	64.91	99.48	0.97
79	4	U6	Top	8.7	62.9	96.4	8.71	65.48	100.36	0.96
115	6	U4	Top	9.3	62.9	96.4	9.31	65.70	100.68	0.96
121	6	U6	Top	9.4	62.9	96.4	9.43	65.74	100.75	0.96
64	4	U1	Top	10.9	62.9	96.4	10.93	66.27	101.56	0.95
73	4	U4	Top	10.0	62.9	96.4	10.03	65.95	101.07	0.95
106	6	U1	Top	10.9	62.9	96.4	10.93	66.27	101.56	0.95
70	4	U3	Top	14.3	62.9	96.4	14.29	67.44	103.35	0.93
112	6	U3	Top	14.3	62.9	96.4	14.29	67.44	103.35	0.93
67	4	U2	Top	25.1	62.9	96.4	25.14	71.13	109.01	0.88
109	6	U2	Top	25.1	62.9	96.4	25.14	71.13	109.01	0.88

Max. Capacity Ratio: 0.97

10.2. MM at P=6 [kip]



22 x 16 in

General Information

Project	---
Column	---
Engineer	---
Code	ACI 318-14
Bar Set	ASTM A615
Units	English
Run Option	Design
Run Axis	Biaxial
Slenderness	Considered
Column Type	Structural
Capacity Method	Moment capacity

Materials

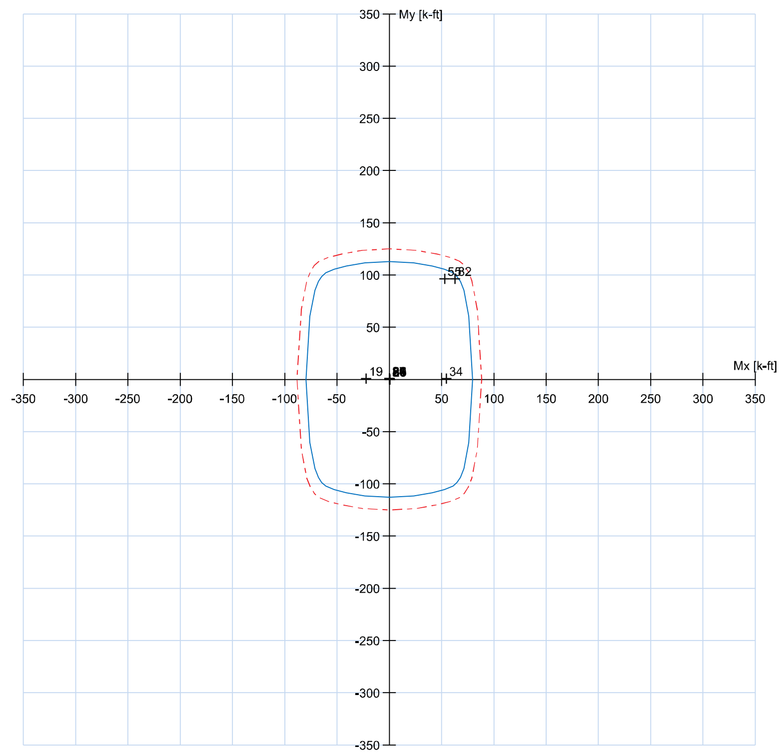
f'_c	3 ksi
E_c	3122.02 ksi
f_y	40 ksi
E_s	29000 ksi

Section

Type	Rectangular
Width	22 in
Depth	16 in
A_g	352 in^2
I_x	7509.33 in^4
I_y	14197.3 in^4

Reinforcement

Pattern	All sides equal
Bar layout	Rectangular
Cover to	Transverse bars
Clear cover	2 in
Bars	4 #9
Confinement type	Tied
Total steel area, A_s	4.00 in^2
Rho	1.14 %
Min. clear spacing	8.74 in



MM at P=6.0 [kip]

No.	Load Combo			P_u kip	M_{ux} k-ft	M_{uy} k-ft	ϕP_n kip	ϕM_{nx} k-ft	ϕM_{ny} k-ft	Capacity Ratio
82	4	U7	Top	6.4	62.9	96.4	6.37	64.65	99.08	0.97
55	3	U5	Top	6.4	52.9	96.4	6.37	57.11	104.07	0.93
34	2	U5	Top	6.4	54.6	0.7	6.37	79.86	0.98	0.68
19	1	U7	Top	6.4	-22.1	0.7	6.37	-79.78	2.41	0.28
20	1	U7	Bot	6.4	0.6	0.0	6.37	79.92	0.00	0.01
21	1	U7	Bot	6.4	0.0	0.7	6.37	0.00	113.20	0.01
35	2	U5	Bot	6.4	0.6	0.0	6.37	79.92	0.00	0.01
36	2	U5	Bot	6.4	0.0	0.7	6.37	0.00	113.20	0.01
56	3	U5	Bot	6.4	0.6	0.0	6.37	79.92	0.00	0.01
57	3	U5	Bot	6.4	0.0	0.7	6.37	0.00	113.20	0.01
83	4	U7	Bot	6.4	0.6	0.0	6.37	79.92	0.00	0.01
84	4	U7	Bot	6.4	0.0	0.7	6.37	0.00	113.20	0.01

Max. Capacity Ratio: 0.97

Column Design — C2 - Special Moment Frame Column

Bending Axis	Shear Axis
X-X/3-3	Y-Y/2-2

lux (out of plane span) (in) =	198	
luy (in plane span) (in) =	198	
b (in) =	22	
h (in) =	16	
long bar size =	9	
Tie size =	4	
number of longitudinal bars =	4	
d' =	2.500	
f'c (psi) =	3000	
fy (psi) =	40000	
Pu Compression (k) =	23.93	
Pu Tension (k) =	-3.550	
Tu (k-ft) =	0.00	
Max NA depth (in) =	7.5	6 bars in tension
Min NA depth (in) =	2.6	3 layers in tension
Mu Strong x (k-ft) =	104.50	
Mu Weak y (k-ft) =	79.57	

BENDING DESIGN

Slenderness

ACI 318-14 (Sec. 6.2.5 & 6.2.6)	(k*l)/0.3*b =	30.00 ≥		22	Therefore, slenderness effects must be accounted for in SP Column Analysis

Special Moment Frame Column Design Requirements

Dimensional Limits					
ACI 318-14 (Sec. 18.7.2.1a)	bmin = 12"	≤		22	, Therefore OK
	hmin = 12"	≤		16	, Therefore OK
ACI 318-14 (Sec. 18.6.2.1b)	Min(b,h)/Max(b,h) =	0.7273 ≥		0.4	, Therefore OK
Minimum Flexural Strength of Columns					
ACI 318-14 (Eq. 18.7.3.2)	ΣMnc ≥ (6/5)ΣMnb				
	(6/5)ΣMnb x (k-ft) =	60.00 ≤	Mu =	104.50	, Therefore Mu controls column demand
	(6/5)ΣMnb y (k-ft) =	86.40 ≥	Mu =	79.57	, Therefore (5/6)ΣMnb controls column demand
Longitudinal Reinforcement					
ACI 318-14 (Sec. 18.7.4.1)	0.01Ag ≤ Ast ≤ 0.06Ag				
	Ast (in^2) =	3.976 ≥	0.01Ag =	3.480239	, Therefore OK
	Ast (in^2) =	3.976 ≤	0.06Ag =	20.88144	, Therefore OK

SHEAR DESIGN

Special Moment Frame Column Design Requirements

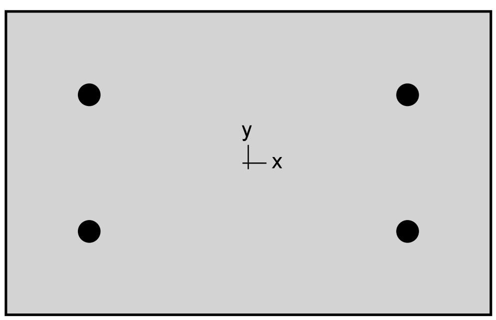
Transverse Reinforcement					
ACI 318-14 (Sec. 18.7.5.1a)	l_o (in) =	22.0			
ACI 318-14 (Sec. 18.7.5.1b)	l_o (in) =	33.0 Controls			
ACI 318-14 (Sec. 18.7.5.1c)	l_o (in) =	18.0			
ACI 318-14 (Sec. 18.7.5.2e)	hx (in) =	17.0 ≤	14 in		, Therefore OK
ACI 318-14 (Sec. 18.7.5.2f)	0.03Ag*f'c (k) =	31.3 ≥	Pu (k) =	23.93	, Therefore hx is notrequired to be reduced
ACI 318-14 (Sec. 18.7.5.2f)	f'c (psi) =	3000 ≤		10000	, Therefore hx is notrequired to be reduced
ACI 318-14 (Sec. 18.7.5.3a)	s_o (in) =	4			
ACI 318-14 (Sec. 18.7.5.3b)	s_o (in) =	7			
ACI 318-14 (Sec. 18.7.5.3c)	s_o (in) = 4 +(14-hx / 3) =	3 Controls			
ACI 318-14 (Sec. 18.7.5.3)	s_o ,max (in) =	6.0 ≥		3	, Therefore OK
ACI 318-14 (Sec. 18.7.5.3)	c ,min (in) =	4.0 ≥		3	, Therefore Use #4 Ties @ 4" o.c. in l_o regions
ACI 318-14 (Table. 18.7.5.4a)	Ash/sbh = 0.3*(Ag/Ach - 1)*(f'c/fyt) =	0.0046			
ACI 318-14 (Table. 18.7.5.4b)	Ash/sbh = 0.09*(f'c/fyt) =	0.0068 Controls			
	Ash/sbh, provided =	0.0147 ≥	Ash/sbh, control =	0.0068	, Therefore #4 Ties @ 4" o.c. is Adequate
ACI 318-14 (Table. 18.7.5.5)	sv, max (in) beyond l_o regions = Min(6*db, 6) =	6 Controls			, Therefore Use #4 Ties @ 6" o.c. beyond l_o regions
Joints of Special Moment Frames					
ACI 318-14 (Sec. 18.3.3.1)	Use Tie Reinforcement as Required in Lo regions	, Therefore use #4 Ties @ 4" o.c. in at SMF Joints			
ACI 318-14 (Table 18.8.4.1)	ϕv*Vn (k) = ϕv*12*(Av/s)*fyt*d (conservative) =	172 ≥	Vu=	9.63	
Ties					
ACI 318-14 (Sec. 25.7.2.1a)	sv, min (in) beyond l_o regions = (4/3)*dagg+ds =	1.5 ≥		4	, Therefore Minimum Tie Spacing is Adequate
ACI 318-14 (Sec. 25.7.2.1b)	sv, max (in) beyond l_o regions = Min(16db, 48ds, dc,min)	16 ≥		6	, Therefore Maximum Tie Spacing is Adequate
ACI 318-14 (Sec. 25.7.2.2)	Tie Size =	4 ≥		3	, Therefore Tie Size is Adequate
Transverse Reinforcement					
ACI 318-14 (Sec. 18.7.6.2.1a)	Ve (k) = Max Seismic Shear =	5.22 ≥	Vu/2 (k) =	4.82	
ACI 318-14 (Sec. 18.7.6.2.1b)	Ag*f'c/20 (k) =	52.20 ≥	Pu (k) =	23.93	, Therefore Shear Reinforcement Shall be designed assuming Vc=0 for locations specified in Sec. 18.7.5.1
ACI 318-14 (Eq. 22.5.2.2)	For Calculaton of Vc an Vs, d is to be taken as 0.8*h =	12.80 in			
ACI 318-14 (Eq. 22.5.10.5.3)	ϕv*Vn (k) = ϕv*Vs = ϕv*(Av/s)*fyt*d =	96 ≥	Vu (k) =	9.63	, Therefore #4 ties spaced @ 4" o.c. are adequate

TORSION

Torsional Strength

Threshold Torsion					
ACI 318-14 (Sec. 22.7.4.1a & 22.7.1.1)	ϕT_{th} compression (k) = $(\lambda*\sqrt{f'c}*A_{cp}^2)/p_{cp} * \sqrt{(1+(Nu/4*Ag*\lambda*\sqrt{f'c}))}$ =	76.77 ≤	Tu (k) =	0.00	, Therefore Torsional Effects may be Neglected
	ϕT_{th} tension (k) = $(\lambda*\sqrt{f'c}*A_{cp}^2)/p_{cp} * \sqrt{(1+(Nu/4*Ag*\lambda*\sqrt{f'c}))}$ =	68.51 ≤	Tu (k) =	0.00	, Therefore Torsional Effects may be Neglected

spColumn v6.50
Computer program for the Strength Design of Reinforced Concrete Sections



Contents

List of Figures

1. General Information

File Name	c:\senior project\lateral\beam design\cg.col
Project	---
Column	---
Engineer	---
Code	ACI 318-14
Bar Set	ASTM A615
Units	English
Run Option	Design
Run Axis	X - axis
Slenderness	Not Considered
Column Type	Structural
Capacity Method	Critical capacity

2. Material Properties

2.1. Concrete

Type	Standard	
f'_c	3	ksi
E_c	3122.02	ksi
f_c	2.55	ksi
ε_u	0.003	in/in
β_1	0.85	

2.2. Steel

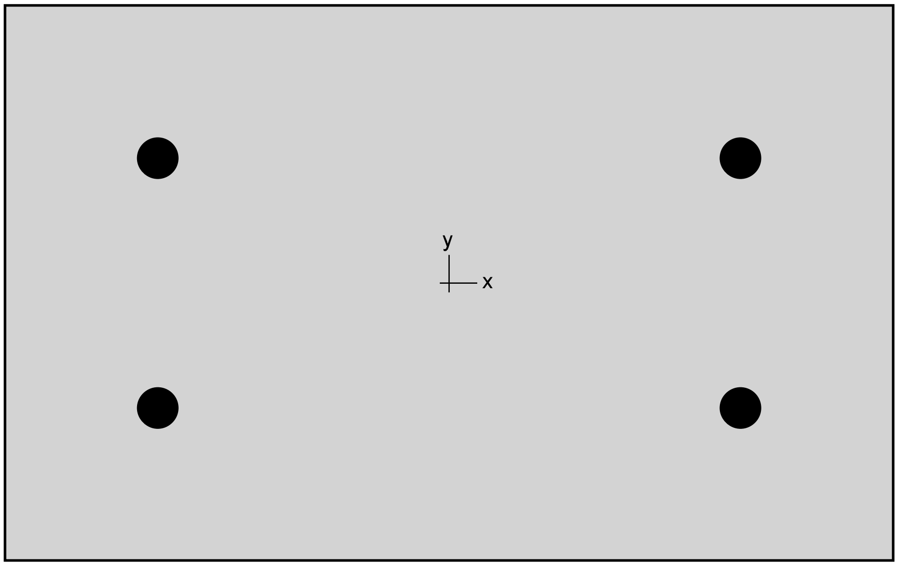
Type	Standard	
f_y	40	ksi
E_s	29000	ksi
ε_{yt}	0.00137931	in/in

3. Section

3.1. Shape and Properties

Type	Rectangular	
Width	16	in
Depth	10	in
A_g	160	in^2
I_x	1333.33	in^4
I_y	3413.33	in^4
r_x	2.88675	in
r_y	4.6188	in
X_o	0	in
Y_o	0	in

3.2. Section Figure



Rectangular 16 x 10 in 1.10% reinf.

Figure 1: Column section

4. Reinforcement

4.1. Bar Set: ASTM A615

Bar	Diameter	Area	Bar	Diameter	Area	Bar	Diameter	Area
	in	in²		in	in²		in	in²
#3	0.38	0.11	#4	0.50	0.20	#5	0.63	0.31
#6	0.75	0.44	#7	0.88	0.60	#8	1.00	0.79
#9	1.13	1.00	#10	1.27	1.27	#11	1.41	1.56
#14	1.69	2.25	#18	2.26	4.00			

4.2. Design Criteria

Bar selection	Min. number of bars
$A_{s,min}$ = 0.01 x A_g	1.6 in²
$A_{s,max}$ = 0.08 x A_g	12.8 in²
Allowable Capacity Ratio (<1 is safe)	1.00

4.3. Confinement and Factors

Confinement type	Tied
For #10 bars or less	#3 ties
For larger bars	#4 ties
Capacity Reduction Factors	
Axial compression, (a)	0.8
Tension controlled ϕ, (b)	0.9
Compression controlled ϕ, (c)	0.65

4.4. Arrangement

Pattern	All sides equal

Bar layout	Rectangular
Cover to	Transverse bars
Clear cover	2 in
Bars	4 #6
Total steel area, A_s	1.76 in^2
Rho	1.10 %
Minimum clear spacing	3.75 in

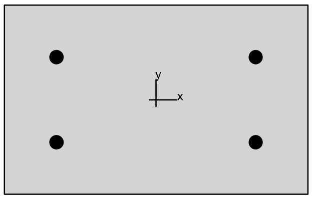
5. Factored Loads and Moments with Corresponding Capacity Ratios

NOTE: Calculations are based on "Critical Capacity" Method.
Allowable Capacity (Ratio) <= 1.00

No.	Demand		Capacity		Parameters at Capacity			Capacity
	P_u	M_{ux}	ϕP_n	ϕM_{nx}	NA Depth	ε_t	ϕ	Ratio
	kip	k-ft	kip	k-ft	in			
1	13.41	14.21	0.00	21.60	1.94	0.00822	0.900	0.78
2	-3.50	14.21	-8.42	19.45	1.76	0.00936	0.900	0.83

6. Diagrams

6.1. PM at θ=0 [deg]



16 x 10 in

General Information

Project	---
Column	---
Engineer	---
Code	ACI 318-14
Bar Set	ASTM A615
Units	English
Run Option	Design
Run Axis	X - axis
Slenderness	Not Considered
Column Type	Structural
Capacity Method	Critical capacity

Materials

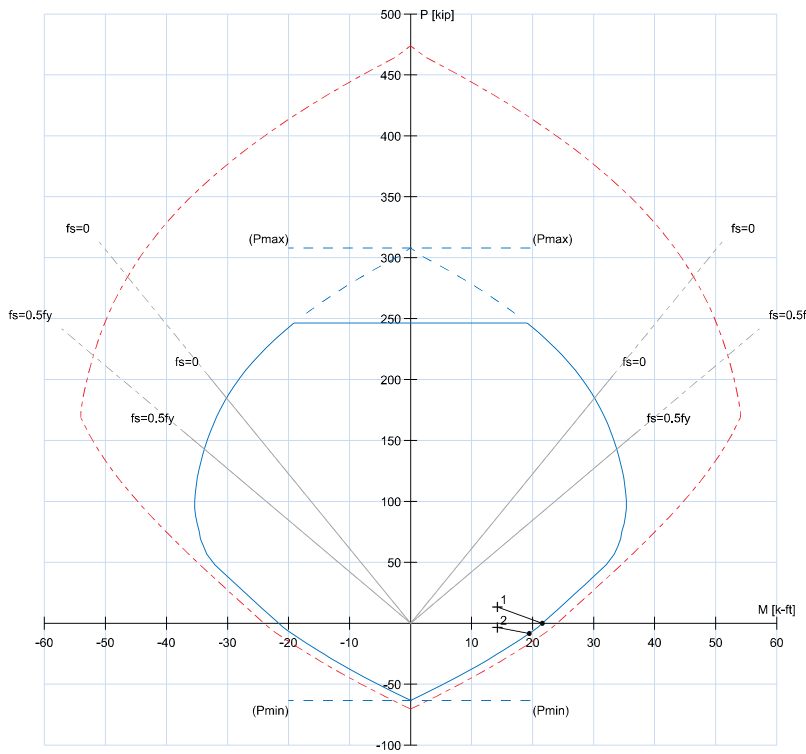
f'_c	3 ksi
E_c	3122.02 ksi
f_y	40 ksi
E_s	29000 ksi

Section

Type	Rectangular
Width	16 in
Depth	10 in
A_g	160 in²
I_x	1333.33 in⁴
I_y	3413.33 in⁴

Reinforcement

Pattern	All sides equal
Bar layout	Rectangular
Cover to	Transverse bars
Clear cover	2 in
Bars	4 #6
Confinement type	Tied
Total steel area, A_s	1.76 in²
Rho	1.10 %
Min. clear spacing	3.75 in



PM at 0.0 [deg]

No.	P_u	M_{ux}	ϕP_n	ϕM_{nx}	Capacity
	kip	k-ft	kip	k-ft	Ratio
2	-3.5	14.2	-8.42	19.45	0.83
1	13.4	14.2	0.00	21.60	0.78

Max. Capacity Ratio: 0.83

Column Design C3 - Gravity Column

Bending Axis	Shear Axis
X-X/3-3	Y-Y/2-2

lux (out of plane span) (in) =	198
luy (in plane span) (in) =	198
b (in) =	10
h (in) =	16
long bar size =	6
Tie size =	3
number of longitudinal bars =	4
Area of long bars =	0.442
d' =	2.375
f'c (psi) =	3000
fy (psi) =	40000
Pu Compression (k) =	13.41
Pu Tension (k) =	3.52
Tu (k-ft) =	0.00
Max NA depth (in) =	3.7 6 bars in tension
Min NA depth (in) =	2.2 3 layers in tension
Mu Strong x (k-ft) =	8.90
Mu Weak y (k-ft) =	0.00

BENDING DESIGN

Slenderness

ACI 318-14 (Sec. 6.2.5 & 6.2.6)	(k*l)/0.3*b =	66.00 ≥	22	Therefore, slenderness effects must be accounted for in SP Column Analysis

Column Design Requirements

Longitudinal Reinforcement

ACI 318-14 (Sec. 18.7.4.1)

$0.01A_g \le A_{st} \le 0.06A_g$

Ast (in^2) =	1.767 ≥	0.01Ag =	1.582329	, Therefore OK
Ast (in^2) =	1.767 ≤	0.06Ag =	9.493971	, Therefore OK

SHEAR DESIGN

Column Design Requirements

Members not designated as part of the seismic-force-resisting system

ACI 318-14 (Sec. 18.14.3.1)	Members have been designed for controling values in ETABS model including δu effects, Therefore Section 18.14.3.2 applies				
ACI 318-14 (Sec. 18.14.3.2b)	s_o ,max (in) = min(d-long*6, 6) =	4.5			, Therefore use Tie Spacing of 4.5" o.c. Throughout
ACI 318-14 (Sec. 18.14.3.2c)	0.35*Po (k) =	158 ≥	Pu (k) =	13.41	, Therefore no additional requirements need to be satisfied

Transverse Reinforcement

ACI 318-14 (Sec. 18.7.5.2e)	hx (in) =	5.3 ≤	14 in		, Therefore OK
ACI 318-14 (Sec. 18.7.5.2f)	0.03Ag*f'c (k) =	14.2 ≥	Pu (k) =	13.41	, Therefore hx is notrequired to be reduced
ACI 318-14 (Sec. 18.7.5.2f)	f'c (psi) =	3000 ≤	10000		, Therefore hx is notrequired to be reduced
ACI 318-14 (Sec. 25.7.2.2)	Tie Size =	3 ≥	3		, Therefore Tie Size is Adequate

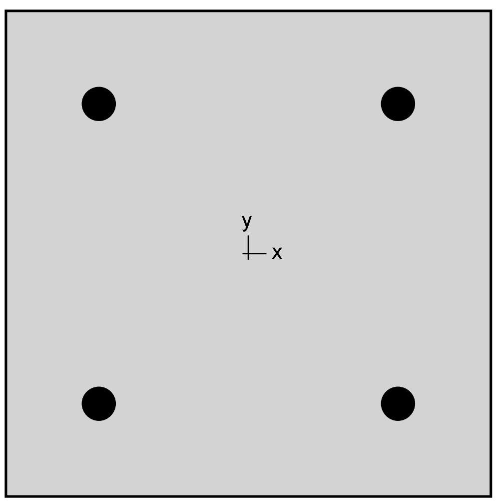
Shear Strength Design Forces

ACI 318-14 (Sec. 18.7.6.1.1)	Ve (k) = Max Seismic Shear =	0.736			This Column is Pinned on Both Ends, Therefore No Shear is Transferred by Seismic Activity
ACI 318-14 (Eq. 22.7.5.4b)	ϕv*Vn (k) = ϕv*Vs = ϕv*(Av/s)*fyt*d =	52.02 ≥	Ve (k) =	0.74	, Therefore #3 Ties @ 5" o.c. are adequate beyond l_o regions

Transverse Reinforcement

ACI 318-14 (Sec. 18.7.6.2.1a)	Ve (k) = Max Seismic Shear =	0.736 ≤	Vu/2 (k) =	1.27	, Therefore Section 18.7.6.2.1 does not apply

spColumn v6.50
Computer program for the Strength Design of Reinforced Concrete Sections



Contents

List of Figures

1. General Information

File Name	c:\senior project\lateral\beam design\cc.col
Project	---
Column	---
Engineer	---
Code	ACI 318-14
Bar Set	ASTM A615
Units	English
Run Option	Design
Run Axis	Biaxial
Slenderness	Considered
Column Type	Structural
Capacity Method	Moment capacity

2. Material Properties

2.1. Concrete

Type	Standard	
f'_c	3	ksi
E_c	3122.02	ksi
f_c	2.55	ksi
ε_u	0.003	in/in
β_1	0.85	

2.2. Steel

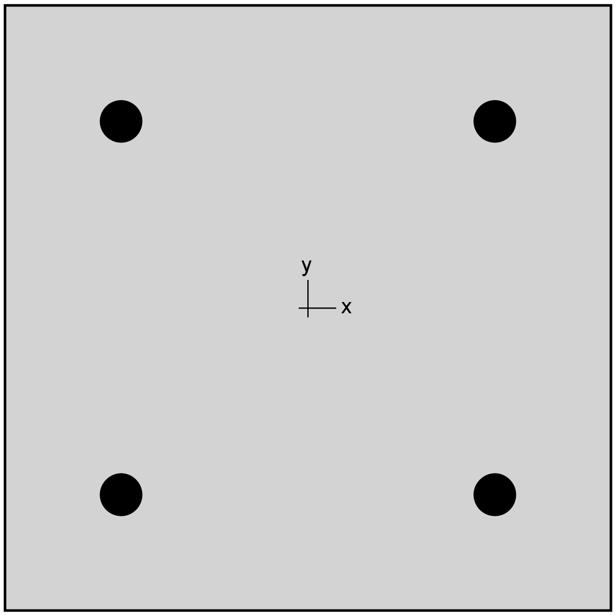
Type	Standard	
f_y	40	ksi
E_s	29000	ksi
ε_{yt}	0.00137931	in/in

3. Section

3.1. Shape and Properties

Type	Rectangular	
Width	16	in
Depth	16	in
A_g	256	in^2
I_x	5461.33	in^4
I_y	5461.33	in^4
r_x	4.6188	in
r_y	4.6188	in
X_o	0	in
Y_o	0	in

3.2. Section Figure



Rectangular 16 x 16 in 1.56% reinf.

Figure 1: Column section

4. Reinforcement

4.1. Bar Set: ASTM A615

Bar	Diameter	Area	Bar	Diameter	Area	Bar	Diameter	Area
	in	in^2		in	in^2		in	in^2
#3	0.38	0.11	#4	0.50	0.20	#5	0.63	0.31
#6	0.75	0.44	#7	0.88	0.60	#8	1.00	0.79
#9	1.13	1.00	#10	1.27	1.27	#11	1.41	1.56
#14	1.69	2.25	#18	2.26	4.00			

4.2. Design Criteria

Bar selection	Min. number of bars
$A_{s,min}$ = 0.01 x A_g	2.56 in^2
$A_{s,max}$ = 0.08 x A_g	20.48 in^2
Allowable Capacity Ratio (<1 is safe)	0.98

4.3. Confinement and Factors

Confinement type	Tied
For #10 bars or less	#4 ties
For larger bars	#4 ties
Capacity Reduction Factors	
Axial compression, (a)	0.8
Tension controlled ϕ, (b)	0.9
Compression controlled ϕ, (c)	0.65

4.4. Arrangement

Pattern	All sides equal
Bar layout	Rectangular
Cover to	Transverse bars
Clear cover	2 in
Bars	4 #9
Total steel area, A_s	4.00 in^2
Rho	1.56 %
Minimum clear spacing	8.74 in

5. Loading

5.1. Load Combinations

Combination	Dead	Live	Wind	EQ	Snow
U1	1.400	0.000	0.000	0.000	1.000
U2	1.200	1.600	0.000	0.000	1.000
U3	1.200	0.500	0.000	0.000	1.000
U4	1.200	0.000	0.000	1.000	1.000
U5	0.900	0.000	0.000	1.000	1.000
U6	1.200	0.000	0.000	-1.000	1.000
U7	0.900	0.000	0.000	-1.000	1.000

5.2. Service Loads

No.	Load Case	Axial Load	Mx @ Top	Mx @ Bottom	My @ Top	My @ Bottom
		kip	k-ft	k-ft	k-ft	k-ft
1	Dead	1.61	0.87	0.00	0.07	0.00
1	Live	2.47	1.33	0.00	0.11	0.00
1	Wind	0.00	0.00	0.00	0.00	0.00
1	EQ	0.00	61.81	0.00	0.00	0.00
1	Snow	0.00	0.00	0.00	0.00	0.00
2	Dead	1.61	0.87	0.00	0.07	0.00
2	Live	2.47	1.33	0.00	0.11	0.00
2	Wind	0.00	0.00	0.00	0.00	0.00
2	EQ	0.25	0.00	0.00	62.10	0.00
2	Snow	0.00	0.00	0.00	0.00	0.00
3	Dead	1.61	0.87	0.00	0.07	0.00
3	Live	2.47	1.33	0.00	0.11	0.00
3	Wind	0.00	0.00	0.00	0.00	0.00
3	EQ	-0.25	0.00	0.00	62.10	0.00
3	Snow	0.00	0.00	0.00	0.00	0.00

5.3. Sustained Load Factors

Load Case	Factor
	%
Dead	0
Live	0
Wind	0
EQ	0
Snow	0

6. Slenderness

6.1. Sway Criteria

X-Axis	Sway column
2^{nd} order effects along length	Considered
$\sum P_c$	4.00 x P_c
$\sum P_u$	4.00 x P_u
Y-Axis	Sway column
2^{nd} order effects along length	Considered
$\sum P_c$	4.00 x P_c
$\sum P_u$	4.00 x P_u

6.2. Columns

Column	Axis	Height	Width	Depth	I	f'_c	E_c
		ft	in	in	in^4	ksi	ksi
Design	X	11.188	16	16	5461.33	3	3122.02
Design	Y	11.1888	16	16	5461.33	3	3122.02
Above	X	(no column specified...)					
Above	Y	(no column specified...)					
Below	X	(no column specified...)					
Below	Y	(no column specified...)					

6.3. X - Beams

Beam	Length	Width	Depth	I	f'_c	E_c
	ft	in	in	in^4	ksi	ksi
Above Left	21	16	8	682.667	3	3122.02
Above Right	(no beam specified...)					
Below Left	(no beam specified...)					
Below Right	(no beam specified...)					

6.4. Y - Beams

Beam	Length	Width	Depth	I	f'_c	E_c
	ft	in	in	in^4	ksi	ksi
Above Left	(no beam specified...)					
Above Right	9.5	16	8	682.667	3	3122.02
Below Left	(no beam specified...)					
Below Right	(no beam specified...)					

7. Moment Magnification

7.1. General Parameters

Factors	Code defaults
Stiffness reduction factor, ϕ_K	0.75
Cracked section coefficients, cI(beams)	0.35
Cracked section coefficients, cI(columns)	0.7
$0.2\ E_c\ I_g + E_s\ I_{se}$ (X-axis)	6.24e+006 kip-in^2
$0.2\ E_c\ I_g + E_s\ I_{se}$ (Y-axis)	6.24e+006 kip-in^2
Minimum eccentricity, $e_{x\ min}$	1.08 in
Minimum eccentricity, $e_{y\ min}$	1.08 in

7.2. Effective Length Factors

Axis	Ψ_{top}	Ψ_{bottom}	k (Nonsway)	k (Sway)	kl_u/r
X	29.163	999.000	0.993	7.047	204.83
Y	13.192	999.000	0.985	4.965	144.33

Notes:
Slenderness kl_u/r is greater than 100.
A second-order frame analysis is recommended to account for slenderness.

7.3. Magnification Factors: X - axis

Load Combo		At Ends					Along Length					
		$\sum P_u$ kip	P_c kip	$\sum P_c$ kip	β_{ds}	δ_s	P_u kip	$k'l_u/r$	P_c kip	β_{dns}	C_m	δ
1	U1	9.01	68.77	275.07	0.000	1.046	2.25	(N/A)	3463.12	0.000	0.600	1.000
1	U2	23.54	68.77	275.07	0.000	1.129	5.88	(N/A)	3463.12	0.000	0.600	1.000
1	U3	12.67	68.77	275.07	0.000	1.065	3.17	(N/A)	3463.12	0.000	0.600	1.000
1	U4	7.72	68.77	275.07	0.000	1.039	1.93	(N/A)	3463.12	0.000	0.600	1.000
1	U5	5.79	68.77	275.07	0.000	1.029	1.45	(N/A)	3463.12	0.000	0.600	1.000
1	U6	7.72	68.77	275.07	0.000	1.039	1.93	(N/A)	3463.12	0.000	0.600	1.000
1	U7	5.79	68.77	275.07	0.000	1.029	1.45	(N/A)	3463.12	0.000	0.600	1.000
2	U1	9.01	68.77	275.07	0.000	1.046	2.25	(N/A)	3463.12	0.000	0.600	1.000
2	U2	23.54	68.77	275.07	0.000	1.129	5.88	(N/A)	3463.12	0.000	0.600	1.000
2	U3	12.67	68.77	275.07	0.000	1.065	3.17	(N/A)	3463.12	0.000	0.600	1.000
2	U4	8.71	68.77	275.07	0.000	1.044	2.18	(N/A)	3463.12	0.000	0.600	1.000
2	U5	6.78	68.77	275.07	0.000	1.034	1.69	(N/A)	3463.12	0.000	0.600	1.000
2	U6	6.74	68.77	275.07	0.000	1.034	1.68	(N/A)	3463.12	0.000	0.600	1.000
2	U7	4.81	68.77	275.07	0.000	1.024	1.20	(N/A)	3463.12	0.000	0.600	1.000
3	U1	9.01	68.77	275.07	0.000	1.046	2.25	(N/A)	3463.12	0.000	0.600	1.000
3	U2	23.54	68.77	275.07	0.000	1.129	5.88	(N/A)	3463.12	0.000	0.600	1.000
3	U3	12.67	68.77	275.07	0.000	1.065	3.17	(N/A)	3463.12	0.000	0.600	1.000
3	U4	6.74	68.77	275.07	0.000	1.034	1.68	(N/A)	3463.12	0.000	0.600	1.000
3	U5	4.81	68.77	275.07	0.000	1.024	1.20	(N/A)	3463.12	0.000	0.600	1.000
3	U6	8.71	68.77	275.07	0.000	1.044	2.18	(N/A)	3463.12	0.000	0.600	1.000
3	U7	6.78	68.77	275.07	0.000	1.034	1.69	(N/A)	3463.12	0.000	0.600	1.000

7.4. Magnification Factors: Y - axis

Load Combo		At Ends					Along Length					
		$\sum P_u$ kip	P_c kip	$\sum P_c$ kip	β_{ds}	δ_s	P_u kip	$k'l_u/r$	P_c kip	β_{dns}	C_m	δ
1	U1	9.01	138.50	553.99	0.000	1.022	2.25	(N/A)	3518.20	0.000	0.600	1.000
1	U2	23.54	138.50	553.99	0.000	1.060	5.88	(N/A)	3518.20	0.000	0.600	1.000
1	U3	12.67	138.50	553.99	0.000	1.031	3.17	(N/A)	3518.20	0.000	0.600	1.000
1	U4	7.72	138.50	553.99	0.000	1.019	1.93	(N/A)	3518.20	0.000	0.600	1.000
1	U5	5.79	138.50	553.99	0.000	1.014	1.45	(N/A)	3518.20	0.000	0.600	1.000
1	U6	7.72	138.50	553.99	0.000	1.019	1.93	(N/A)	3518.20	0.000	0.600	1.000
1	U7	5.79	138.50	553.99	0.000	1.014	1.45	(N/A)	3518.20	0.000	0.600	1.000
2	U1	9.01	138.50	553.99	0.000	1.022	2.25	(N/A)	3518.20	0.000	0.600	1.000
2	U2	23.54	138.50	553.99	0.000	1.060	5.88	(N/A)	3518.20	0.000	0.600	1.000
2	U3	12.67	138.50	553.99	0.000	1.031	3.17	(N/A)	3518.20	0.000	0.600	1.000
2	U4	8.71	138.50	553.99	0.000	1.021	2.18	(N/A)	3518.20	0.000	0.600	1.000
2	U5	6.78	138.50	553.99	0.000	1.017	1.69	(N/A)	3518.20	0.000	0.600	1.000
2	U6	6.74	138.50	553.99	0.000	1.016	1.68	(N/A)	3518.20	0.000	0.600	1.000
2	U7	4.81	138.50	553.99	0.000	1.012	1.20	(N/A)	3518.20	0.000	0.600	1.000
3	U1	9.01	138.50	553.99	0.000	1.022	2.25	(N/A)	3518.20	0.000	0.600	1.000
3	U2	23.54	138.50	553.99	0.000	1.060	5.88	(N/A)	3518.20	0.000	0.600	1.000
3	U3	12.67	138.50	553.99	0.000	1.031	3.17	(N/A)	3518.20	0.000	0.600	1.000
3	U4	6.74	138.50	553.99	0.000	1.016	1.68	(N/A)	3518.20	0.000	0.600	1.000

Load Combo		At Ends					Along Length					
		$\sum P_u$	P_c	$\sum P_c$	β_{ds}	δ_s	P_u	$k'l_u/r$	P_c	β_{dns}	C_m	δ
		kip	kip	kip			kip		kip			
3	U5	4.81	138.50	553.99	0.000	1.012	1.20	(N/A)	3518.20	0.000	0.600	1.000
3	U6	8.71	138.50	553.99	0.000	1.021	2.18	(N/A)	3518.20	0.000	0.600	1.000
3	U7	6.78	138.50	553.99	0.000	1.017	1.69	(N/A)	3518.20	0.000	0.600	1.000

8. Factored Moments

NOTE: Each loading combination includes the following cases:
Top - At column top
Bot - At column bottom

8.1. X - axis

Load Combo			1st Order				2nd Order			Ratio	
			M_{ns}	M_s	M_u	M_{min}		M_i	M_c	$2^{nd}/1^{st}$	
			k-ft	k-ft	k-ft	k-ft		k-ft	k-ft		
1	U1	Top	1.21	0.00	1.21	0.20	M_2=	1.21	1.21	1.000	
1	U1	Bot	0.00	0.00	0.00	0.20	M_1=	0.00	0.20	1.000	#
1	U1	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	3.17	0.00	3.17	0.53	M_2=	3.17	3.17	1.000	
1	U2	Top	0.00	0.00	0.00	0.53	M_1=	0.00	0.53	1.000	#
1	U2	Bot				(N/A)	M_1=	0.00	0.00	1.000	
1	U3	Top	1.70	0.00	1.70	0.28	M_2=	1.70	1.70	1.000	
1	U3	Bot	0.00	0.00	0.00	0.28	M_1=	0.00	0.28	1.000	#
1	U3	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	1.04	61.81	62.85	0.17	M_2=	65.25	65.25	1.038	
1	U4	Top	0.00	0.00	0.00	0.17	M_1=	0.00	0.17	1.000	#
1	U4	Bot				(N/A)	M_1=	0.00	0.00	1.000	
1	U5	Top	0.78	61.81	62.59	0.13	M_2=	64.37	64.37	1.029	
1	U5	Bot	0.00	0.00	0.00	0.13	M_1=	0.00	0.13	1.000	#
1	U5	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	1.04	-61.81	-60.77	-0.17	M_2=	-63.17	-63.17	1.040	
1	U6	Top	0.00	0.00	0.00	0.17	M_1=	0.00	0.17	1.000	#
1	U6	Bot				(N/A)	M_1=	0.00	0.00	1.000	
1	U7	Top	0.78	-61.81	-61.03	-0.13	M_2=	-62.82	-62.82	1.029	
1	U7	Bot	0.00	0.00	0.00	0.13	M_1=	0.00	0.13	1.000	#
1	U7	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	1.21	0.00	1.21	0.20	M_2=	1.21	1.21	1.000	
2	U1	Top	0.00	0.00	0.00	0.20	M_1=	0.00	0.20	1.000	#
2	U1	Bot				(N/A)	M_1=	0.00	0.00	1.000	
2	U2	Top	3.17	0.00	3.17	0.53	M_2=	3.17	3.17	1.000	
2	U2	Bot	0.00	0.00	0.00	0.53	M_1=	0.00	0.53	1.000	#
2	U2	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	1.70	0.00	1.70	0.28	M_2=	1.70	1.70	1.000	
2	U3	Top	0.00	0.00	0.00	0.28	M_1=	0.00	0.28	1.000	#
2	U3	Bot				(N/A)	M_1=	0.00	0.00	1.000	
2	U4	Top	1.04	0.00	1.04	0.20	M_2=	1.04	1.04	1.000	
2	U4	Bot	0.00	0.00	0.00	0.20	M_1=	0.00	0.20	1.000	#
2	U4	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	0.78	0.00	0.78	0.15	M_2=	0.78	0.78	1.000	
2	U5	Top	0.00	0.00	0.00	0.15	M_1=	0.00	0.15	1.000	#
2	U5	Bot				(N/A)	M_1=	0.00	0.00	1.000	
2	U6	Top	1.04	0.00	1.04	0.15	M_2=	1.04	1.04	1.000	
2	U6	Bot	0.00	0.00	0.00	0.15	M_1=	0.00	0.15	1.000	#
2	U6	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	0.78	0.00	0.78	0.11	M_2=	0.78	0.78	1.000	
2	U7	Top	0.00	0.00	0.00	0.11	M_1=	0.00	0.11	1.000	#

Load Combo			1st Order M_{ns} k-ft	M_s k-ft	M_u k-ft	M_{min} k-ft	2nd Order	M_i k-ft	M_c k-ft	Ratio 2nd/1st	
2	U7	Bot				(N/A)	M_1=	0.00	0.00	1.000	
3	U1	Top	1.21	0.00	1.21	0.20	M_2=	1.21	1.21	1.000	
3	U1	Bot	0.00	0.00	0.00	0.20	M_1=	0.00	0.20	1.000	#
3	U1	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	3.17	0.00	3.17	0.53	M_2=	3.17	3.17	1.000	
3	U2	Top	0.00	0.00	0.00	0.53	M_1=	0.00	0.53	1.000	#
3	U2	Bot				(N/A)	M_1=	0.00	0.00	1.000	
3	U3	Top	1.70	0.00	1.70	0.28	M_2=	1.70	1.70	1.000	
3	U3	Bot	0.00	0.00	0.00	0.28	M_1=	0.00	0.28	1.000	#
3	U3	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	1.04	0.00	1.04	0.15	M_2=	1.04	1.04	1.000	
3	U4	Top	0.00	0.00	0.00	0.15	M_1=	0.00	0.15	1.000	#
3	U4	Bot				(N/A)	M_1=	0.00	0.00	1.000	
3	U5	Top	0.78	0.00	0.78	0.11	M_2=	0.78	0.78	1.000	
3	U5	Bot	0.00	0.00	0.00	0.11	M_1=	0.00	0.11	1.000	#
3	U5	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	1.04	0.00	1.04	0.20	M_2=	1.04	1.04	1.000	
3	U6	Top	0.00	0.00	0.00	0.20	M_1=	0.00	0.20	1.000	#
3	U6	Bot				(N/A)	M_1=	0.00	0.00	1.000	
3	U7	Top	0.78	0.00	0.78	0.15	M_2=	0.78	0.78	1.000	
3	U7	Bot	0.00	0.00	0.00	0.15	M_1=	0.00	0.15	1.000	#
3	U7	Bot				(N/A)	M_1=	0.00	0.00	1.000	

M_{min} exceeds M_i for X and Y - axis bending but shall be applied to each axis separately for capacity check.

8.2. Y - axis

Load Combo			1st Order M_{ns} k-ft	M_s k-ft	M_u k-ft	M_{min} k-ft	2nd Order	M_i k-ft	M_c k-ft	Ratio 2nd/1st	
1	U1	Top	0.10	0.00	0.10	0.20	M_2=	0.10	0.20	1.000	
1	U1	Bot	0.00	0.00	0.00	0.20	M_1=	0.00	0.20	1.000	#
1	U1	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	0.27	0.00	0.27	0.53	M_2=	0.27	0.53	1.000	
1	U2	Top	0.00	0.00	0.00	0.53	M_1=	0.00	0.53	1.000	#
1	U2	Bot				(N/A)	M_1=	0.00	0.00	1.000	
1	U3	Top	0.15	0.00	0.15	0.28	M_2=	0.15	0.28	1.000	
1	U3	Bot	0.00	0.00	0.00	0.28	M_1=	0.00	0.28	1.000	#
1	U3	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	0.09	0.00	0.09	0.17	M_2=	0.09	0.17	1.000	
1	U4	Top	0.00	0.00	0.00	0.17	M_1=	0.00	0.17	1.000	#
1	U4	Bot				(N/A)	M_1=	0.00	0.00	1.000	
1	U5	Top	0.07	0.00	0.07	0.13	M_2=	0.07	0.13	1.000	
1	U5	Bot	0.00	0.00	0.00	0.13	M_1=	0.00	0.13	1.000	#
1	U5	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	0.09	0.00	0.09	0.17	M_2=	0.09	0.17	1.000	
1	U6	Top	0.00	0.00	0.00	0.17	M_1=	0.00	0.17	1.000	#
1	U6	Bot				(N/A)	M_1=	0.00	0.00	1.000	
1	U7	Top	0.07	0.00	0.07	0.13	M_2=	0.07	0.13	1.000	
1	U7	Bot	0.00	0.00	0.00	0.13	M_1=	0.00	0.13	1.000	#
1	U7	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	0.10	0.00	0.10	0.20	M_2=	0.10	0.20	1.000	
2	U1	Top	0.00	0.00	0.00	0.20	M_1=	0.00	0.20	1.000	#
2	U1	Bot				(N/A)	M_1=	0.00	0.00	1.000	
2	U2	Top	0.27	0.00	0.27	0.53	M_2=	0.27	0.53	1.000	

Load			1st Order				2nd Order			Ratio	
Combo			M_{ns}	M_s	M_u	M_{min}		M_i	M_c	2nd/1st	
			k-ft	k-ft	k-ft	k-ft		k-ft	k-ft		
2	U2	Bot	0.00	0.00	0.00	0.53	M_1=	0.00	0.53	1.000	#
2	U2	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	0.15	0.00	0.15	0.28	M_2=	0.15	0.28	1.000	
2	U3	Top	0.00	0.00	0.00	0.28	M_1=	0.00	0.28	1.000	#
2	U3	Bot				(N/A)	M_1=	0.00	0.00	1.000	
2	U4	Top	0.09	62.10	62.19	0.20	M_2=	63.52	63.52	1.021	
2	U4	Bot	0.00	0.00	0.00	0.20	M_1=	0.00	0.20	1.000	#
2	U4	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	0.07	62.10	62.17	0.15	M_2=	63.20	63.20	1.017	
2	U5	Top	0.00	0.00	0.00	0.15	M_1=	0.00	0.15	1.000	#
2	U5	Bot				(N/A)	M_1=	0.00	0.00	1.000	
2	U6	Top	0.09	-62.10	-62.01	-0.15	M_2=	-63.04	-63.04	1.017	
2	U6	Bot	0.00	0.00	0.00	0.15	M_1=	0.00	0.15	1.000	#
2	U6	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	0.07	-62.10	-62.03	-0.11	M_2=	-62.76	-62.76	1.012	
2	U7	Top	0.00	0.00	0.00	0.11	M_1=	0.00	0.11	1.000	#
2	U7	Bot				(N/A)	M_1=	0.00	0.00	1.000	
3	U1	Top	0.10	0.00	0.10	0.20	M_2=	0.10	0.20	1.000	
3	U1	Bot	0.00	0.00	0.00	0.20	M_1=	0.00	0.20	1.000	#
3	U1	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	0.27	0.00	0.27	0.53	M_2=	0.27	0.53	1.000	
3	U2	Top	0.00	0.00	0.00	0.53	M_1=	0.00	0.53	1.000	#
3	U2	Bot				(N/A)	M_1=	0.00	0.00	1.000	
3	U3	Top	0.15	0.00	0.15	0.28	M_2=	0.15	0.28	1.000	
3	U3	Bot	0.00	0.00	0.00	0.28	M_1=	0.00	0.28	1.000	#
3	U3	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	0.09	62.10	62.19	0.15	M_2=	63.21	63.21	1.016	
3	U4	Top	0.00	0.00	0.00	0.15	M_1=	0.00	0.15	1.000	#
3	U4	Bot				(N/A)	M_1=	0.00	0.00	1.000	
3	U5	Top	0.07	62.10	62.17	0.11	M_2=	62.89	62.89	1.012	
3	U5	Bot	0.00	0.00	0.00	0.11	M_1=	0.00	0.11	1.000	#
3	U5	Bot				(N/A)	M_1=	0.00	0.00	1.000	
	U	Bot	0.09	-62.10	-62.01	-0.20	M_2=	-63.34	-63.34	1.021	
3	U6	Top	0.00	0.00	0.00	0.20	M_1=	0.00	0.20	1.000	#
3	U6	Bot				(N/A)	M_1=	0.00	0.00	1.000	
3	U7	Top	0.07	-62.10	-62.03	-0.15	M_2=	-63.06	-63.06	1.017	
3	U7	Bot	0.00	0.00	0.00	0.15	M_1=	0.00	0.15	1.000	#
3	U7	Bot				(N/A)	M_1=	0.00	0.00	1.000	

M_{min} exceeds M_i for X and Y - axis bending but shall be applied to each axis separately for capacity check.

9. Factored Loads and Moments with Corresponding Capacity Ratios

NOTE: Calculations are based on "Moment Capacity" Method.
Allowable Capacity (Ratio) <= 0.98
Each loading combination includes the following cases:
Top - At column top
Bot - At column bottom

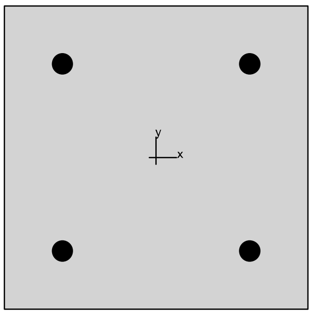
No.	Load			Demand			Capacity			Parameters at Capacity			Capacity
	Combo			P_u	M_{ux}	M_{uy}	ϕP_n	ϕM_{nx}	ϕM_{ny}	NA Depth	ε_t	ϕ	Ratio
				kip	k-ft	k-ft	kip	k-ft	k-ft	in			
1	1	U1	Top	2.25	1.21	0.20	2.25	73.15	12.23	3.56	0.00913	0.900	0.02
2	1	U1	Bot	2.25	0.20	0.00	2.25	73.85	0.00	2.82	0.01077	0.900	0.00
3	1	U1	Bot	2.25	0.00	0.20	2.25	0.00	73.85	2.82	0.01077	0.900	0.00
4	1	U2	Top	5.88	3.17	0.53	5.88	74.71	12.49	3.62	0.00892	0.900	0.04
5	1	U2	Bot	5.88	0.53	0.00	5.88	75.40	0.00	2.86	0.01058	0.900	0.01

No.	Load Combo			Demand P_u kip	Demand M_{ux} k-ft	Demand M_{uy} k-ft	Capacity ϕP_n kip	Capacity ϕM_{nx} k-ft	Capacity ϕM_{ny} k-ft	NA Depth in	ε_t	ϕ	Capacity Ratio
6	1	U2	Bot	5.88	0.00	0.53	5.88	0.00	75.40	2.86	0.01058	0.900	0.01
7	1	U3	Top	3.17	1.70	0.28	3.17	73.55	12.30	3.57	0.00907	0.900	0.02
8	1	U3	Bot	3.17	0.28	0.00	3.17	74.25	0.00	2.83	0.01072	0.900	0.00
9	1	U3	Bot	3.17	0.00	0.28	3.17	0.00	74.25	2.83	0.01072	0.900	0.00
10	1	U4	Top	1.93	65.25	0.17	1.93	73.70	0.20	2.83	0.01076	0.900	0.89
11	1	U4	Bot	1.93	0.17	0.00	1.93	73.71	0.00	2.81	0.01079	0.900	0.00
12	1	U4	Bot	1.93	0.00	0.17	1.93	0.00	73.71	2.81	0.01079	0.900	0.00
13	1	U5	Top	1.45	64.37	0.13	1.45	73.49	0.15	2.82	0.01080	0.900	0.88
14	1	U5	Bot	1.45	0.13	0.00	1.45	73.50	0.00	2.81	0.01082	0.900	0.00
15	1	U5	Bot	1.45	0.00	0.13	1.45	0.00	73.50	2.81	0.01082	0.900	0.00
16	1	U6	Top	1.93	-63.17	0.17	1.93	-73.69	0.20	2.83	0.01076	0.900	0.86
17	1	U6	Bot	1.93	0.17	0.00	1.93	73.71	0.00	2.81	0.01079	0.900	0.00
18	1	U6	Bot	1.93	0.00	0.17	1.93	0.00	73.71	2.81	0.01079	0.900	0.00
19	1	U7	Top	1.45	-62.82	0.13	1.45	-73.49	0.15	2.82	0.01080	0.900	0.85
20	1	U7	Bot	1.45	0.13	0.00	1.45	73.50	0.00	2.81	0.01082	0.900	0.00
21	1	U7	Bot	1.45	0.00	0.13	1.45	0.00	73.50	2.81	0.01082	0.900	0.00
22	2	U1	Top	2.25	1.21	0.20	2.25	73.15	12.23	3.56	0.00913	0.900	0.02
23	2	U1	Bot	2.25	0.20	0.00	2.25	73.85	0.00	2.82	0.01077	0.900	0.00
24	2	U1	Bot	2.25	0.00	0.20	2.25	0.00	73.85	2.82	0.01077	0.900	0.00
25	2	U2	Top	5.88	3.17	0.53	5.88	74.71	12.49	3.62	0.00892	0.900	0.04
26	2	U2	Bot	5.88	0.53	0.00	5.88	75.40	0.00	2.86	0.01058	0.900	0.01
27	2	U2	Bot	5.88	0.00	0.53	5.88	0.00	75.40	2.86	0.01058	0.900	0.01
28	2	U3	Top	3.17	1.70	0.28	3.17	73.55	12.30	3.57	0.00907	0.900	0.02
29	2	U3	Bot	3.17	0.28	0.00	3.17	74.25	0.00	2.83	0.01072	0.900	0.00
30	2	U3	Bot	3.17	0.00	0.28	3.17	0.00	74.25	2.83	0.01072	0.900	0.00
31	2	U4	Top	2.18	1.04	63.52	2.18	1.21	73.75	2.89	0.01061	0.900	0.86
32	2	U4	Bot	2.18	0.20	0.00	2.18	73.81	0.00	2.82	0.01078	0.900	0.00
33	2	U4	Bot	2.18	0.00	0.20	2.18	0.00	73.81	2.82	0.01078	0.900	0.00
34	2	U5	Top	1.69	0.78	63.20	1.69	0.91	73.55	2.87	0.01068	0.900	0.86
35	2	U5	Bot	1.69	0.15	0.00	1.69	73.60	0.00	2.81	0.01080	0.900	0.00
36	2	U5	Bot	1.69	0.00	0.15	1.69	0.00	73.60	2.81	0.01080	0.900	0.00
37	2	U6	Top	1.68	1.04	-63.04	1.68	1.21	-73.53	2.88	0.01064	0.900	0.86
38	2	U6	Bot	1.68	0.15	0.00	1.68	73.60	0.00	2.81	0.01080	0.900	0.00
39	2	U6	Bot	1.68	0.00	0.15	1.68	0.00	73.60	2.81	0.01080	0.900	0.00
40	2	U7	Top	1.20	0.78	-62.76	1.20	0.91	-73.34	2.86	0.01071	0.900	0.86
41	2	U7	Bot	1.20	0.11	0.00	1.20	73.39	0.00	2.81	0.01083	0.900	0.00
42	2	U7	Bot	1.20	0.00	0.11	1.20	0.00	73.39	2.81	0.01083	0.900	0.00
43	3	U1	Top	2.25	1.21	0.20	2.25	73.15	12.23	3.56	0.00913	0.900	0.02
44	3	U1	Bot	2.25	0.20	0.00	2.25	73.85	0.00	2.82	0.01077	0.900	0.00
45	3	U1	Bot	2.25	0.00	0.20	2.25	0.00	73.85	2.82	0.01077	0.900	0.00
46	3	U2	Top	5.88	3.17	0.53	5.88	74.71	12.49	3.62	0.00892	0.900	0.04
47	3	U2	Bot	5.88	0.53	0.00	5.88	75.40	0.00	2.86	0.01058	0.900	0.01
48	3	U2	Bot	5.88	0.00	0.53	5.88	0.00	75.40	2.86	0.01058	0.900	0.01
49	3	U3	Top	3.17	1.70	0.28	3.17	73.55	12.30	3.57	0.00907	0.900	0.02
50	3	U3	Bot	3.17	0.28	0.00	3.17	74.25	0.00	2.83	0.01072	0.900	0.00
51	3	U3	Bot	3.17	0.00	0.28	3.17	0.00	74.25	2.83	0.01072	0.900	0.00
52	3	U4	Top	1.68	1.04	63.21	1.68	1.21	73.53	2.88	0.01064	0.900	0.86
53	3	U4	Bot	1.68	0.15	0.00	1.68	73.60	0.00	2.81	0.01080	0.900	0.00
54	3	U4	Bot	1.68	0.00	0.15	1.68	0.00	73.60	2.81	0.01080	0.900	0.00
55	3	U5	Top	1.20	0.78	62.89	1.20	0.91	73.34	2.86	0.01071	0.900	0.86
56	3	U5	Bot	1.20	0.11	0.00	1.20	73.39	0.00	2.81	0.01083	0.900	0.00
57	3	U5	Bot	1.20	0.00	0.11	1.20	0.00	73.39	2.81	0.01083	0.900	0.00
58	3	U6	Top	2.18	1.04	-63.34	2.18	1.21	-73.75	2.89	0.01061	0.900	0.86
59	3	U6	Bot	2.18	0.20	0.00	2.18	73.81	0.00	2.82	0.01078	0.900	0.00

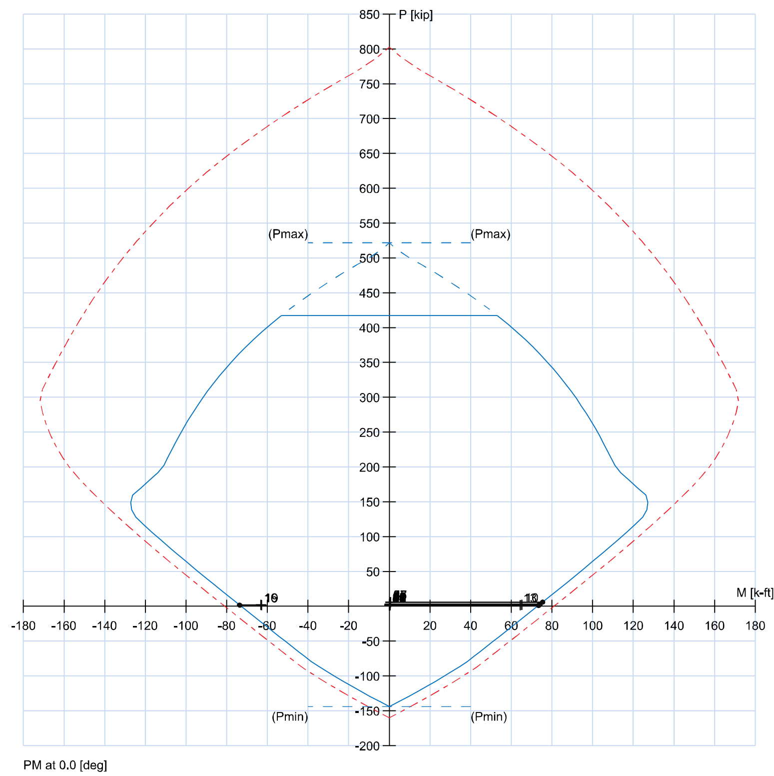
No.	Load Combo			Demand P_u kip	Demand M_{ux} k-ft	Demand M_{uy} k-ft	Capacity ϕP_n kip	Capacity ϕM_{nx} k-ft	Capacity ϕM_{ny} k-ft	Parameters at Capacity NA Depth in	ε_t	ϕ	Capacity Ratio
60	3	U6	Bot	2.18	0.00	0.20	2.18	0.00	73.81	2.82	0.01078	0.900	0.00
61	3	U7	Top	1.69	0.78	-63.06	1.69	0.91	-73.55	2.87	0.01068	0.900	0.86
62	3	U7	Bot	1.69	0.15	0.00	1.69	73.60	0.00	2.81	0.01080	0.900	0.00
63	3	U7	Bot	1.69	0.00	0.15	1.69	0.00	73.60	2.81	0.01080	0.900	0.00

10. Diagrams

10.1. PM at θ=0 [deg]



16 x 16 in



General Information	
Project	---
Column	---
Engineer	---
Code	ACI 318-14
Bar Set	ASTM A615
Units	English
Run Option	Design
Run Axis	Biaxial
Slenderness	Considered
Column Type	Structural
Capacity Method	Moment capacity

Materials	
f'_c	3 ksi
E_c	3122.02 ksi
f_y	40 ksi
E_s	29000 ksi

Section	
Type	Rectangular
Width	16 in
Depth	16 in
A_g	256 in²
I_x	5461.33 in⁴
I_y	5461.33 in⁴

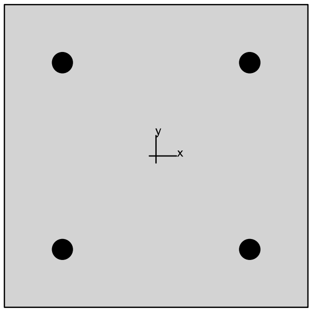
Reinforcement	
Pattern	All sides equal
Bar layout	Rectangular
Cover to	Transverse bars
Clear cover	2 in
Bars	4 #9
Confinement type	Tied
Total steel area, A_s	4.00 in²
Rho	1.56 %
Min. clear spacing	8.74 in

No.	Load Combo			P_u kip	M_{ux} k-ft	M_{uy} k-ft	ϕP_n kip	ϕM_{nx} k-ft	ϕM_{ny} k-ft	Capacity Ratio
10	1	U4	Top	1.9	65.3	0.2	1.93	73.70	0.20	0.89
13	1	U5	Top	1.4	64.4	0.1	1.45	73.49	0.15	0.88
16	1	U6	Top	1.9	-63.2	0.2	1.93	-73.69	0.20	0.86
19	1	U7	Top	1.4	-62.8	0.1	1.45	-73.49	0.15	0.85
5	1	U2	Bot	5.9	0.5	0.0	5.88	75.40	0.00	0.01
26	2	U2	Bot	5.9	0.5	0.0	5.88	75.40	0.00	0.01
47	3	U2	Bot	5.9	0.5	0.0	5.88	75.40	0.00	0.01
2	1	U1	Bot	2.3	0.2	0.0	2.25	73.85	0.00	0.00
8	1	U3	Bot	3.2	0.3	0.0	3.17	74.25	0.00	0.00
11	1	U4	Bot	1.9	0.2	0.0	1.93	73.71	0.00	0.00
14	1	U5	Bot	1.4	0.1	0.0	1.45	73.50	0.00	0.00
17	1	U6	Bot	1.9	0.2	0.0	1.93	73.71	0.00	0.00
20	1	U7	Bot	1.4	0.1	0.0	1.45	73.50	0.00	0.00
23	2	U1	Bot	2.3	0.2	0.0	2.25	73.85	0.00	0.00
29	2	U3	Bot	3.2	0.3	0.0	3.17	74.25	0.00	0.00

Only 15 points out of 25 are listed.

Max. Capacity Ratio: 0.89

10.2. MM at P=2 [kip]



16 x 16 in

General Information

Project	---
Column	---
Engineer	---
Code	ACI 318-14
Bar Set	ASTM A615
Units	English
Run Option	Design
Run Axis	Biaxial
Slenderness	Considered
Column Type	Structural
Capacity Method	Moment capacity

Materials

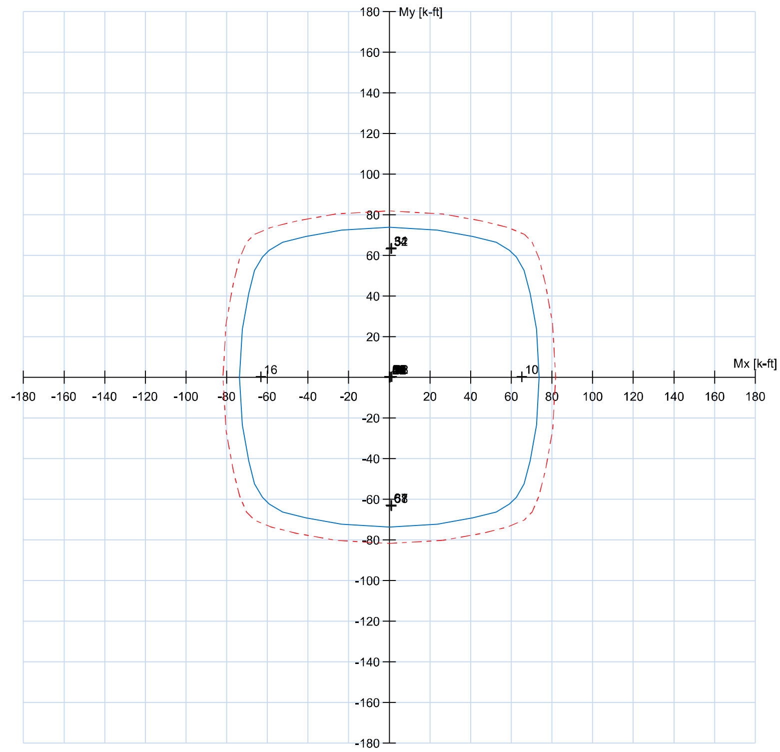
f'_c	3 ksi
E_c	3122.02 ksi
f_y	40 ksi
E_s	29000 ksi

Section

Type	Rectangular
Width	16 in
Depth	16 in
A_g	256 in^2
I_x	5461.33 in^4
I_y	5461.33 in^4

Reinforcement

Pattern	All sides equal
Bar layout	Rectangular
Cover to	Transverse bars
Clear cover	2 in
Bars	4 #9
Confinement type	Tied
Total steel area, A_s	4.00 in^2
Rho	1.56 %
Min. clear spacing	8.74 in



MM at P=2.0 [kip]

No.	Load Combo			P_u kip	M_{ux} k-ft	M_{uy} k-ft	ϕP_n kip	ϕM_{nx} k-ft	ϕM_{ny} k-ft	Capacity Ratio
10	1	U4	Top	1.9	65.3	0.2	1.93	73.70	0.20	0.89
16	1	U6	Top	1.9	-63.2	0.2	1.93	-73.69	0.20	0.86
31	2	U4	Top	2.2	1.0	63.5	2.18	1.21	73.75	0.86
34	2	U5	Top	1.7	0.8	63.2	1.69	0.91	73.55	0.86
37	2	U6	Top	1.7	1.0	-63.0	1.68	1.21	-73.53	0.86
52	3	U4	Top	1.7	1.0	63.2	1.68	1.21	73.53	0.86
58	3	U6	Top	2.2	1.0	-63.3	2.18	1.21	-73.75	0.86
61	3	U7	Top	1.7	0.8	-63.1	1.69	0.91	-73.55	0.86
1	1	U1	Top	2.3	1.2	0.2	2.25	73.15	12.23	0.02
22	2	U1	Top	2.3	1.2	0.2	2.25	73.15	12.23	0.02
43	3	U1	Top	2.3	1.2	0.2	2.25	73.15	12.23	0.02
2	1	U1	Bot	2.3	0.2	0.0	2.25	73.85	0.00	0.00
3	1	U1	Bot	2.3	0.0	0.2	2.25	0.00	73.85	0.00
11	1	U4	Bot	1.9	0.2	0.0	1.93	73.71	0.00	0.00
12	1	U4	Bot	1.9	0.0	0.2	1.93	0.00	73.71	0.00

Only 15 points out of 33 are listed.

Max. Capacity Ratio: 0.89

Column Design — C4 - Cantilevered Column

Bending Axis	Shear Axis	
X-X/3-3	Y-Y/2-2	
lux (out of plane span) (in) =	134	
luy (in plane span) (in) =	134	
b (in) =	16	
h (in) =	16	
long bar size =	9	
Tie size =	4	
number of longitudinal bars =	4	
d' =	2.500	
f'c (psi) =	3000	
fy (psi) =	40000	
Pu Compression (k) =	5.89	
Pu Tension (k) =	-0.500	
Tu (k-ft) =	0.00	
Max NA depth (in) =	3.7	6 bars in tension
Min NA depth (in) =	2.2	3 layers in tension
Mu Strong x (k-ft) =	62.23	
Mu Weak y (k-ft) =	62.10	

BENDING DESIGN

Slenderness

ACI 318-14 (Sec. 6.2.5 & 6.2.6)	(k*l)/0.3*b =	27.92 ≥	22	Therefore, slenderness effects must be accounted for in SP Column Analysis

Special Moment Frame Column Design Requirements

Dimensional Limits					
ACI 318-14 (Sec. 18.7.2.1a)	bmin = 12"	≤		16	, Therefore OK
	hmin = 12"	≤		16	, Therefore OK
ACI 318-14 (Sec. 18.6.2.1b)	Min(b,h)/Max(b,h) =	1 ≥		0.4	, Therefore OK
Minimum Flexural Strength of Columns					
ACI 318-14 (Eq. 18.7.3.2)	ΣMnc ≥ (6/5)ΣMnb				
	(6/5)ΣMnb x (k-ft) =	66.00 ≥	Mu =	62.23	, Therefore (5/6)ΣMnb controls column demand
	(6/5)ΣMnb y (k-ft) =	43.20 ≤	Mu =	62.10	, Therefore Mu controls column demand
Longitudinal Reinforcement					
ACI 318-14 (Sec. 18.7.4.1)	0.01Ag ≤ Ast ≤ 0.06Ag				
	Ast (in^2) =	3.976 ≥	0.01Ag =	2.520239	, Therefore OK
	Ast (in^2) =	3.976 ≤	0.06Ag =	15.12144	, Therefore OK

SHEAR DESIGN

Special Moment Frame Column Design Requirements

Transverse Reinforcement					
ACI 318-14 (Sec. 18.7.5.1a)	l_o (in) =	16.0			
ACI 318-14 (Sec. 18.7.5.1b)	l_o (in) =	22.3 Controls			
ACI 318-14 (Sec. 18.7.5.1c)	l_o (in) =	18.0			
ACI 318-14 (Sec. 18.7.5.2e)	hx (in) =	11.0 ≤	14 in		, Therefore OK
ACI 318-14 (Sec. 18.7.5.2f)	0.03Ag*f'c (k) =	22.7 ≥	Pu (k) =	5.89	, Therefore hx is notrequired to be reduced
ACI 318-14 (Sec. 18.7.5.2f)	f'c (psi) =	3000 ≤		10000	, Therefore hx is notrequired to be reduced
ACI 318-14 (Sec. 18.7.5.3a)	s_o (in) =	4 Controls			, Therefore Use #4 Ties @ 4" o.c. in l_o regions
ACI 318-14 (Sec. 18.7.5.3b)	s_o (in) =	7			
ACI 318-14 (Sec. 18.7.5.3c)	s_o (in) = 4 +(14-hx / 3) =	5			
ACI 318-14 (Sec. 18.7.5.3)	s_o ,max (in) =	6.0 ≥		4	, Therefore OK
ACI 318-14 (Sec. 18.7.5.3)	s_o ,min (in) =	4.0 ≤		4	, Therefore OK
ACI 318-14 (Table. 18.7.5.4a)	Ash/sbh = 0.3*(Ag/Ach - 1)*(f'c/fyt) =	0.0244 Controls			
ACI 318-14 (Table. 18.7.5.4b)	Ash/sbh = 0.09*(f'c/fyt) =	0.0068			
	Ash/sbh, provided =	0.0227 ≤	Ash/sbh, control =	0.0244	, Therefore #4 Ties @ 4" o.c. is not Adequate, Use #4 Ties @ 3.5" o.c.
	Ash/sbh, provided =	0.0260 ≥	Ash/sbh, control =	0.0244	, Therefore Ok, Use #4 Ties @ 3.5" o.c. in l_o regions
ACI 318-14 (Table. 18.7.5.5)	sv, max (in) beyond l_o regions = Min(6*db, 6) =	6 Controls			, Therefore Use #4 Ties @ 6" o.c. beyond l_o regions
Joints of Special Moment Frames					
ACI 318-14 (Sec. 18.3.3.1)	Use Tie Reinforcement as Required in Lo regions	, Therefore use #4 Ties @ 3.5" o.c. in at SMF Joints			
ACI 318-14 (Table 18.8.4.1)	ϕv*Vn (k) = ϕv*12*(Av/s)*fyt*d (conservative) =	124 ≥	Vu=	5.33	
Ties					
ACI 318-14 (Sec. 25.7.2.1a)	sv, min (in) beyond l_o regions = (4/3)*dagg+ds =	1.5 ≤		3.5	, Therefore Minimum Tie Spacing is Adequate
ACI 318-14 (Sec. 25.7.2.1b)	sv, max (in) beyond l_o regions = Min(16db, 48ds, dc,min)	16 ≥		6	, Therefore Maximum Tie Spacing is Adequate
ACI 318-14 (Sec. 25.7.2.2)	Tie Size =	4 ≥		3	, Therefore Tie Size is Adequate
Transverse Reinforcement					
ACI 318-14 (Sec. 18.7.6.2.1a)	Ve (k) = Max Seismic Shear =	3.06 ≥	Vu/2 (k) =	2.67	
ACI 318-14 (Sec. 18.7.6.2.1b)	Ag*f'c/20 (k) =	37.80 ≥	Pu (k) =	5.89	, Therefore Shear Reinforcement Shall be designed assuming Vc=0 for locations specified in Sec. 18.7.5.1
ACI 318-14 (Eq. 22.5.2.2)	For Calculaton of Vc an Vs, d is to be taken as 0.8*h =	12.80 in			
ACI 318-14 (Eq. 22.5.10.5.3)	ϕv*Vn (k) = ϕv*Vs = ϕv*(Av/s)*fyt*d =	109.7 ≥	Vu (k) =	5.33	, Therefore #3 ties spaced @ 3" o.c. are adequate

TORSION

Torsional Strength

Threshold Torsion					
ACI 318-14 (Sec. 22.7.4.1a & 22.7.1.1)	ϕT_{th} compression (k) = $(\lambda*\sqrt{f'c}*A_{cp}^2)/p_{cp}*\sqrt{(1+(Nu/4*Ag*\lambda*\sqrt{f'c}))}$ =	44.25 ≤	Tu (k) =	0.00	, Therefore Torsional Effects may be Neglected
	ϕT_{th} tension (k) = $(\lambda*\sqrt{f'c}*A_{cp}^2)/p_{cp}*\sqrt{(1+(Nu/4*Ag*\lambda*\sqrt{f'c}))}$ =	42.26 ≤	Tu (k) =	0.00	, Therefore Torsional Effects may be Neglected

General Footing

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Lic. # : KW-06003493 HOHBACH-LEWIN

DESCRIPTION: C1

Code References

Calculations per ACI 318-11, IBC 2012, CBC 2013, ASCE 7-10
Load Combinations Used : IBC 2018

General Information

Material Properties

f'c : Concrete 28 day strength	=	3.0 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : Concrete Elastic Modulus	=	3,122.0 ksi
Concrete Density	=	150.0 pcf
φ Values Flexure	=	0.90
Shear	=	0.750

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	No
Use Pedestal wt for stability, mom & shear	:	No

Soil Design Values

Allowable Soil Bearing	=	1.50 ksf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	100.0 pcf
Soil/Concrete Friction Coeff.	=	

Increases based on footing Depth

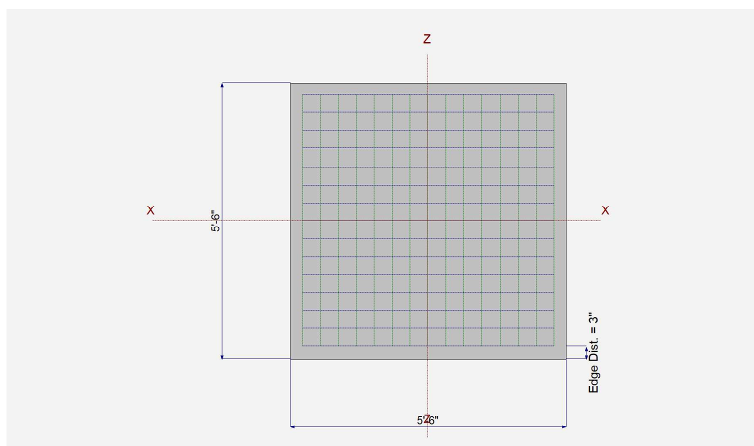
Footing base depth below soil surface	=	2.50 ft
Allow press. increase per foot of depth	=	ksf
when footing base is below	=	ft

Increases based on footing plan dimension

Allowable pressure increase per foot of depth	=	ksf
when max. length or width is greater than	=	ft

Dimensions

Width parallel to X-X Axis	=	5.50 ft
Length parallel to Z-Z Axis	=	5.50 ft
Footing Thickness	=	24.0 in



Pedestal dimensions...

px : parallel to X-X Axis	=	16.0 in
pz : parallel to Z-Z Axis	=	16.0 in
Height	=	in

Rebar Centerline to Edge of Concrete...

at Bottom of footing	=	3.0 in

Reinforcing

Bars parallel to X-X Axis

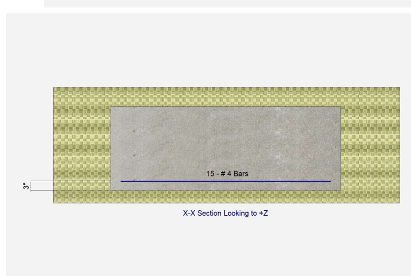
Number of Bars	=	15.0
Reinforcing Bar Size	=	# 4

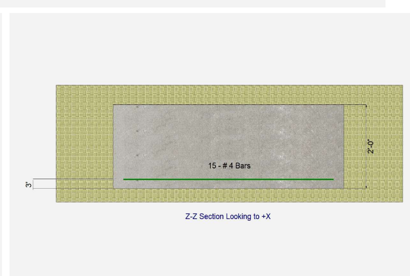
Bars parallel to Z-Z Axis

Number of Bars	=	15.0
Reinforcing Bar Size	=	# 4

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation	n/a
# Bars required within zone	n/a
# Bars required on each side of zone	n/a





Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	2.50	3.80				1.70		k
OB : Overburden	=								ksf
M-xx	=	0.10	0.10				18.70		k-ft
M-zz	=	0.40	0.40				19.90		k-ft
V-x	=						1.820		k
V-z	=						1.520		k

General Footing

DESCRIPTION: C1

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.8942	Soil Bearing	1.784 ksf	1.995 ksf	+0.730D-0.710E about Z-Z axis
PASS	1.464	Overturning - X-X	15.278 k-ft	22.371 k-ft	+0.60D+0.70E
PASS	1.338	Overturning - Z-Z	16.718 k-ft	22.371 k-ft	+0.60D+0.70E
PASS	1.295	Sliding - X-X	1.274 k	1.650 k	+D+0.70E
PASS	1.551	Sliding - Z-Z	1.064 k	1.650 k	+D+0.70E
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.05235	Z Flexure (+X)	2.630 k-ft/ft	50.233 k-ft/ft	+0.7284D+E
PASS	0.01166	Z Flexure (-X)	0.5859 k-ft/ft	50.233 k-ft/ft	+1.20D+1.60Lr
PASS	0.04505	X Flexure (+Z)	2.263 k-ft/ft	50.233 k-ft/ft	+0.7284D+E
PASS	0.01264	X Flexure (-Z)	0.6350 k-ft/ft	50.233 k-ft/ft	+1.20D+1.60Lr
PASS	0.03892	1-way Shear (+X)	3.198 psi	82.158 psi	+0.7284D+E
PASS	0.004179	1-way Shear (-X)	0.3434 psi	82.158 psi	+1.20D+1.60Lr
PASS	0.02628	1-way Shear (+Z)	2.159 psi	82.158 psi	+0.7284D+E
PASS	0.004633	1-way Shear (-Z)	0.3806 psi	82.158 psi	+1.20D+1.60Lr
PASS	0.01220	2-way Punching	2.005 psi	164.317 psi	+1.20D+1.60Lr

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc	Actual Soil Bearing Stress @ Location				Actual / Allow Ratio
		(in)		Bottom, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	1.50	n/a	0.1037	0.3791	0.3862	n/a	n/a	0.258
X-X, +D+Lr	1.50	n/a	0.1561	0.5011	0.5154	n/a	n/a	0.344
X-X, +D+0.750Lr	1.50	n/a	0.1456	0.4706	0.4831	n/a	n/a	0.322
X-X, +1.180D+Lr+0.710E	2.0	n/a	10.064	0.05818	1.176	n/a	n/a	0.588
X-X, +1.180D+Lr-0.710E	2.0	n/a	-11.236	1.081	0.0	n/a	n/a	0.541
X-X, +0.730D+0.710E	1.995	n/a	19.272	0.0	1.015	n/a	n/a	0.509
X-X, +0.730D-0.710E	1.995	n/a	-25.453	1.376	0.0	n/a	n/a	0.690
Z-Z, D Only	1.50	0.4147	n/a	n/a	n/a	0.3684	0.3969	0.265
Z-Z, +D+Lr	1.50	0.6244	n/a	n/a	n/a	0.4797	0.5368	0.358
Z-Z, +D+0.750Lr	1.50	0.5823	n/a	n/a	n/a	0.4519	0.5019	0.335
Z-Z, +1.180D+Lr+0.710E	2.0	11.306	n/a	n/a	n/a	0.0	1.245	0.623
Z-Z, +1.180D+Lr-0.710E	2.0	-11.697	n/a	n/a	n/a	1.104	0.0	0.552
Z-Z, +0.730D+0.710E	1.995	21.132	n/a	n/a	n/a	0.0	1.173	0.588
Z-Z, +0.730D-0.710E	1.995	-27.207	n/a	n/a	n/a	1.784	0.0	0.894

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
X-X, D Only	0.10 k-ft	31.831 k-ft	318.313	OK
X-X, +D+Lr	0.20 k-ft	42.281 k-ft	211.406	OK
X-X, +D+0.750Lr	0.1750 k-ft	39.669 k-ft	226.679	OK
X-X, +D+0.70E	15.318 k-ft	35.104 k-ft	2.292	OK
X-X, +D+0.5250E	11.514 k-ft	34.286 k-ft	2.978	OK
X-X, +0.60D+0.70E	15.278 k-ft	22.371 k-ft	1.464	OK
Z-Z, D Only	0.40 k-ft	31.831 k-ft	79.578	OK
Z-Z, +D+Lr	0.80 k-ft	42.281 k-ft	52.852	OK
Z-Z, +D+0.750Lr	0.70 k-ft	39.669 k-ft	56.670	OK
Z-Z, +D+0.70E	16.878 k-ft	35.104 k-ft	2.080	OK
Z-Z, +D+0.5250E	12.759 k-ft	34.286 k-ft	2.687	OK
Z-Z, +0.60D+0.70E	16.718 k-ft	22.371 k-ft	1.338	OK

All units k

Sliding Stability

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
X-X, D Only	0.0 k	1.650 k	No Sliding	OK
X-X, +D+Lr	0.0 k	1.650 k	No Sliding	OK
X-X, +D+0.750Lr	0.0 k	1.650 k	No Sliding	OK
X-X, +D+0.70E	1.274 k	1.650 k	1.295	OK
X-X, +D+0.5250E	0.9555 k	1.650 k	1.727	OK

General Footing

DESCRIPTION: C1

Sliding Stability

All units k

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
X-X, +0.60D+0.70E	1.274 k	1.650 k	1.295	OK
Z-Z, D Only	0.0 k	1.650 k	No Sliding	OK
Z-Z, +D+Lr	0.0 k	1.650 k	No Sliding	OK
Z-Z, +D+0.750Lr	0.0 k	1.650 k	No Sliding	OK
Z-Z, +D+0.70E	1.064 k	1.650 k	1.551	OK
Z-Z, +D+0.5250E	0.7980 k	1.650 k	2.068	OK
Z-Z, +0.60D+0.70E	1.064 k	1.650 k	1.551	OK

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	0.2593	+Z	Bottom	0.5184	Min Temp %	0.5455	50.233	OK
X-X, +1.40D	0.2429	-Z	Bottom	0.5184	Min Temp %	0.5455	50.233	OK
X-X, +1.20D+0.50Lr	0.3615	+Z	Bottom	0.5184	Min Temp %	0.5455	50.233	OK
X-X, +1.20D+0.50Lr	0.3416	-Z	Bottom	0.5184	Min Temp %	0.5455	50.233	OK
X-X, +1.20D	0.2222	+Z	Bottom	0.5184	Min Temp %	0.5455	50.233	OK
X-X, +1.20D	0.2082	-Z	Bottom	0.5184	Min Temp %	0.5455	50.233	OK
X-X, +1.20D+1.60Lr	0.6678	+Z	Bottom	0.5184	Min Temp %	0.5455	50.233	OK
X-X, +1.20D+1.60Lr	0.6350	-Z	Bottom	0.5184	Min Temp %	0.5455	50.233	OK
X-X, +0.90D	0.1667	+Z	Bottom	0.5184	Min Temp %	0.5455	50.233	OK
X-X, +0.90D	0.1561	-Z	Bottom	0.5184	Min Temp %	0.5455	50.233	OK
X-X, +0.7284D+E	2.263	+Z	Bottom	0.5184	Min Temp %	0.5455	50.233	OK
X-X, +0.7284D+E	0.4742	-Z	Top	0.5184	Min Temp %	0.5455	50.233	OK
Z-Z, +1.40D	0.2183	-X	Bottom	0.5184	Min Temp %	0.5455	50.233	OK
Z-Z, +1.40D	0.2838	+X	Bottom	0.5184	Min Temp %	0.5455	50.233	OK
Z-Z, +1.20D+0.50Lr	0.3117	-X	Bottom	0.5184	Min Temp %	0.5455	50.233	OK
Z-Z, +1.20D+0.50Lr	0.3913	+X	Bottom	0.5184	Min Temp %	0.5455	50.233	OK
Z-Z, +1.20D	0.1871	-X	Bottom	0.5184	Min Temp %	0.5455	50.233	OK
Z-Z, +1.20D	0.2433	+X	Bottom	0.5184	Min Temp %	0.5455	50.233	OK
Z-Z, +1.20D+1.60Lr	0.5859	-X	Bottom	0.5184	Min Temp %	0.5455	50.233	OK
Z-Z, +1.20D+1.60Lr	0.7169	+X	Bottom	0.5184	Min Temp %	0.5455	50.233	OK
Z-Z, +0.90D	0.1404	-X	Bottom	0.5184	Min Temp %	0.5455	50.233	OK
Z-Z, +0.90D	0.1825	+X	Bottom	0.5184	Min Temp %	0.5455	50.233	OK
Z-Z, +0.7284D+E	0.4742	-X	Top	0.5184	Min Temp %	0.5455	50.233	OK
Z-Z, +0.7284D+E	2.630	+X	Bottom	0.5184	Min Temp %	0.5455	50.233	OK

One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0.13 psi	0.18 psi	0.15 psi	0.16 psi	0.18 psi	82.16 psi	0.00	OK
+1.20D+0.50Lr	0.18 psi	0.24 psi	0.20 psi	0.22 psi	0.24 psi	82.16 psi	0.00	OK
+1.20D	0.11 psi	0.15 psi	0.12 psi	0.14 psi	0.15 psi	82.16 psi	0.00	OK
+1.20D+1.60Lr	0.34 psi	0.44 psi	0.38 psi	0.41 psi	0.44 psi	82.16 psi	0.01	OK
+0.90D	0.08 psi	0.11 psi	0.09 psi	0.10 psi	0.11 psi	82.16 psi	0.00	OK
+0.7284D+E	0.29 psi	3.20 psi	0.29 psi	2.16 psi	3.20 psi	82.16 psi	0.04	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	0.77 psi	164.32 psi	0.004704	OK
+1.20D+0.50Lr	1.08 psi	164.32 psi	0.006586	OK
+1.20D	0.66 psi	164.32 psi	0.004032	OK
+1.20D+1.60Lr	2.01 psi	164.32 psi	0.0122	OK
+0.90D	0.50 psi	164.32 psi	0.003024	OK
+0.7284D+E	1.80 psi	164.32 psi	0.01095	OK

General Footing

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DESCRIPTION: C2

Code References

Calculations per ACI 318-11, IBC 2012, CBC 2013, ASCE 7-10
Load Combinations Used : IBC 2018

General Information

Material Properties

f'c : Concrete 28 day strength	=	3.0	ksi
fy : Rebar Yield	=	60.0	ksi
Ec : Concrete Elastic Modulus	=	3,122.0	ksi
Concrete Density	=	150.0	pcf
φ Values Flexure	=	0.90	
Shear	=	0.750	

Analysis Settings

Min Steel % Bending Reinf.	=		
Min Allow % Temp Reinf.	=	0.00180	
Min. Overturning Safety Factor	=	1.0	: 1
Min. Sliding Safety Factor	=	1.0	: 1
Add Ftg Wt for Soil Pressure	:	Yes	
Use ftg wt for stability, moments & shears	:	Yes	
Add Pedestal Wt for Soil Pressure	:	No	
Use Pedestal wt for stability, mom & shear	:	No	

Soil Design Values

Allowable Soil Bearing	=	1.50	ksf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	100.0	pcf
Soil/Concrete Friction Coeff.	=		

Increases based on footing Depth

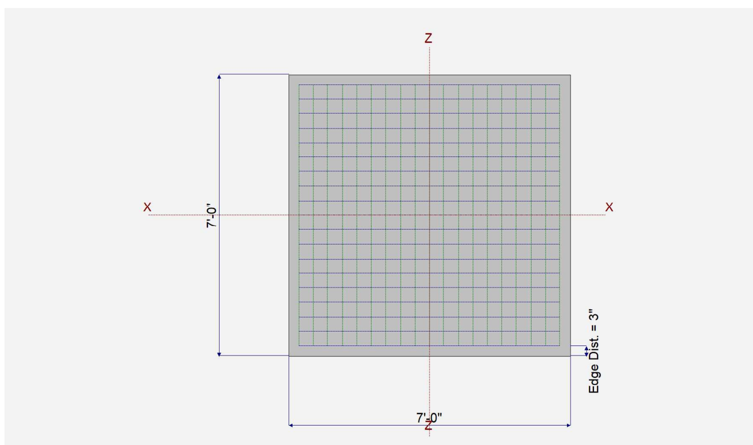
Footing base depth below soil surface	=	3.50	ft
Allow press. increase per foot of depth	=		ksf
when footing base is below	=		ft

Increases based on footing plan dimension

Allowable pressure increase per foot of depth	=		ksf
when max. length or width is greater than	=		ft

Dimensions

Width parallel to X-X Axis	=	7.0	ft
Length parallel to Z-Z Axis	=	7.0	ft
Footing Thickness	=	24.0	in



Pedestal dimensions...

px : parallel to X-X Axis	=	16.0	in
pz : parallel to Z-Z Axis	=	16.0	in
Height	=		in

Rebar Centerline to Edge of Concrete...

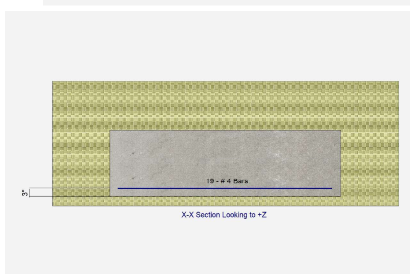
at Bottom of footing	=	3.0	in

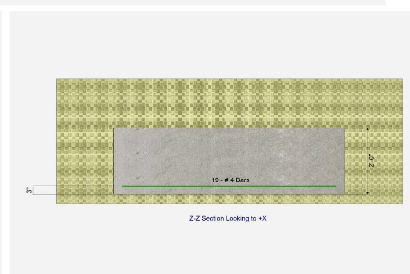
Reinforcing

Bars parallel to X-X Axis			
Number of Bars	=		19.0
Reinforcing Bar Size	=	#	4
Bars parallel to Z-Z Axis			
Number of Bars	=		19.0
Reinforcing Bar Size	=	#	4

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation	n/a
# Bars required within zone	n/a
# Bars required on each side of zone	n/a





Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	7.70	9.90				0.80		k
OB : Overburden	=								ksf
M-xx	=						48.20		k-ft
M-zz	=	6.20	6.90				34.70		k-ft
V-x	=	1.20	1.30				2.80		k
V-z	=						3.90		k

General Footing

DESCRIPTION: C2

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.7977	Soil Bearing	1.595 ksf	2.0 ksf	+1.180D+Lr+0.710E about Z-Z axis
PASS	1.250	Overturning - X-X	39.20 k-ft	49.0 k-ft	+0.60D+0.70E
PASS	1.468	Overturning - Z-Z	33.370 k-ft	49.0 k-ft	+0.60D+0.70E
PASS	1.108	Sliding - X-X	3.160 k	3.50 k	+D+0.70E
PASS	1.282	Sliding - Z-Z	2.730 k	3.50 k	+D+0.70E
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.08288	Z Flexure (+X)	4.144 k-ft/ft	50.0 k-ft/ft	+0.7284D+E
PASS	0.03049	Z Flexure (-X)	1.524 k-ft/ft	50.0 k-ft/ft	+1.372D+E
PASS	0.1097	X Flexure (+Z)	5.487 k-ft/ft	50.0 k-ft/ft	+0.7284D+E
PASS	0.04108	X Flexure (-Z)	2.054 k-ft/ft	50.0 k-ft/ft	+1.20D+1.60Lr
PASS	0.07116	1-way Shear (+X)	5.847 psi	82.158 psi	+0.7284D+E
PASS	0.02087	1-way Shear (-X)	1.715 psi	82.158 psi	+1.372D+E
PASS	0.1070	1-way Shear (+Z)	8.788 psi	82.158 psi	+0.7284D+E
PASS	0.02596	1-way Shear (-Z)	2.133 psi	82.158 psi	+1.20D+1.60Lr
PASS	0.03960	2-way Punching	6.507 psi	164.317 psi	+1.20D+1.60Lr

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc (in)	Actual Soil Bearing Stress @ Location Bottom, -Z	Top, +Z	Left, -X	Right, +X	Actual / Allow Ratio
X-X, D Only	1.50	n/a	0.0	0.4571	0.4571	n/a	n/a	0.305
X-X, +1.180D+Lr+0.710E	2.0	n/a	12.930	0.06451	1.442	n/a	n/a	0.721
X-X, +0.730D+0.710E	2.0	n/a	28.199	0.0	1.387	n/a	n/a	0.694
X-X, +D+Lr	1.50	n/a	0.0	0.6592	0.6592	n/a	n/a	0.440
X-X, +D+0.750Lr	1.50	n/a	0.0	0.6087	0.6087	n/a	n/a	0.406
Z-Z, D Only	1.50	4.607	n/a	n/a	n/a	0.3082	0.6061	0.404
Z-Z, +1.180D+Lr+0.710E	2.0	15.695	n/a	n/a	n/a	0.0	1.595	0.798
Z-Z, +0.730D+0.710E	2.0	24.745	n/a	n/a	n/a	0.0	1.112	0.556
Z-Z, +D+Lr	1.50	6.724	n/a	n/a	n/a	0.3457	0.9726	0.648
Z-Z, +D+0.750Lr	1.50	6.327	n/a	n/a	n/a	0.3364	0.8810	0.587

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
X-X, D Only	None	0.0 k-ft	Infinity	OK
X-X, +D+Lr	None	0.0 k-ft	Infinity	OK
X-X, +D+0.750Lr	None	0.0 k-ft	Infinity	OK
X-X, +D+0.70E	39.20 k-ft	80.360 k-ft	2.050	OK
X-X, +D+0.5250E	29.40 k-ft	79.870 k-ft	2.717	OK
X-X, +0.60D	None	0.0 k-ft	Infinity	OK
X-X, +0.60D+0.70E	39.20 k-ft	49.0 k-ft	1.250	OK
Z-Z, D Only	8.60 k-ft	78.40 k-ft	9.116	OK
Z-Z, +D+Lr	18.10 k-ft	113.050 k-ft	6.246	OK
Z-Z, +D+0.750Lr	15.725 k-ft	104.388 k-ft	6.638	OK
Z-Z, +D+0.70E	36.810 k-ft	80.360 k-ft	2.183	OK
Z-Z, +D+0.5250E	29.758 k-ft	79.870 k-ft	2.684	OK
Z-Z, +0.60D	5.160 k-ft	47.040 k-ft	9.116	OK
Z-Z, +0.60D+0.70E	33.370 k-ft	49.0 k-ft	1.468	OK

All units k

Sliding Stability

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
X-X, D Only	1.20 k	3.50 k	2.917	OK
X-X, +D+Lr	2.50 k	3.50 k	1.40	OK
X-X, +D+0.750Lr	2.175 k	3.50 k	1.609	OK
X-X, +D+0.70E	3.160 k	3.50 k	1.108	OK
X-X, +D+0.5250E	2.670 k	3.50 k	1.311	OK
X-X, +0.60D	0.720 k	3.50 k	4.861	OK
X-X, +0.60D+0.70E	2.680 k	3.50 k	1.306	OK

General Footing

DESCRIPTION: C2

Sliding Stability

All units k

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
Z-Z, D Only	0.0 k	3.50 k	No Sliding	OK
Z-Z, +D+Lr	0.0 k	3.50 k	No Sliding	OK
Z-Z, +D+0.750Lr	0.0 k	3.50 k	No Sliding	OK
Z-Z, +D+0.70E	2.730 k	3.50 k	1.282	OK
Z-Z, +D+0.5250E	2.048 k	3.50 k	1.709	OK
Z-Z, +0.60D	0.0 k	3.50 k	No Sliding	OK
Z-Z, +0.60D+0.70E	2.730 k	3.50 k	1.282	OK

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	0.8829	+Z	Bottom	0.5184	Min Temp %	0.5429	50.0	OK
X-X, +1.40D	0.8829	-Z	Bottom	0.5184	Min Temp %	0.5429	50.0	OK
X-X, +1.20D+0.50Lr	1.162	+Z	Bottom	0.5184	Min Temp %	0.5429	50.0	OK
X-X, +1.20D+0.50Lr	1.162	-Z	Bottom	0.5184	Min Temp %	0.5429	50.0	OK
X-X, +1.20D	0.7568	+Z	Bottom	0.5184	Min Temp %	0.5429	50.0	OK
X-X, +1.20D	0.7568	-Z	Bottom	0.5184	Min Temp %	0.5429	50.0	OK
X-X, +1.20D+1.60Lr	2.054	+Z	Bottom	0.5184	Min Temp %	0.5429	50.0	OK
X-X, +1.20D+1.60Lr	2.054	-Z	Bottom	0.5184	Min Temp %	0.5429	50.0	OK
X-X, +1.372D+E	4.062	+Z	Bottom	0.5184	Min Temp %	0.5429	50.0	OK
X-X, +1.372D+E	1.595	-Z	Top	0.5184	Min Temp %	0.5429	50.0	OK
X-X, +0.90D	0.5676	+Z	Bottom	0.5184	Min Temp %	0.5429	50.0	OK
X-X, +0.90D	0.5676	-Z	Bottom	0.5184	Min Temp %	0.5429	50.0	OK
X-X, +0.7284D+E	5.487	+Z	Bottom	0.5184	Min Temp %	0.5429	50.0	OK
X-X, +0.7284D+E	0.8770	-Z	Top	0.5184	Min Temp %	0.5429	50.0	OK
Z-Z, +1.40D	0.2658	-X	Bottom	0.5184	Min Temp %	0.5429	50.0	OK
Z-Z, +1.40D	1.50	+X	Bottom	0.5184	Min Temp %	0.5429	50.0	OK
Z-Z, +1.20D+0.50Lr	0.3897	-X	Bottom	0.5184	Min Temp %	0.5429	50.0	OK
Z-Z, +1.20D+0.50Lr	1.935	+X	Bottom	0.5184	Min Temp %	0.5429	50.0	OK
Z-Z, +1.20D	0.2278	-X	Bottom	0.5184	Min Temp %	0.5429	50.0	OK
Z-Z, +1.20D	1.286	+X	Bottom	0.5184	Min Temp %	0.5429	50.0	OK
Z-Z, +1.20D+1.60Lr	0.7460	-X	Bottom	0.5184	Min Temp %	0.5429	50.0	OK
Z-Z, +1.20D+1.60Lr	3.362	+X	Bottom	0.5184	Min Temp %	0.5429	50.0	OK
Z-Z, +1.372D+E	1.524	-X	Top	0.5184	Min Temp %	0.5429	50.0	OK
Z-Z, +1.372D+E	3.759	+X	Bottom	0.5184	Min Temp %	0.5429	50.0	OK
Z-Z, +0.90D	0.1709	-X	Bottom	0.5184	Min Temp %	0.5429	50.0	OK
Z-Z, +0.90D	0.9643	+X	Bottom	0.5184	Min Temp %	0.5429	50.0	OK
Z-Z, +0.7284D+E	0.8770	-X	Top	0.5184	Min Temp %	0.5429	50.0	OK
Z-Z, +0.7284D+E	4.144	+X	Bottom	0.5184	Min Temp %	0.5429	50.0	OK

One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0.17 psi	1.66 psi	0.92 psi	0.92 psi	1.66 psi	82.16 psi	0.02	OK
+1.20D+0.50Lr	0.27 psi	2.14 psi	1.21 psi	1.21 psi	2.14 psi	82.16 psi	0.03	OK
+1.20D	0.15 psi	1.43 psi	0.79 psi	0.79 psi	1.43 psi	82.16 psi	0.02	OK
+1.20D+1.60Lr	0.55 psi	3.71 psi	2.13 psi	2.13 psi	3.71 psi	82.16 psi	0.05	OK
+1.372D+E	1.72 psi	4.42 psi	1.72 psi	4.81 psi	4.81 psi	82.16 psi	0.06	OK
+0.90D	0.11 psi	1.07 psi	0.59 psi	0.59 psi	1.07 psi	82.16 psi	0.01	OK
+0.7284D+E	0.91 psi	5.85 psi	0.91 psi	8.79 psi	8.79 psi	82.16 psi	0.11	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	2.80 psi	164.32 psi	0.01702	OK
+1.20D+0.50Lr	3.68 psi	164.32 psi	0.02241	OK
+1.20D	2.40 psi	164.32 psi	0.01459	OK
+1.20D+1.60Lr	6.51 psi	164.32 psi	0.0396	OK
+1.372D+E	3.19 psi	164.32 psi	0.01944	OK
+0.90D	1.80 psi	164.32 psi	0.01094	OK
+0.7284D+E	2.73 psi	164.32 psi	0.01659	OK

General Footing

DESCRIPTION: C3

Code References

Calculations per ACI 318-11, IBC 2012, CBC 2013, ASCE 7-10
Load Combinations Used : IBC 2018

General Information

Material Properties

f'c : Concrete 28 day strength	=	3.0	ksi
fy : Rebar Yield	=	60.0	ksi
Ec : Concrete Elastic Modulus	=	3,122.0	ksi
Concrete Density	=	150.0	pcf
φ Values Flexure	=	0.90	
Shear	=	0.750	

Analysis Settings

Min Steel % Bending Reinf.	=		
Min Allow % Temp Reinf.	=	0.00180	
Min. Overturning Safety Factor	=	1.0	: 1
Min. Sliding Safety Factor	=	1.0	: 1
Add Ftg Wt for Soil Pressure	:	Yes	
Use ftg wt for stability, moments & shears	:	Yes	
Add Pedestal Wt for Soil Pressure	:	No	
Use Pedestal wt for stability, mom & shear	:	No	

Soil Design Values

Allowable Soil Bearing	=	1.50	ksf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	100.0	pcf
Soil/Concrete Friction Coeff.	=		

Increases based on footing Depth

Footing base depth below soil surface	=	2.50	ft
Allow press. increase per foot of depth	=		ksf
when footing base is below	=		ft

Increases based on footing plan dimension

Allowable pressure increase per foot of depth	=		ksf
when max. length or width is greater than	=		ft

Dimensions

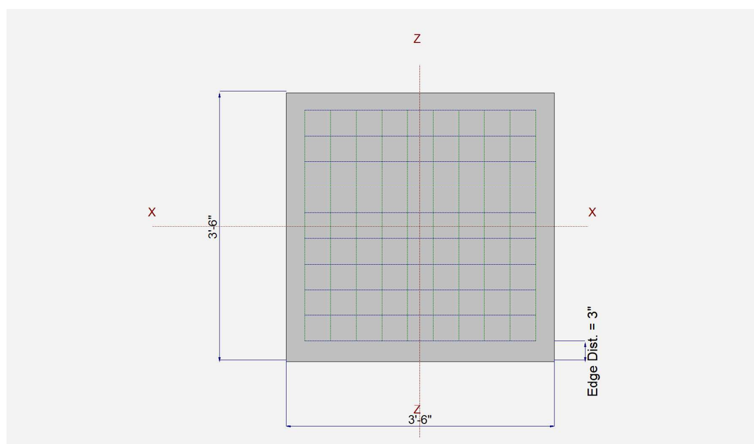
Width parallel to X-X Axis	=	3.50	ft
Length parallel to Z-Z Axis	=	3.50	ft
Footing Thickness	=	24.0	in

Pedestal dimensions...

px : parallel to X-X Axis	=	16.0	in
pz : parallel to Z-Z Axis	=	16.0	in
Height	=		in

Rebar Centerline to Edge of Concrete...

at Bottom of footing	=	3.0	in

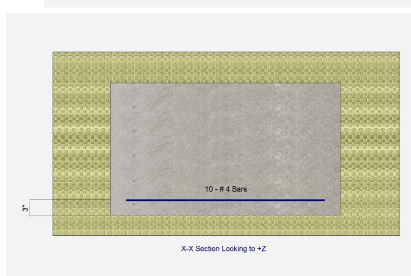


Reinforcing

Bars parallel to X-X Axis			
Number of Bars	=		10.0
Reinforcing Bar Size	=	#	4
Bars parallel to Z-Z Axis			
Number of Bars	=		10.0
Reinforcing Bar Size	=	#	4

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation	n/a
# Bars required within zone	n/a
# Bars required on each side of zone	n/a



Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	4.20	5.90				2.20		k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=								k-ft
V-x	=								k
V-z	=						0.30		k

General Footing

DESCRIPTION: C3

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.7493	Soil Bearing	1.124 ksf	1.50 ksf	+D+Lr about Z-Z axis
PASS	26.104	Overturning - X-X	0.420 k-ft	10.964 k-ft	+0.60D+0.70E
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	5.0	Sliding - Z-Z	0.210 k	1.050 k	+D+0.70E
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.01320	Z Flexure (+X)	0.6936 k-ft/ft	52.559 k-ft/ft	+1.20D+1.60Lr
PASS	0.01320	Z Flexure (-X)	0.6936 k-ft/ft	52.559 k-ft/ft	+1.20D+1.60Lr
PASS	0.01320	X Flexure (+Z)	0.6936 k-ft/ft	52.559 k-ft/ft	+1.20D+1.60Lr
PASS	0.01320	X Flexure (-Z)	0.6936 k-ft/ft	52.559 k-ft/ft	+1.20D+1.60Lr
PASS	n/a	1-way Shear (+X)	0.0 psi	82.158 psi	n/a
PASS	0.0	1-way Shear (-X)	0.0 psi	0.0 psi	n/a
PASS	n/a	1-way Shear (+Z)	0.0 psi	82.158 psi	n/a
PASS	n/a	1-way Shear (-Z)	0.0 psi	82.158 psi	n/a
PASS	n/a	2-way Punching	1.051 psi	82.158 psi	+1.20D+1.60Lr

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc (in)	Zecc (in)	Actual Soil Bearing Stress @ Location Bottom, -Z	Top, +Z	Left, -X	Right, +X	Actual / Allow Ratio
X-X, D Only	1.50	n/a	0.0	0.6429	0.6429	n/a	n/a	0.429
X-X, +D+Lr	1.50	n/a	0.0	1.124	1.124	n/a	n/a	0.749
X-X, +D+0.750Lr	1.50	n/a	0.0	1.004	1.004	n/a	n/a	0.669
X-X, +D+0.70E	1.50	n/a	0.5353	0.7104	0.8268	n/a	n/a	0.551
X-X, +1.180D+Lr+0.710E	1.995	n/a	0.3051	1.309	1.427	n/a	n/a	0.715
X-X, +0.730D+0.710E	2.0	n/a	0.6992	0.5378	0.6558	n/a	n/a	0.328
Z-Z, D Only	1.50	0.0	n/a	n/a	n/a	0.6429	0.6429	0.429
Z-Z, +D+Lr	1.50	0.0	n/a	n/a	n/a	1.124	1.124	0.749
Z-Z, +D+0.750Lr	1.50	0.0	n/a	n/a	n/a	1.004	1.004	0.669
Z-Z, +D+0.70E	1.50	0.0	n/a	n/a	n/a	0.7686	0.7686	0.512
Z-Z, +1.180D+Lr+0.710E	1.995	0.0	n/a	n/a	n/a	1.368	1.368	0.686
Z-Z, +0.730D+0.710E	2.0	0.0	n/a	n/a	n/a	0.5968	0.5968	0.299

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
X-X, D Only	None	0.0 k-ft	Infinity	OK
X-X, +D+Lr	None	0.0 k-ft	Infinity	OK
X-X, +D+0.750Lr	None	0.0 k-ft	Infinity	OK
X-X, +D+0.70E	0.420 k-ft	16.476 k-ft	39.229	OK
X-X, +D+0.5250E	0.3150 k-ft	15.803 k-ft	50.167	OK
X-X, +0.60D	None	0.0 k-ft	Infinity	OK
X-X, +0.60D+0.70E	0.420 k-ft	10.964 k-ft	26.104	OK
Z-Z, D Only	None	0.0 k-ft	Infinity	OK
Z-Z, +D+Lr	None	0.0 k-ft	Infinity	OK
Z-Z, +D+0.750Lr	None	0.0 k-ft	Infinity	OK
Z-Z, +D+0.70E	None	0.0 k-ft	Infinity	OK
Z-Z, +D+0.5250E	None	0.0 k-ft	Infinity	OK
Z-Z, +0.60D	None	0.0 k-ft	Infinity	OK
Z-Z, +0.60D+0.70E	None	0.0 k-ft	Infinity	OK

All units k

Sliding Stability

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
X-X, D Only	0.0 k	1.050 k	No Sliding	OK
X-X, +D+Lr	0.0 k	1.050 k	No Sliding	OK
X-X, +D+0.750Lr	0.0 k	1.050 k	No Sliding	OK
X-X, +D+0.70E	0.0 k	1.050 k	No Sliding	OK
X-X, +D+0.5250E	0.0 k	1.050 k	No Sliding	OK

General Footing

DESCRIPTION: C3

Sliding Stability

All units k

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
X-X, +0.60D	0.0 k	1.050 k	No Sliding	OK
X-X, +0.60D+0.70E	0.0 k	1.050 k	No Sliding	OK
Z-Z, D Only	0.0 k	1.050 k	No Sliding	OK
Z-Z, +D+Lr	0.0 k	1.050 k	No Sliding	OK
Z-Z, +D+0.750Lr	0.0 k	1.050 k	No Sliding	OK
Z-Z, +D+0.70E	0.210 k	1.050 k	5.0	OK
Z-Z, +D+0.5250E	0.1575 k	1.050 k	6.667	OK
Z-Z, +0.60D	0.0 k	1.050 k	No Sliding	OK
Z-Z, +0.60D+0.70E	0.210 k	1.050 k	5.0	OK

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	0.2817	+Z	Bottom	0.5184	Min Temp %	0.5714	52.559	OK
X-X, +1.40D	0.2817	-Z	Bottom	0.5184	Min Temp %	0.5714	52.559	OK
X-X, +1.20D+0.50Lr	0.3827	+Z	Bottom	0.5184	Min Temp %	0.5714	52.559	OK
X-X, +1.20D+0.50Lr	0.3827	-Z	Bottom	0.5184	Min Temp %	0.5714	52.559	OK
X-X, +1.20D	0.2414	+Z	Bottom	0.5184	Min Temp %	0.5714	52.559	OK
X-X, +1.20D	0.2414	-Z	Bottom	0.5184	Min Temp %	0.5714	52.559	OK
X-X, +1.20D+1.60Lr	0.6936	+Z	Bottom	0.5184	Min Temp %	0.5714	52.559	OK
X-X, +1.20D+1.60Lr	0.6936	-Z	Bottom	0.5184	Min Temp %	0.5714	52.559	OK
X-X, +0.90D	0.1811	+Z	Bottom	0.5184	Min Temp %	0.5714	52.559	OK
X-X, +0.90D	0.1811	-Z	Bottom	0.5184	Min Temp %	0.5714	52.559	OK
X-X, +0.7284D+E	0.2910	+Z	Bottom	0.5184	Min Temp %	0.5714	52.559	OK
X-X, +0.7284D+E	0.2128	-Z	Bottom	0.5184	Min Temp %	0.5714	52.559	OK
Z-Z, +1.40D	0.2817	-X	Bottom	0.5184	Min Temp %	0.5714	52.559	OK
Z-Z, +1.40D	0.2817	+X	Bottom	0.5184	Min Temp %	0.5714	52.559	OK
Z-Z, +1.20D+0.50Lr	0.3827	-X	Bottom	0.5184	Min Temp %	0.5714	52.559	OK
Z-Z, +1.20D+0.50Lr	0.3827	+X	Bottom	0.5184	Min Temp %	0.5714	52.559	OK
Z-Z, +1.20D	0.2414	-X	Bottom	0.5184	Min Temp %	0.5714	52.559	OK
Z-Z, +1.20D	0.2414	+X	Bottom	0.5184	Min Temp %	0.5714	52.559	OK
Z-Z, +1.20D+1.60Lr	0.6936	-X	Bottom	0.5184	Min Temp %	0.5714	52.559	OK
Z-Z, +1.20D+1.60Lr	0.6936	+X	Bottom	0.5184	Min Temp %	0.5714	52.559	OK
Z-Z, +0.90D	0.1811	-X	Bottom	0.5184	Min Temp %	0.5714	52.559	OK
Z-Z, +0.90D	0.1811	+X	Bottom	0.5184	Min Temp %	0.5714	52.559	OK
Z-Z, +0.7284D+E	0.2519	-X	Bottom	0.5184	Min Temp %	0.5714	52.559	OK
Z-Z, +0.7284D+E	0.2519	+X	Bottom	0.5184	Min Temp %	0.5714	52.559	OK

One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0.00 psi	0.00 psi	0.00 psi	0.00 psi	0.00 psi	82.16 psi	0.00	OK
+1.20D+0.50Lr	0.00 psi	0.00 psi	0.00 psi	0.00 psi	0.00 psi	82.16 psi	0.00	OK
+1.20D	0.00 psi	0.00 psi	0.00 psi	0.00 psi	0.00 psi	82.16 psi	0.00	OK
+1.20D+1.60Lr	0.00 psi	0.00 psi	0.00 psi	0.00 psi	0.00 psi	82.16 psi	0.00	OK
+0.90D	0.00 psi	0.00 psi	0.00 psi	0.00 psi	0.00 psi	82.16 psi	0.00	OK
+0.7284D+E	0.00 psi	0.00 psi	0.00 psi	0.00 psi	0.00 psi	82.16 psi	0.00	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	0.43 psi	164.32 psi	0.002597	OK
+1.20D+0.50Lr	0.58 psi	164.32 psi	0.00353	OK
+1.20D	0.37 psi	164.32 psi	0.002226	OK
+1.20D+1.60Lr	1.05 psi	164.32 psi	0.006397	OK
+0.90D	0.27 psi	164.32 psi	0.00167	OK
+0.7284D+E	0.38 psi	164.32 psi	0.002323	OK

General Footing

DESCRIPTION: C4

Code References

Calculations per ACI 318-11, IBC 2012, CBC 2013, ASCE 7-10
Load Combinations Used : IBC 2018

General Information

Material Properties

f'c : Concrete 28 day strength	=	3.0	ksi
fy : Rebar Yield	=	60.0	ksi
Ec : Concrete Elastic Modulus	=	3,122.0	ksi
Concrete Density	=	150.0	pcf
φ Values Flexure	=	0.90	
Shear	=	0.750	

Analysis Settings

Min Steel % Bending Reinf.	=		
Min Allow % Temp Reinf.	=	0.00180	
Min. Overturning Safety Factor	=	1.0	: 1
Min. Sliding Safety Factor	=	1.0	: 1
Add Ftg Wt for Soil Pressure	:	Yes	
Use ftg wt for stability, moments & shears	:	Yes	
Add Pedestal Wt for Soil Pressure	:	No	
Use Pedestal wt for stability, mom & shear	:	No	

Soil Design Values

Allowable Soil Bearing	=	1.50	ksf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	100.0	pcf
Soil/Concrete Friction Coeff.	=		

Increases based on footing Depth

Footing base depth below soil surface	=	4.0	ft
Allow press. increase per foot of depth	=		ksf
when footing base is below	=		ft

Increases based on footing plan dimension

Allowable pressure increase per foot of depth	=		ksf
when max. length or width is greater than	=		ft

Dimensions

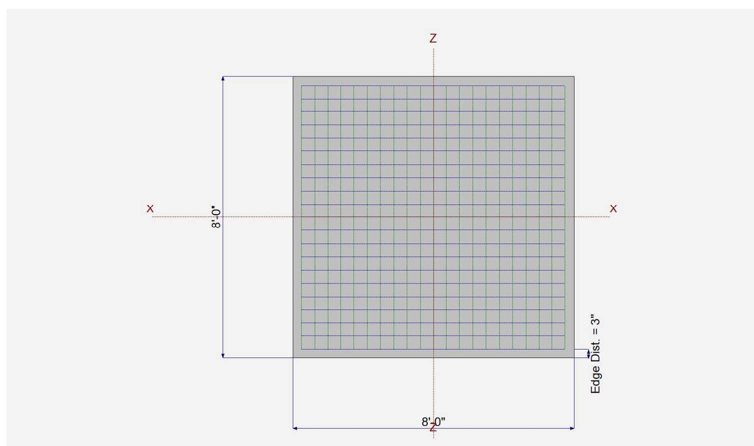
Width parallel to X-X Axis	=	8.0	ft
Length parallel to Z-Z Axis	=	8.0	ft
Footing Thickness	=	24.0	in

Pedestal dimensions...

px : parallel to X-X Axis	=	16.0	in
pz : parallel to Z-Z Axis	=	16.0	in
Height	=		in

Rebar Centerline to Edge of Concrete...

at Bottom of footing	=	3.0	in

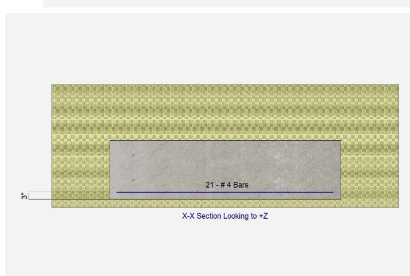


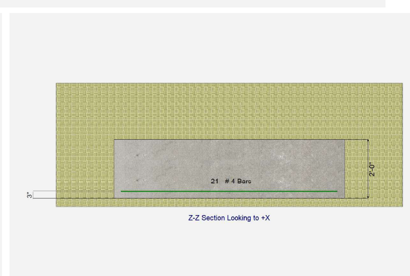
Reinforcing

Bars parallel to X-X Axis			
Number of Bars	=		21.0
Reinforcing Bar Size	=	#	4
Bars parallel to Z-Z Axis			
Number of Bars	=		21.0
Reinforcing Bar Size	=	#	4

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation	n/a
# Bars required within zone	n/a
# Bars required on each side of zone	n/a





Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	1.60	2.50				0.20		k
OB : Overburden	=								ksf
M-xx	=	0.40	0.60				54.40		k-ft
M-zz	=	0.050	0.060				55.10		k-ft
V-x	=						5.80		k
V-z	=						4.90		k

General Footing

DESCRIPTION: C4

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.6947	Soil Bearing	1.386 ksf	1.995 ksf	+0.730D+0.710E about Z-Z axis
PASS	1.117	Overturning - X-X	45.180 k-ft	50.480 k-ft	+0.60D+0.70E
PASS	1.080	Overturning - Z-Z	46.720 k-ft	50.480 k-ft	+0.60D+0.70E
PASS	1.182	Sliding - X-X	4.060 k	4.80 k	+D+0.70E
PASS	1.399	Sliding - Z-Z	3.430 k	4.80 k	+D+0.70E
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.02508	Z Flexure (+X)	1.214 k-ft/ft	48.397 k-ft/ft	+0.7284D+E
PASS	0.02508	Z Flexure (-X)	1.214 k-ft/ft	48.397 k-ft/ft	+0.7284D+E
PASS	0.02508	X Flexure (+Z)	1.214 k-ft/ft	48.397 k-ft/ft	+0.7284D+E
PASS	0.02508	X Flexure (-Z)	1.214 k-ft/ft	48.397 k-ft/ft	+0.7284D+E
PASS	0.01689	1-way Shear (+X)	1.387 psi	82.158 psi	+0.7284D+E
PASS	0.01689	1-way Shear (-X)	1.387 psi	82.158 psi	+0.7284D+E
PASS	0.01689	1-way Shear (+Z)	1.387 psi	82.158 psi	+0.7284D+E
PASS	0.01689	1-way Shear (-Z)	1.387 psi	82.158 psi	+0.7284D+E
PASS	0.02343	2-way Punching	3.850 psi	164.317 psi	+0.7284D+E

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc (in)	Zecc (in)	Actual Soil Bearing Stress @ Location: Bottom, -Z	Top, +Z	Left, -X	Right, +X	Actual / Allow Ratio
X-X, D Only	1.50	n/a	0.2308	0.3204	0.3296	n/a	n/a	0.220
X-X, +D+Lr	1.50	n/a	0.5150	0.3525	0.3757	n/a	n/a	0.251
X-X, +D+0.750Lr	1.50	n/a	0.4498	0.3444	0.3642	n/a	n/a	0.243
X-X, +0.60D	1.50	n/a	0.2308	0.1922	0.1978	n/a	n/a	0.132
X-X, +1.180D+Lr+0.710E	2.0	n/a	20.593	0.0	0.9862	n/a	n/a	0.493
X-X, +0.730D+0.710E	1.995	n/a	35.919	0.0	1.252	n/a	n/a	0.628
Z-Z, D Only	1.50	0.02885	n/a	n/a	n/a	0.3244	0.3256	0.217
Z-Z, +D+Lr	1.50	0.05665	n/a	n/a	n/a	0.3628	0.3653	0.244
Z-Z, +D+0.750Lr	1.50	0.05028	n/a	n/a	n/a	0.3532	0.3554	0.237
Z-Z, +0.60D	1.50	0.02885	n/a	n/a	n/a	0.1947	0.1953	0.130
Z-Z, +1.180D+Lr+0.710E	2.0	20.956	n/a	n/a	n/a	0.0	0.9993	0.500
Z-Z, +0.730D+0.710E	1.995	37.108	n/a	n/a	n/a	0.0	1.386	0.695

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
X-X, D Only	0.40 k-ft	83.20 k-ft	208.0	OK
X-X, +D+Lr	1.0 k-ft	93.20 k-ft	93.20	OK
X-X, +D+0.750Lr	0.850 k-ft	90.70 k-ft	106.706	OK
X-X, +D+0.70E	45.340 k-ft	83.760 k-ft	1.847	OK
X-X, +D+0.5250E	34.105 k-ft	83.620 k-ft	2.452	OK
X-X, +0.60D	0.240 k-ft	49.920 k-ft	208.0	OK
X-X, +0.60D+0.70E	45.180 k-ft	50.480 k-ft	1.117	OK
Z-Z, D Only	0.050 k-ft	83.20 k-ft	1,664.0	OK
Z-Z, +D+Lr	0.110 k-ft	93.20 k-ft	847.27	OK
Z-Z, +D+0.750Lr	0.0950 k-ft	90.70 k-ft	954.74	OK
Z-Z, +D+0.70E	46.740 k-ft	83.760 k-ft	1.792	OK
Z-Z, +D+0.5250E	35.068 k-ft	83.620 k-ft	2.385	OK
Z-Z, +0.60D	0.030 k-ft	49.920 k-ft	1,664.0	OK
Z-Z, +0.60D+0.70E	46.720 k-ft	50.480 k-ft	1.080	OK

All units k

Sliding Stability

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
X-X, D Only	0.0 k	4.80 k	No Sliding	OK
X-X, +D+Lr	0.0 k	4.80 k	No Sliding	OK
X-X, +D+0.750Lr	0.0 k	4.80 k	No Sliding	OK
X-X, +D+0.70E	4.060 k	4.80 k	1.182	OK
X-X, +D+0.5250E	3.045 k	4.80 k	1.576	OK

General Footing

DESCRIPTION: C4

Sliding Stability

All units k

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
X-X, +0.60D	0.0 k	4.80 k	No Sliding	OK
X-X, +0.60D+0.70E	4.060 k	4.80 k	1.182	OK
Z-Z, D Only	0.0 k	4.80 k	No Sliding	OK
Z-Z, +D+Lr	0.0 k	4.80 k	No Sliding	OK
Z-Z, +D+0.750Lr	0.0 k	4.80 k	No Sliding	OK
Z-Z, +D+0.70E	3.430 k	4.80 k	1.399	OK
Z-Z, +D+0.5250E	2.573 k	4.80 k	1.866	OK
Z-Z, +0.60D	0.0 k	4.80 k	No Sliding	OK
Z-Z, +0.60D+0.70E	3.430 k	4.80 k	1.399	OK

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	0.2208	+Z	Bottom	0.5184	Min Temp %	0.5250	48.397	OK
X-X, +1.40D	0.1681	-Z	Bottom	0.5184	Min Temp %	0.5250	48.397	OK
X-X, +1.20D+0.50Lr	0.3118	+Z	Bottom	0.5184	Min Temp %	0.5250	48.397	OK
X-X, +1.20D+0.50Lr	0.2385	-Z	Bottom	0.5184	Min Temp %	0.5250	48.397	OK
X-X, +1.20D	0.1892	+Z	Bottom	0.5184	Min Temp %	0.5250	48.397	OK
X-X, +1.20D	0.1441	-Z	Bottom	0.5184	Min Temp %	0.5250	48.397	OK
X-X, +1.20D+1.60Lr	0.5816	+Z	Bottom	0.5184	Min Temp %	0.5250	48.397	OK
X-X, +1.20D+1.60Lr	0.4462	-Z	Bottom	0.5184	Min Temp %	0.5250	48.397	OK
X-X, +0.90D	0.1419	+Z	Bottom	0.5184	Min Temp %	0.5250	48.397	OK
X-X, +0.90D	0.1081	-Z	Bottom	0.5184	Min Temp %	0.5250	48.397	OK
X-X, +0.7284D+E	1.214	+Z	Top	0.5184	Min Temp %	0.5250	48.397	OK
X-X, +0.7284D+E	1.214	-Z	Top	0.5184	Min Temp %	0.5250	48.397	OK
Z-Z, +1.40D	0.1911	-X	Bottom	0.5184	Min Temp %	0.5250	48.397	OK
Z-Z, +1.40D	0.1977	+X	Bottom	0.5184	Min Temp %	0.5250	48.397	OK
Z-Z, +1.20D+0.50Lr	0.2709	-X	Bottom	0.5184	Min Temp %	0.5250	48.397	OK
Z-Z, +1.20D+0.50Lr	0.2794	+X	Bottom	0.5184	Min Temp %	0.5250	48.397	OK
Z-Z, +1.20D	0.1638	-X	Bottom	0.5184	Min Temp %	0.5250	48.397	OK
Z-Z, +1.20D	0.1695	+X	Bottom	0.5184	Min Temp %	0.5250	48.397	OK
Z-Z, +1.20D+1.60Lr	0.5065	-X	Bottom	0.5184	Min Temp %	0.5250	48.397	OK
Z-Z, +1.20D+1.60Lr	0.5212	+X	Bottom	0.5184	Min Temp %	0.5250	48.397	OK
Z-Z, +0.90D	0.1229	-X	Bottom	0.5184	Min Temp %	0.5250	48.397	OK
Z-Z, +0.90D	0.1271	+X	Bottom	0.5184	Min Temp %	0.5250	48.397	OK
Z-Z, +0.7284D+E	1.214	-X	Top	0.5184	Min Temp %	0.5250	48.397	OK
Z-Z, +0.7284D+E	1.214	+X	Top	0.5184	Min Temp %	0.5250	48.397	OK

One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0.22 psi	0.23 psi	0.19 psi	0.26 psi	0.26 psi	82.16 psi	0.00	OK
+1.20D+0.50Lr	0.31 psi	0.32 psi	0.27 psi	0.36 psi	0.36 psi	82.16 psi	0.00	OK
+1.20D	0.19 psi	0.19 psi	0.16 psi	0.22 psi	0.22 psi	82.16 psi	0.00	OK
+1.20D+1.60Lr	0.58 psi	0.60 psi	0.50 psi	0.67 psi	0.67 psi	82.16 psi	0.01	OK
+0.90D	0.14 psi	0.15 psi	0.12 psi	0.16 psi	0.16 psi	82.16 psi	0.00	OK
+0.7284D+E	1.39 psi	1.39 psi	1.39 psi	1.39 psi	1.39 psi	82.16 psi	0.02	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	0.62 psi	164.32 psi	0.003753	OK
+1.20D+0.50Lr	0.87 psi	164.32 psi	0.005311	OK
+1.20D	0.53 psi	164.32 psi	0.003217	OK
+1.20D+1.60Lr	1.63 psi	164.32 psi	0.009918	OK
+0.90D	0.40 psi	164.32 psi	0.002413	OK
+0.7284D+E	3.85 psi	164.32 psi	0.02343	OK

GENERAL

1. ALL NEW CONSTRUCTION SHALL COMPLY WITH THE CONTRACT DOCUMENTS AND THE CURRENT EDITION OF THE LOCAL BUILDING CODE. THESE DRAWINGS ARE COPY RIGHTED INSTRUMENTS OF SERVICE FOR USE ONLY ON THIS PROJECT.

2. THESE GENERAL NOTES SUPERSEDE THE REQUIREMENTS OF THE PROJECT SPECIFICATIONS. IN CASE OF CONFLICT BETWEEN THE PLANS AND SPECIFICATIONS, CONTACT THE OWNER'S REPRESENTATIVE.

3. REFERENCE TO CODES, RULES, REGULATIONS, STANDARDS, MANUFACTURER'S INSTRUCTIONS OR REQUIREMENTS OF REGULATORY AGENCIES IS TO THE LATEST PRINTED EDITION OF EACH IN EFFECT AT THE DATE OF SUBMISSION OF BID UNLESS THE DOCUMENT DATE IS SHOWN.

4. TYPICAL DETAILS AND GENERAL NOTES APPLY TO ALL PARTS OF THE WORK EXCEPT WHERE SPECIFICALLY DETAILED OR UNLESS NOTED OTHERWISE (U.N.O.)

5. THE STRUCTURAL DRAWINGS ILLUSTRATE THE NEW STRUCTURAL MEMBERS. REFER TO ARCHITECTURAL, MECHANICAL AND ELECTRICAL DRAWINGS FOR NON-STRUCTURAL ITEMS WHICH REQUIRE SPECIAL PROVISIONS DURING THE CONSTRUCTION OF THE STRUCTURAL MEMBERS.

6. REFER TO ARCHITECTURAL DRAWINGS FOR FLOOR DEPRESSIONS, EDGE OF SLAB, OPENINGS, SLOPES, DRAINS, CURBS, PADS, EMBEDDED ITEMS, NON-BEARING PARTITIONS, ETC. REFER TO MECHANICAL AND ELECTRICAL DRAWINGS FOR SLEEVES, OPENINGS, AND HANGERS FOR PIPES, DUCTS AND EQUIPMENT.

7. THE CONTRACTOR SHALL VERIFY AND BE RESPONSIBLE FOR COORDINATING THE WORK OF ALL TRADES AND SHALL VERIFY ALL DIMENSIONS AND CONDITIONS WHICH IMPACT THE WORK. FIELD VERIFY SIZES, ELEVATIONS, HOLE LOCATIONS, ETC. PRIOR TO FABRICATION.

8. DRAWING DIMENSIONS ARE TO FACE OF FINISH, JOINT CENTERLINE OR COLUMN GRID CENTERLINE UNLESS NOTED OTHERWISE. DO NOT SCALE THE DRAWINGS.

9. CONTRACTOR SHALL CAREFULLY REVIEW THE DRAWINGS TO IDENTIFY THE SCOPE OF WORK REQUIRED. VISIT THE SITE TO RELATE THE SCOPE OF WORK TO EXISTING CONDITIONS AND DETERMINE THE EXTENT TO WHICH THOSE CONDITIONS AND PHYSICAL SURROUNDINGS WILL IMPACT THE WORK.

10. EXISTING CONDITIONS AS SHOWN ON THESE PLANS ARE FOR REFERENCE ONLY. CONTRACTOR IS REQUIRED TO FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO CONSTRUCTION. CONTRACTOR SHALL REPORT CONDITIONS THAT CONFLICT WITH THE CONTRACT DOCUMENTS TO THE OWNER'S REPRESENTATIVE. DO NOT DEVIATE FROM THE CONTRACT DOCUMENTS WITHOUT WRITTEN DIRECION FROM THE OWNER'S REPRESENTATIVE.

11. THE CONTRACTOR SHALL RESOLVE ANY CONFLICTS ON THE DRAWINGS OR IN THE SPECIFICATIONS WITH THE OWNER'S REPRESENTATIVE BEFORE PROCEEDING WITH THE WORK. NO CHANGE IN SIZE OR DIMENSION OF A STRUCTURAL MEMBER, NOR SHALL ANY OPENINGS BE MADE IN ANY STRUCTURAL MEMBER, WITHOUT THE WRITTEN APPROVAL OF THE ENGINEER.

12. ANY DEVIATION, MODIFICATION & SUBSTITUTION FROM THE APPROVED SET OF STRUCTURAL DRAWINGS SHALL BE SUBMITTED TO THE OWNER'S REPRESENTATIVE FOR REVIEW/APPROVAL PRIOR TO ITS USE OR INCLUSION ON THE SHOP DRAWINGS & PRIOR TO PROCEEDING WITH THE WORK.

13. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY SHORES, BRACES AND GUYS REQUIRED TO SUPPORT ALL LOADS TO WHICH THE BUILDING STRUCTURE AND COMPONENTS, SOILS, OTHER STRUCTURES AND UTILITIES MAY BE SUBJECTED DURING CONSTRUCTION. SHORING SYSTEMS SHALL BE DESIGNED AND STAMPED BY A LOCALLY LISCENSED CIVIL ENGINEER. VISITS TO THE SITE BY THE OWNER'S REPRESENTATIVE WILL NOT INCLUDE OBSERVATION OF THE ABOVE NOTED ITEMS.

14. THE CONTRACTOR SHALL PROVIDE MEANS, METHOD, TECHNIQUES, SEQUENCE AND PROCEDURE OF CONSTRUCTION AS REQUIRED. SITE VISITS PERFORMED BY THE OWNER'S REPRESENTATIVE DO NOT INCLUDE INSPECTIONS OF MEANS AND METHODS OF CONSTRUCTION PERFORMED BY CONTRACTOR.

15. THE CONTRACTOR SHALL PROTECT ALL WORK, MATERIALS AND EQUIPMENT FROM DAMAGE AND SHALL PROVIDE PROPER STORAGE FACILITIES FOR MATERIALS AND EQUIPMENT DURING CONSTRUCTION.

16. STRUCTURAL OBSERVATIONS PERFORMED BY ENGINEER DURING CONSTRUCTION ARE NOT THE CONTINUOUS AND SPECIAL INSPECTION SERVICES AND DO NOT WAIVE THE RESPONSIBILITY FOR THE INSPECTIONS REQUIRED OF THE BUILDING INSPECTOR OR THE DEPUTY INSPECTOR. OBSERVATIONS ALSO DO NOT GUARANTEE CONTRACTOR'S PERFORMANCE AND SHALL NOT BE CONSIDERED AS SUPERVISION OF CONSTRUCTION.

17. CONTRACTORS SHALL REVIEW SHOP DRAWINGS FOR COMPLETENESS AND COMPLIANCE WITH CONTRACT DOCUMENTS. CONTRACTOR SHALL STAMP SHOP DRAWINGS PRIOR TO SUBMISSION TO OWNER'S REPRESENTATIVE.

18. REVIEW OF THE SHOP DRAWINGS SHALL NOT BE CONSTRUED AS AN AUTHORIZATION TO DEVIATE FROM CONTRACT DOCUMENTS.

19. SHOP DRAWINGS WILL NOT BE PROCESSED DUE TO INCOMPLETENESS, LACK OF CO-ORDINATION WITH RELEVANT PORTION OF CONTRACT DOCUMENTS, LACK OF CALCULATIONS IF REQUIRED AND WHERE DEVIATIONS, MODIFICATIONS AND SUBSTITUTIONS ARE INDICATED WITHOUT PRIOR WRITTEN APPROVAL FROM OWNER'S REPRESENTATIVE.ALLOW FOURTEEN WORKING DAYS FOR PROCESSING SHOP DRAWINGS AFTER RECEIPT.

DESIGN BASIS

1. APPLICABLE CODE: INTERNATIONAL BUILDING CODE (IBC), 2019 EDITION.

2. VERTICAL LOADS
-ROOF LIVE LOAD - : 125PSF(2ND FLOOR), 50PSF(3RD FLOOR)
-ROOF LIVE LOAD:

3. LATERAL LOADS
DESIGN WIND CRITERIA: PER ASCE 7-16
BASIC WIND SPEED: 110 mph
WIND EXPOSURE: C

DESIGN SEISMIC CRITERIA:
SITE CLASS: D
S_{DS} *= 0.8580g*
S_{D1} *= 0.3943g*
IMPORTANCE FACTOR, I= 1
SEISMIC DESIGN CATEGORY= D
OCCUPANCY CATEGORY = II
RESPONSE MODIFICATION COEFF., R= 8 (SPECIAL REINFORCED CONCRETE MOMENT FRAMES)
*DESIGN SEISMIC COEFF., V= 0.1073*W (ASD)*

4. GEOTECHNICAL CRITERIA:
-DESIGN OF FOUNDATION IS BASED ON TABLE 1806.2 (IBC)
-ALLOWABLE SOIL BEARING PRESSURE:
DEAD + LIVE: 1500 psf
DEAD + LIVE + WIND OR SEISMIC: 2000 psf

CONCRETE

1. CONCRETE SHALL BE SUPPLIED AND PLACED IN ACCORDANCE WITH ACI 318.

2. CONCRETE SHALL BE AS FOLLOWS:

CONCRETE USE	STRENGTH AT 28 DAYS U.O.N.	W/C RATIO	AGGREGATE SIZE	WEIGHT	SHRINKAGE
SLAB ON GRADE	* 3000 psi	0.45 MAX.	3/4" (LS)	145pcf	.045%
FOUNDATIONS	* 3000 psi	0.50 MAX.	3/4"	145pcf	-

(LS) CRUSHED LOW SHRINKAGE ROCK
* SPECIAL INSPECTION FOR 3000 PSI CONCRETE IS NOT REQUIRED (2010 CRC R404.1.2.3 PAMC 16.04.180)

3. STRENGTH: COMPRESSIVE STRENGTH IN PSI WHEN TESTED IN ACCORDANCE WITH ASTM C39

4. PORTLAND CEMENT SHALL CONFORM TO ASTM C-150, TYPE II.

5. AGGREGATE FOR STONE CONCRETE SHALL CONFORM TO ASTM C-33. FOR LOW SHRINKAGE AGGREGATE; USE LIMESTONE OR GRANITE. AGGREGATE FOR LIGHTWEIGHT CONCRETE SHALL CONFORM TO ASTM C-330.

6. FLY ASH: ASTM C 618, CLASS F OR CLASS C. MINIMUM RECOMMENDED FLY ASH CONTENT BY MASS OF CEMENTITIOUS MATERIAL IS 20%. MAXIMUM RECOMMENDATION IS 25%.

7. ADMIXTURES: MIX SHALL CONTAIN POLYMER BASED, WATER REDUCING ADMIXTURE. THE FOLLOWING TYPES OF ADMIXTURES ARE ALLOWED AS PLASTICIZERS AND/ OR SET ACCELERATORS TO IMPROVE WORKABILITY.
- ASTM C494, TYPES A, C, E, G. HIGH RANGE WATER REDUCERS SHALL ALSO MEET REQUIREMENTS OF ASTM C 1017.
- THE INITIAL SLUMP OF THE CONCRETE BEFORE INTRODUCING ADMIXTURES SHOULD BE MINIMUM 2" INCHES

8. SHRINKAGE - CONTRACTOR TO PROVIDE CONCRETE MIX HISTORY DATA OR PROVIDE TESTING REPORT

9. MINIMUM REINF. COVER FOR CAST-IN-PLACE CONCRETE:
- CONC. CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH . . . . 3"
- CONC. FORMED BELOW GRADE OR EXPOSED TO WEATHER:
  NO. 6 AND GREATER . . . . 2"
  NO. 5 AND SMALLER . . . . 1 1/2"
- CONC. NOT EXPOSED TO WEATHER NOR IN CONTACT WITH GROUND:
  SLABS, WALLS, AND JOISTS: NO. 11 AND SMALLER . . . . 3/4"
  BEAMS AND COL: PRIMARY REINF., TIES, STIRRUPS, SPIRALS . . . . 1 1/2"

INTERIOR SLAB ON GRADE:
1. DO NOT ALLOW WATER TO COLLECT ON OR AROUND BUILDING PAD.
2. INITIAL CURING: INITIAL CURING SHALL IMMEDIATELY FOLLOW THE FINISHING OPERATION. CONCRETE SHALL BE KEPT CONTINUOUSLY MOIST AT LEAST OVERNIGHT.
3. FINAL CURING: IMMEDIATELY FOLLOWING THE INITIAL CURING AND BEFORE THE CONCRETE HAS DRIED. SLABS TO RECEIVE MOISTURE SENSITIVE FLOORING MATERIALS TO BE CONTINUOUSLY CURED FOR 7 DAYS BY WET COVERING OR MOISTURE RETAINING COVERING. LIQUID MEMBRANE CURING COMPOUNDS SHALL NOT BE PERMITTED.
4. INTERIOR SLABS SHALL RECEIVE A LIGHT BROOM FINISH U.O.N. TOLERANCE SHALL BE 1/8" IN 10'-0". EDGES SHALL BE SMOOTH TROWELED.
5. ALL CONC. TO BE REINFORCED UNLESS SPECIFICALLY MARKED "NOT REINFORCED"

VAPOR BARRIER:
1. 15 MIL ASTM E-1745 CLASS A, TYP. U.O.N. IN DET. 8/S5.1

PLACEMENT
1. ALL REINFORCING BARS, ANCHOR BOLTS, AND ALL OTHER CONC. INSERTS SHALL BE WELL SECURED IN POSITION PRIOR TO PLACING CONCRETE.
2. CHAMFER ALL CORNERS OF CONCRETE TO PREVENT DAMAGE.
3. CONSTRUCTION TOLERANCE SHALL COMPLY TO ACI 117.
4. CONCRETE SHALL BE PLACED IN A CONTINUOUS OPERATION BETWEEN PREDETERMINED CONSTRUCTION JOINTS.
5. USE VIBRATORS TO CONSOLIDATE CONCRETE. DO NOT USE VIBRATORS PLACEMENT IN ANY APPROVED MANNER. FOOTINGS ARE EXEMPTED FROM THIS REQUIREMENT.
6. PATCHING OF CONCRETE: ALL INSERT HOLES AND OTHER IMPERFECTIONS ON THE SURFACES OF THE CONCRETE SHALL BE FILLED WITH GROUT, BRUSHED AND SACKED TO A UNIFORM FINISH.
7. BARS SHALL BE FIRMLY SUPPORTED AND ACCURATELY PLACED AS REQUIRED BY THE A.C.I. STANDARDS, USING TIE AND SUPPORT BARS IN ADDITION TO REINFORCEMENT SHOWN WHERE NECESSARY FOR FIRM AND ACCURATE PLACING. ALL DOWELS SHALL BE ACCURATELY SET IN PLACE BEFORE PLACING CONCRETE.
8., #5 AND LARGER REINFORCING BARS SHALL NOT BE SPLICED EXCEPT AS LOCATED AND DETAILED ON THE DRAWINGS. #4 AND SMALLER BARS WITH LENGTH NOT SHOWN SHALL BE CONTINUOUS, LAPPING 1'-6" MINIMUM IN CONCRETE (SEE TYPICAL DETAILS). HORIZONTAL WALL SPLICES SHALL BE STAGGERED. VERTICAL BARS SHALL NOT BE SPLICED EXCEPT AT HORIZONTAL SUPPORT, SUCH AS FLOOR OR ROOF, UNLESS DETAILED OTHERWISE. ALL BARS ENDING AT THE FACE OF A WALL, COLUMN, OR BEAM SHALL EXTEND TO WITHIN 2" OF THE FAR FACE AND HAVE A 90 DEGREE HOOK UNLESS OTHERWISE SHOWN.
9. DRAWINGS SHOW TYPICAL REINFORCING CONDITIONS. CONTRACTOR SHALL PREPARE DETAILED PLACEMENT DRAWINGS OF ALL CONDITIONS SHOWING QUANTITY, SPACING, SIZE, CLEARANCES, LAPS, INTERSECTIONS AND COVERAGE REQUIRED BY STRUCTURAL DETAILS, APPLICABLE CODE AND TRADE STANDARDS. CONTRACTOR SHALL NOTIFY REINFORCING INSPECTOR OF ANY ADJUSTMENTS FROM TYPICAL CONDITIONS THAT ARE PROPOSED IN PLACEMENT DRAWINGS TO FACILITATE FIELD PLACEMENT OF REINFORCING STEEL AND CONCRETE.
10. NO WELDING OF REINFORCEMENT (INCLUDING TACK WELDING) SHALL BE DONE UNLESS SHOWN ON THE DRAWINGS. WHERE SHOWN ON THE DRAWINGS, WELDING OF REINFORCING STEEL SHALL BE PERFORMED BY WELDERS SPECIFICALLY CERTIFIED FOR REINFORCING STEEL. USE E90XX ELECTRODES.

FOUNDATIONS

1. REMOVE LOOSE SOIL AND STANDING WATER FROM FOUNDATION EXCAVATIONS PRIOR TO PLACING CONCRETE.

2. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR EXCAVATION PROCEDURES INCLUDING LAGGING, SHORING, UNDERPINNING AND PROTECTION OF EXISTING CONSTRUCTION.

3. PLACE BACKFILL BEHIND RETAINING WALLS AFTER CONCRETE HAS ATTAINED FULL DESIGN STRENGTH. BRACE BUILDING AND PIT WALLS BELOW GRADE FROM LATERAL LOADS UNTIL ATTACHED FLOORS AND SLABS ON GRADE ARE COMPLETE AND HAVE ATTAINED FULL DESIGN STRENGTH.

FORMWORK

1. BEFORE STARTING CONSTRUCTION, THE CONTRACTOR SHALL DEVELOP A PROCEDURE AND SCHEDULE FOR REMOVAL OF CONCRETE FORMS AND SHORES. CONCRETE FORMS AND SHORES SHALL BE REMOVED IN SUCH A MANNER AS TO NOT IMPAIR THE SAFETY AND SERVICEABILITY OF THE STRUCTURE. IN ADDITION TO THE ABOVE REQUIREMENTS, REMOVAL OF FORMS SHALL BE NO SOONER THAN THE FOLLOWING

2. PROVIDE CURING WHERE FORMS ARE REMOVED IN LESS THAN 7 DAYS, INCLUDING BUT NOT LIMITED TO WALLS, COLUMNS, AND UNDERSIDE OF ELEVATED SLABS.

WOOD

1. FRAMING LUMBER - EASTERN WHITE PINE;
- JOISTS AND RAFTERS: NO. 3 U.N.O.
- POSTS AND BEAMS: NO. 3 U.N.O.
- TRUSS MEMBERS AND BRACING: NO. 3 U.N.O.
- ALL LUMBER IN CONTACT WITH CONCRETE OR MASONRY TO BE PRESERVATIVE TREATED.
- ALL LUMBER SHALL HAVE A MAXIMUM MOISTURE CONTENT OF 19% PRIOR TO FINAL FRAMING INSPECTION.

2. FRAMING HARDWARE: AS MANUFACTURED BY SIMPSON CO. OR APPROVED EQUAL.SIMPSON DESIGNATIONS USED.

3. NAILS: COMMON WIRE GAGE U.O.N. NAILING TO CONFORM TO CBC TABLE 2304.9.1 U.O.N.

4. BOLTS: ASTM A307. PROVIDE WASHER UNDER HEADS AND NUTS.

5. PROVIDE LATERAL SUPPORT FOR BEAMS, JOISTS AND RAFTERS AT ENDS AND POINTS OF BEARING.

6. LAG SCREWS PER ANSI/ ASME STANDARD B18.2.1 PROVIDE LEAD HOLE SAME DIAMETER AND DEPTH AS SHANK AND THEN DRILL HOLE 60% - 70% OF SHANK DIAMETER FOR THREADED PORTIONS.

7. PRESSURE TREATED LUMBER:
- PRESSURE TREATED D.F. SHALL BE AWPB STAMPED. AMMONIACAL COPPERQUAT (ACQ), COPPER BORON AZOLE (CBA), OR BORATE TREATED AWPASTANDARD C2, MINIMUM 0.40 INCH. PENETRATION INCISED.
- ALL PRESERVATIVE TREATED LUMBER SHALL BE FIELD-APPLIED WITH PRESERVATIVE WHERE CUT AND DRILLED ON SITE WITH COPPER NAPHATHENATE (2% COPPER AS METAL).
- USE HOT DIPPED GALVANIZED HARDWARE, IE. BOLTS, NAIL, ETC. FOR ALL ATTACHMENT TO ACQ OR CBA TREATED MEMBERS.

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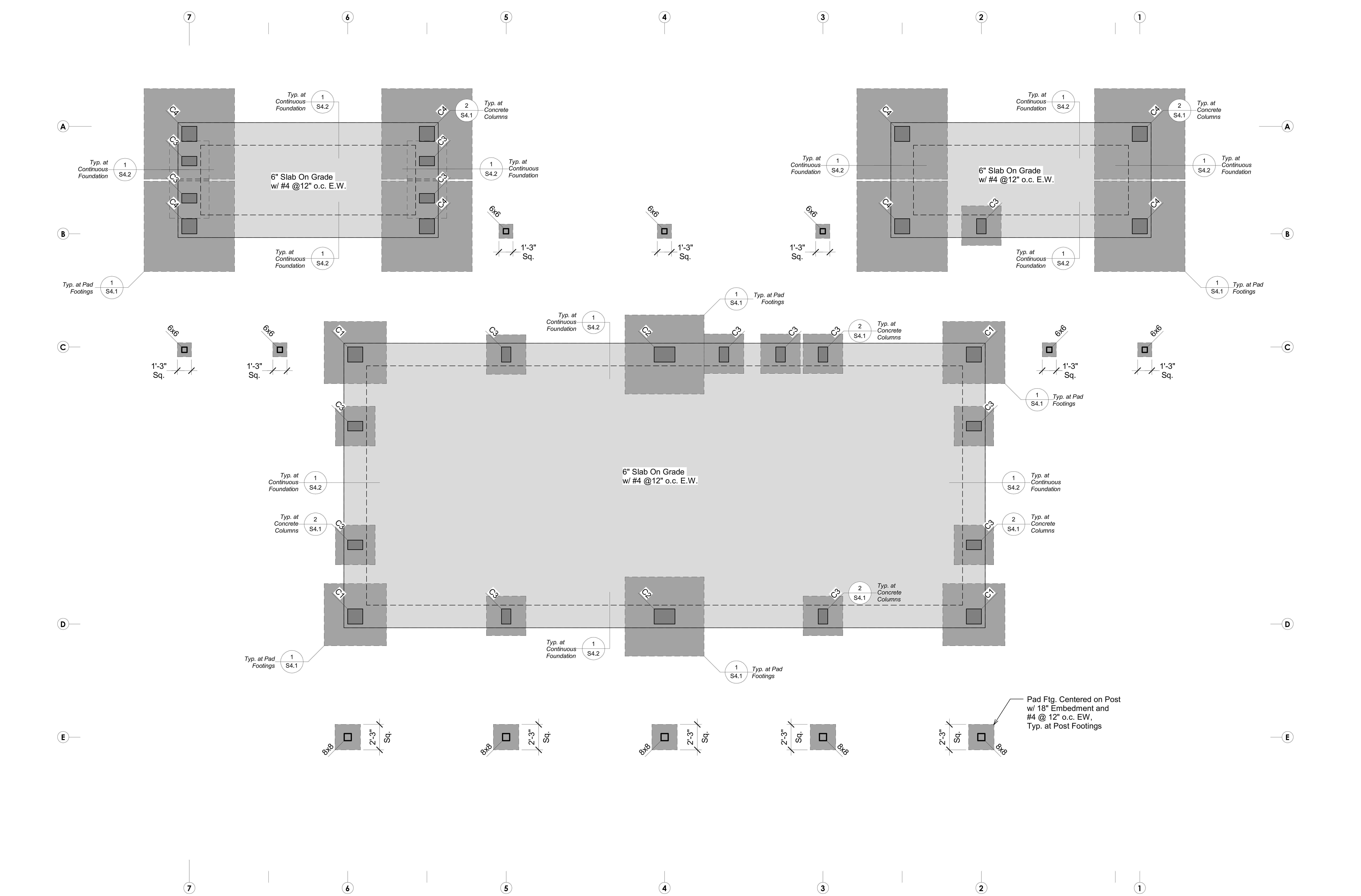
Client
EMPOWERING VILLAGES
Kigali, Rwanda
CEO: DANIEL KLINCK
Project Director: CARLY ALTHOFF

KILIMBI COMMUNITY CENTER
Kilimbi, Rwanda
Structural Specifications

Project Engineer: S. Reeves
Date: 08/09/2020
Scale: As Indicated
Sheet: **S1.1**



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EMPOWERING VILLAGES
Kigali, Rwanda

CEO: DANIEL KLINCK
Project Director: CARLY ALTHOFF

KILIMBI COMMUNITY CENTER

Kilimbi, Rwanda

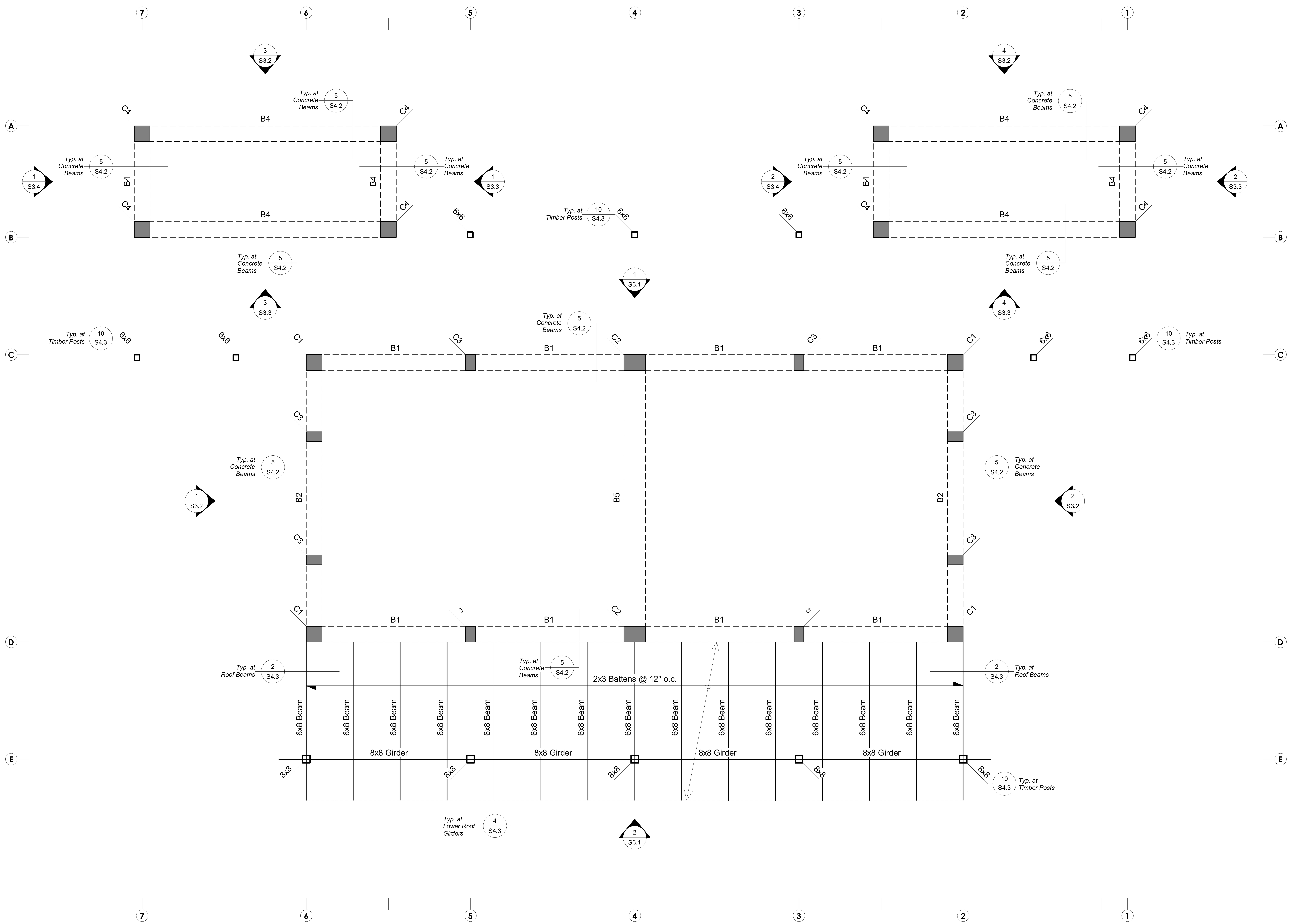
Foundation Plan

Project Engineer
S. Reeves

Date
08/09/2020

Scale
As Indicated

Sheet
S2.1



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Kigali, Rwanda

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Project Director: CARLY ALTHOFF

KILIMBI COMMUNITY CENTER

Kilimbi, Rwanda

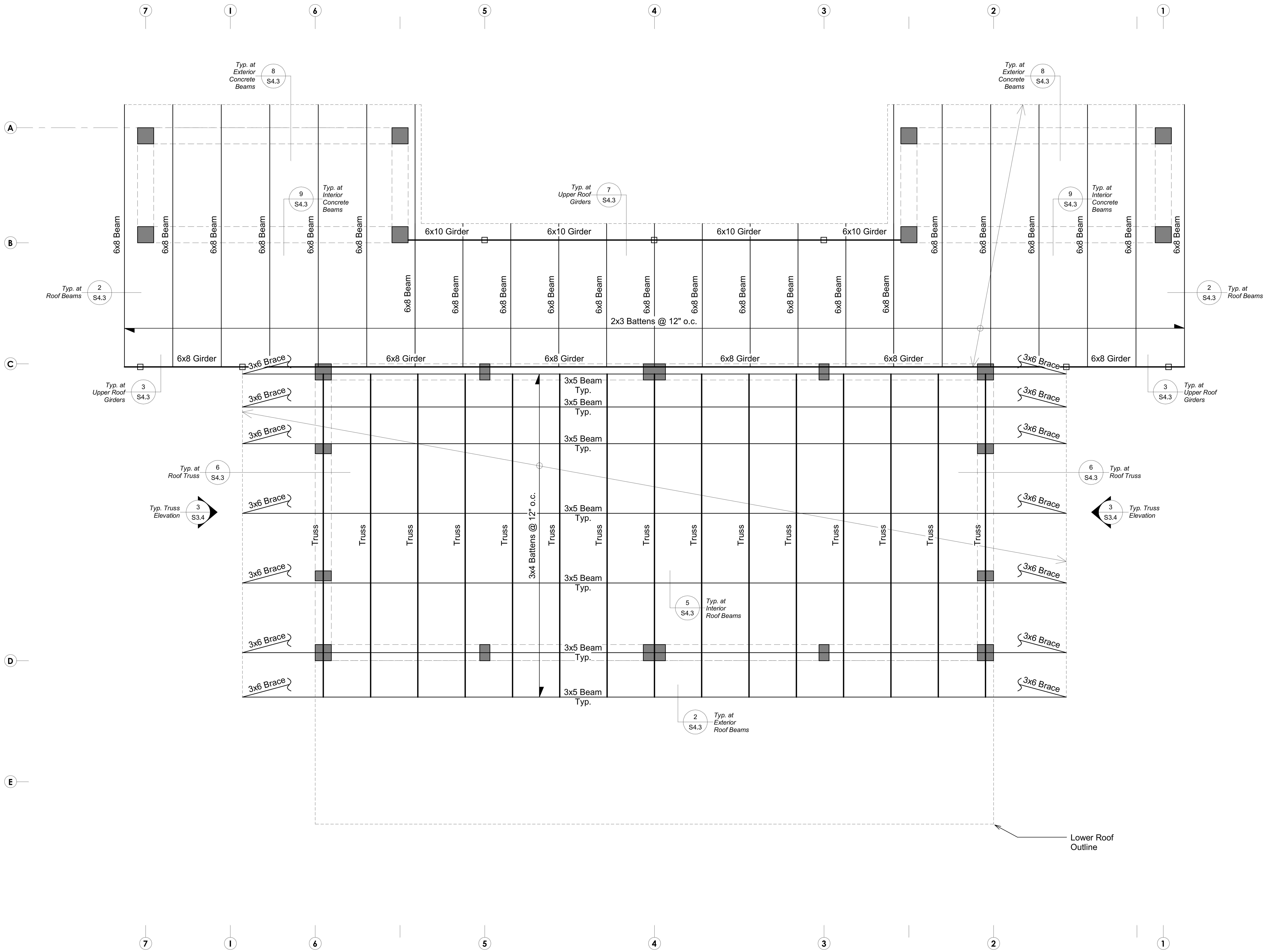
Lower Roof Framing Plan

Project Engineer: S. Reeves

Date: 08/09/2020

Scale: 1/4" = 1'-0"

Sheet: **S2.2**



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Client

EMPOWERING VILLAGES
Kigali, Rwanda

CEO: DANIEL KLINCK
Project Director: CARLY ALTHOFF

KILIMBI COMMUNITY CENTER

Kilimbi, Rwanda

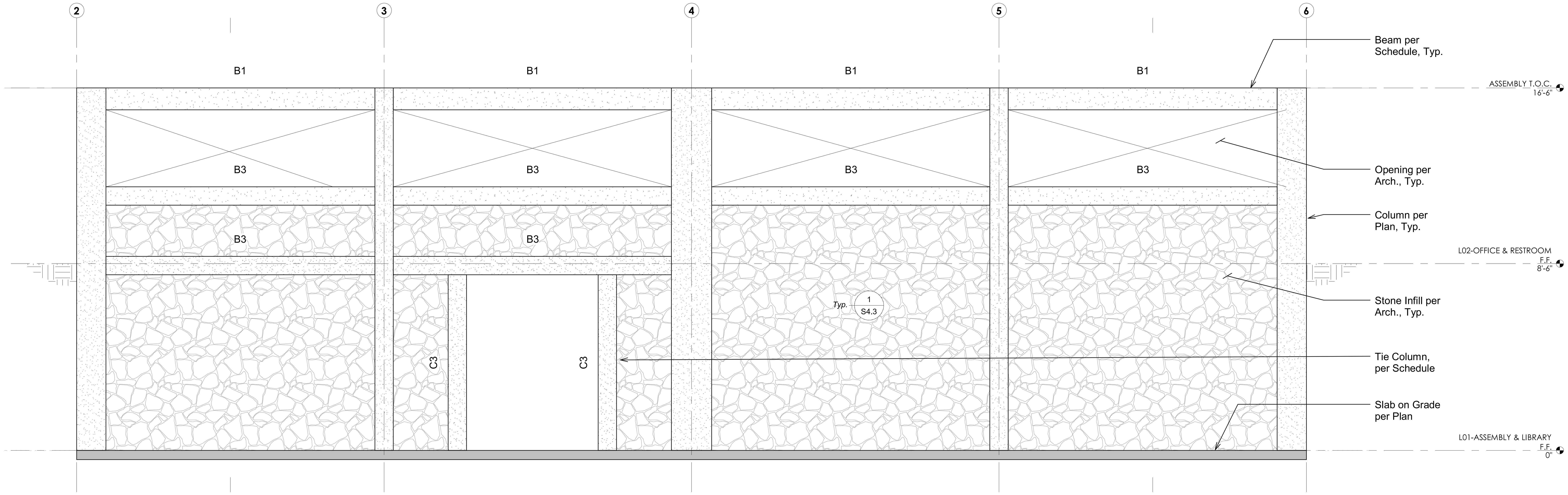
Upper Roof Framing Plan

Project Engineer
S. Reeves

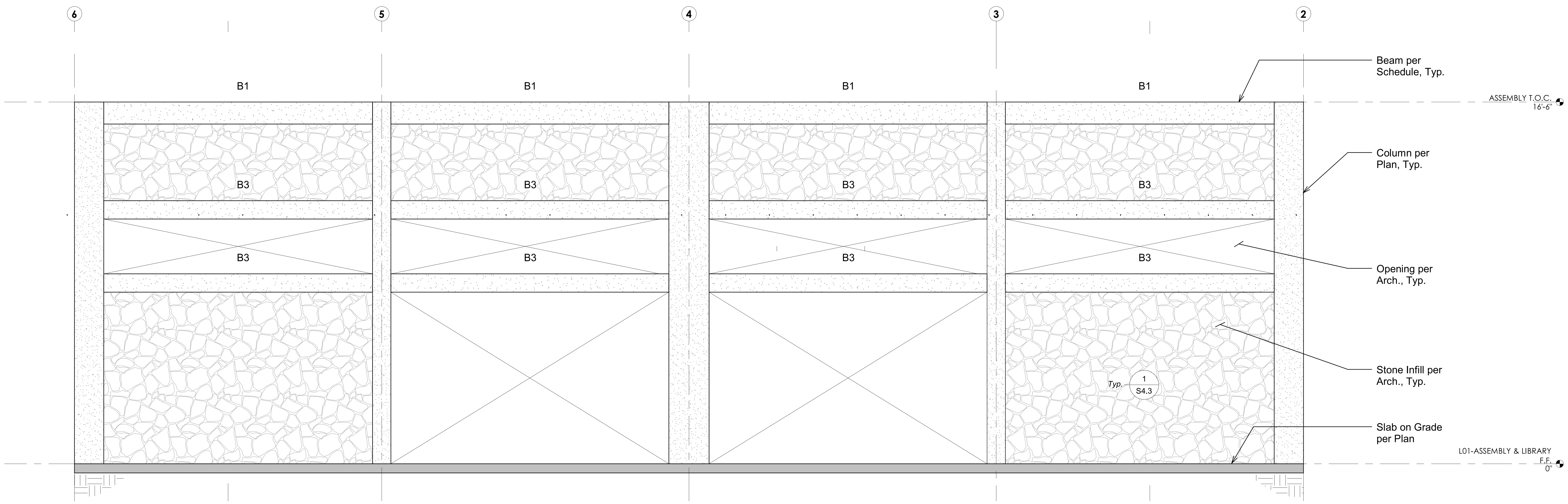
Date
08/09/2020

Scale
1/4" = 1'-0"

Sheet
S2.3



1 **North Framing Elevation - Main Building**
3/8" = 1'-0"



2 **South Framing Elevation - Main Building**
3/8" = 1'-0"

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KILIMBI COMMUNITY CENTER
Kilimbi, Rwanda
Structural Elevations

Project Engineer: S. Reeves
Date: 08/09/2020
Scale: 3/8" = 1'-0"
Sheet: **S3.1**

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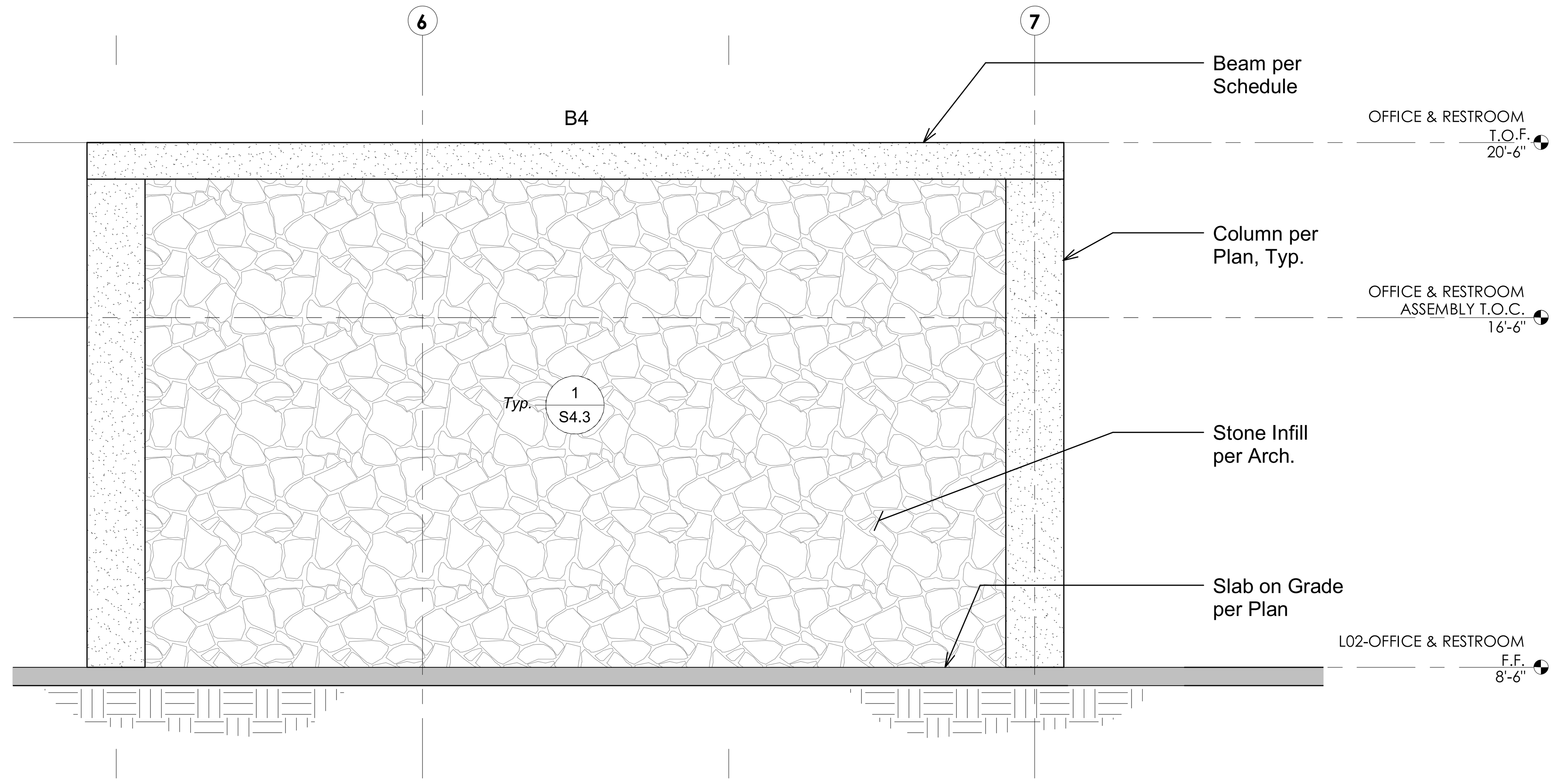

3 **North Framing Elevation - Office**
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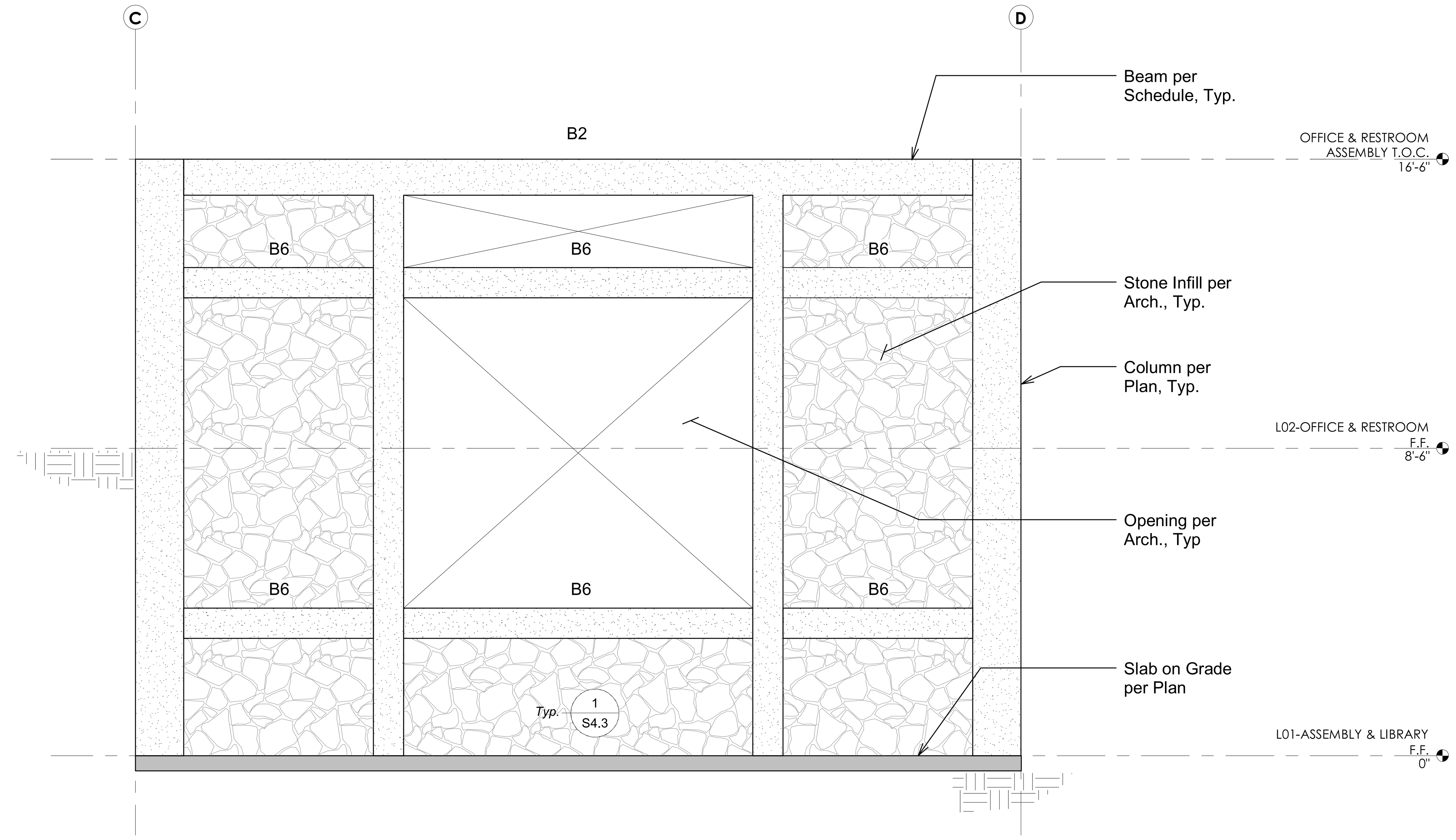

1 **West Framing Elevation - Main Building**
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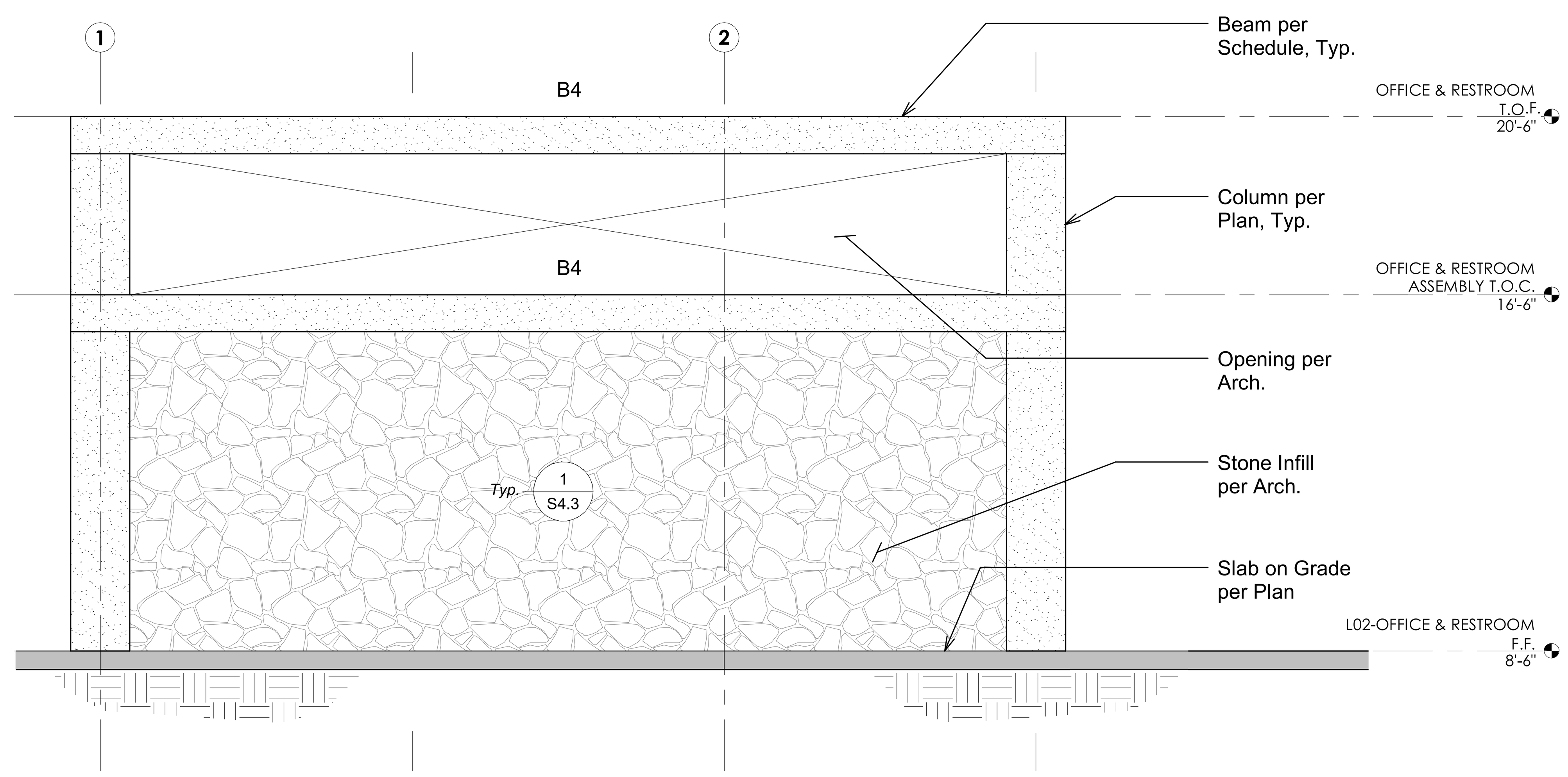
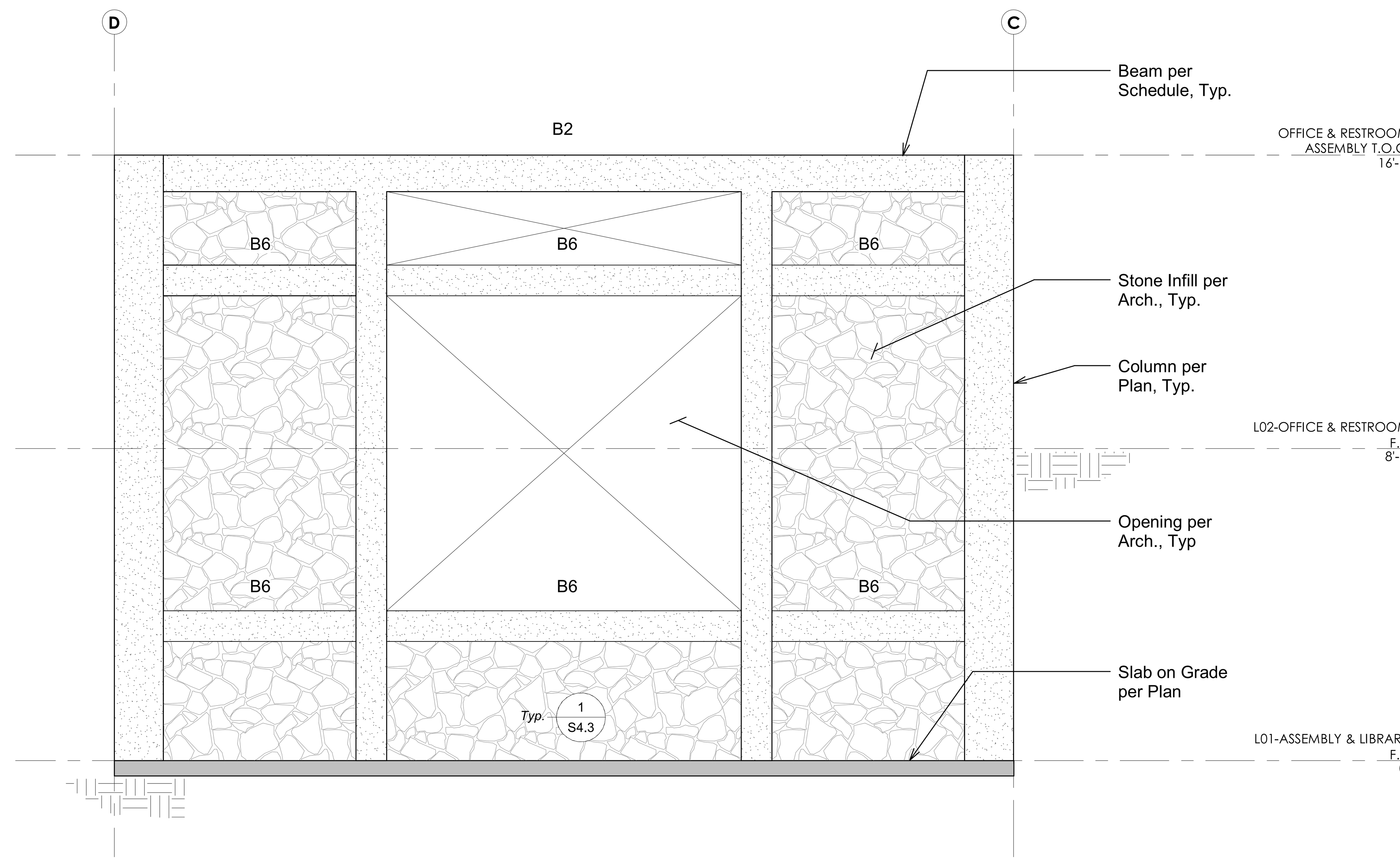


4 **North Framing Elevation - Restroom**
3/8" = 1'-0"



2 **East Framing Elevation - Main Builidng**
3/8" = 1'-0"

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Kilimbi, Rwanda
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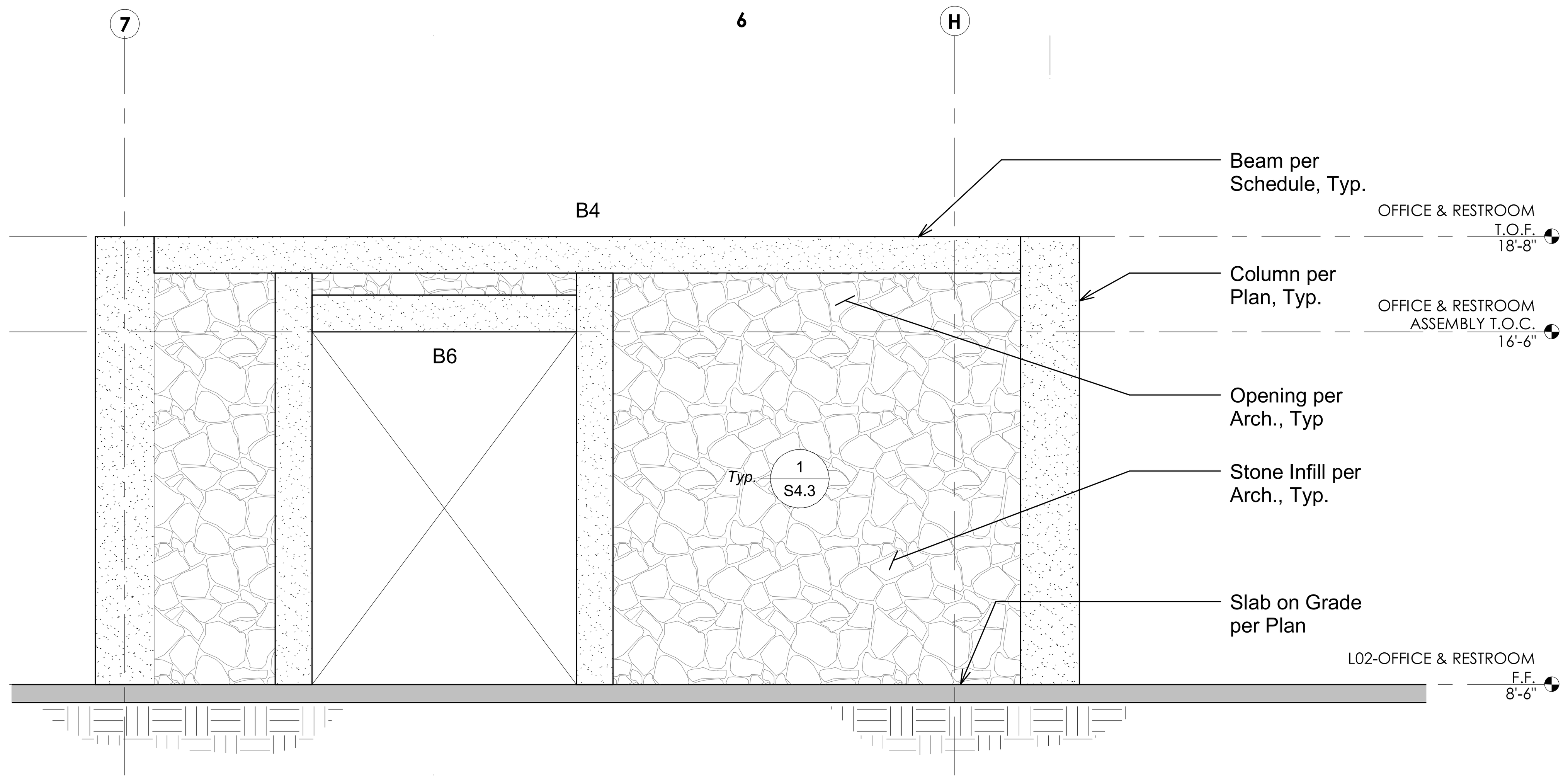
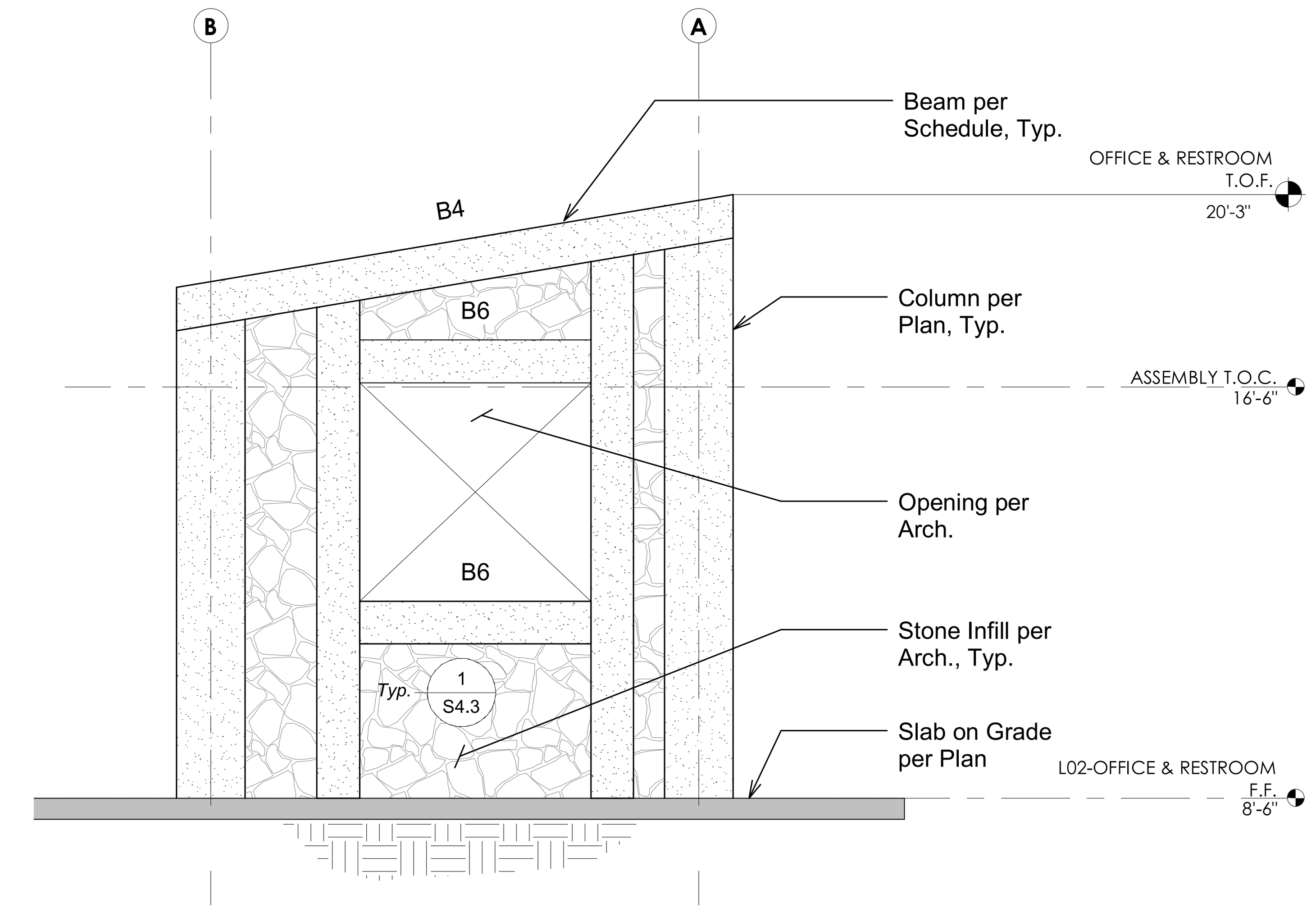
Project Engineer: S. Reeves
Date: 08/09/2020
Scale: As Indicated
Sheet: **S3.2**



3 **South Framing Elevation - Office**
3/8" = 1'-0"



1 **East Framing Elevation - Office**
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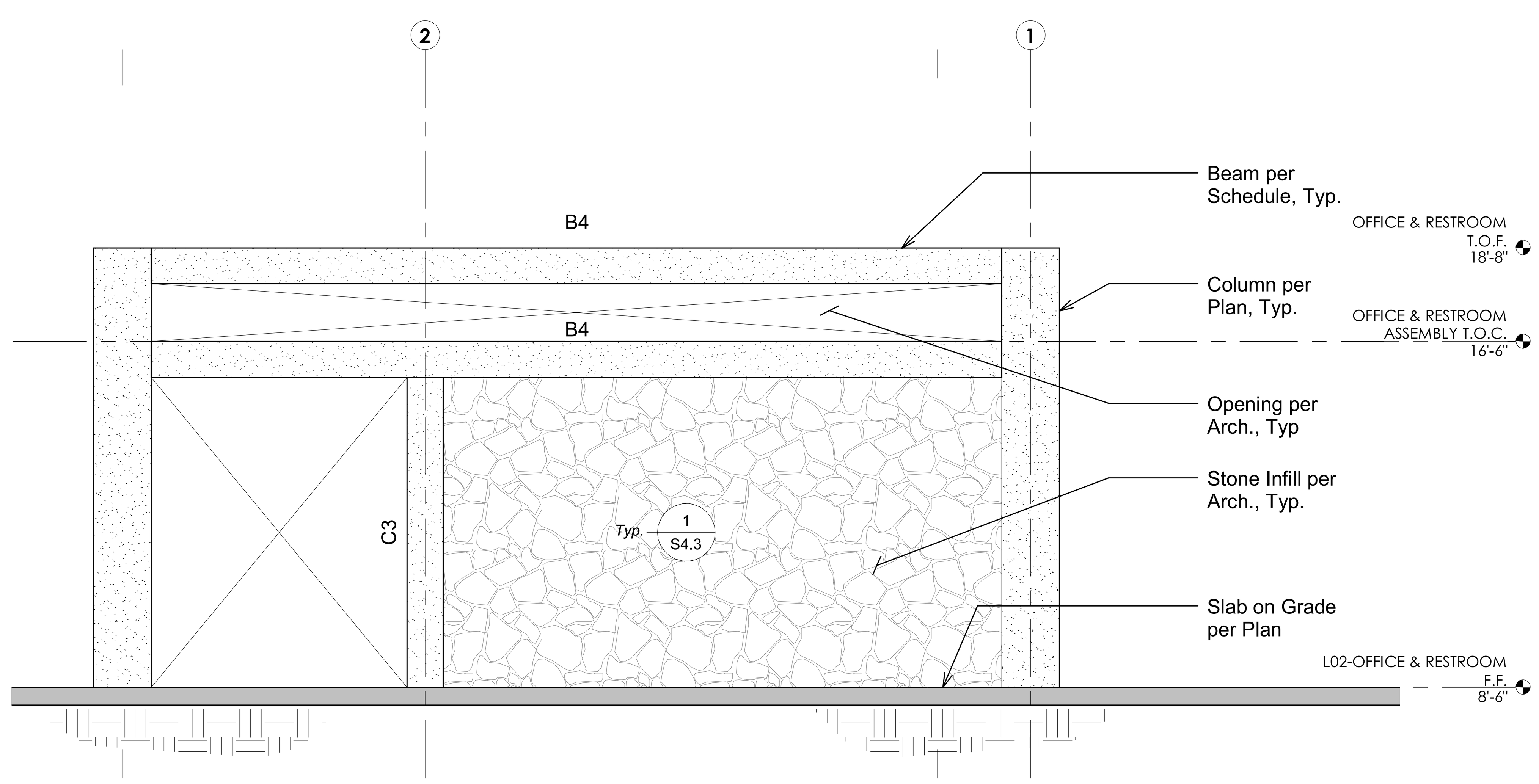
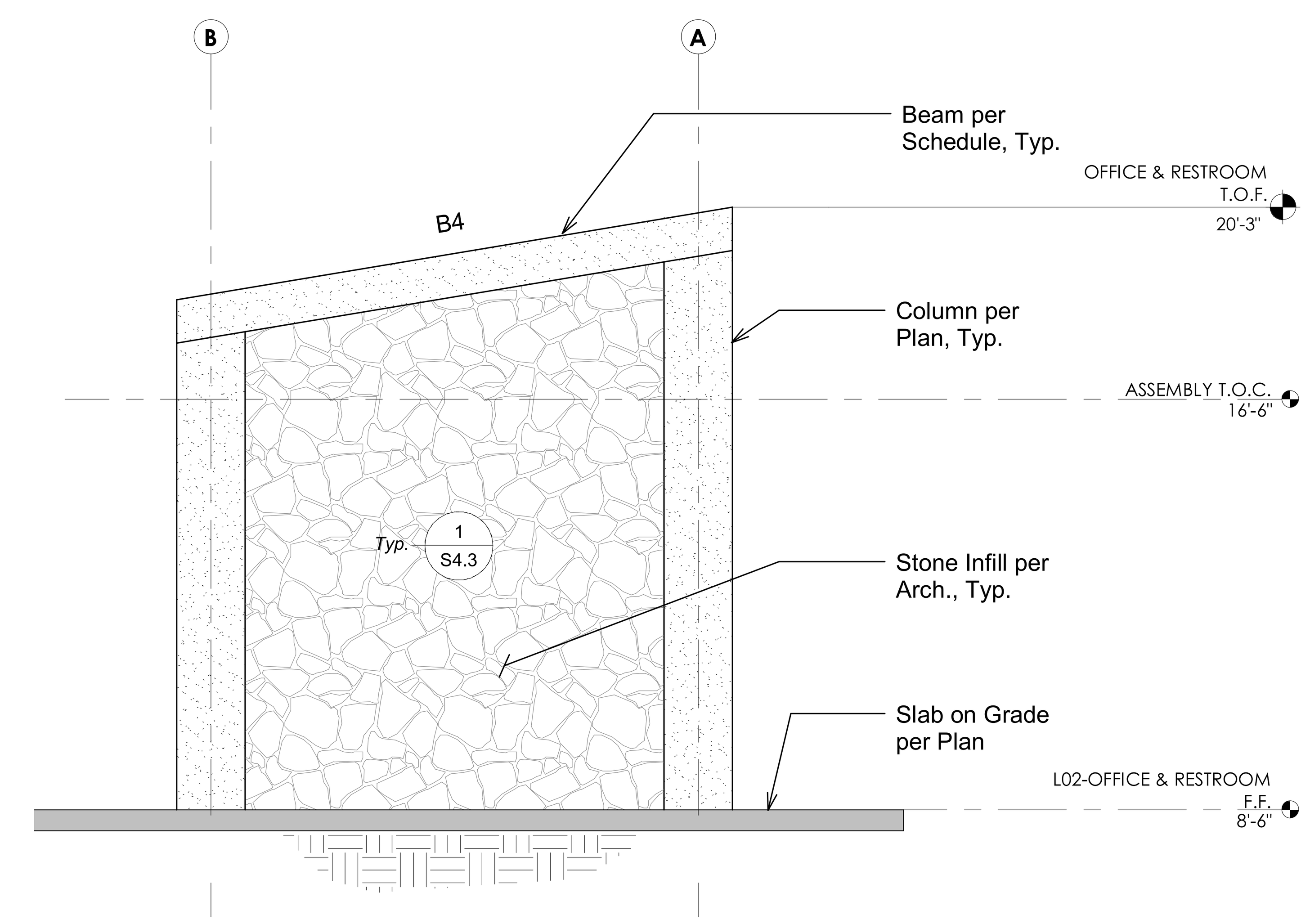


4 **South Framing Elevation - Restroom**
3/8" = 1'-0"



2 **East Framing Elevation - Restroom**
3/8" = 1'-0"

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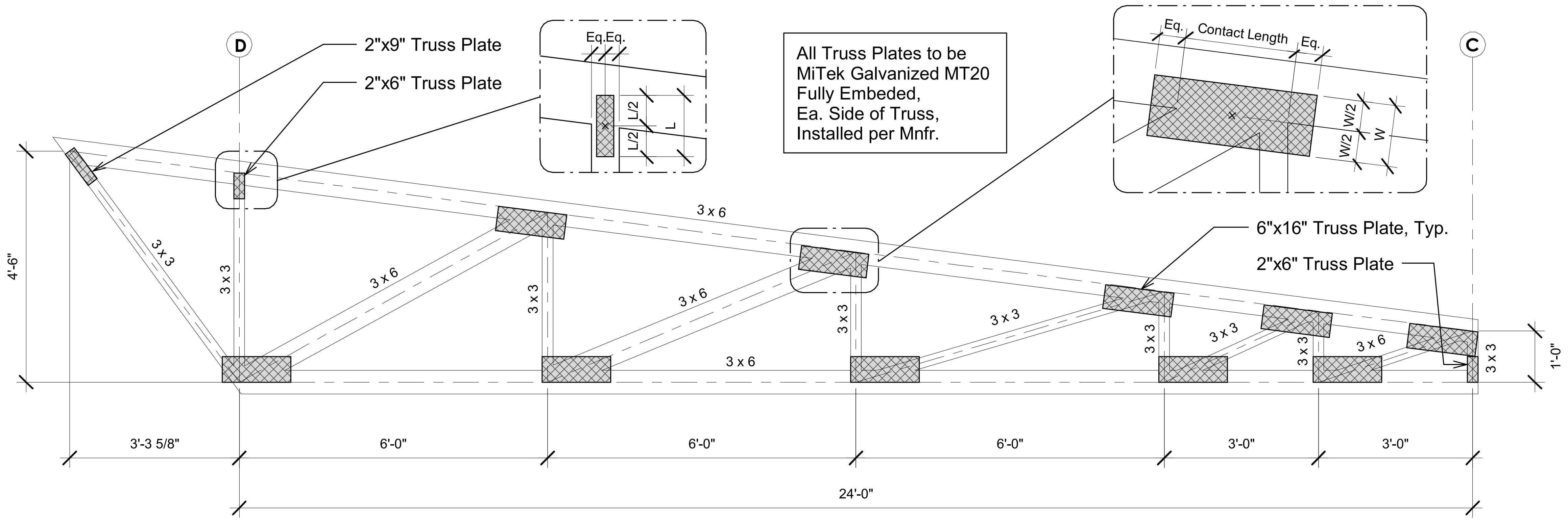
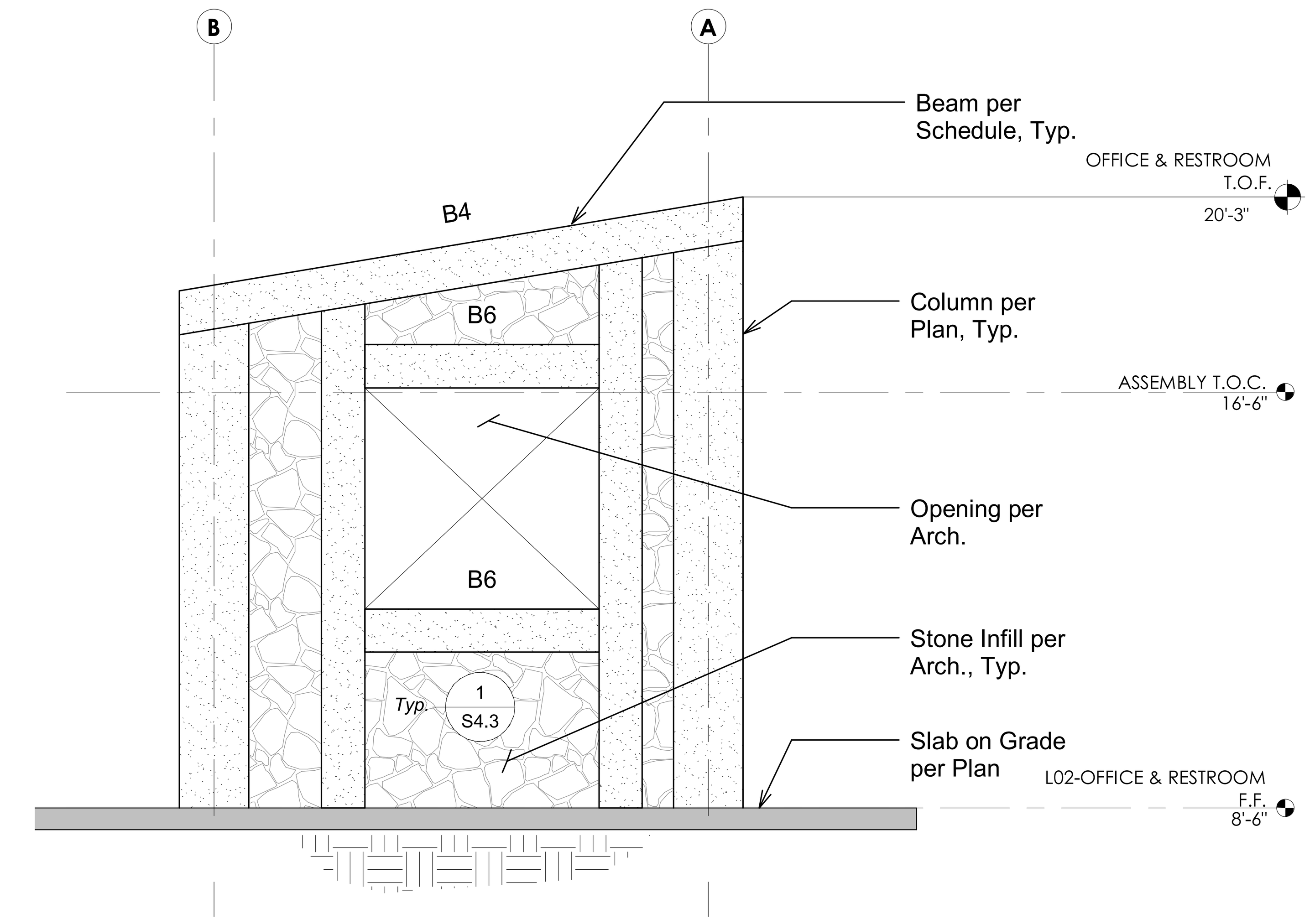
Kilimbi, Rwanda
Structural Elevations

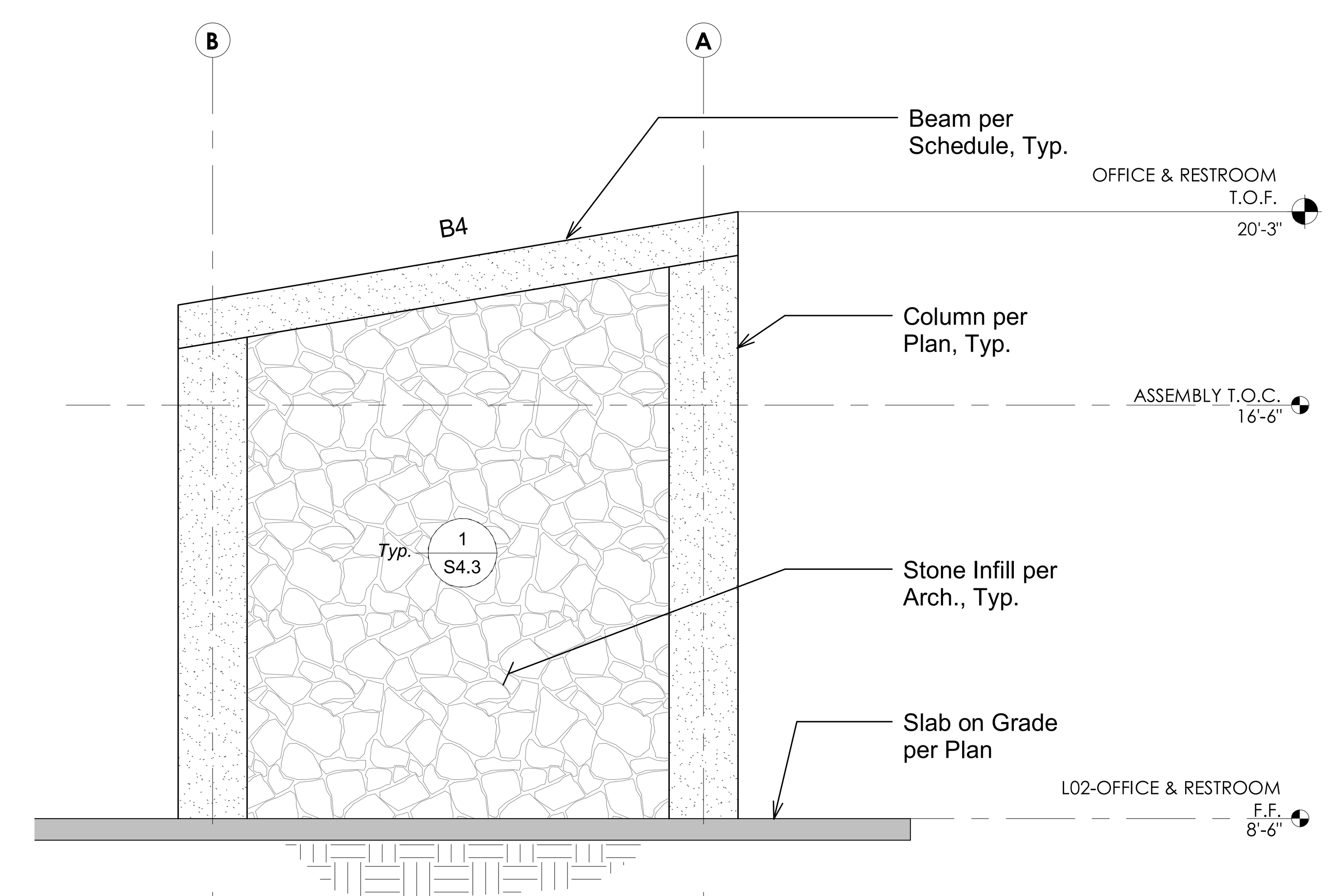
Project Engineer: S. Reeves
Date: 08/09/2020
Scale: 3/8" = 1'-0"
Sheet: **S3.3**



3 **A Typ. Truss Elevation**
1/2" = 1'-0"



1 **West Framing Elevation - Office**
3/8" = 1'-0"



2 **West Framing Elevation - Restroom**
3/8" = 1'-0"

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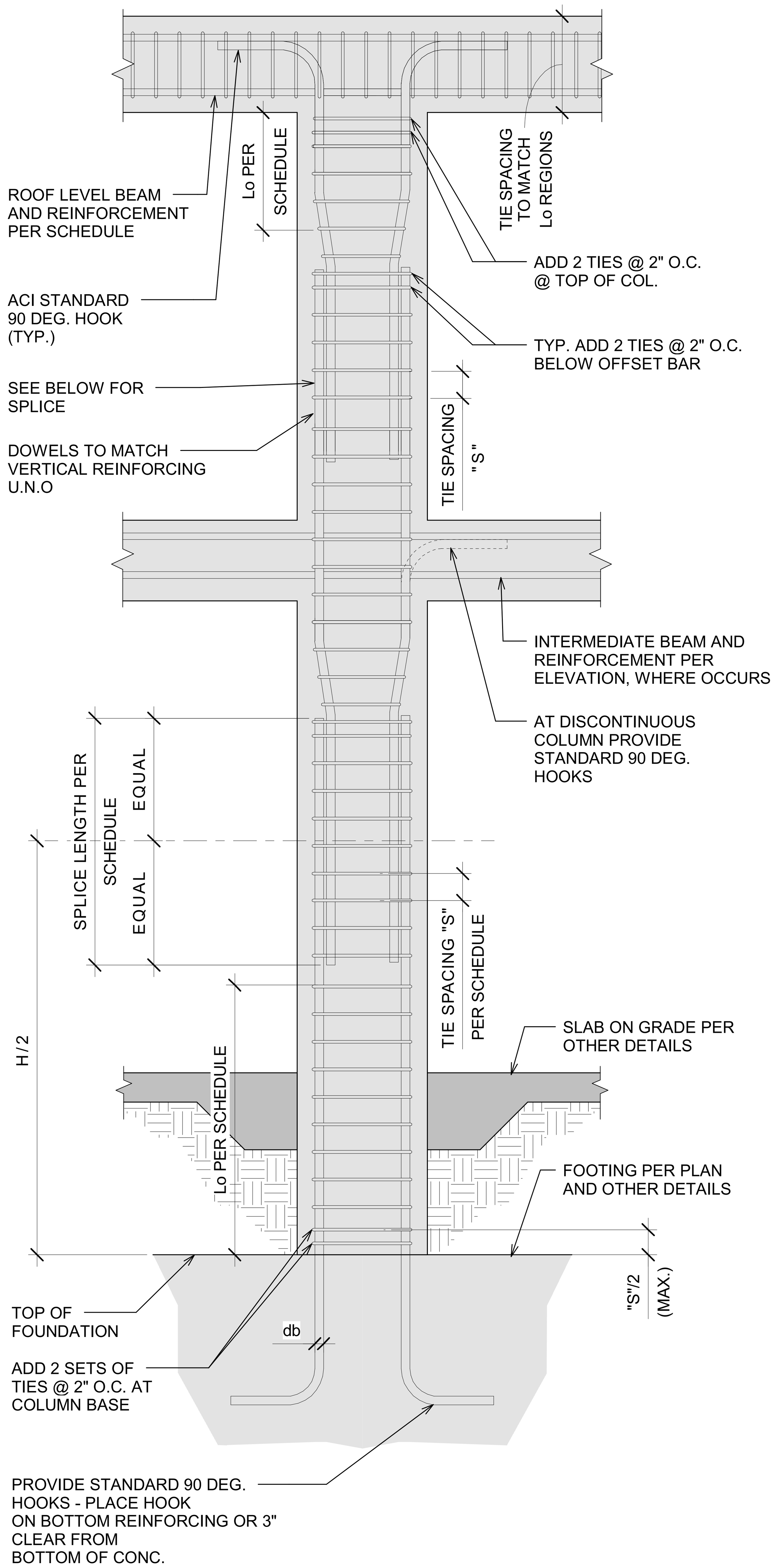
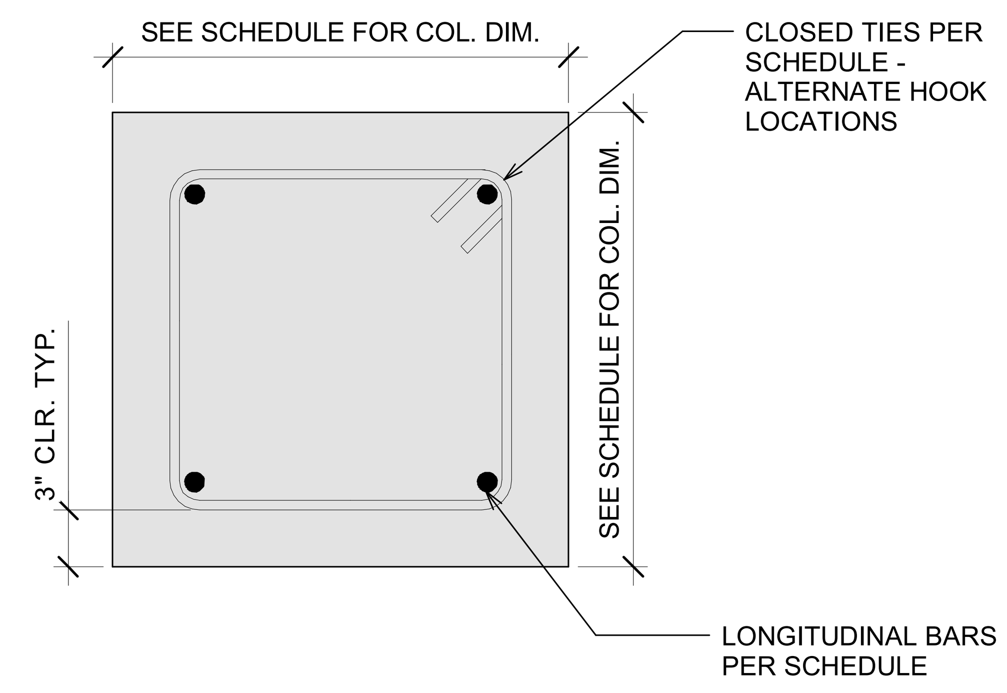
Kilimbi, Rwanda
Structural Elevations

Project Engineer: S. Reeves
Date: 08/09/2020
Scale: As Indicated
Sheet: **S3.4**



2 Concrete Column Elevation
3/4" = 1'-0"

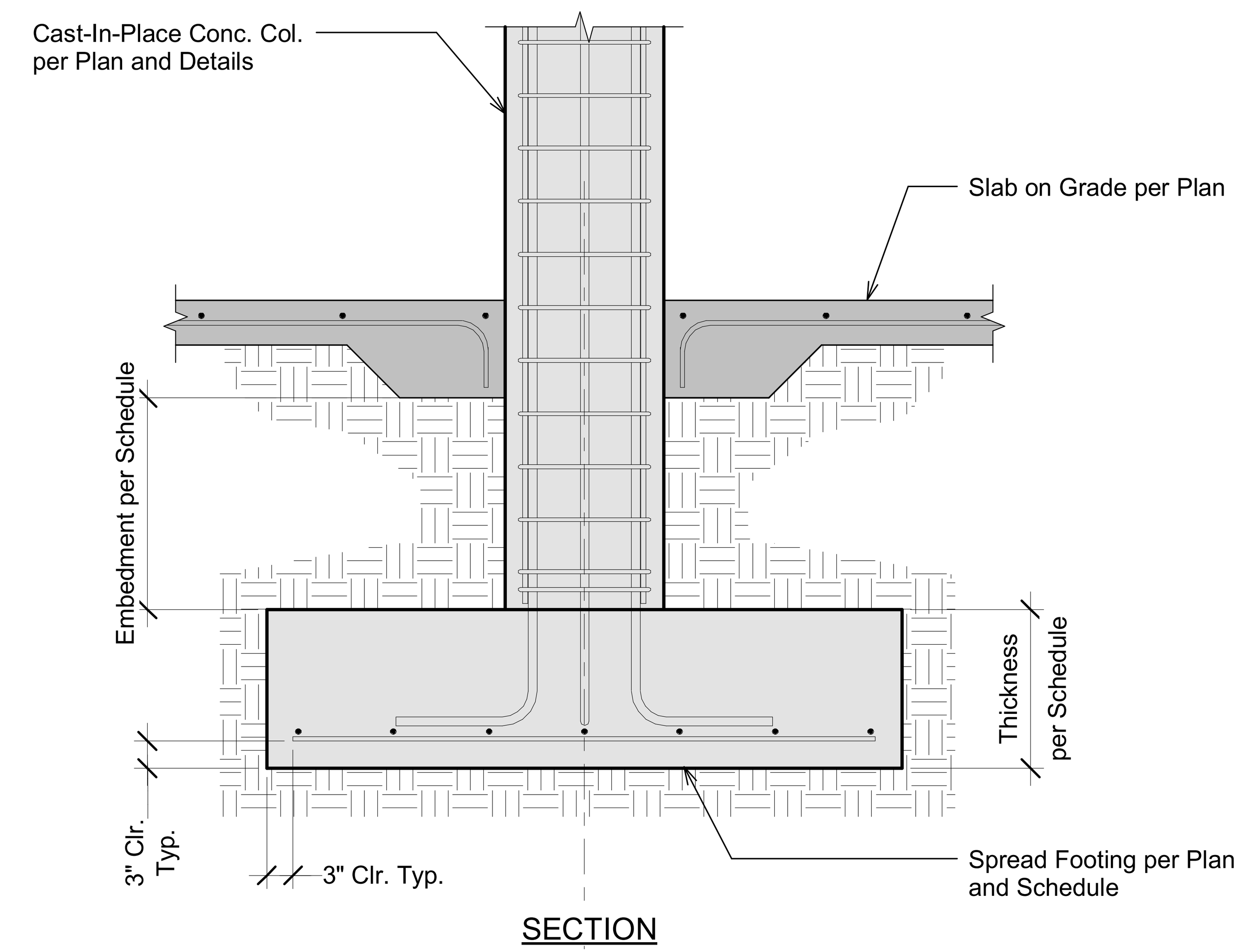


3 Column Section
1 1/2" = 1'-0"

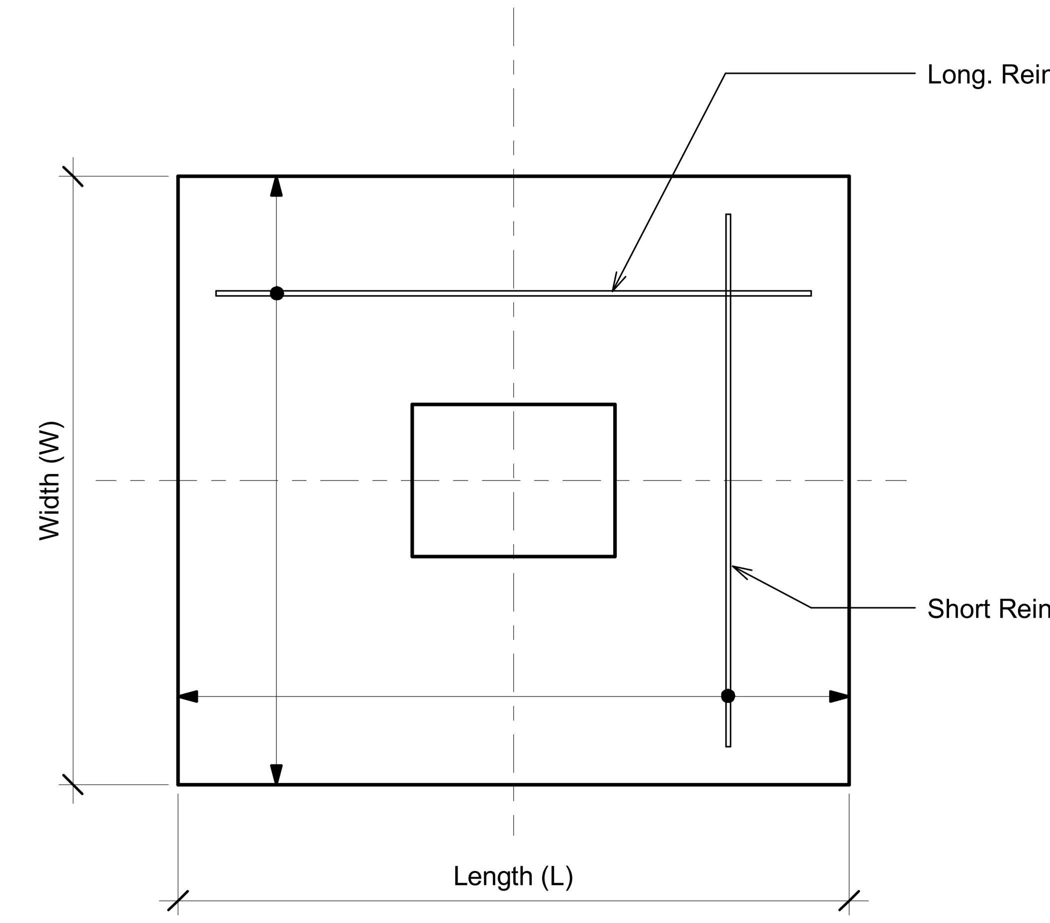
CONCRETE COLUMN SCHEDULE

	COLUMN MARK											
	C1			C2			C3			C4		
	REINFORCING	SIZE	TIES	REINFORCING	SIZE	TIES	REINFORCING	SIZE	TIES	REINFORCING	SIZE	TIES
ROOF – INTERMEDIATE BEAM LINE	(4) # 9	16" x 16"	# 4 @ 6" o.c.	(4) # 9	22" x 16"	# 4 @ 6" o.c.	(4) # 6	10" x 16"	# 3 @ 4.5" o.c.	(4) # 9	16" x 16"	# 4 @ 6" o.c.
INTERMEDIATE BEAM LINE – L02 OFFICE & RESTROOM F.F.	(4) # 9	16" x 16"	# 4 @ 6" o.c.	(4) # 9	22" x 16"	# 4 @ 6" o.c.	(4) # 6	10" x 16"	# 3 @ 4.5" o.c.	(4) # 9	16" x 16"	# 4 @ 6" o.c.
L02 – L01 ASSEMBLY & LIBRARY F.F.	(4) # 9	16" x 16"	# 4 @ 6" o.c.	(4) # 9	22" x 16"	# 4 @ 6" o.c.	(4) # 6	10" x 16"	# 3 @ 4.5" o.c.	(4) # 9	16" x 16"	# 4 @ 6" o.c.
NOTES	Lo REGIONS = 33" DECREASE TIE SPACING TO 3.5" O.C. IN Lo REGIONS			Lo REGIONS = 33" DECREASE TIE SPACING TO 4" O.C. IN Lo REGIONS						Lo REGIONS = 23" DECREASE TIE SPACING TO 3.5" O.C. IN Lo REGIONS		

ROOF
INTERMEDIATE BEAM LINE
INTERMEDIATE BEAM LINE
L02 OFFICE & RESTROOM F.F.
L01 ASSEMBLY & LIBRARY F.F.
SEE ARCH'L
SEE ARCH'L



SECTION



PLAN

FOOTING SCHEDULE

Column	Size	Thickness	Reinforcing	Embedment
C1	5'-6" x 5'-6"	24"	#4 @ 4" o.c. E.W.	2'-6"
C2	7'-0" x 7'-0"	24"	#4 @ 4" o.c. E.W.	3'-6"
C3	3'-6" x 3'-6"	24"	#4 @ 4" o.c. E.W.	2'-6"
C4	8'-0" x 8'-0"	24"	#4 @ 5.5" o.c. E.W.	4'-0"

1 Pad Footing
1" = 1'-0"

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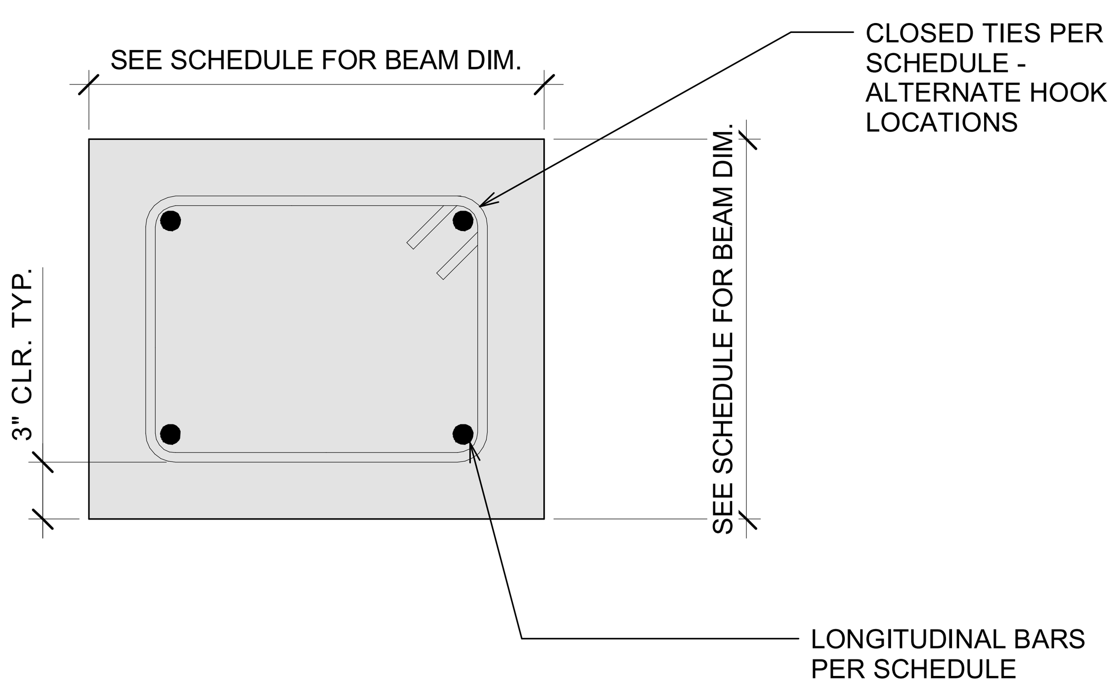
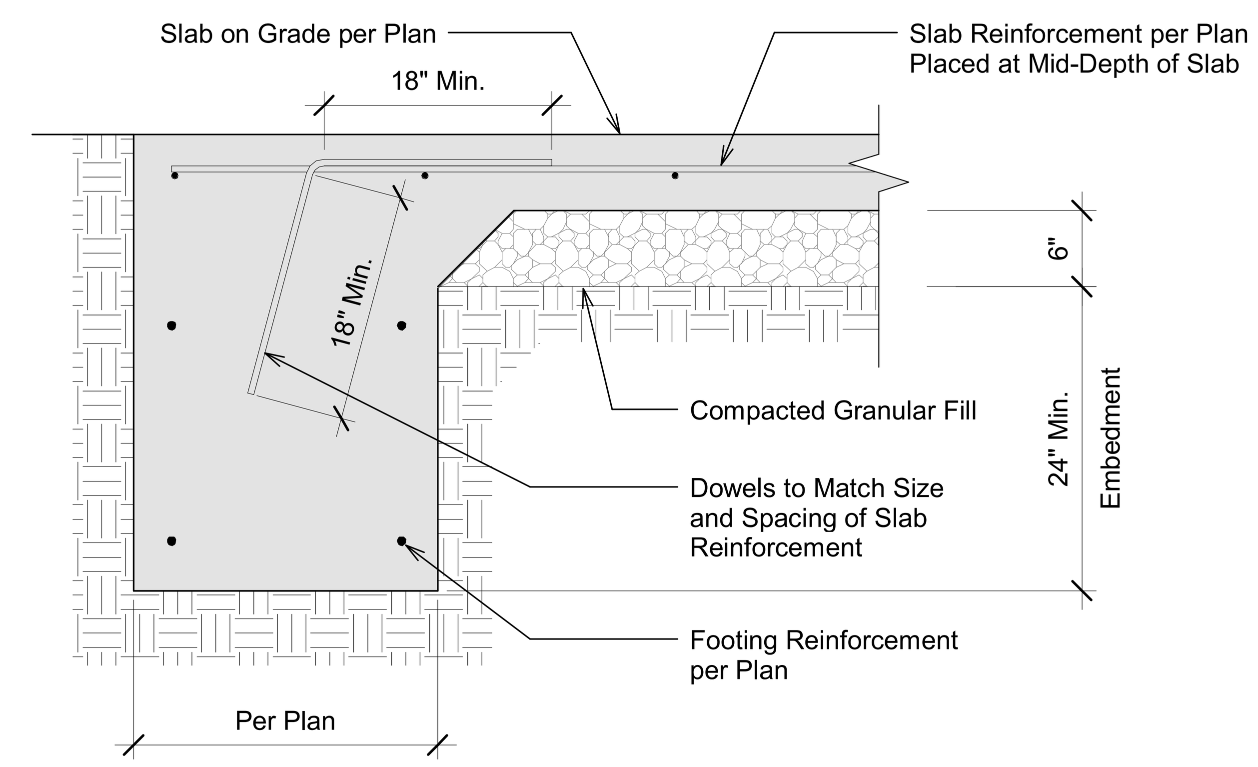
Kilimbi, Rwanda
Structural Details

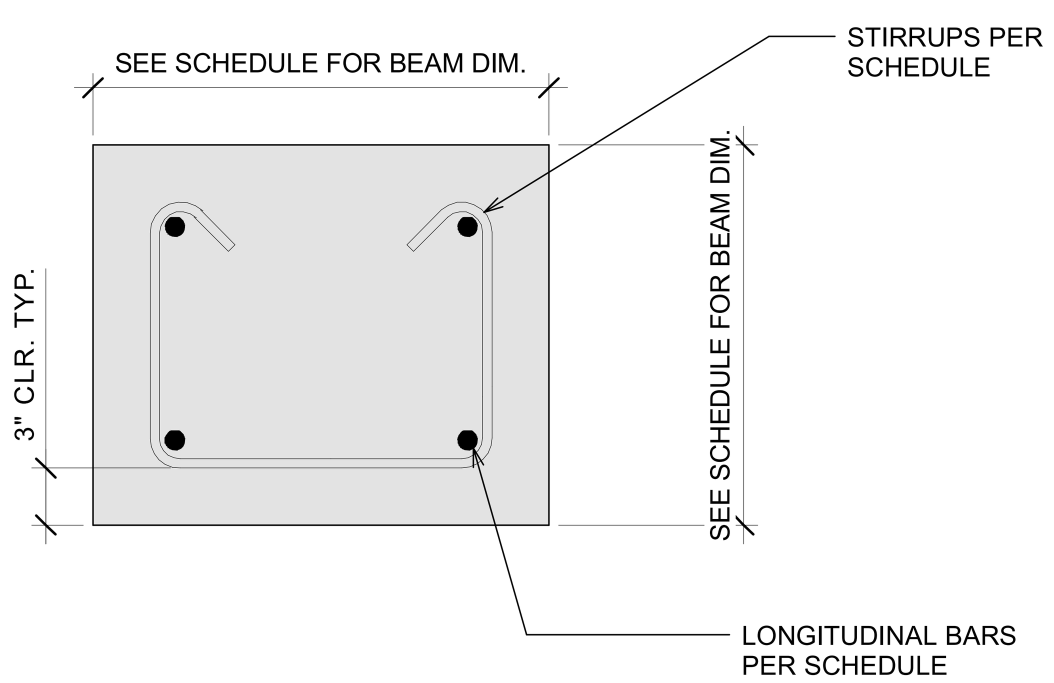
Project Engineer: S. Reeves
Date: 08/09/2020
Scale: As Indicated
Sheet: **S4.1**



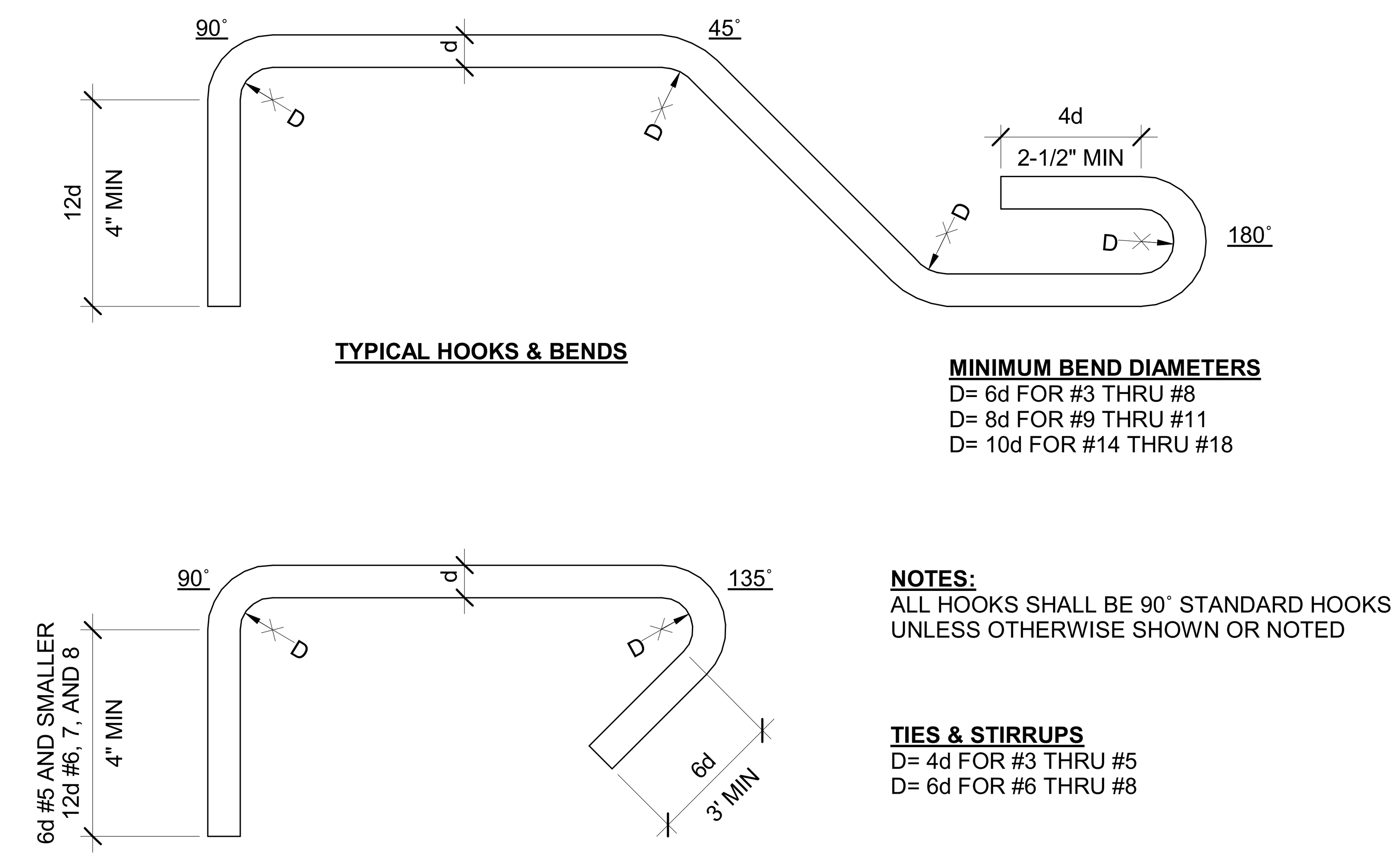
3 **Typ. Beam Section**
1 1/2" = 1'-0"



1 **Typ. Foundation**
1" = 1'-0"



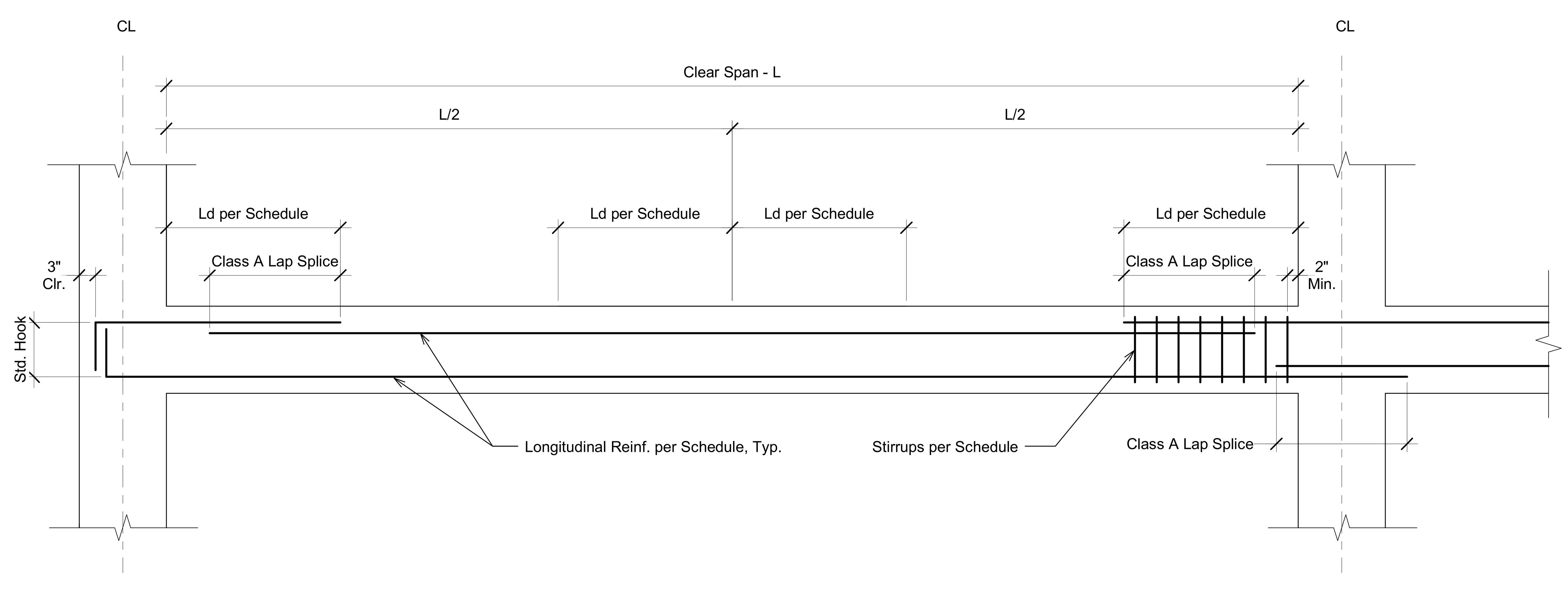
4 **Gravity Beam Section**
1 1/2" = 1'-0"



2 **Typ. Rebar Hooks**
NOT TO SCALE

CONCRETE BEAM SCHEDULE

MARK	WIDTH	DEPTH	LONG. REINF.	SHEAR REINF.	Ld REGIONS	DETAIL
B1	16"	12"	(4) - #7	#3 @ 5.5" o.c.	Ld = 32" Use #3 @ 2.5" o.c.	3/S4.3
B2	16"	12"	(4) - #8	#3 @ 3" o.c.	Ld = 32" Use #3 @ 2.5" o.c.	3/S4.3
B3	16"	10"	(4) - #6	#3 @ 2.5" o.c.	None	4/S4.3
B4	16"	10"	(4) - #7	#3 @ 2.5" o.c.	None	4/S4.3
B5	22"	12"	(4) - #8	#3 @ 3" o.c.	Ld = 44" Use #3 @ 1.5" o.c.	3/S4.3
B6	16"	10"	(4) - #3	#3 @ 8" o.c.	None	4/S4.3



5 **A Concrete Beam Eelvation**
3/4" = 1'-0"

320

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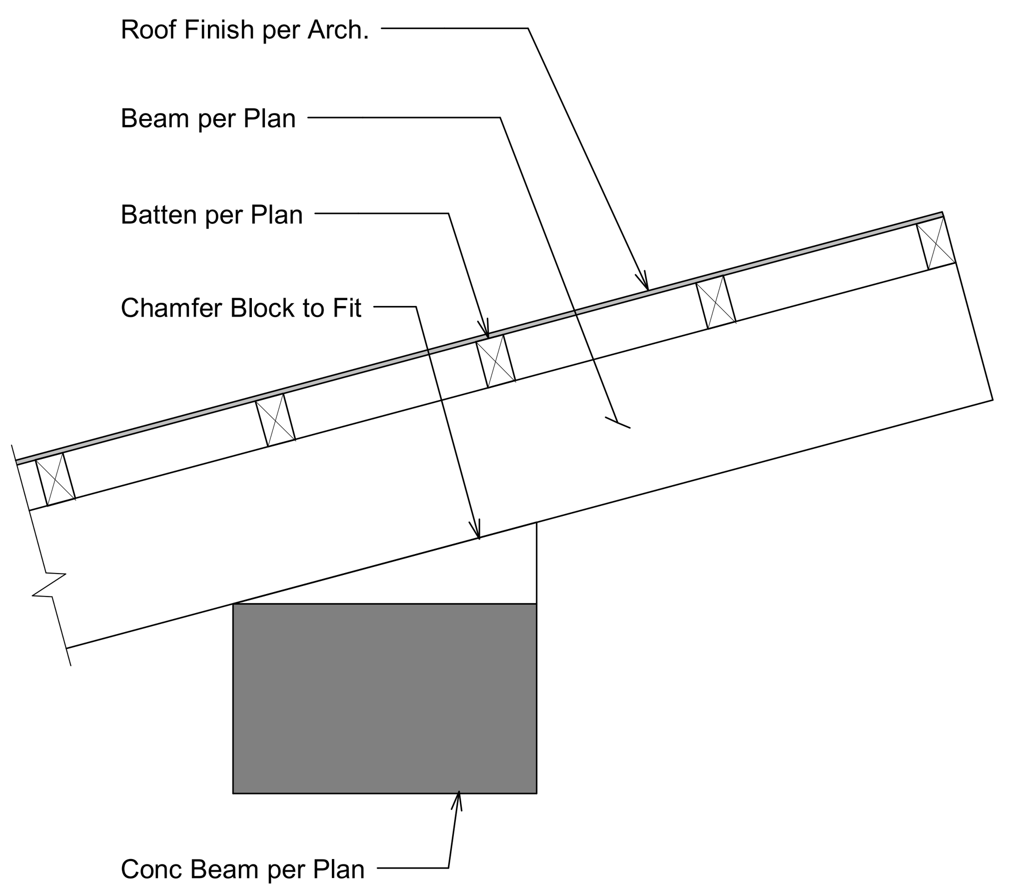
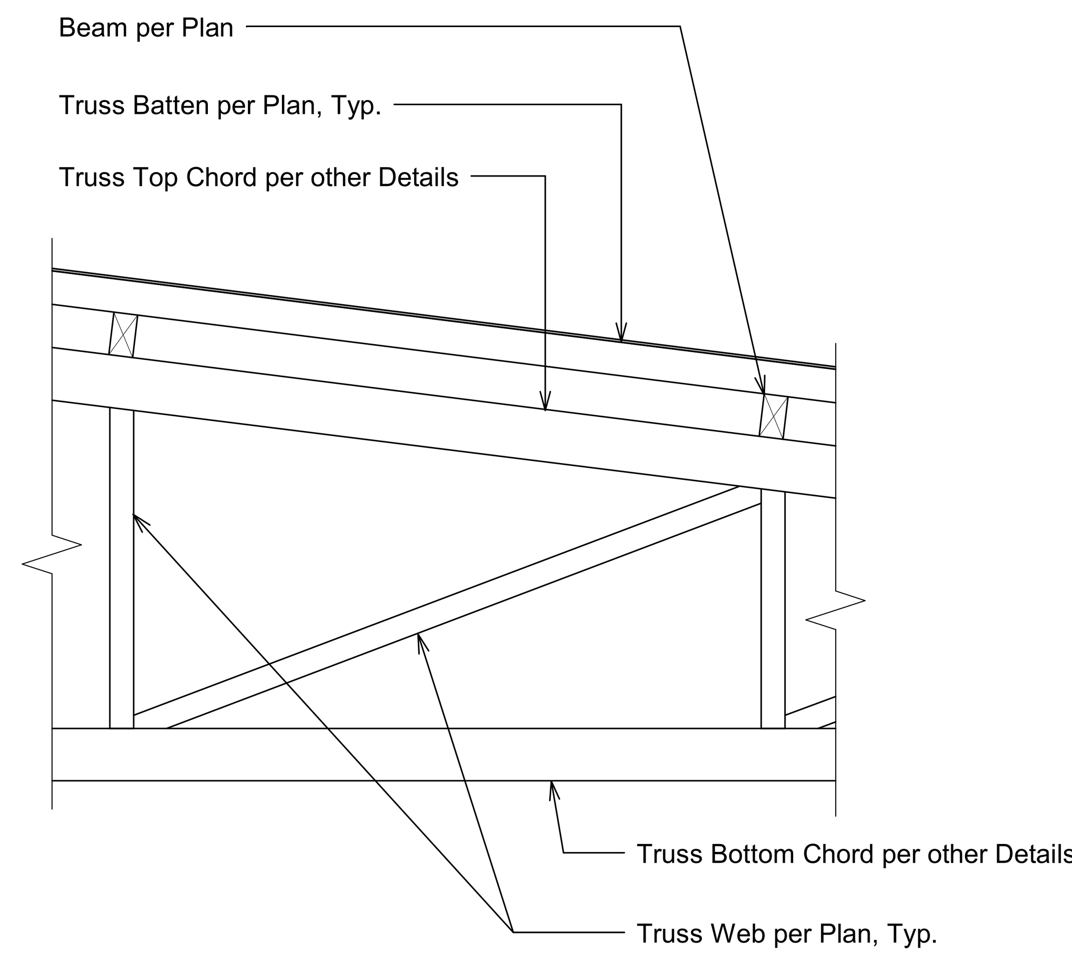
KILIMBI COMMUNITY CENTER
Kilimbi, Rwanda
Structural Details

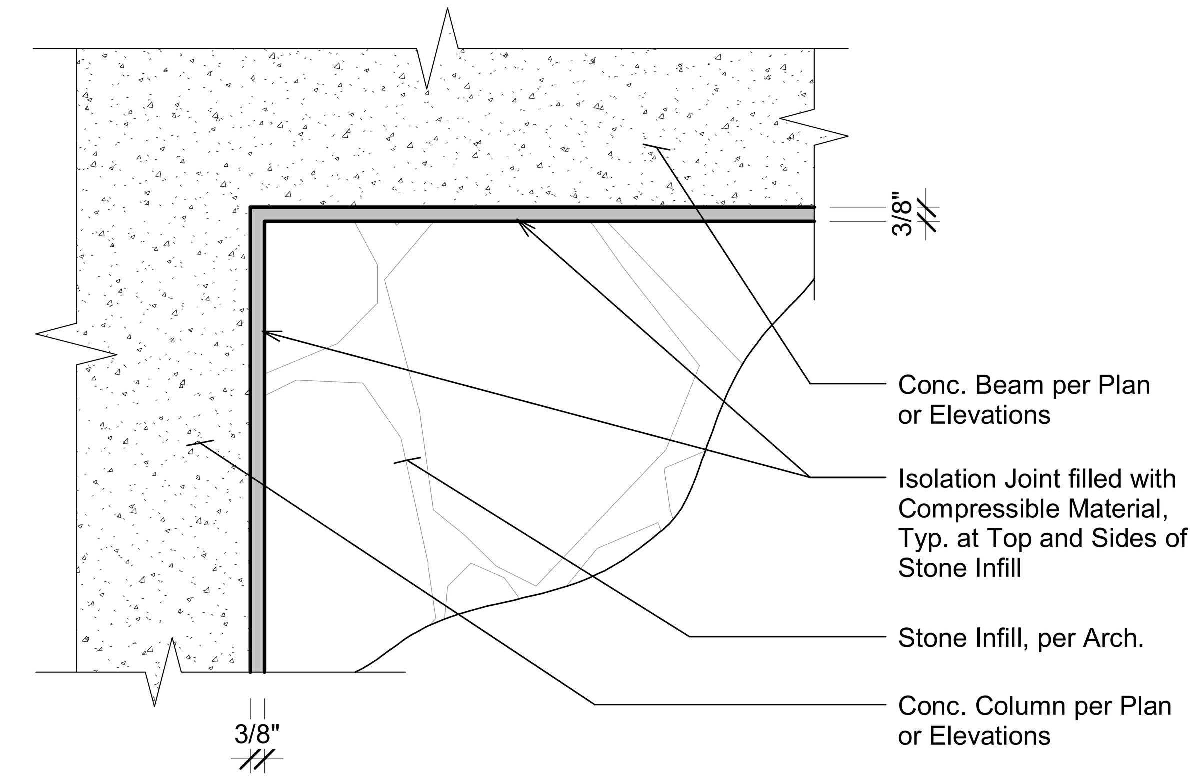
Project Engineer: S. Reeves
Date: 08/09/2020
Scale: As indicated
Sheet: **S4.2**



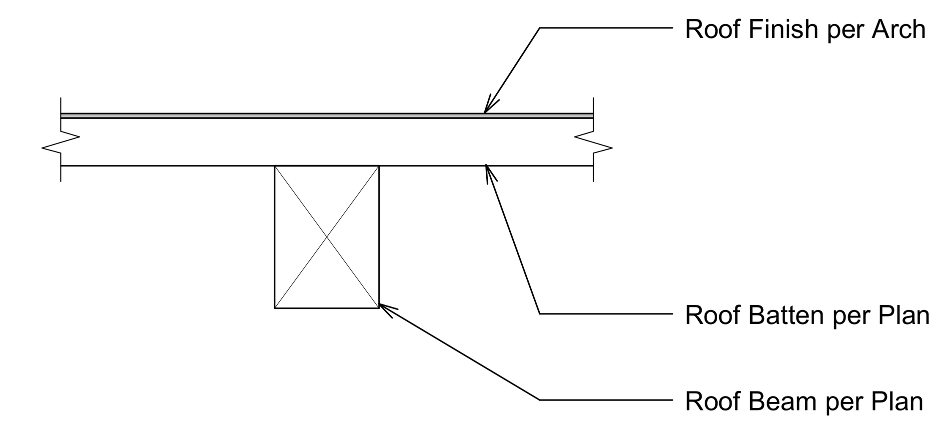
8 **Roof Framing at Exterior Concrete Beam**
1 1/2" = 1'-0"



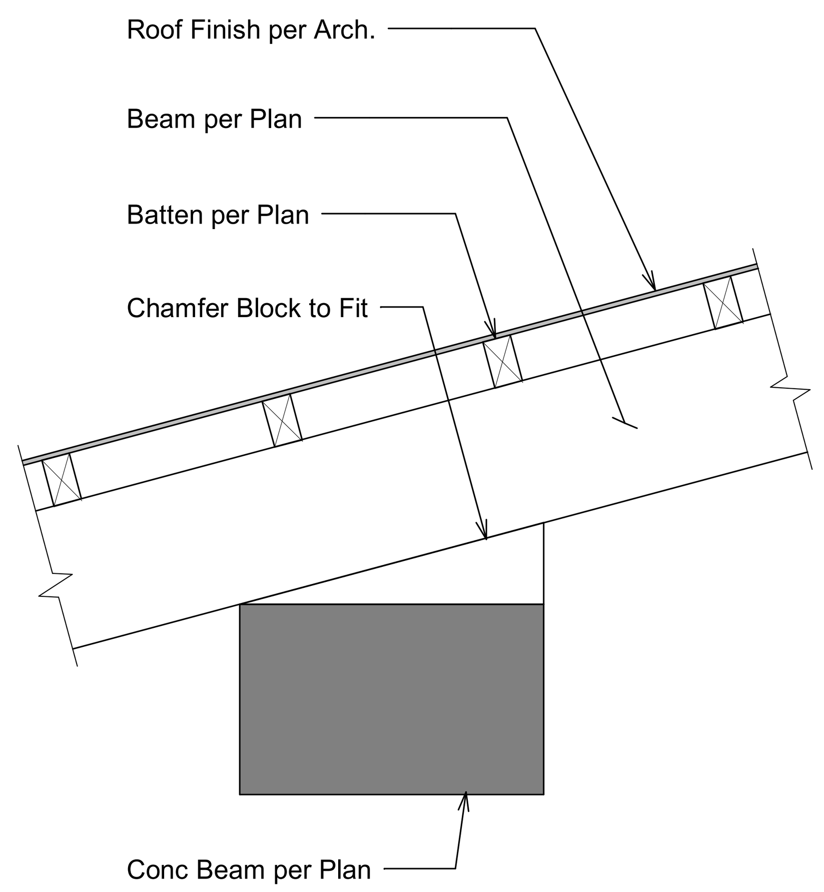
5 **Roof Framing Parallel to Truss**
3/4" = 1'-0"



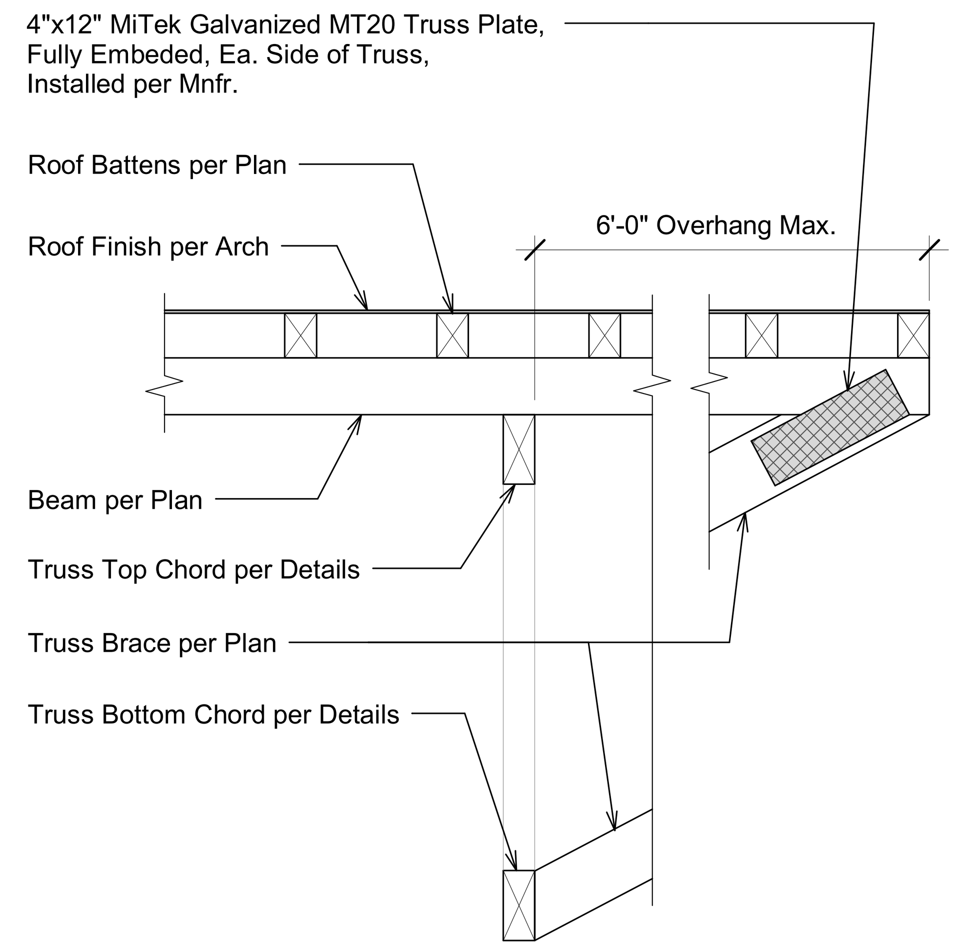
1 **Typical Wall Infill**
3" = 1'-0"



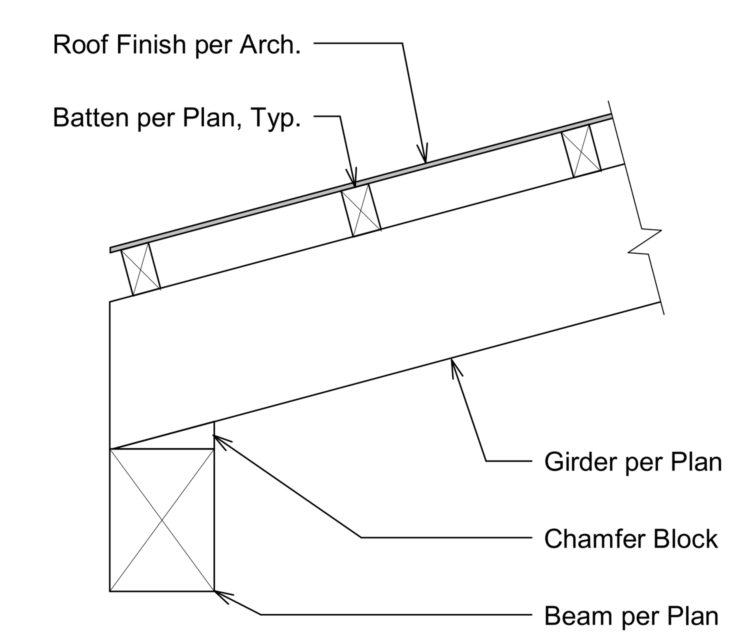
2 **Batten to Roof Beam**
1 1/2" = 1'-0"



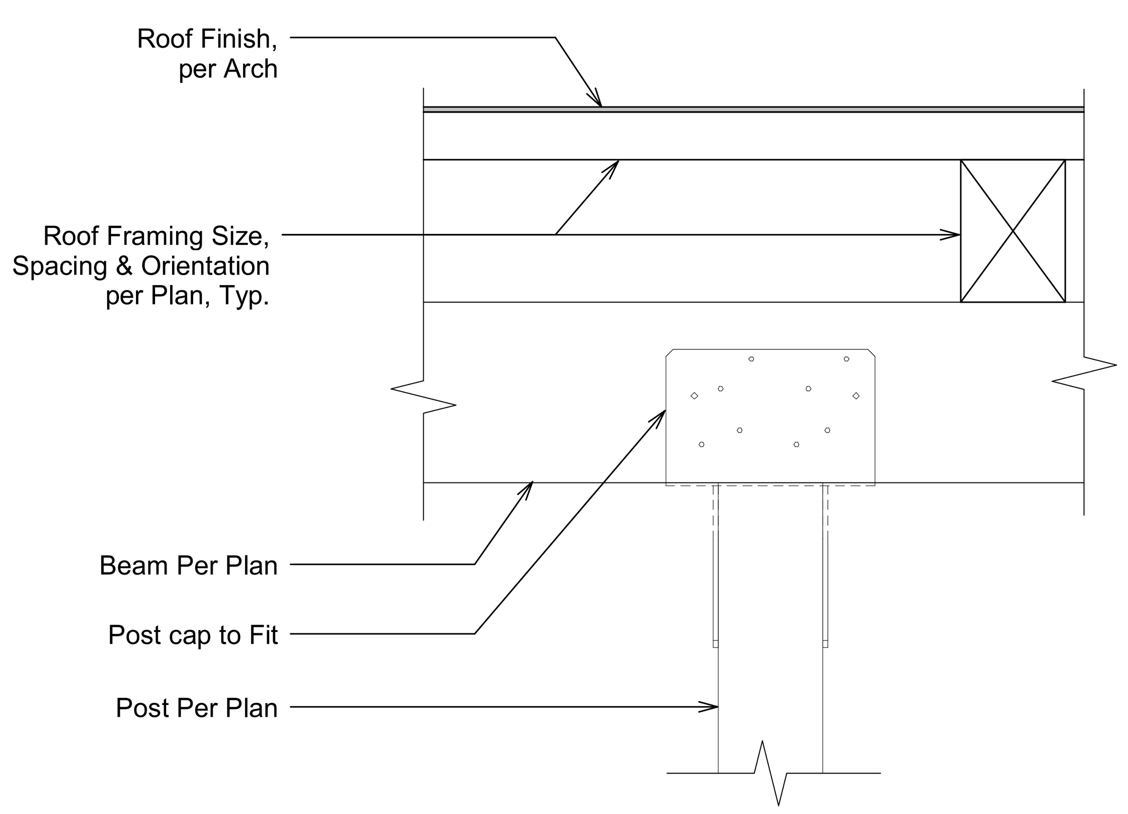
9 **Roof framing at Interior Concrete Beam**
1 1/2" = 1'-0"



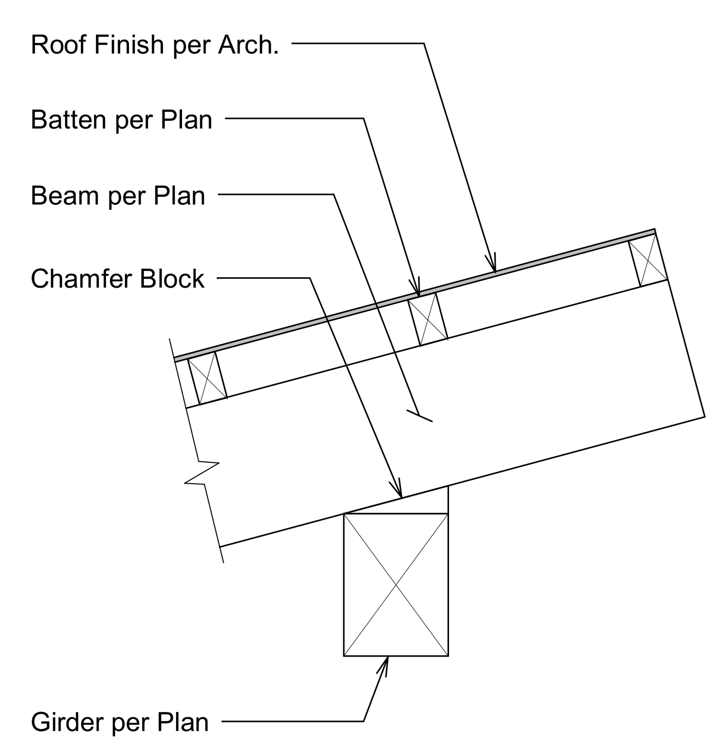
6 **Roof Framing Perpendicular to Truss**
1" = 1'-0"



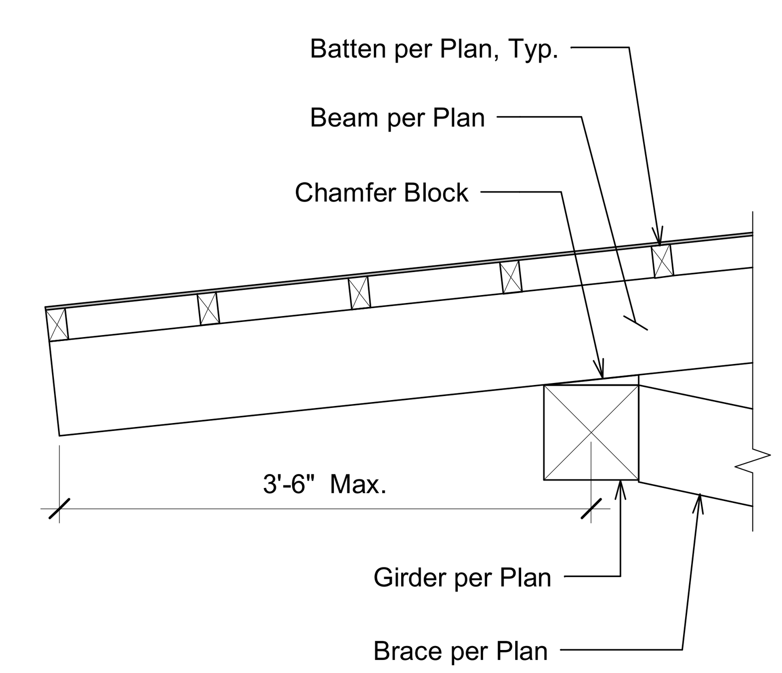
3 **Roof Framing at Upper Roof**
1 1/2" = 1'-0"



10 **Beam to Post**
1 1/2" = 1'-0"



7 **Roof Framing at Upper Roof Overhang**
1 1/2" = 1'-0"



4 **Roof Framing at Lower Roof**
1" = 1'-0"

321

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KILIMBI COMMUNITY CENTER

Kilimbi, Rwanda

Structural Details

Project Engineer: S. Reeves

Date: 08/09/2020

Scale: As Indicated

Sheet

S4.3

Empowering Villages

Kilimbi Community Center

a Journeyman International Project

BY: SERENA REEVES

Who is Journeyman International?

-CalPoly alumni Daniel Weins

-Connecting students to causes

-Positive global impact while learning

What is Empowering Villages?

-Humanitarian organization based in Kigali, Rwanda

-Focuses on inspiring, training, and educating

-Partnered with EMPWR for renewable energy access

The Team

Architect

Rebecca Johnson

Construction Manager

Chris Audi

Architectural Engineer

Serena Reeves

The Project

<u>Timber</u>

Trusses and other Gravity Framing

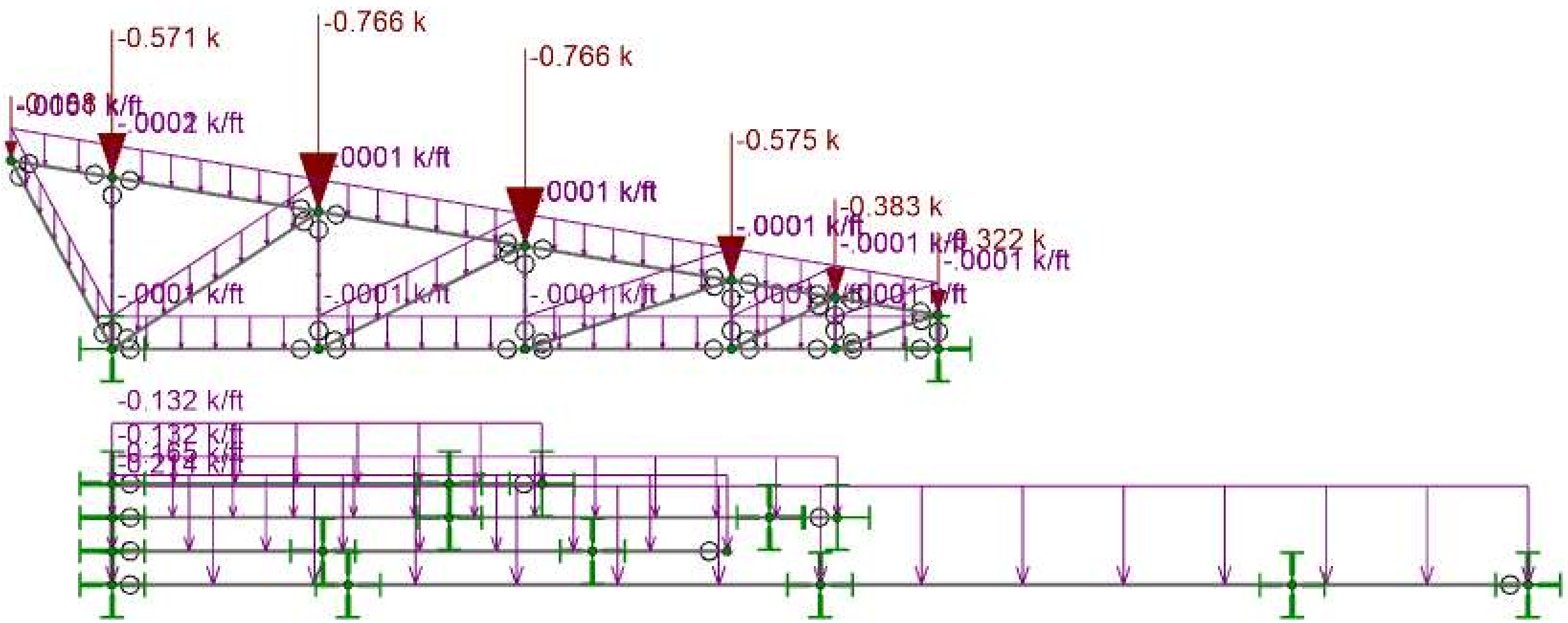
<u>Concrete</u>

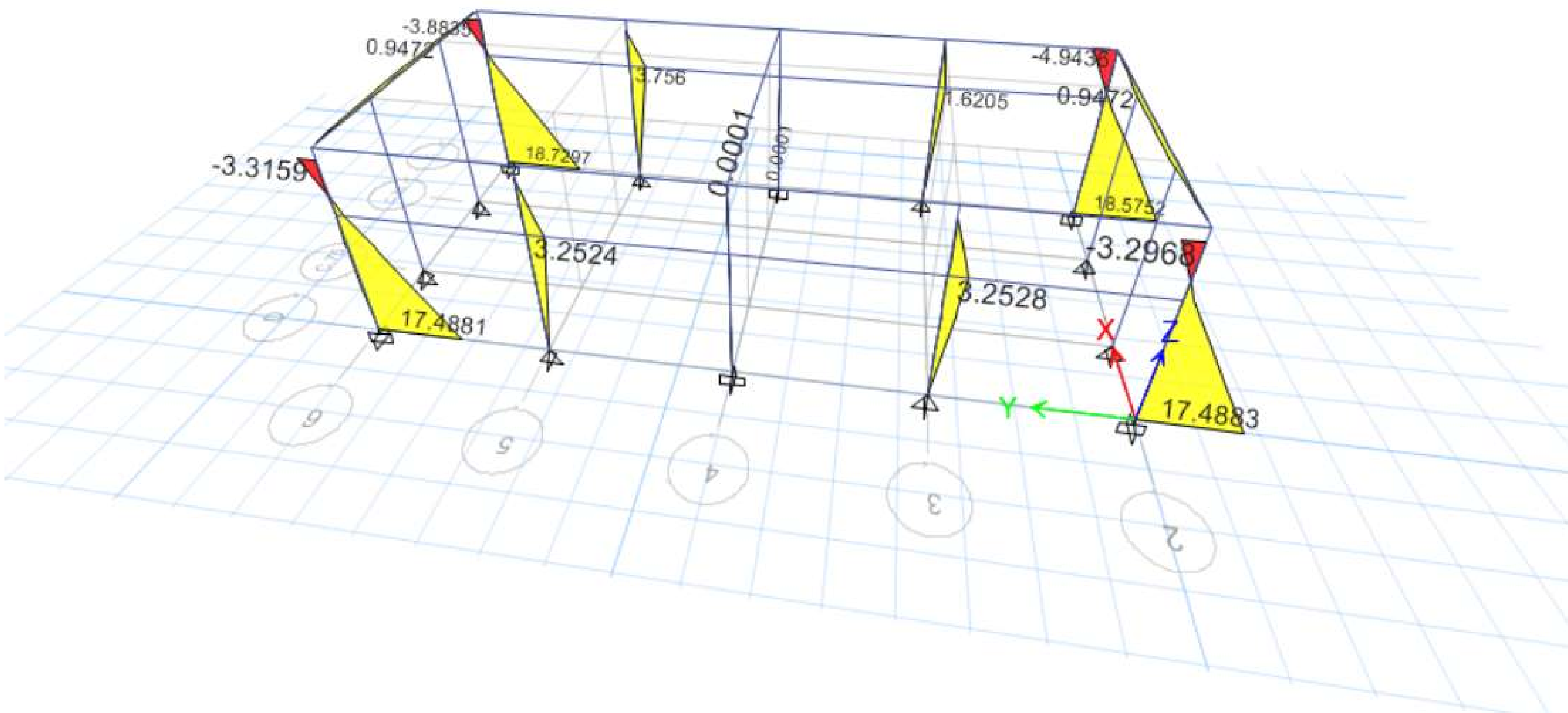
Diaphragm, Special Moment Frames, Cantilevered Columns, Slab On Grade, Retaining Walls, and Foundations

THE SITE


Kilimbi Site
Google Earth
Image © 2018 CNES / Airbus
© 2018 Google
900 ft
N

Structural Analysis

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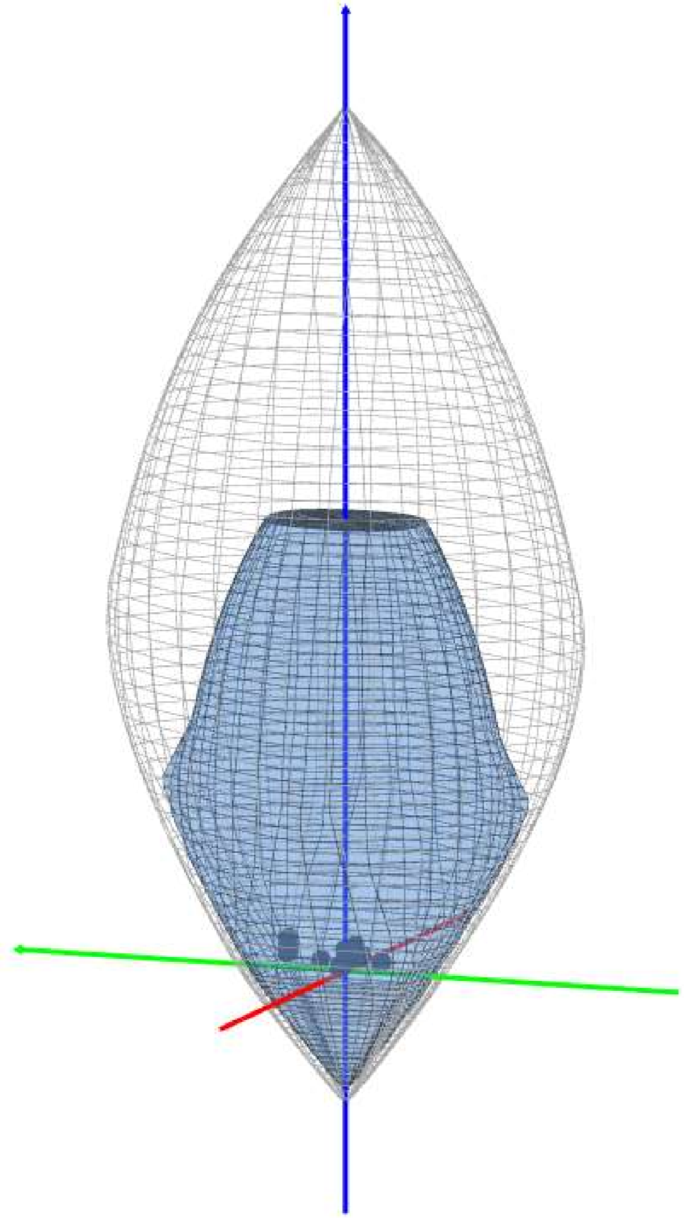
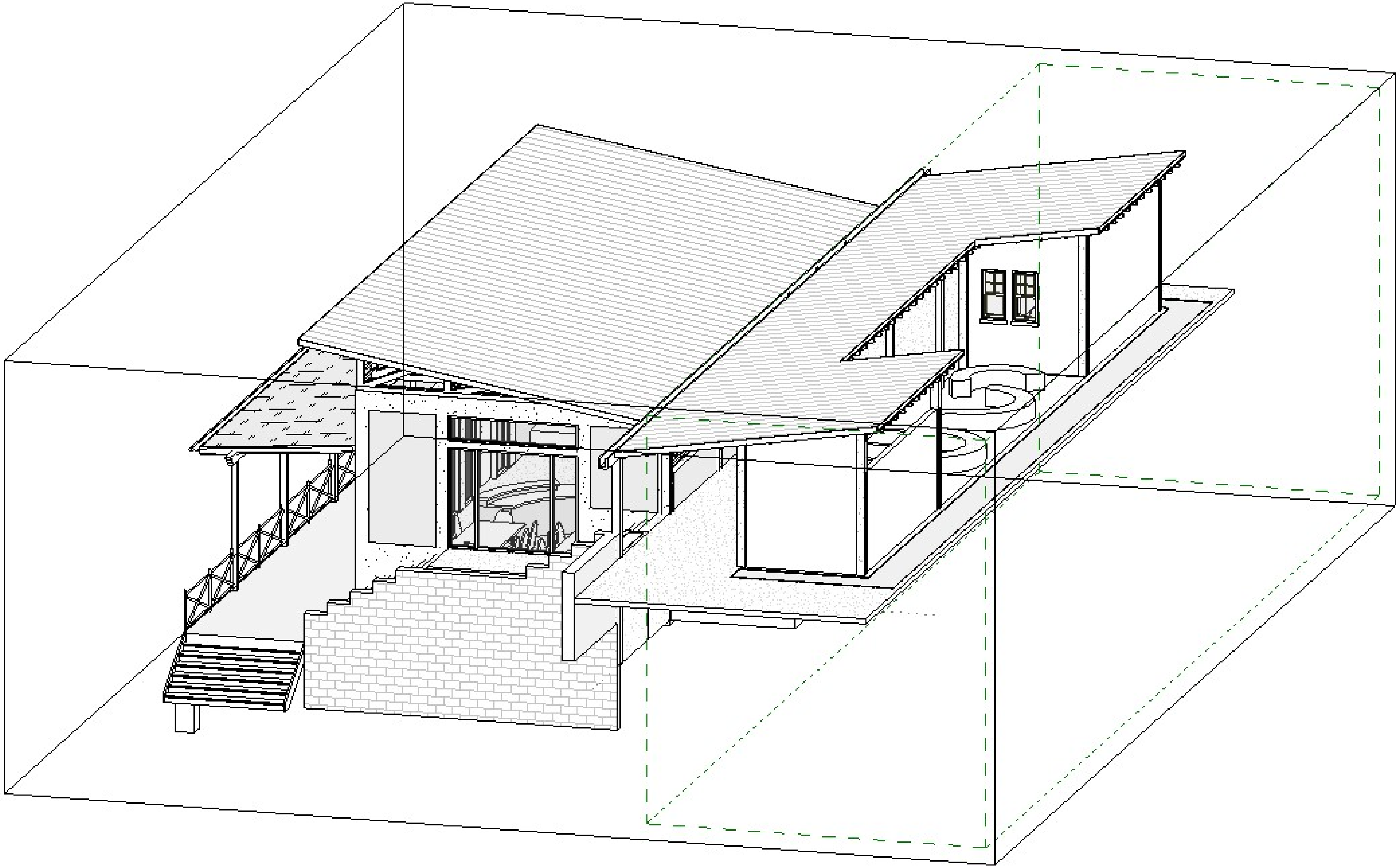
2





Global


Where We Are Working
THE JI TEAM HAS DESIGNED IN OVER 40 COUNTRIES
42
Countries
24
Projects completed or in construction
101
Designs completed
30
Projects currently in design

Cultural and Social

-Exposure to different cultures

-Sets example and promotes well engineered structures

-Mitigate disruption of daily life in the case of natural disasters or at least a shelter

-Empowering Villages can focus on empowering villages, rather than constantly repairing them

-Community Center encourages people to come together and learn together in a scattered community

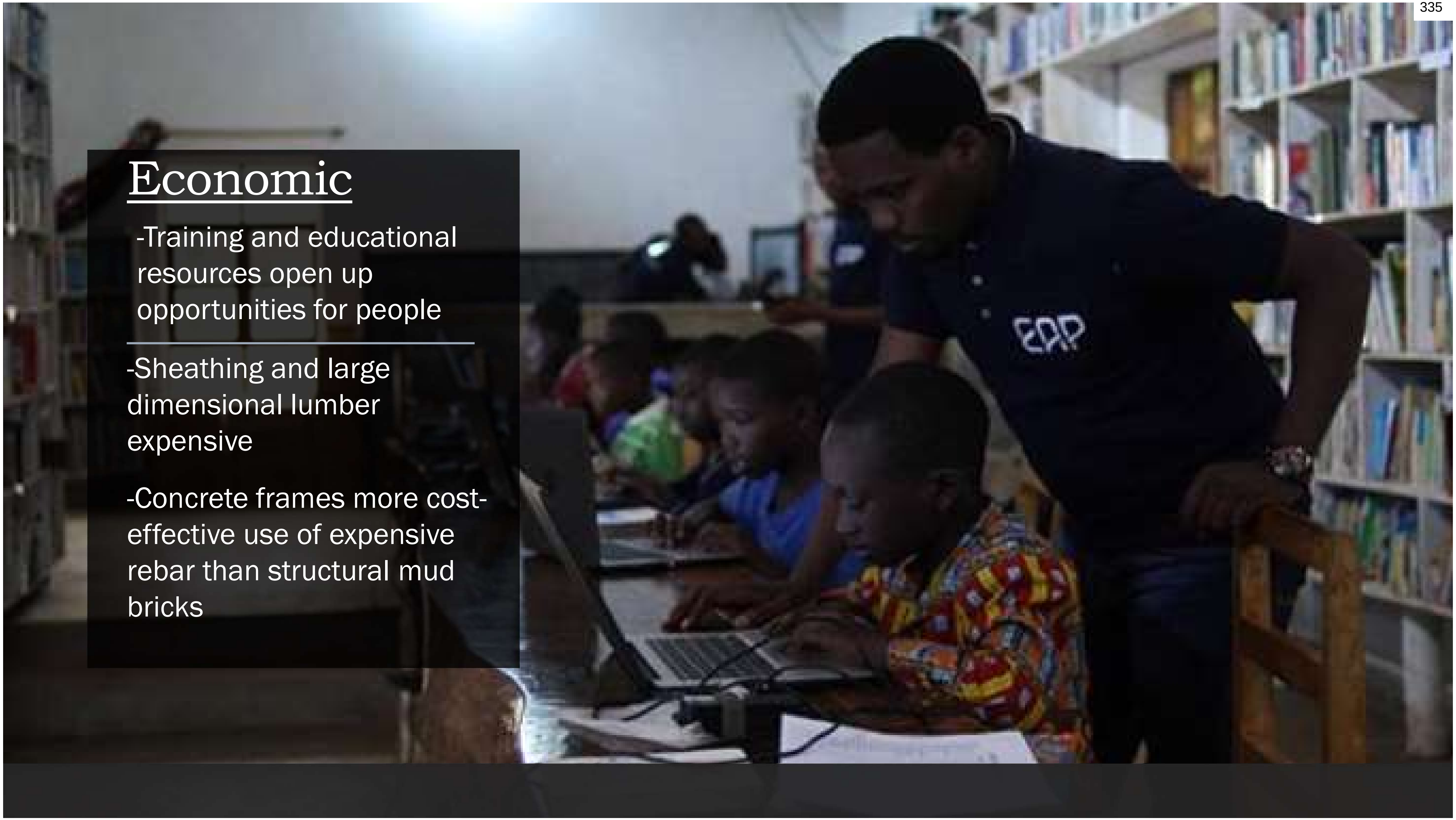
Environmental

Pro-

Creates green energy sources, both hydro and solar

Con-

Mainly concrete structure



Economic

-Training and educational resources open up opportunities for people

-Sheathing and large dimensional lumber expensive

-Concrete frames more cost-effective use of expensive rebar than structural mud bricks

Learning On My Own

-More experience in Etabs, Risa, Excel, SpColumn, and Revit

-Concrete moment frame design

-How infill is detailed participate or not