ข้อกำหนดที่ใช้ในการออกแบบ (DESIGN CRITERIA)

โครงการ : ก่อสร้างและตกแต่งภายใน อาคารสำนักงาน กสทช. แห่งใหม่

การออกแบบโดยวิธีกำลัง (Ultimate Strength design method)

สัมประสิทธิ์น้ำหนักบรรทุก (Load factor)

น้ำหนักบรรทุคงที่ (Dead load : DL)	=	*1.70*
น้ำหนักบรรทุกจร (Live load : LL)	=	*2.00*
แรงลม (Wind load : WL)	=	*2.00*
แรงแผ่นดินไหว (Earthquake load : EL)	=	*2.20*

กำลังที่ต้องการเพื่อต้านน้ำหนักบรรทุก (U = Required strength to resist factored load)

U = 1.7DL + 2.0 LL

U = 0.75(1.7DL + 2.0LL + 2.0WL) หรือ 0.9DL + 1.3WL

U = 0.75(1.7DL + 2.0LL + 2.2EL) หรือ 0.9DL + 1.43EL

ตัวคูณลดกำลัง (Strength reduction factor)

สำหรับแรงดัด (Bending)	=	*0.90*
สำหรับแแรงเฉือน (Shear)	=	*0.85*
สำหหรับแรงเฉือน (Compression)	=	*0.70*

คอนกรีต (Concrete)

กำลังอัดประลัย (Ultimate Strength) Fc'	=	*320*	ksc
แรงเฉือนแบบคาน Vc	=	*9.481*	ksc (For Beam Shear)
แรงเฉือนทะลุ Vc	=	*18.962*	ksc (For Punching Shear)

เหล็กเส้นกลม (Round Bar)

กำลังดึงสูงสุด (Yield Strength)	Fy	=	*2400*	ksc	(SR 24)

เหล็กเส้นข้ออ้อย (Deformed Bar)

กำลังดึงสูงสุด (Yield Strength)	Fy	=	*5000*	ksc	(SD 50)

เหล็กรูปพรรณ (Structural Steel)

Structural steel shape	GRADE	SS400
High strength bolt (HTB)	GRADE	F10T
Welding electrode	GRADE	E70
Anchor bolt	GRADE	SS400

น้ำหนักบรรทุกคงที่ (Dead Load)

น้ำหนักคอนกรีต (DL. of Concrete)	=	2400	กก. ต่อ ลบ.ม. (kg/Cu.m.)
น้ำหนักอิฐมอญเต็มแผ่น (DL. of Brick Wall)	=	360	กก. ต่อ ตร.ม. (kg/Sq.m.)
น้ำหนักอิฐมอญครึ่งแผ่น (DL. of Half Brick Wall)	=	180	กก. ต่อ ตร.ม. (kg/Sq.m.)
น้ำหนักผนังก่ออิฐบล็อกหนา 9 ซ.ม.	=	160	กก. ต่อ ตร.ม. (kg/Sq.m.)
น้ำหนักผนังกระจก	=	120	กก. ต่อ ตร.ม. (kg/Sq.m.)

น้ำหนักบรรทุกจร (Live Load)

น้ำหนักบรรทุกจรห้องปฏิบัติการทดสอบ EMC	=	3000	กก. ต่อ ตร.ม. (kg/Sq.m.)
น้ำหนักบรรทุกจร SHIELD ROOM	=	600	กก. ต่อ ตร.ม. (kg/Sq.m.)
น้ำหนักบรรทุกจร LAB และปฏิบัติงาน	=	400	กก. ต่อ ตร.ม. (kg/Sq.m.)
น้ำหนักบรรทุกจร DATA CENTER	=	1200	กก. ต่อ ตร.ม. (kg/Sq.m.)

Project: อาคารคลังเอกสารและห้องปฏิบัติการ กสทช.

Title: CALCULATION OF POST-TENSION SLAB2nd- ROOF FLOORS

2F,3F,5F and Roof -LINE-G3

1 - USER SPECIFIED GENERAL ANALYSIS AND DESIGN PARAMETERS

Parameter	Value	Parameter	Value
Concrete		Fy (Main bars)	4.00 T/cm 2
F'c for BEAMS/SLABS	320.00 Kg/cm 2	Fy (Shear reinforcement)	4.00 T/cm 2
F'ci for BEAMS/SLABS	240.00 Kg/cm 2	Minimum Cover at TOP	2.00 cm
For COLUMNS/WALLS	320.00 Kg/cm 2	Minimum Cover at BOTTOM	2.00 cm
Ec for BEAMS/SLABS	275.00 T/cm 2	Post-tensioning	
For COLUMNS/WALLS	275.00 T/cm 2	SYSTEM	BONDED
CREEP factor	2.00	Fpu	18.96 T/cm 2
CONCRETE WEIGHT	NORMAL	Fse	12.00 T/cm 2
UNIT WEIGHT	2400.00 Kg/m 3	Strand area	0.990 cm 2
Tension stress limits / (f'c)1/2		Min CGS from TOP	4.20 cm
At Top	1.600	Min CGS from BOT for interior spans	5.60 cm
At Bottom	1.600	Min CGS from BOT for exterior spans	5.60 cm
Compression stress limits / f'c		Min average precompression	8.80 Kg/cm 2
At all locations	0.450	Max spacing / slab depth	8.00
Tension stress limits (initial) / (f'c)1/2		Analysis and design options	
At Top	0.795	Structural system - Equiv Frame	TWO-WAY
At Bottom	0.795	Moments reduced to face of support	YES
Compression stress limits (initial) / f'c		Moment Redistribution	NO
At all locations	0.600	DESIGN CODE SELECTED	ACI-318 (1999)
Reinforcement			

2 - INPUT GEOMETRY

2.1 Principal Span Data of Uniform Spans

Span	Form	Length	Width	Depth	TF Width	TF Thick.	BF/MF Width	BF/MF Thick.	Rh	Right Mult.	Left Mult.
		m	cm	cm	cm	cm	cm	cm	cm		
1	1	8.00	100.00	27.00					0.00	3.27	3.27
2	1	8.00	100.00	27.00					0.00	3.27	3.27
3	1	8.00	100.00	27.00					0.00	3.27	3.27
4	1	8.00	100.00	27.00					0.00	3.27	3.27
5	1	8.00	100.00	27.00					0.00	3.27	3.27

2.5 Drop Cap and Drop Panel Data

Joint	Cap T	Cap B	Cap DL	Cap DR	Drop TL	Drop TR	Drop B	Drop L	Drop R
	cm	cm	cm	cm	cm	cm	cm	cm	cm
1	70.00	654.00	0.00	17.50	0.00	0.00	0.00	0.00	0.00
2	35.00	240.00	140.00	140.00	0.00	0.00	0.00	0.00	0.00
3	35.00	240.00	140.00	140.00	0.00	0.00	0.00	0.00	0.00
4	35.00	240.00	140.00	140.00	0.00	0.00	0.00	0.00	0.00
5	35.00	240.00	140.00	140.00	0.00	0.00	0.00	0.00	0.00
6	35.00	654.00	140.00	0.00	0.00	0.00	0.00	0.00	0.00

2.7 Support Width and Column Data

Joint	Support Width	Length LC	B(DIA.) LC	D LC	% LC	CBC LC	Length UC	B(DIA.) UC	D UC	% UC	CBC UC
	cm	m	cm	cm			m	cm	cm		
1	65.0	4.2	40.0	65.0	100	(2)	4.2	40.0	65.0	100	(2)
2	55.0	4.2	55.0	55.0	100	(1)	4.2	55.0	55.0	100	(1)
3	55.0	4.2	55.0	55.0	100	(1)	4.2	55.0	55.0	100	(1)
4	55.0	4.2	55.0	55.0	100	(1)	4.2	55.0	55.0	100	(1)
5	55.0	4.2	55.0	55.0	100	(1)	4.2	55.0	55.0	100	(1)
6	55.0	4.2	55.0	55.0	100	(2)	4.2	55.0	55.0	100	(2)

3 - INPUT APPLIED LOADING

3.1 Loading As Appears in User's Input Screen

Span	Class	Type	W	P1	P2	A	B	C	F	M
			T/m2	T/m	T/m	m	m	m	T	T-m
1	LL	U	0.400							
1	SDL	U	0.370							
2	LL	U	0.400							
2	SDL	U	0.370							
3	LL	U	0.400							
3	SDL	U	0.370							
4	LL	U	0.400							
4	SDL	U	0.370							
5	LL	U	0.400							
5	SDL	U	0.370							

NOTE: SELFWEIGHT INCLUSION REQUIRED (SW= SELF WEIGHT Computed from geometry input and treated as dead loading. Unit selfweight W = 2400.0 Kg/m^3
NOTE: LIVE LOADING is SKIPPED with a skip factor of 1.00

3.2 Compiled loads

Span	Class	Type	P1	P2	F	M	A	B	C	Reduction Factor
			T/m	T/m	T	T-m	m	m	m	%
1	LL	P	2.616				0.000	8.000		0.000
1	SDL	P	2.420				0.000	8.000		
1	SW	P	10.987				0.000	0.175		
1	SW	P	4.238				0.175	6.600		
1	SW	P	4.699				6.600	8.000		
2	LL	P	2.616				0.000	8.000		0.000
2	SDL	P	2.420				0.000	8.000		
2	SW	P	4.699				0.000	1.400		
2	SW	P	4.238				1.400	6.600		
2	SW	P	4.699				6.600	8.000		
3	LL	P	2.616				0.000	8.000		0.000
3	SDL	P	2.420				0.000	8.000		
3	SW	P	4.699				0.000	1.400		
3	SW	P	4.238				1.400	6.600		
3	SW	P	4.699				6.600	8.000		
4	LL	P	2.616				0.000	8.000		0.000
4	SDL	P	2.420				0.000	8.000		
4	SW	P	4.699				0.000	1.400		
4	SW	P	4.238				1.400	6.600		
4	SW	P	4.699				6.600	8.000		
5	LL	P	2.616				0.000	8.000		0.000

5	SDL	P	2.420				0.000	8.000		
5	SW	P	4.699				0.000	1.400		
5	SW	P	4.238				1.400	6.600		
5	SW	P	5.494				6.600	8.000		

7 - SELECTED POST-TENSIONING FORCES AND TENDON PROFILES

7.1 Tendon Profile

Tendon A

Span	Type	X1/L	X2/L	X3/L	A/L
1	1	0.100	0.500	0.100	---
2	1	0.100	0.500	0.100	---
3	1	0.100	0.500	0.100	---
4	1	0.100	0.500	0.100	---
5	1	0.100	0.500	0.100	---

7.2 Selected Post-Tensioning Forces and Tendon Drape

Tendon A

Span	Force	CGS Left	CGS C1	CGS C2	CGS Right	P/A	Wbal	WBal (%DL)
	T	cm	cm	cm	cm	kg/cm2	T/-	
1	230.503	-13.50	---	-21.40	-4.20	13.05	3.616	53
2	238.157	-4.20	---	-21.40	-4.20	13.49	5.120	75
3	221.798	-4.20	---	-21.40	-4.20	12.56	4.769	70
4	238.151	-4.20	---	-21.40	-4.20	13.49	5.120	75
5	230.529	-4.20	---	-21.40	-13.50	13.06	3.616	52

All Tendons

Span	Force	Total P/A	Total WBal (%DL)
	T	kg/cm2	
1	230.503	13.05	53
2	238.157	13.49	75
3	221.798	12.56	70
4	238.151	13.49	75
5	230.529	13.06	52

Approximate weight of strand: 637.3 Kg

7.3 Tendon Extents and Stressing Conditions

Type	Num	Force	Left End	Right End	From	To	Extension
A	20	11.65	Live	Live	1	5	---

7.4 Required Minimum Post-Tensioning Forces

	Based on Stress Conditions			Based on Minimum P/A		
Type	Left	Center	Right	Left	Center	Right
	T	T	T	T	T	T
1	0.00	149.83	182.84	155.39	155.39	172.29
2	139.39	0.00	79.63	172.29	155.39	172.29
3	90.71	25.54	90.66	172.29	155.39	172.29
4	79.46	0.00	139.31	172.29	155.39	172.29
5	182.64	153.37	0.00	172.29	155.39	201.43

7.5 Service Stresses (tension shown positive)

Envelope of Service 1

Span	Left Top Max-T	Left Top Max-C	Left Bot Max-T	Left Bot Max-C	Center Top Max-T	Center Top Max-C	Center Bot Max-T	Center Bot Max-C	Right Top Max-T	Right Top Max-C	Right Bot Max-T	Right Bot Max-C

	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2
1	-----	-24.32	-----	-4.79	-----	-43.80	17.69	-1.42	19.31	-----	-----	-52.82
2	11.64	-4.45	-----	-43.18	-----	-22.33	-----	-21.44	3.49	-10.97	-----	-31.67
3	5.97	-8.71	-----	-34.56	-----	-27.48	2.35	-14.05	5.96	-8.72	-----	-34.55
4	3.47	-11.00	-----	-31.64	-----	-22.31	-----	-21.44	11.63	-4.41	-----	-43.16
5	19.27	-----	-----	-52.77	-----	-44.16	18.05	-1.16	-----	-22.47	2.75	-----

7.6 Post-Tensioning Balance Moments, Shears and Reactions

Span Moments and Shears

Span	Moment Left	Moment Center	Moment Right	Shear Left	Shear Right
	T-m	T-m	T-m	T	T
1	0.37	-14.45	31.13	-0.76	-0.76
2	30.36	-14.82	28.16	0.28	0.28
3	27.53	-13.61	27.53	0.00	0.00
4	28.16	-14.82	30.37	-0.28	-0.28
5	31.13	-14.74	9.02	0.84	0.84

Reactions and Column Moments

Joint	Reaction	Moment Lower Column	Moment Upper Column
	T	T-m	T-m
1	0.760	0.000	0.000
2	-1.035	-0.458	-0.417
3	0.275	-0.323	-0.295
4	0.277	0.323	0.294
5	-1.113	0.465	0.423
6	0.837	0.000	0.000

Note: Moments are reported at face of support

8 - FACTORED MOMENTS AND REACTIONS ENVELOPE

8.1 Factored Design Moments (Not Redistributed)

Span	Left Max	Left Min	Middle Max	Middle Min	Right Max	Right Min
	T-m	T-m	T-m	T-m	T-m	T-m
1	8.58	13.34	61.28	35.47	-89.88	-64.25
2	-77.87	-58.44	37.44	14.75	-63.63	-39.92
3	-66.95	-44.73	41.21	19.05	-66.39	-44.19
4	-63.01	-39.33	38.01	15.35	-77.24	-57.81
5	-89.19	-63.79	62.41	36.47	7.77	11.84

8.2 Reactions and Column Moments

Joint	Reaction Max	Reaction Min	Moment Lower Column Max	Moment Lower Column Min	Moment Upper Column Max	Moment Upper Column Min
	T	T	T-m	T-m	T-m	T-m
1	44.48	29.13	0.00	0.00	0.00	0.00
2	129.50	103.32	15.35	0.64	13.08	0.58
3						
4						
5						
6						

8.3 Secondary Moments

Span	Left	Midspan	Right
	T-m	T-m	T-m

1	0.25	3.04	5.87
2	5.13	4.11	3.09
3	2.41	2.68	2.96
4	3.67	4.70	5.73
5	6.46	3.35	0.23

Note: Moments are reported at face of support

10 - MILD STEEL - NO REDISTRIBUTION

10.1 Required Rebar

10.1.1 Total Strip Required Rebar

Span	Location	From	To	As Required	Ultimate	Minimum	Initial	UBC
		m	m	cm2	cm2	cm2	cm2	cm2
1	BOT	2.40	2.80	3.45	3.45	0.00	0.00	0.00
5	BOT	4.80	5.60	5.25	5.25	0.00	0.00	0.00

10.2 Provided Rebar

10.2.1 Total Strip Provided Rebar

Span	ID	Location	From	Quantity	Size	Length	Area
			m			m	cm2
1	1	BOT	0.00	3	5	40.00	6.00

10.2.2 Total Strip Steel Disposition

Span	ID	Location	From	Quantity	Size	Length
			m			m
1	1	BOT	0.00	3	5	8.00
2	1	BOT	0.00	3	5	8.00
3	1	BOT	0.00	3	5	8.00
4	1	BOT	0.00	3	5	8.00
5	1	BOT	0.00	3	5	8.00

13 - PUNCHING SHEAR REINFORCEMENT

13.1 Critical Section Geometry

Column	Layer	Cond.	a	d	b1	b2
			cm	cm	cm	cm
1	1	2	11.87	23.73	76.86	63.73
2	1	1	15.87	31.73	86.73	86.73
3	1	1	15.87	31.73	86.73	86.73
4	1	1	15.87	31.73	86.73	86.73
5	1	1	15.87	31.73	86.73	86.73
6	1	2	15.87	31.73	70.86	86.73

13.2 Critical Section Stresses

Label	Layer	Cond.	Factored shear	Factored moment	Stress due to shear	Stress due to moment	Total stress	Allowable stress	Stress ratio
			T	T-m	T/cm2	T/cm2	T/cm2	T/cm2	
1	1	2	-44.47	-0.00	0.01	0.002	0.011	0.010	1.149
2	1	1	-127.62	-16.92	0.01	0.002	0.014	0.017	0.793
3	1	1	-114.64	+3.83	0.01	0.000	0.011	0.017	0.636
4	1	1	-114.49	-3.86	0.01	0.000	0.011	0.017	0.635
5	1	1	-127.71	+16.88	0.01	0.002	0.014	0.017	0.793

6	1	2	-45.17	+0.00	0.01	0.002	0.008	0.016	0.499

13.3 Punching Shear Reinforcement

Reinforcement option: Stirrups

Bar Size: 4

Col.	Dist	N_Legs	Dist	N_Legs	Dist	N_Legs	Dist	N_Legs	Dist	N_Legs
	cm		cm		cm		cm		cm	
1	11.9	5								
2										
3										
4										
5										
6										

Dist. = Distance measured from the face of support

Note: Columns with --- have not been checked for punching shear.

Note: Columns with *** have exceeded the maximum allowable shear stress.

14 - DEFLECTIONS

14.1 Maximum Span Deflections - Service Combination 1

Span	SW	SW+PT	SW+PT+ SDL	SW+PT+SDL +Creep	LL	X	Sustained	Total
	cm	cm	cm	cm	cm	cm	cm	cm
1	0.3	0.1	0.3	0.8(1012)	0.3(3123)	0.0(*****)	0.8(1012)	1.0(767)
2	0.1	-0.1	-0.1	-0.2(4500)	-0.1(7367)	0.0(*****)	-0.2(4500)	-0.3(2816)
3	0.1	0.0	0.0	0.1(6091)	0.2(4750)	0.0(*****)	0.1(6091)	0.3(2669)
4	0.1	-0.1	-0.1	-0.2(4472)	-0.1(7403)	0.0(*****)	-0.2(4472)	-0.3(2810)
5	0.3	0.1	0.3	0.8(1013)	0.3(3195)	0.0(*****)	0.8(1013)	1.0(772)

Note: Deflections are calculated using effective moment of inertia of cracked sections.

15 - FRICTION, ELONGATION AND LONG TERM LOSSES

15.1 Input Parameters

Parameter	Value	Parameter	Value
Type of Strand	Low Relaxation	Coefficient of Angular Friction (meu)	0.20000 1/rad
Age of Concrete at Stressing	3 days	Coefficient of Wobble Friction (K)	0.00160 rad/m
Ec at Stressing	235.00 T/cm2	Ratio of Jacking Stress	0.75
Average Relative Humidity	65.00 percent	Anchor Set	6.00 mm
Volume to Surface Ratio of Members	13.50 cm	Tendon_A Stressing Method	Both sides
Es of Strand	2038.70 T/cm2		

15.2 Long-term Losses

Tendon	Span	Left	Center	Right
		T/cm2	T/cm2	T/cm2
TENDON_A	1	0.71	0.74	0.80
TENDON_A	2	0.85	0.91	0.86
TENDON_A	3	0.83	0.78	0.83
TENDON_A	4	0.86	0.90	0.85
TENDON_A	5	0.80	0.76	0.72

15.3 Calculated Stresses After Friction and Long-term Losses

Tendon	Span	Stress Left FL Only	Stress Center FL Only	Stress Right FL Only	Stress Left FL+LTL	Stress Center FL+LTL	Stress Right FL+LTL
		T/cm2	T/cm2	T/cm2	T/cm2	T/cm2	T/cm2
TENDON_A	1	12.13	12.40	12.87	11.43	11.65	12.07
TENDON_A	2	12.87	12.93	12.48	12.03	12.02	11.63

TENDON_A	3	12.48	11.97	12.48	11.65	11.18	11.65
TENDON_A	4	12.48	12.93	12.87	11.63	12.02	12.03
TENDON_A	5	12.87	12.40	12.13	12.07	11.64	11.43

15.6 Summary

Tendon	Force	Ext. Left	Start Span	End Span	Ext. Right	Elong. Left	Elong Right	Anchor Left	Anchor Right	Max Stress ratio
	T					cm	cm			
TENDON_A	11.65	0.00	1	5	0.00	23.05	1.62	0.64	0.64	0.69

16 - Unbalanced Moment Reinforcement

16.1 Unbalanced Moment Reinforcement - No Redistribution

Joint	Gamma Left	Gamma Right	Width Left	Width Right	Moment Left Neg	Moment Left Pos	Moment Right Neg	Moment Right Pos	As Top	As Bot	n Bar Top	n Bar Bot
			m	m	T-m	T-m	T-m	T-m	cm2	cm2		
1	0.00	0.56	0.00	1.21	0.00	0.00	0.00	13.34	0.00	0.00	0	0
2	0.60	0.60	1.60	1.60	-12.01	0.00	0.00	0.00	0.00	0.00	0	0
3	0.60	0.60	1.60	1.60	0.00	0.00	-4.81	0.00	0.00	0.00	0	0
4	0.60	0.60	1.60	1.60	-4.86	0.00	0.00	0.00	0.00	0.00	0	0
5	0.60	0.60	1.60	1.60	0.00	0.00	-11.95	0.00	0.00	0.00	0	0
6	0.60	0.00	1.60	0.00	0.00	11.84	0.00	0.00	0.00	0.00	0	0

2F,3F,5F and Roof -LINE-G4

1 - USER SPECIFIED GENERAL ANALYSIS AND DESIGN PARAMETERS

Parameter	Value	Parameter	Value
Concrete		Fy (Main bars)	4.00 T/cm 2
F'c for BEAMS/SLABS	320.00 Kg/cm 2	Fy (Shear reinforcement)	4.00 T/cm 2
F'ci for BEAMS/SLABS	240.00 Kg/cm 2	Minimum Cover at TOP	2.00 cm
For COLUMNS/WALLS	320.00 Kg/cm 2	Minimum Cover at BOTTOM	2.00 cm
Ec for BEAMS/SLABS	275.00 T/cm 2	Post-tensioning	
For COLUMNS/WALLS	275.00 T/cm 2	SYSTEM	BONDED
CREEP factor	2.00	Fpu	18.96 T/cm 2
CONCRETE WEIGHT	NORMAL	Fse	12.00 T/cm 2
UNIT WEIGHT	2400.00 Kg/m 3	Strand area	0.990 cm 2
Tension stress limits / (f'c)1/2		Min CGS from TOP	4.20 cm
At Top	1.600	Min CGS from BOT for interior spans	5.60 cm
At Bottom	1.600	Min CGS from BOT for exterior spans	5.60 cm
Compression stress limits / f'c		Min average precompression	8.80 Kg/cm 2
At all locations	0.450	Max spacing / slab depth	8.00
Tension stress limits (initial) / (f'c)1/2		Analysis and design options	
At Top	0.795	Structural system - Equiv Frame	TWO-WAY
At Bottom	0.795	Moments reduced to face of support	YES
Compression stress limits (initial) / f'c		Moment Redistribution	NO
At all locations	0.600	DESIGN CODE SELECTED	ACI-318 (1999)
Reinforcement			

2 - INPUT GEOMETRY

2.1 Principal Span Data of Uniform Spans

Span	Form	Length	Width	Depth	TF Width	TF Thick.	BF/MF Width	BF/MF Thick.	Rh	Right Mult.	Left Mult.
		m	cm	cm	cm	cm	cm	cm	cm		
1	1	8.00	100.00	27.00					0.00	3.27	0.45
2	1	8.00	100.00	27.00					0.00	3.27	0.45
3	1	8.00	100.00	27.00					0.00	3.27	0.45
4	1	8.00	100.00	27.00					0.00	3.27	0.45
5	1	8.00	100.00	27.00					0.00	3.27	0.45

2.5 Drop Cap and Drop Panel Data

Joint	Cap T	Cap B	Cap DL	Cap DR	Drop TL	Drop TR	Drop B	Drop L	Drop R
	cm	cm	cm	cm	cm	cm	cm	cm	cm
1	35.00	167.50	0.00	400.00	0.00	0.00	0.00	0.00	0.00
2	35.00	167.50	400.00	400.00	0.00	0.00	0.00	0.00	0.00
3	35.00	167.50	400.00	400.00	0.00	0.00	0.00	0.00	0.00
4	35.00	167.50	400.00	400.00	0.00	0.00	0.00	0.00	0.00
5	35.00	167.50	400.00	400.00	0.00	0.00	0.00	0.00	0.00
6	35.00	167.50	400.00	0.00	0.00	0.00	0.00	0.00	0.00

2.7 Support Width and Column Data

Joint	Support Width	Length LC	B(DIA.) LC	D LC	% LC	CBC LC	Length UC	B(DIA.) UC	D UC	% UC	CBC UC
	cm	m	cm	cm			m	cm	cm		
1	65.0	4.3	45.0	65.0	100	(1)	4.2	45.0	65.0	100	(1)
2	65.0	4.3	45.0	65.0	100	(1)	4.2	45.0	65.0	100	(1)

3	65.0	4.3	45.0	65.0	100	(1)	4.2	45.0	65.0	100	(1)
4	65.0	4.3	45.0	65.0	100	(1)	4.2	45.0	65.0	100	(1)
5	65.0	4.3	45.0	65.0	100	(1)	4.2	45.0	65.0	100	(1)
6	65.0	4.3	45.0	65.0	100	(1)	4.2	45.0	65.0	100	(1)

3 - INPUT APPLIED LOADING

3.1 Loading As Appears in User's Input Screen

Span	Class	Type	W	P1	P2	A	B	C	F	M
			T/m2	T/m	T/m	m	m	m	T	T-m
1	LL	U	0.400							
1	SDL	U	0.300							
1	SDL	L		0.960		0.000	8.000			
2	LL	U	0.400							
2	SDL	U	0.300							
2	SDL	L		0.960		0.000	8.000			
3	LL	U	0.400							
3	SDL	U	0.300							
3	SDL	L		0.960		0.000	8.000			
4	LL	U	0.400							
4	SDL	U	0.300							
4	SDL	L		0.960		0.000	8.000			
5	LL	U	0.400							
5	SDL	U	0.300							
5	SDL	L		0.960		0.000	8.000			

NOTE: SELFWEIGHT INCLUSION REQUIRED (SW= SELF WEIGHT Computed from geometry input and treated as dead loading. Unit selfweight W = 2400.0 Kg/m^3
NOTE: LIVE LOADING is SKIPPED with a skip factor of 1.00

3.2 Compiled loads

Span	Class	Type	P1	P2	F	M	A	B	C	Reduction Factor
			T/m	T/m	T	T-m	m	m	m	%
1	LL	P	1.488				0.000	8.000		0.000
1	SDL	P	1.116				0.000	8.000		
1	SDL	P	0.960				0.000	8.000		
1	SW	P	2.732				0.000	8.000		
2	LL	P	1.488				0.000	8.000		0.000
2	SDL	P	1.116				0.000	8.000		
2	SDL	P	0.960				0.000	8.000		
2	SW	P	2.732				0.000	8.000		
3	LL	P	1.488				0.000	8.000		0.000
3	SDL	P	1.116				0.000	8.000		
3	SDL	P	0.960				0.000	8.000		
3	SW	P	2.732				0.000	8.000		
4	LL	P	1.488				0.000	8.000		0.000
4	SDL	P	1.116				0.000	8.000		
4	SDL	P	0.960				0.000	8.000		
4	SW	P	2.732				0.000	8.000		
5	LL	P	1.488				0.000	8.000		0.000
5	SDL	P	1.116				0.000	8.000		
5	SDL	P	0.960				0.000	8.000		
5	SW	P	2.732				0.000	8.000		

7 - SELECTED POST-TENSIONING FORCES AND TENDON PROFILES

7.1 Tendon Profile

Tendon A

Span	Type	X1/L	X2/L	X3/L	A/L
1	1	0.100	0.500	0.100	---
2	1	0.100	0.500	0.100	---
3	1	0.100	0.500	0.100	---
4	1	0.100	0.500	0.100	---
5	1	0.100	0.500	0.100	---

7.2 Selected Post-Tensioning Forces and Tendon Drape

Tendon A

Span	Force	CGS Left	CGS C1	CGS C2	CGS Right	P/A	Wbal	WBal (%DL)
	T	cm	cm	cm	cm	kg/cm2	T/-	
1	140.453	-15.56	---	-29.40	-4.20	12.34	3.427	71
2	128.032	-4.20	---	-29.40	-4.20	11.25	4.033	84
3	104.250	-4.20	---	-29.40	-4.20	9.16	3.284	68
4	128.032	-4.20	---	-29.40	-4.20	11.25	4.033	84
5	140.453	-4.20	---	-29.40	-15.56	12.34	3.427	71

All Tendons

Span	Force	Total P/A	Total WBal (%DL)
	T	kg/cm2	
1	140.453	12.34	71
2	128.032	11.25	84
3	104.25	9.16	68
4	128.032	11.25	84
5	140.453	12.34	71

Approximate weight of strand: 414.3 Kg

7.3 Tendon Extents and Stressing Conditions

Type	Num	Force	Left End	Right End	From	To	Extension
A	13	9.98	Live	Live	1	5	---

7.4 Required Minimum Post-Tensioning Forces

	Based on Stress Conditions			Based on Minimum P/A		
Type	Left	Center	Right	Left	Center	Right
	T	T	T	T	T	T
1	16.01	33.33	59.05	100.18	100.18	100.18
2	49.27	17.56	41.25	100.18	100.18	100.18
3	46.41	19.54	46.41	100.18	100.18	100.18
4	41.24	17.56	49.27	100.18	100.18	100.18
5	59.04	33.33	16.01	100.18	100.18	100.18

7.5 Service Stresses (tension shown positive)

Envelope of Service 1

Span	Left Top Max-T	Left Top Max-C	Left Bot Max-T	Left Bot Max-C	Center Top Max-T	Center Top Max-C	Center Bot Max-T	Center Bot Max-C	Right Top Max-T	Right Top Max-C	Right Bot Max-T	Right Bot Max-C
	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2
1	2.90	-6.26	-----	-28.83	-----	-23.73	1.90	-8.30	3.75	-7.28	-----	-33.02
2	1.20	-9.75	-----	-29.22	-----	-17.90	-----	-13.77	3.53	-7.34	-----	-27.40
3	8.02	-2.91	-----	-32.59	-----	-20.68	5.24	-5.65	8.02	-2.91	-----	-32.59
4	3.53	-7.34	-----	-27.40	-----	-17.90	-----	-13.77	1.21	-9.75	-----	-29.22
5	3.75	-7.28	-----	-33.02	-----	-23.73	1.90	-8.30	2.90	-6.26	-----	-28.83

7.6 Post-Tensioning Balance Moments, Shears and Reactions
Span Moments and Shears

Span	Moment Left	Moment Center	Moment Right	Shear Left	Shear Right
	T-m	T-m	T-m	T	T
1	11.46	-11.44	18.69	1.12	1.12
2	18.85	-12.76	18.04	0.11	0.11
3	15.52	-9.88	15.52	0.00	0.00
4	18.04	-12.76	18.85	-0.11	-0.11
5	18.69	-11.44	11.46	-1.12	-1.12

Reactions and Column Moments

Joint	Reaction	Moment Lower Column	Moment Upper Column
	T	T-m	T-m
1	-1.116	6.363	6.102
2	1.006	0.233	0.223
3	0.110	-1.367	-1.311
4	0.110	1.366	1.310
5	1.006	-0.234	-0.224
6	-1.116	-6.363	-6.102

Note: Moments are reported at face of support

8 - FACTORED MOMENTS AND REACTIONS ENVELOPE

8.1 Factored Design Moments (Not Redistributed)

Span	Left Max	Left Min	Middle Max	Middle Min	Right Max	Right Min
	T-m	T-m	T-m	T-m	T-m	T-m
1	-17.94	-8.14	35.47	26.74	-38.75	-29.07
2	-36.42	-26.11	28.67	19.38	-36.27	-25.80
3	-39.27	-28.83	25.83	16.50	-39.27	-28.83
4	-36.27	-25.80	28.67	19.39	-36.42	-26.11
5	-38.75	-29.07	35.47	26.74	-17.94	-8.14

8.2 Reactions and Column Moments

Joint	Reaction Max	Reaction Min	Moment Lower Column Max	Moment Lower Column Min	Moment Upper Column Max	Moment Upper Column Min
	T	T	T-m	T-m	T-m	T-m
1	34.55	24.04	-7.96	-14.64	-7.64	-14.04
2	77.56	66.36	7.17	-3.56	6.88	-3.41
3	75.02	63.42	4.03	-7.06	3.86	-6.77
4	75.02	63.42	7.06	-4.03	6.78	-3.86
5	77.56	66.36	3.56	-7.17	3.42	-6.88
6	34.55	24.04	14.64	7.96	14.04	7.64

8.3 Secondary Moments

Span	Left	Midspan	Right
	T-m	T-m	T-m
1	12.10	8.00	3.90
2	3.96	3.55	3.15
3	0.44	0.44	0.44
4	3.15	3.55	3.96
5	3.90	8.00	12.10

Note: Moments are reported at face of support

13 - PUNCHING SHEAR REINFORCEMENT

13.1 Critical Section Geometry

Column	Layer	Cond.	a	d	b1	b2
			cm	cm	cm	cm
1	1	3	15.87	31.73	80.86	60.86
2	1	4	15.87	31.73	96.73	60.86
3	1	4	15.87	31.73	96.73	60.86
4	1	4	15.87	31.73	96.73	60.86
5	1	4	15.87	31.73	96.73	60.86
6	1	3	15.87	31.73	80.86	60.86

13.2 Critical Section Stresses

Label	Layer	Cond.	Factored shear	Factored moment	Stress due to shear	Stress due to moment	Total stress	Allowable stress	Stress ratio
			T	T-m	T/cm2	T/cm2	T/cm2	T/cm2	
1	1	3	-34.55	+28.67	0.01	0.006	0.014	0.016	0.840
2	1	4	-66.47	-14.05	0.01	0.003	0.012	0.016	0.760
3	1	4	-63.96	+13.84	0.01	0.003	0.012	0.016	0.735
4	1	4	-63.96	-13.84	0.01	0.003	0.012	0.016	0.735
5	1	4	-66.47	+14.05	0.01	0.003	0.012	0.016	0.760
6	1	3	-34.55	-28.67	0.01	0.006	0.014	0.016	0.840

13.3 Punching Shear Reinforcement

Reinforcement option: Stirrups
Bar Size: 4

Col.	Dist	N_Legs	Dist	N_Legs	Dist	N_Legs	Dist	N_Legs	Dist	N_Legs
	cm		cm		cm		cm		cm	
1										
2										
3										
4										
5										
6										

Dist. = Distance measured from the face of support
Note: Columns with --- have not been checked for punching shear.
Note: Columns with *** have exceeded the maximum allowable shear stress.

14 - DEFLECTIONS

14.1 Maximum Span Deflections - Service Combination 1

Span	SW	SW+PT	SW+PT+ SDL	SW+PT+SDL +Creep	LL	X	Sustained	Total
	cm	cm	cm	cm	cm	cm	cm	cm
1	0.1	0.0	0.1	0.2(4994)	0.1(9900)	0.0(*****)	0.2(4994)	0.2(3361)
2	0.1	-0.1	0.0	0.0(45884)	0.1(10202)	0.0(*****)	0.0(45884)	0.1(13119)
3	0.1	0.0	0.0	0.1(5650)	0.1(10066)	0.0(*****)	0.1(5650)	0.2(3618)
4	0.1	-0.1	0.0	0.0(45864)	0.1(10202)	0.0(*****)	0.0(45864)	0.1(13121)
5	0.1	0.0	0.1	0.2(4993)	0.1(9900)	0.0(*****)	0.2(4993)	0.2(3361)

Note: Deflections are calculated using effective moment of inertia of cracked sections.

15 - FRICTION, ELONGATION AND LONG TERM LOSSES

15.1 Input Parameters

Parameter	Value	Parameter	Value
Type of Strand	Low Relaxation	Coefficient of Angular Friction (meu)	0.16000 1/rad
Age of Concrete at Stressing	3 days	Coefficient of Wobble Friction (K)	0.01600 rad/m
Ec at Stressing	235.00 T/cm2	Ratio of Jacking Stress	0.75
Average Relative Humidity	65.00 percent	Anchor Set	6.00 mm
Volume to Surface Ratio of Members	15.00 cm	Tendon_A Stressing Method	Both sides
Es of Strand	1970.00 T/cm2		

15.2 Long-term Losses

Tendon	Span	Left	Center	Right
		T/cm2	T/cm2	T/cm2
TENDON_A	1	0.62	0.76	0.79
TENDON_A	2	0.79	0.78	0.71
TENDON_A	3	0.66	0.65	0.66
TENDON_A	4	0.71	0.78	0.79
TENDON_A	5	0.79	0.78	0.62

15.3 Calculated Stresses After Friction and Long-term Losses

Tendon	Span	Stress Left FL Only	Stress Center FL Only	Stress Right FL Only	Stress Left FL+LTL	Stress Center FL+LTL	Stress Right FL+LTL
		T/cm2	T/cm2	T/cm2	T/cm2	T/cm2	T/cm2
TENDON_A	1	10.57	11.68	11.90	9.95	10.93	11.11
TENDON_A	2	11.90	10.70	9.70	11.09	9.92	8.99
TENDON_A	3	9.70	8.73	9.70	9.04	8.08	9.04
TENDON_A	4	9.70	10.70	11.90	8.99	9.92	11.09
TENDON_A	5	11.90	11.68	10.57	11.11	10.91	9.95

15.6 Summary

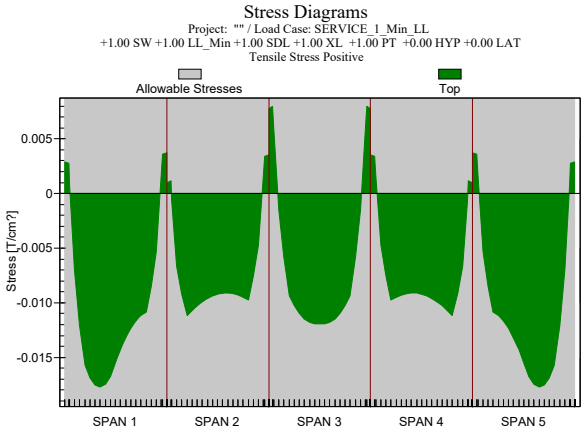
Tendon	Force	Ext. Left	Start Span	End Span	Ext. Right	Elong. Left	Elong Right	Anchor Left	Anchor Right	Max Stress ratio
	T					cm	cm			
TENDON_A	9.97	0.00	1	5	0.00	17.93	3.98	0.56	0.56	0.65

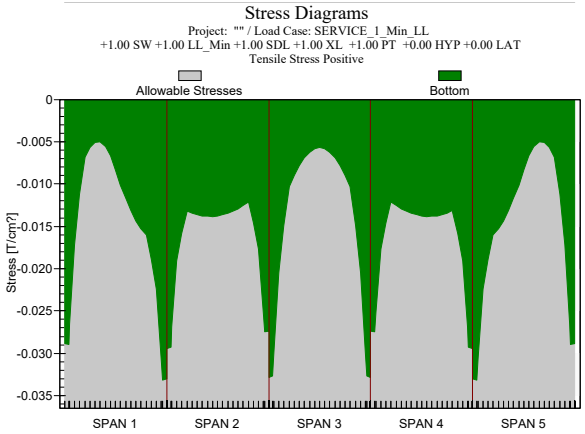
16 - Unbalanced Moment Reinforcement

16.1 Unbalanced Moment Reinforcement - No Redistribution

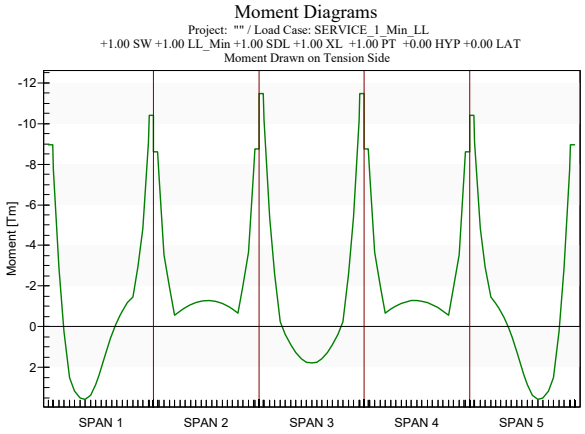
Joint	Gamma Left	Gamma Right	Width Left	Width Right	Moment Left Neg	Moment Left Pos	Moment Right Neg	Moment Right Pos	As Top	As Bot	n Bar Top	n Bar Bot
			m	m	T-m	T-m	T-m	T-m	cm2	cm2		
1	0.00	0.57	0.00	1.43	0.00	0.00	-17.94	0.00	0.00	0.00	0	0
2	0.57	0.57	1.43	1.43	-2.95	0.00	0.00	0.00	0.00	0.00	0	0
3	0.57	0.57	1.43	1.43	0.00	0.00	-3.03	0.00	0.00	0.00	0	0
4	0.57	0.57	1.43	1.43	-3.03	0.00	0.00	0.00	0.00	0.00	0	0
5	0.57	0.57	1.43	1.43	0.00	0.00	-2.96	0.00	0.00	0.00	0	0
6	0.57	0.00	1.43	0.00	-17.94	0.00	0.00	0.00	0.00	0.00	0	0

LOAD COMBINATION: SERVICE_1_Min_LL

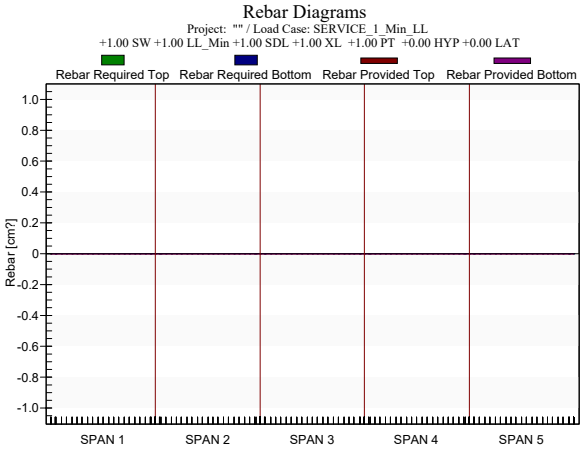




SERVICE COMBINATION STRESSES
(Tension stress positive)

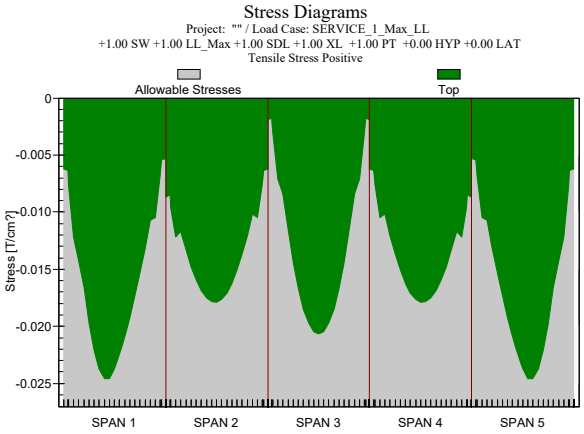


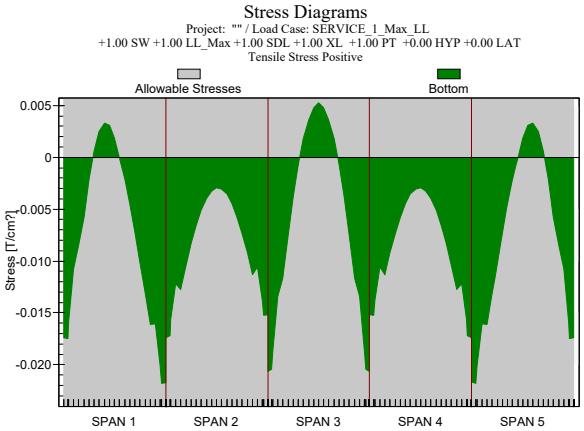
DESIGN MOMENT
(Moment is drawn on tension side)



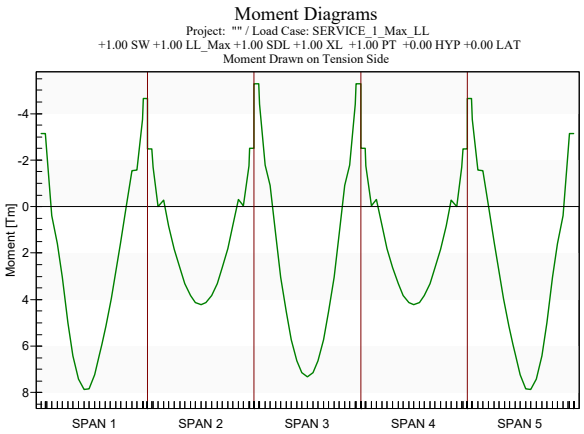
REINFORCEMENT
REQUIRED AND PROVIDED

LOAD COMBINATION: SERVICE_1_Max_LL

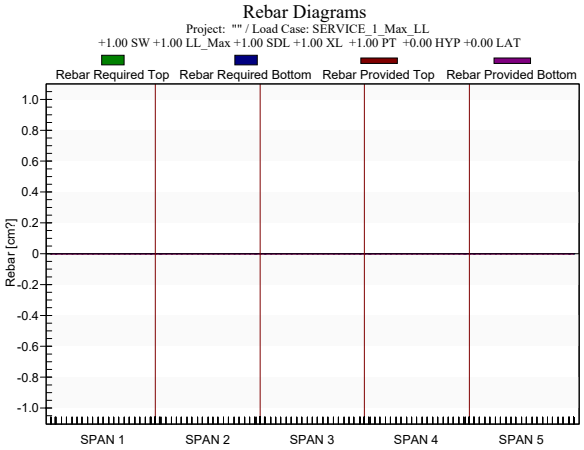




SERVICE COMBINATION STRESSES
(Tension stress positive)

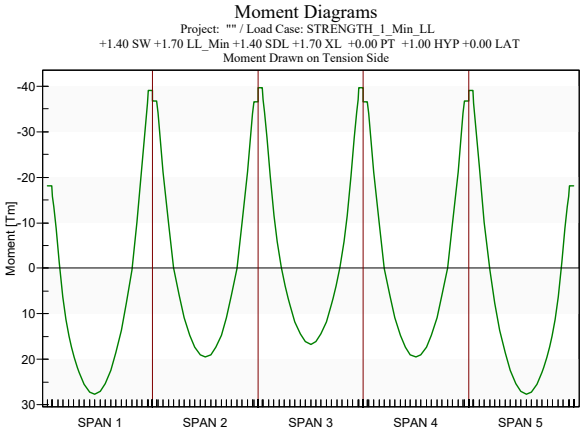


DESIGN MOMENT
(Moment is drawn on tension side)

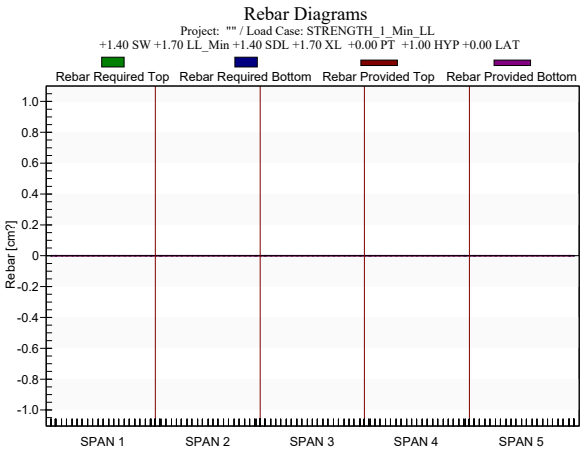


REINFORCEMENT
REQUIRED AND PROVIDED

LOAD COMBINATION: STRENGTH_1_Min_LL

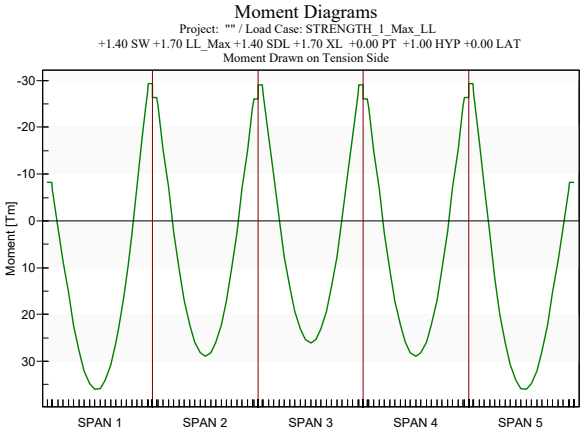


DESIGN MOMENT
(Moment is drawn on tension side)

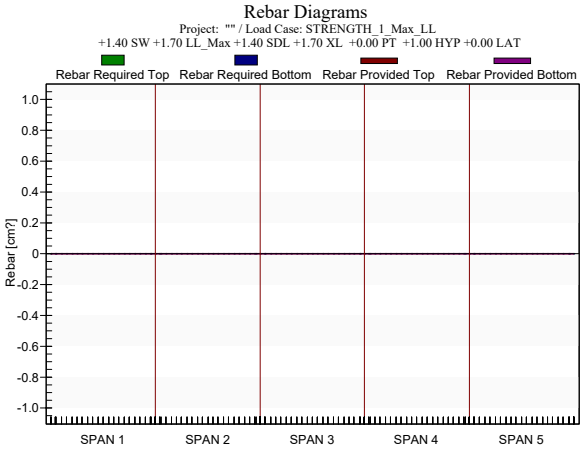


REINFORCEMENT
REQUIRED AND PROVIDED

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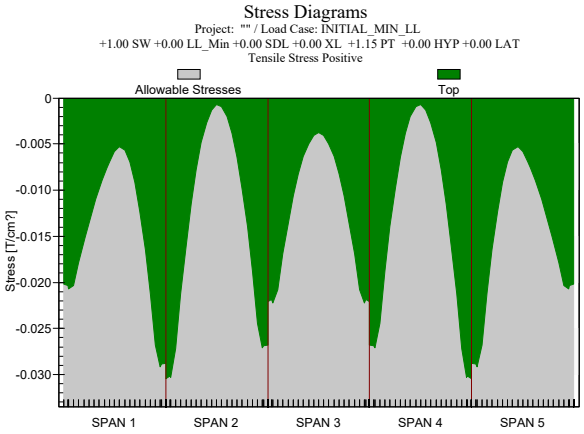


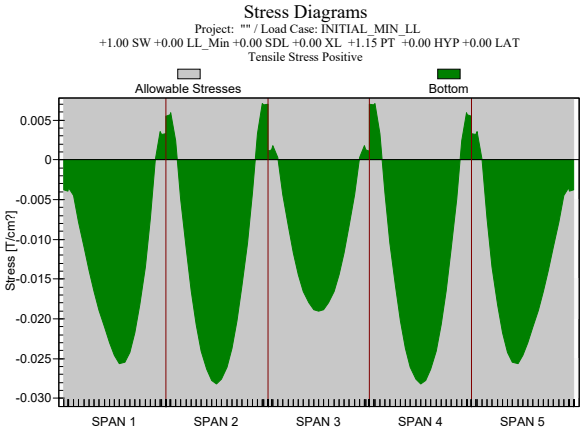
DESIGN MOMENT
(Moment is drawn on tension side)



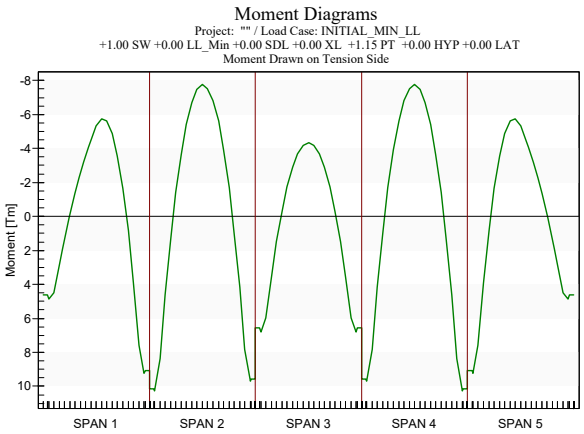
REINFORCEMENT
REQUIRED AND PROVIDED

LOAD COMBINATION: INITIAL_MIN_LL

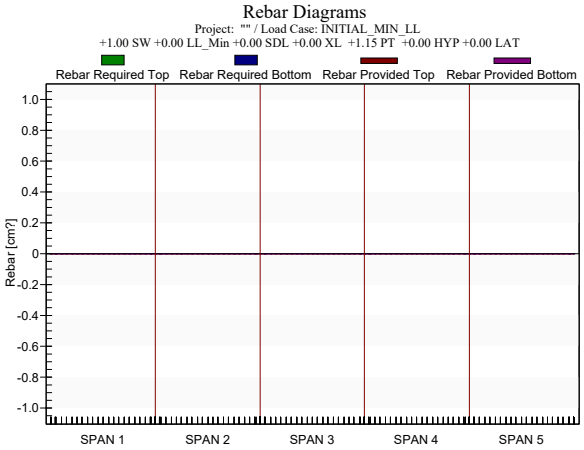




SERVICE COMBINATION STRESSES
(Tension stress positive)

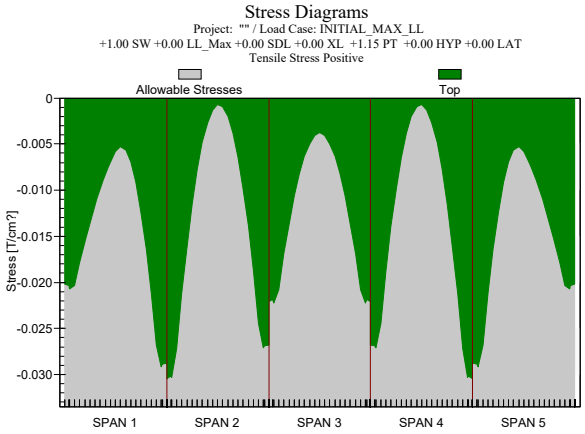


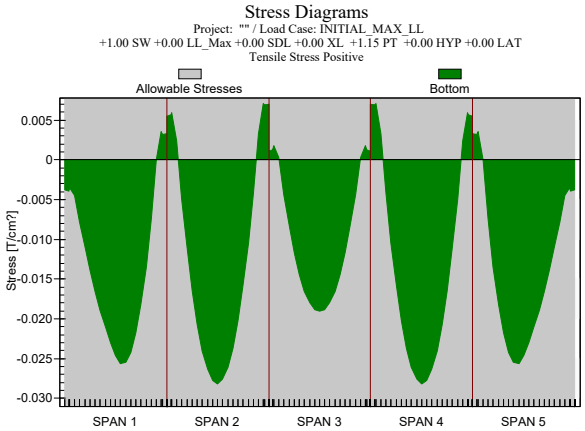
DESIGN MOMENT
(Moment is drawn on tension side)



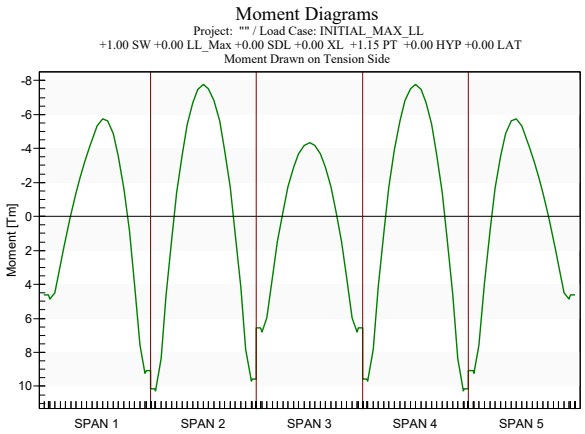
REINFORCEMENT
REQUIRED AND PROVIDED

LOAD COMBINATION: INITIAL_MAX_LL

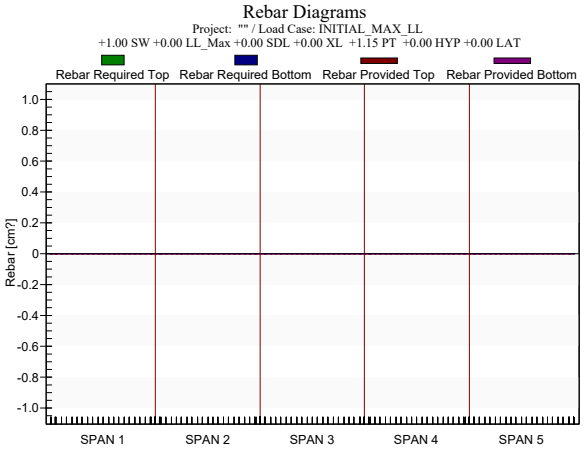




SERVICE COMBINATION STRESSES
(Tension stress positive)

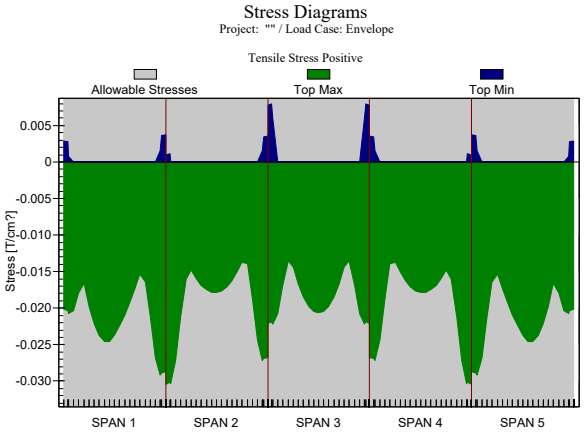


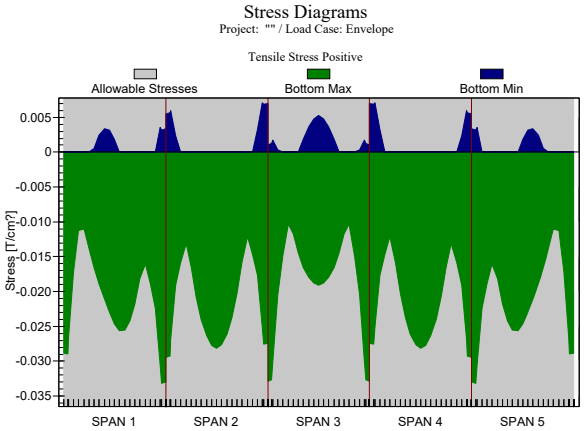
DESIGN MOMENT
(Moment is drawn on tension side)



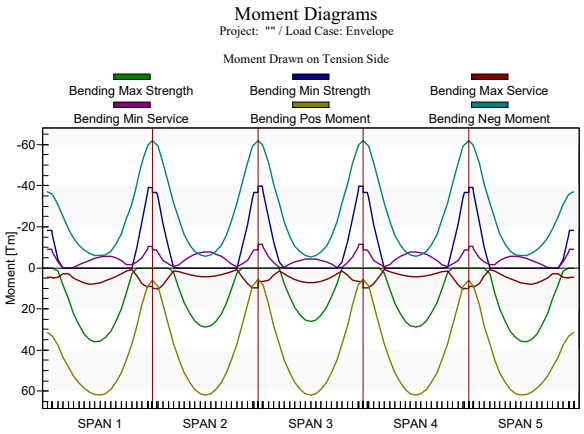
REINFORCEMENT
REQUIRED AND PROVIDED

LOAD COMBINATION: Envelope

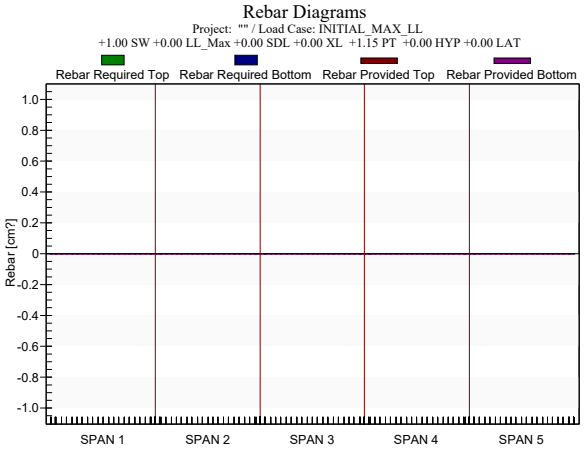




SERVICE COMBINATION STRESSES
(Tension stress positive)



DESIGN MOMENT
(Moment is drawn on tension side)



REINFORCEMENT
REQUIRED AND PROVIDED

2F,3F,5F and Roof -LINE-GK

1 - USER SPECIFIED GENERAL ANALYSIS AND DESIGN PARAMETERS

Parameter	Value	Parameter	Value
Concrete		Fy (Main bars)	4.00 T/cm 2
F'c for BEAMS/SLABS	320.00 Kg/cm 2	Fy (Shear reinforcement)	4.00 T/cm 2
F'ci for BEAMS/SLABS	240.00 Kg/cm 2	Minimum Cover at TOP	2.00 cm
For COLUMNS/WALLS	320.00 Kg/cm 2	Minimum Cover at BOTTOM	2.00 cm
Ec for BEAMS/SLABS	275.00 T/cm 2	Post-tensioning	
For COLUMNS/WALLS	275.00 T/cm 2	SYSTEM	BONDED
CREEP factor	2.00	Fpu	18.96 T/cm 2
CONCRETE WEIGHT	NORMAL	Fse	12.00 T/cm 2
UNIT WEIGHT	2400.00 Kg/m 3	Strand area	0.990 cm 2
Tension stress limits / (f'c)1/2		Min CGS from TOP	4.20 cm
At Top	1.600	Min CGS from BOT for interior spans	5.60 cm
At Bottom	1.600	Min CGS from BOT for exterior spans	5.60 cm
Compression stress limits / f'c		Min average precompression	8.80 Kg/cm 2
At all locations	0.450	Max spacing / slab depth	8.00
Tension stress limits (initial) / (f'c)1/2		Analysis and design options	
At Top	0.795	Structural system - Equiv Frame	TWO-WAY
At Bottom	0.795	Moments reduced to face of support	YES
Compression stress limits (initial) / f'c		Moment Redistribution	NO
At all locations	0.600	DESIGN CODE SELECTED	ACI-318 (1999)
Reinforcement			

2 - INPUT GEOMETRY

2.1 Principal Span Data of Uniform Spans

Span	Form	Length	Width	Depth	TF Width	TF Thick.	BF/MF Width	BF/MF Thick.	Rh	Right Mult.	Left Mult.
		m	cm	cm	cm	cm	cm	cm	cm		
1	1	6.53	100.00	27.00					0.00	3.26	0.33
2	1	6.53	100.00	27.00					0.00	3.26	0.33
3	1	6.53	100.00	27.00					0.00	3.26	0.33

2.5 Drop Cap and Drop Panel Data

Joint	Cap T	Cap B	Cap DL	Cap DR	Drop TL	Drop TR	Drop B	Drop L	Drop R
	cm	cm	cm	cm	cm	cm	cm	cm	cm
1	35.00	173.00	0.00	326.50	0.00	0.00	0.00	0.00	0.00
2	35.00	173.00	326.50	326.50	0.00	0.00	0.00	0.00	0.00
3	35.00	173.00	326.50	326.50	0.00	0.00	0.00	0.00	0.00
4	35.00	173.00	326.50	0.00	0.00	0.00	0.00	0.00	0.00

2.7 Support Width and Column Data

Joint	Support Width	Length LC	B(DIA.) LC	D LC	% LC	CBC LC	Length UC	B(DIA.) UC	D UC	% UC	CBC UC
	cm	m	cm	cm			m	cm	cm		
1	45.0	4.3	65.0	45.0	100	(2)	4.2	65.0	45.0	100	(2)
2	45.0	4.3	65.0	45.0	100	(1)	4.2	65.0	45.0	100	(1)
3	45.0	4.3	65.0	45.0	100	(1)	4.2	65.0	45.0	100	(1)
4	45.0	4.3	65.0	45.0	100	(2)	4.2	65.0	45.0	100	(2)

3 - INPUT APPLIED LOADING

3.1 Loading As Appears in User's Input Screen

Span	Class	Type	W	P1	P2	A	B	C	F	M
			T/m2	T/m	T/m	m	m	m	T	T-m
1	LL	U	0.400							
1	SDL	U	0.300							
1	SDL	L		0.960		0.000	6.530			
2	LL	U	0.400							
2	SDL	U	0.300							
2	SDL	L		0.960		0.000	6.530			
3	LL	U	0.400							
3	SDL	U	0.300							
3	SDL	L		0.960		0.000	6.530			

NOTE: SELFWEIGHT INCLUSION REQUIRED (SW= SELF WEIGHT Computed from geometry input and treated as dead loading. Unit selfweight W = 2400.0 Kg/m^3
NOTE: LIVE LOADING is SKIPPED with a skip factor of 1.00

3.2 Compiled loads

Span	Class	Type	P1	P2	F	M	A	B	C	Reduction Factor
			T/m	T/m	T	T-m	m	m	m	%
1	LL	P	1.436				0.000	6.530		0.000
1	SDL	P	1.077				0.000	6.530		
1	SDL	P	0.960				0.000	6.530		
1	SW	P	2.658				0.000	6.530		
2	LL	P	1.436				0.000	6.530		0.000
2	SDL	P	1.077				0.000	6.530		
2	SDL	P	0.960				0.000	6.530		
2	SW	P	2.658				0.000	6.530		
3	LL	P	1.436				0.000	6.530		0.000
3	SDL	P	1.077				0.000	6.530		
3	SDL	P	0.960				0.000	6.530		
3	SW	P	2.658				0.000	6.530		

7 - SELECTED POST-TENSIONING FORCES AND TENDON PROFILES

7.1 Tendon Profile

Tendon A

Span	Type	X1/L	X2/L	X3/L	A/L
1	1	0.100	0.500	0.100	---
2	1	0.100	0.500	0.100	---
3	1	0.100	0.500	0.100	---

7.2 Selected Post-Tensioning Forces and Tendon Drape

Tendon A

Span	Force	CGS Left	CGS C1	CGS C2	CGS Right	P/A	Wbal	WBal (%DL)
	T	cm	cm	cm	cm	kg/cm2	T/-	
1	125.629	-15.70	---	-29.40	-4.20	11.34	4.584	98
2	121.983	-4.20	---	-24.50	-4.20	11.01	4.646	99
3	125.629	-4.20	---	-29.40	-15.70	11.34	4.584	98

All Tendons

Span	Force	Total P/A	Total WBal (%DL)

	T	kg/cm2	
1	125.629	11.34	98
2	121.983	11.01	99
3	125.629	11.34	98

Approximate weight of strand: 192.0 Kg

7.3 Tendon Extents and Stressing Conditions

Type	Num	Force	Left End	Right End	From	To	Extension
A	12	10.56	Live	Live	1	3	---

7.4 Required Minimum Post-Tensioning Forces

	Based on Stress Conditions			Based on Minimum P/A		
Type	Left	Center	Right	Left	Center	Right
	T	T	T	T	T	T
1	0.00	23.70	38.38	97.48	97.48	97.48
2	17.11	0.00	17.11	97.48	97.48	97.48
3	38.38	23.69	0.00	97.48	97.48	97.48

7.5 Service Stresses (tension shown positive)

Envelope of Service 1

Span	Left Top Max-T	Left Top Max-C	Left Bot Max-T	Left Bot Max-C	Center Top Max-T	Center Top Max-C	Center Bot Max-T	Center Bot Max-C	Right Top Max-T	Right Top Max-C	Right Bot Max-T	Right Bot Max-C
	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2
1	-----	-15.51	-----	-5.86	-----	-18.01	-----	-14.00	-----	-13.20	-----	-23.00
2	-----	-13.05	-----	-21.18	-----	-13.66	-----	-17.21	-----	-13.05	-----	-21.18
3	-----	-13.20	-----	-23.00	-----	-18.01	-----	-14.00	-----	-15.51	-----	-5.86

7.6 Post-Tensioning Balance Moments, Shears and Reactions

Span Moments and Shears

Span	Moment Left	Moment Center	Moment Right	Shear Left	Shear Right
	T-m	T-m	T-m	T	T
1	-0.20	-13.92	20.07	-1.01	-1.01
2	16.01	-8.17	16.00	0.00	0.00
3	20.07	-13.92	-0.20	1.01	1.01

Reactions and Column Moments

Joint	Reaction	Moment Lower Column	Moment Upper Column
	T	T-m	T-m
1	1.013	0.000	0.000
2	-1.014	-2.274	-2.181
3	-1.013	2.275	2.182
4	1.014	0.000	0.000

Note: Moments are reported at face of support

8 - FACTORED MOMENTS AND REACTIONS ENVELOPE

8.1 Factored Design Moments (Not Redistributed)

Span	Left Max	Left Min	Middle Max	Middle Min	Right Max	Right Min
	T-m	T-m	T-m	T-m	T-m	T-m
1	3.68	5.15	29.97	20.72	-31.25	-22.52
2	-28.44	-21.54	16.89	8.84	-28.43	-21.53
3	-31.24	-22.51	29.98	20.73	3.68	5.15

8.2 Reactions and Column Moments

Joint	Reaction Max	Reaction Min	Moment Lower Column Max	Moment Lower Column Min	Moment Upper Column Max	Moment Upper Column Min
	T	T	T-m	T-m	T-m	T-m
1	23.90	17.08	0.00	0.00	0.00	0.00
2	65.65	54.39	5.08	-1.29	4.87	-1.24
3	65.65	54.39	1.29	-5.08	1.24	-4.87
4	23.90	17.08	0.00	0.00	0.00	0.00

8.3 Secondary Moments

Span	Left	Midspan	Right
	T-m	T-m	T-m
1	0.23	3.31	6.39
2	2.16	2.16	2.16
3	6.39	3.31	0.23

Note: Moments are reported at face of support

10 - MILD STEEL - NO REDISTRIBUTION

10.1 Required Rebar

10.2 Provided Rebar

13 - PUNCHING SHEAR REINFORCEMENT

13.1 Critical Section Geometry

Column	Layer	Cond.	a	d	b1	b2
			cm	cm	cm	cm
1	1	3	15.87	31.73	60.86	80.86
2	1	4	15.87	31.73	76.73	80.86
3	1	4	15.87	31.73	76.73	80.86
4	1	3	15.87	31.73	60.86	80.86

13.2 Critical Section Stresses

Label	Layer	Cond.	Factored shear	Factored moment	Stress due to shear	Stress due to moment	Total stress	Allowable stress	Stress ratio
			T	T-m	T/cm2	T/cm2	T/cm2	T/cm2	
1	1	3	-23.89	-0.00	0.01	0.002	0.007	0.016	0.431
2	1	4	-64.77	-4.99	0.01	0.001	0.009	0.016	0.583
3	1	4	-64.77	+4.99	0.01	0.001	0.009	0.016	0.583
4	1	3	-23.89	+0.00	0.01	0.002	0.007	0.016	0.431

13.3 Punching Shear Reinforcement

Reinforcement option: Stirrups

Bar Size: 4

Col.	Dist	N_Legs	Dist	N_Legs	Dist	N_Legs	Dist	N_Legs	Dist	N_Legs
	cm		cm		cm		cm		cm	
1										
2										
3										
4										

14 - DEFLECTIONS

14.1 Maximum Span Deflections - Service Combination 1

Span	SW	SW+PT	SW+PT+ SDL	SW+PT+SDL +Creep	LL	X	Sustained	Total
	cm	cm	cm	cm	cm	cm	cm	cm
1	0.1	-0.1	0.0	0.0(14786)	0.1(9269)	0.0(*****)	0.0(14786)	0.1(6321)
2	0.0	0.0	0.0	0.0(13989)	0.0(23616)	0.0(*****)	0.0(13989)	-0.1(8785)
3	0.1	-0.1	0.0	0.0(14787)	0.1(9270)	0.0(*****)	0.0(14787)	0.1(6322)

Note: Deflections are calculated using effective moment of inertia of cracked sections.

15 - FRICTION, ELONGATION AND LONG TERM LOSSES

15.1 Input Parameters

Parameter	Value	Parameter	Value
Type of Strand	Low Relaxation	Coefficient of Angular Friction (meu)	0.16000 1/rad
Age of Concrete at Stressing	3 days	Coefficient of Wobble Friction (K)	0.01600 rad/m
Ec at Stressing	235.00 T/cm2	Ratio of Jacking Stress	0.75
Average Relative Humidity	65.00 percent	Anchor Set	6.00 mm
Volume to Surface Ratio of Members	15.00 cm	Tendon_A Stressing Method	Both sides
Es of Strand	1970.00 T/cm2		

15.2 Long-term Losses

Tendon	Span	Left	Center	Right
		T/cm2	T/cm2	T/cm2
TENDON_A	1	0.60	0.80	0.85
TENDON_A	2	0.80	0.70	0.80
TENDON_A	3	0.85	0.81	0.60

15.3 Calculated Stresses After Friction and Long-term Losses

Tendon	Span	Stress Left FL Only	Stress Center FL Only	Stress Right FL Only	Stress Left FL+LTL	Stress Center FL+LTL	Stress Right FL+LTL
		T/cm2	T/cm2	T/cm2	T/cm2	T/cm2	T/cm2
TENDON_A	1	10.37	11.37	12.04	9.76	10.57	11.20
TENDON_A	2	12.04	10.96	12.04	11.23	10.27	11.23
TENDON_A	3	12.04	11.37	10.37	11.20	10.56	9.76

15.6 Summary

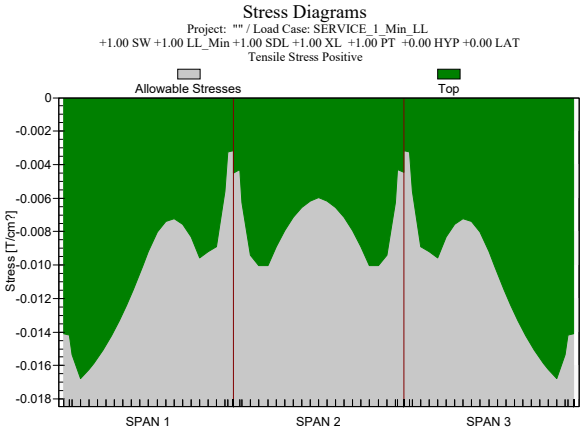
Tendon	Force	Ext. Left	Start Span	End Span	Ext. Right	Elong. Left	Elong Right	Anchor Left	Anchor Right	Max Stress ratio
	T					cm	cm			
TENDON_A	10.57	0.00	1	3	0.00	10.46	0.89	0.55	0.55	0.65

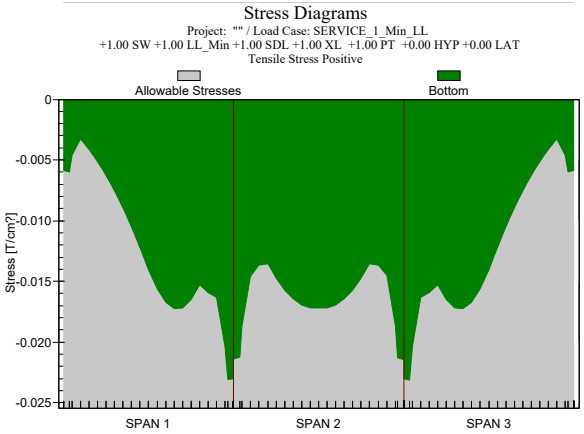
16 - Unbalanced Moment Reinforcement

16.1 Unbalanced Moment Reinforcement - No Redistribution

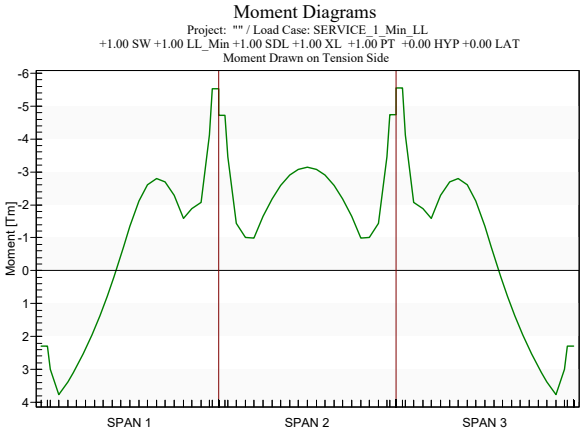
Joint	Gamma Left	Gamma Right	Width Left	Width Right	Moment Left Neg	Moment Left Pos	Moment Right Neg	Moment Right Pos	As Top	As Bot	n Bar Top	n Bar Bot
			m	m	T-m	T-m	T-m	T-m	cm2	cm2		
1	0.00	0.63	0.00	1.50	0.00	0.00	0.00	5.15	0.00	0.00	0	0
2	0.63	0.63	1.50	1.50	-2.81	0.00	0.00	0.00	0.00	0.00	0	0
3	0.63	0.63	1.50	1.50	0.00	0.00	-2.81	0.00	0.00	0.00	0	0
4	0.63	0.00	1.50	0.00	0.00	5.15	0.00	0.00	0.00	0.00	0	0

LOAD COMBINATION: SERVICE_1_Min_LL

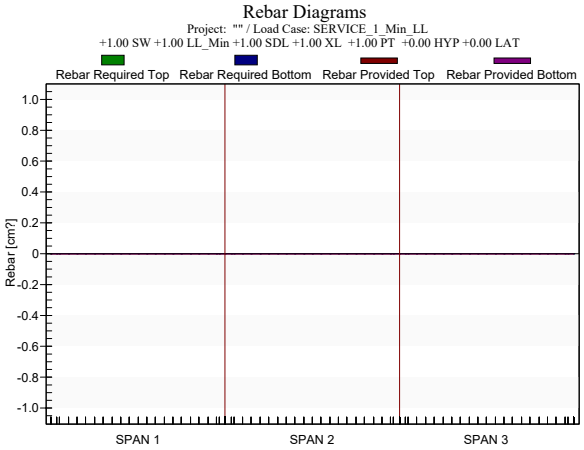




SERVICE COMBINATION STRESSES
(Tension stress positive)

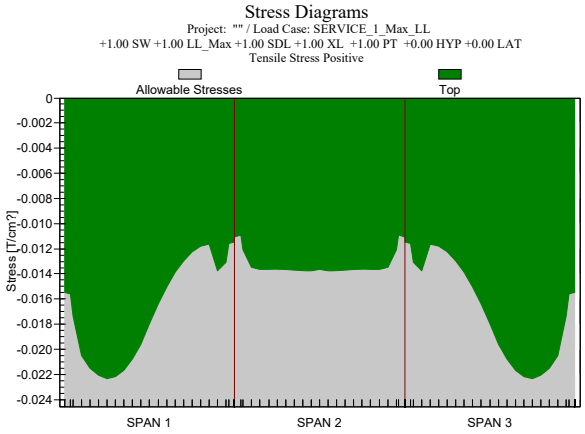


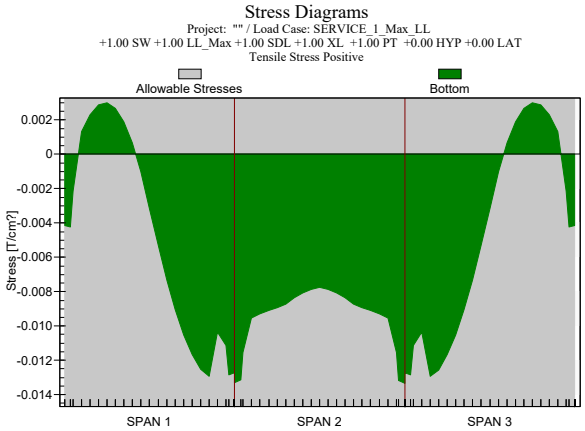
DESIGN MOMENT
(Moment is drawn on tension side)



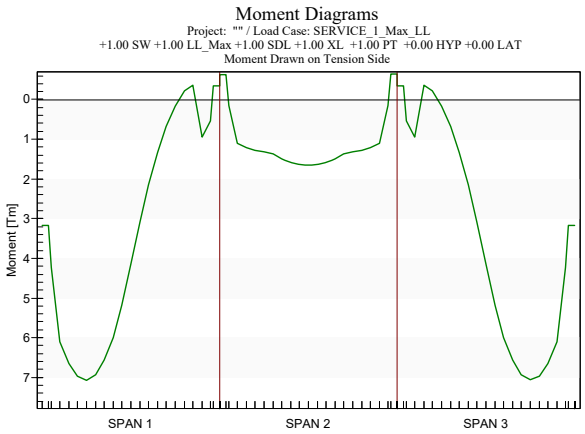
REINFORCEMENT
REQUIRED AND PROVIDED

LOAD COMBINATION: SERVICE_1_Max_LL

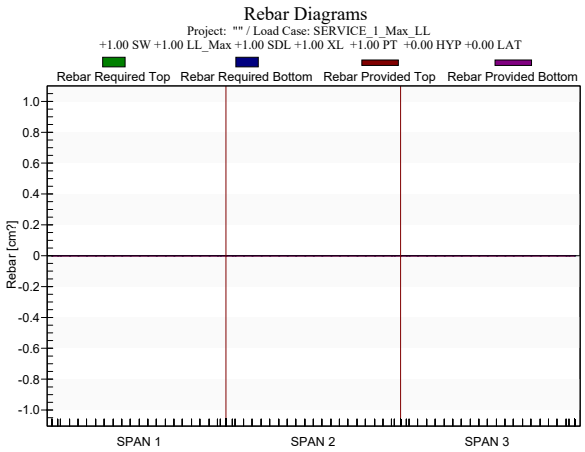




SERVICE COMBINATION STRESSES
(Tension stress positive)

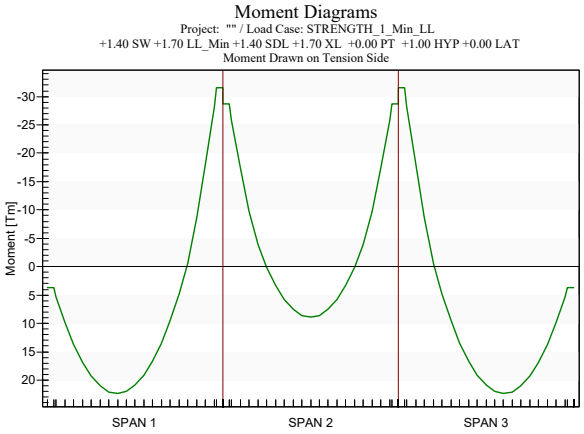


DESIGN MOMENT
(Moment is drawn on tension side)

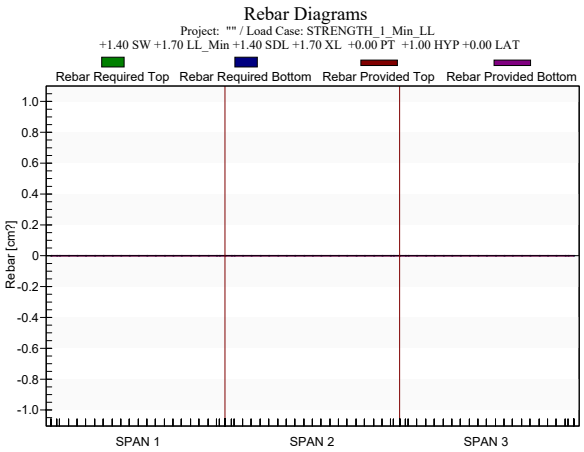


REINFORCEMENT
REQUIRED AND PROVIDED

LOAD COMBINATION: STRENGTH_1_Min_LL

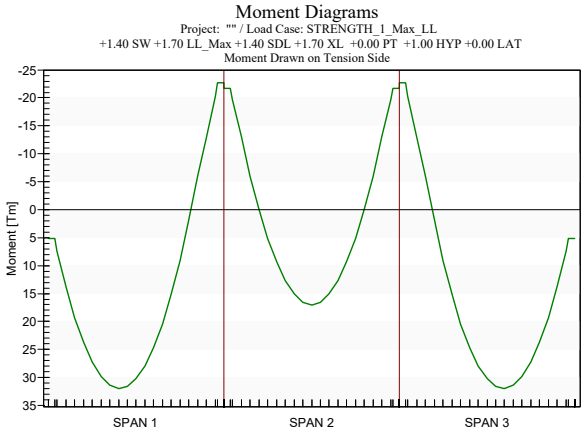


DESIGN MOMENT
(Moment is drawn on tension side)

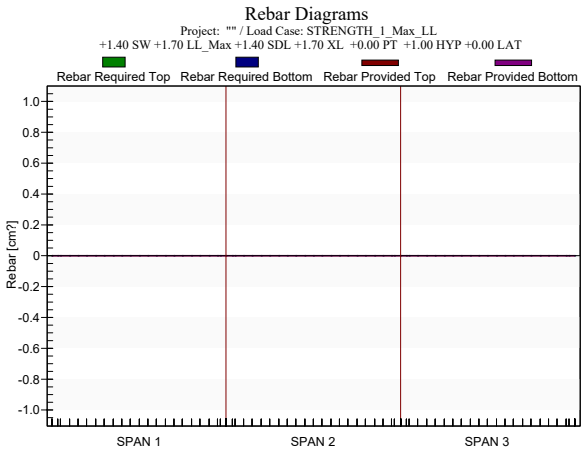


REINFORCEMENT
REQUIRED AND PROVIDED

LOAD COMBINATION: STRENGTH_1_Max_LL

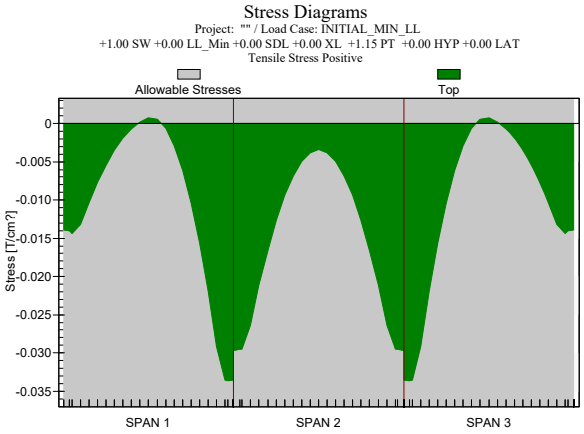


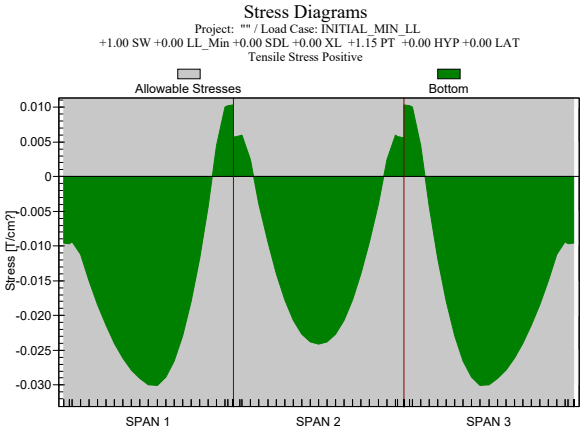
DESIGN MOMENT
(Moment is drawn on tension side)



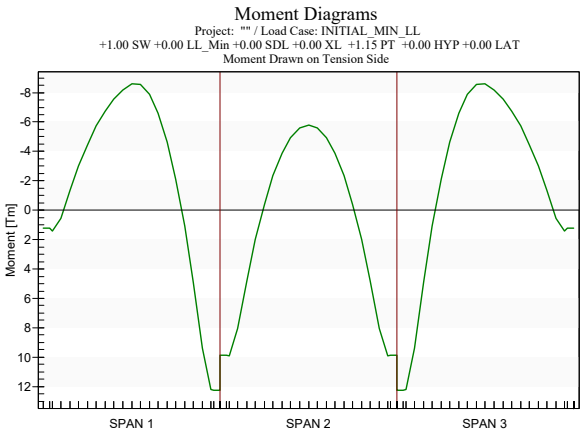
REINFORCEMENT
REQUIRED AND PROVIDED

LOAD COMBINATION: INITIAL_MIN_LL

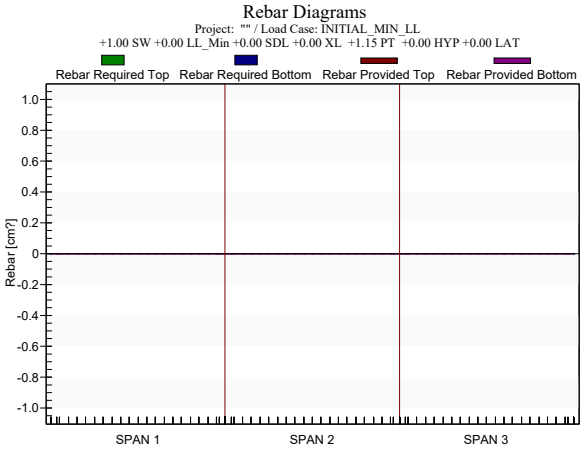




SERVICE COMBINATION STRESSES
(Tension stress positive)

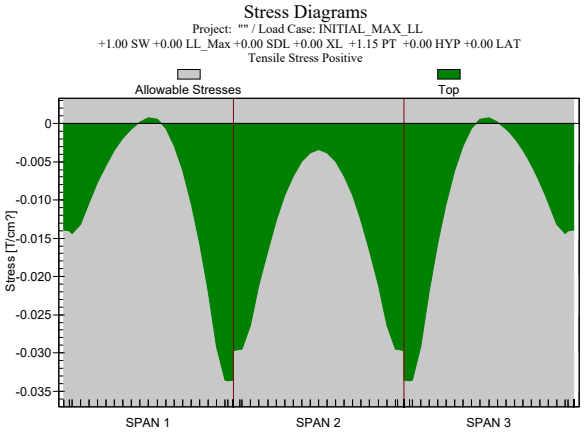


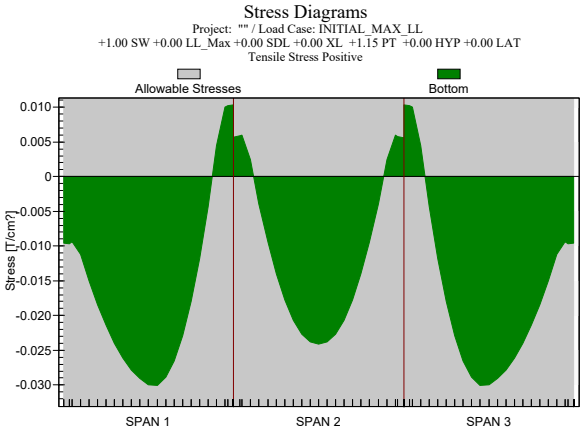
DESIGN MOMENT
(Moment is drawn on tension side)



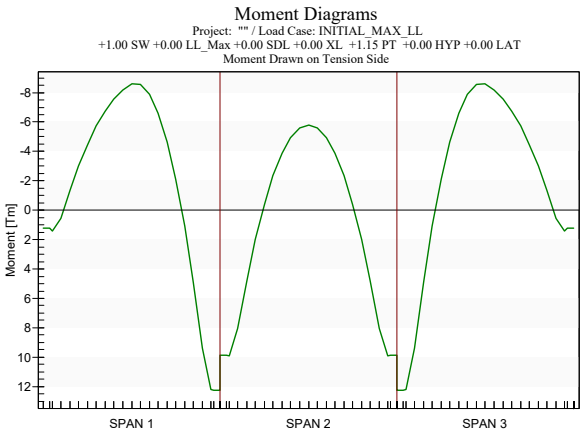
REINFORCEMENT
REQUIRED AND PROVIDED

LOAD COMBINATION: INITIAL_MAX_LL

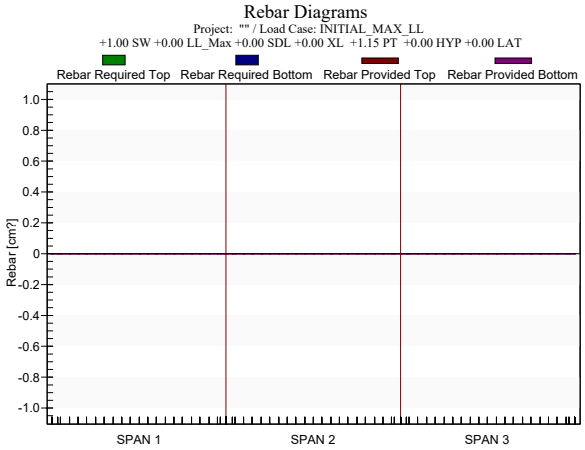




SERVICE COMBINATION STRESSES
(Tension stress positive)

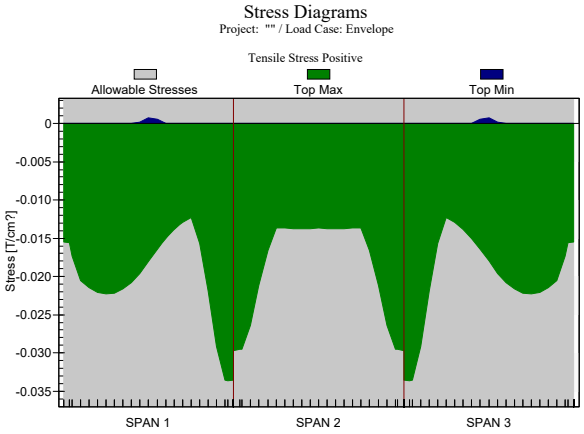


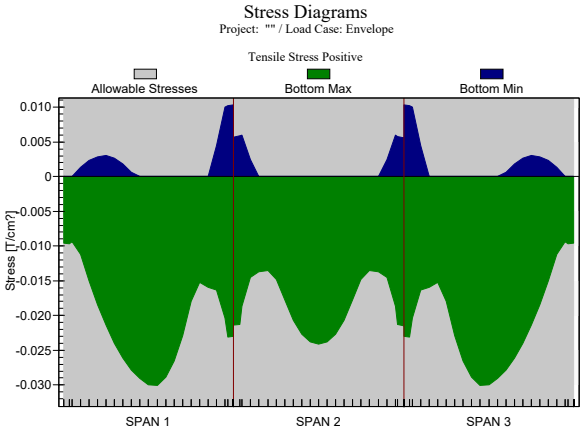
DESIGN MOMENT
(Moment is drawn on tension side)



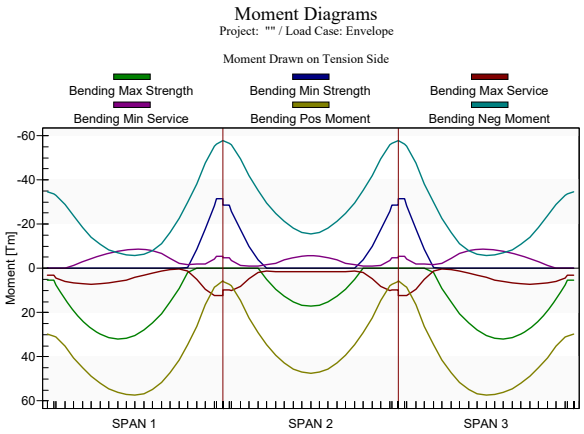
REINFORCEMENT
REQUIRED AND PROVIDED

LOAD COMBINATION: Envelope

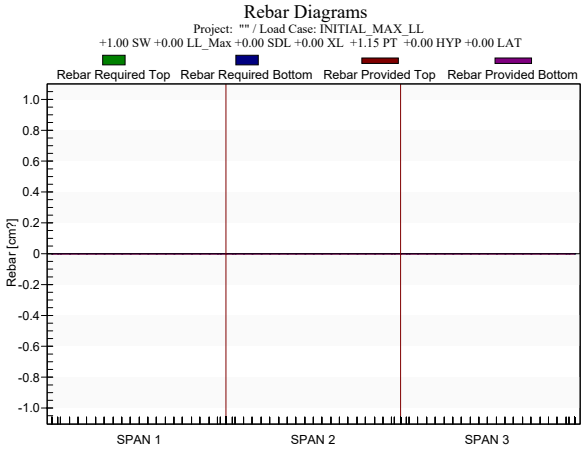




SERVICE COMBINATION STRESSES
(Tension stress positive)



DESIGN MOMENT
(Moment is drawn on tension side)



REINFORCEMENT
REQUIRED AND PROVIDED

4F -LINE-G4

1 - USER SPECIFIED GENERAL ANALYSIS AND DESIGN PARAMETERS

Parameter	Value	Parameter	Value
Concrete		Fy (Main bars)	4.00 T/cm 2
F'c for BEAMS/SLABS	320.00 Kg/cm 2	Fy (Shear reinforcement)	4.00 T/cm 2
F'ci for BEAMS/SLABS	240.00 Kg/cm 2	Minimum Cover at TOP	2.00 cm
For COLUMNS/WALLS	320.00 Kg/cm 2	Minimum Cover at BOTTOM	2.00 cm
Ec for BEAMS/SLABS	275.00 T/cm 2	Post-tensioning	
For COLUMNS/WALLS	275.00 T/cm 2	SYSTEM	BONDED
CREEP factor	2.00	Fpu	18.96 T/cm 2
CONCRETE WEIGHT	NORMAL	Fse	12.00 T/cm 2
UNIT WEIGHT	2400.00 Kg/m 3	Strand area	0.990 cm 2
Tension stress limits / (f'c)1/2		Min CGS from TOP	4.20 cm
At Top	1.600	Min CGS from BOT for interior spans	5.60 cm
At Bottom	1.600	Min CGS from BOT for exterior spans	5.60 cm
Compression stress limits / f'c		Min average precompression	8.80 Kg/cm 2
At all locations	0.450	Max spacing / slab depth	8.00
Tension stress limits (initial) / (f'c)1/2		Analysis and design options	
At Top	0.795	Structural system - Equiv Frame	TWO-WAY
At Bottom	0.795	Moments reduced to face of support	YES
Compression stress limits (initial) / f'c		Moment Redistribution	NO
At all locations	0.600	DESIGN CODE SELECTED	ACI-318 (1999)
Reinforcement			

2 - INPUT GEOMETRY

2.1 Principal Span Data of Uniform Spans

Span	Form	Length	Width	Depth	TF Width	TF Thick.	BF/MF Width	BF/MF Thick.	Rh	Right Mult.	Left Mult.
		m	cm	cm	cm	cm	cm	cm	cm		
1	1	8.00	100.00	30.00					0.00	3.27	0.23
2	1	8.00	100.00	30.00					0.00	3.27	0.23
3	1	8.00	100.00	30.00					0.00	3.27	0.23
4	1	8.00	100.00	30.00					0.00	3.27	0.23
5	1	8.00	100.00	30.00					0.00	3.27	0.23

2.5 Drop Cap and Drop Panel Data

Joint	Cap T	Cap B	Cap DL	Cap DR	Drop TL	Drop TR	Drop B	Drop L	Drop R
	cm	cm	cm	cm	cm	cm	cm	cm	cm
1	45.00	143.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00
2	45.00	143.00	400.00	400.00	0.00	0.00	0.00	0.00	0.00
3	45.00	143.00	400.00	400.00	0.00	0.00	0.00	0.00	0.00
4	45.00	143.00	400.00	400.00	0.00	0.00	0.00	0.00	0.00
5	45.00	143.00	400.00	400.00	0.00	0.00	0.00	0.00	0.00
6	45.00	143.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00

2.7 Support Width and Column Data

Joint	Support Width	Length LC	B(DIA.) LC	D LC	% LC	CBC LC	Length UC	B(DIA.) UC	D UC	% UC	CBC UC
	cm	m	cm	cm			m	cm	cm		
1	65.0	4.8	45.0	65.0	100	(1)	4.3	45.0	65.0	100	(1)
2	65.0	4.8	45.0	65.0	100	(1)	4.3	45.0	65.0	100	(1)

3	65.0	4.8	45.0	65.0	100	(1)	4.3	45.0	65.0	100	(1)
4	65.0	4.8	45.0	65.0	100	(1)	4.3	45.0	65.0	100	(1)
5	65.0	4.8	45.0	65.0	100	(1)	4.3	45.0	65.0	100	(1)
6	65.0	4.8	45.0	65.0	100	(1)	4.3	45.0	65.0	100	(1)

3 - INPUT APPLIED LOADING

3.1 Loading As Appears in User's Input Screen

Span	Class	Type	W	P1	P2	A	B	C	F	M
			T/m2	T/m	T/m	m	m	m	T	T-m
1	LL	U	1.200							
1	SDL	U	0.170							
1	SDL	L		1.080		0.000	8.000			
2	LL	U	1.200							
2	SDL	U	0.170							
2	SDL	L		1.080		0.000	8.000			
3	LL	U	1.200							
3	SDL	U	0.170							
3	SDL	L		1.080		0.000	8.000			
4	LL	U	1.200							
4	SDL	U	0.170							
4	SDL	L		1.080		0.000	8.000			
5	LL	U	1.200							
5	SDL	U	0.170							
5	SDL	L		1.080		0.000	8.000			

NOTE: SELFWEIGHT INCLUSION REQUIRED (SW= SELF WEIGHT Computed from geometry input and treated as dead loading. Unit selfweight W = 2400.0 Kg/m^3
NOTE: LIVE LOADING is SKIPPED with a skip factor of 1.00

3.2 Compiled loads

Span	Class	Type	P1	P2	F	M	A	B	C	Reduction Factor
			T/m	T/m	T	T-m	m	m	m	%
1	LL	P	4.200				0.000	8.000		0.000
1	SDL	P	0.595				0.000	8.000		
1	SDL	P	1.080				0.000	8.000		
1	SW	P	3.035				0.000	8.000		
2	LL	P	4.200				0.000	8.000		0.000
2	SDL	P	0.595				0.000	8.000		
2	SDL	P	1.080				0.000	8.000		
2	SW	P	3.035				0.000	8.000		
3	LL	P	4.200				0.000	8.000		0.000
3	SDL	P	0.595				0.000	8.000		
3	SDL	P	1.080				0.000	8.000		
3	SW	P	3.035				0.000	8.000		
4	LL	P	4.200				0.000	8.000		0.000
4	SDL	P	0.595				0.000	8.000		
4	SDL	P	1.080				0.000	8.000		
4	SW	P	3.035				0.000	8.000		
5	LL	P	4.200				0.000	8.000		0.000
5	SDL	P	0.595				0.000	8.000		
5	SDL	P	1.080				0.000	8.000		
5	SW	P	3.035				0.000	8.000		

7 - SELECTED POST-TENSIONING FORCES AND TENDON PROFILES

7.1 Tendon Profile

Tendon A

Span	Type	X1/L	X2/L	X3/L	A/L
1	1	0.100	0.500	0.100	---
2	1	0.100	0.500	0.100	---
3	1	0.100	0.500	0.100	---
4	1	0.100	0.500	0.100	---
5	1	0.100	0.500	0.100	---

7.2 Selected Post-Tensioning Forces and Tendon Drape

Tendon A

Span	Force	CGS Left	CGS C1	CGS C2	CGS Right	P/A	Wbal	WBal (%DL)
	T	cm	cm	cm	cm	kg/cm2	T/-	
1	154.165	-18.80	---	-30.00	-4.20	12.19	3.565	76
2	140.927	-4.20	---	-29.00	-4.20	11.14	4.369	93
3	113.585	-4.20	---	-30.00	-4.20	8.98	3.663	78
4	140.927	-4.20	---	-29.00	-4.20	11.14	4.369	93
5	154.165	-4.20	---	-30.00	-18.80	12.19	3.565	76

All Tendons

Span	Force	Total P/A	Total WBal (%DL)
	T	kg/cm2	
1	154.165	12.19	76
2	140.927	11.14	93
3	113.585	8.98	78
4	140.927	11.14	93
5	154.165	12.19	76

Approximate weight of strand: 446.1 Kg

7.3 Tendon Extents and Stressing Conditions

Type	Num	Force	Left End	Right End	From	To	Extension
A	14	10.13	Live	Live	1	5	---

7.4 Required Minimum Post-Tensioning Forces

	Based on Stress Conditions			Based on Minimum P/A		
Type	Left	Center	Right	Left	Center	Right
	T	T	T	T	T	T
1	0.00	78.41	82.54	111.28	111.28	111.28
2	71.85	47.82	58.57	111.28	111.28	111.28
3	64.21	52.63	64.20	111.28	111.28	111.28
4	58.57	47.82	71.85	111.28	111.28	111.28
5	82.54	78.41	0.00	111.28	111.28	111.28

7.5 Service Stresses (tension shown positive)

Envelope of Service 1

Span	Left Top Max-T	Left Top Max-C	Left Bot Max-T	Left Bot Max-C	Center Top Max-T	Center Top Max-C	Center Bot Max-T	Center Bot Max-C	Right Top Max-T	Right Top Max-C	Right Bot Max-T	Right Bot Max-C
	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2
1	5.60	-10.51	-----	-34.08	-----	-30.63	13.47	-11.76	11.99	-10.57	-----	-46.44
2	10.09	-12.21	-----	-43.29	-----	-24.48	7.41	-19.67	11.84	-10.10	-----	-40.53
3	14.60	-7.55	-----	-43.94	-----	-26.17	14.94	-12.35	14.60	-7.55	-----	-43.94
4	11.84	-10.10	-----	-40.53	-----	-24.48	7.41	-19.67	10.09	-12.21	-----	-43.30
5	11.99	-10.57	-----	-46.44	-----	-30.63	13.47	-11.76	5.60	-10.51	-----	-34.08

7.6 Post-Tensioning Balance Moments, Shears and Reactions
Span Moments and Shears

Span	Moment Left	Moment Center	Moment Right	Shear Left	Shear Right
	T-m	T-m	T-m	T	T
1	9.81	-12.31	20.71	1.48	1.48
2	20.56	-13.84	19.35	0.17	0.17
3	17.43	-10.91	17.43	0.00	0.00
4	19.35	-13.84	20.56	-0.17	-0.17
5	20.72	-12.31	9.81	-1.48	-1.48

Reactions and Column Moments

Joint	Reaction	Moment Lower Column	Moment Upper Column
	T	T-m	T-m
1	-1.478	5.428	5.410
2	1.313	0.111	0.111
3	0.165	-1.026	-1.023
4	0.165	1.027	1.023
5	1.313	-0.111	-0.111
6	-1.478	-5.428	-5.410

Note: Moments are reported at face of support

8 - FACTORED MOMENTS AND REACTIONS ENVELOPE

8.1 Factored Design Moments (Not Redistributed)

Span	Left Max	Left Min	Middle Max	Middle Min	Right Max	Right Min
	T-m	T-m	T-m	T-m	T-m	T-m
1	-28.59	-3.41	50.34	22.00	-67.16	-40.24
2	-64.48	-36.00	39.38	8.97	-63.34	-33.72
3	-66.14	-36.77	37.60	6.96	-66.14	-36.78
4	-63.35	-33.71	39.37	8.97	-64.48	-36.00
5	-67.16	-40.24	50.34	22.00	-28.58	-3.41

8.2 Reactions and Column Moments

Joint	Reaction Max	Reaction Min	Moment Lower Column Max	Moment Lower Column Min	Moment Upper Column Max	Moment Upper Column Min
	T	T	T-m	T-m	T-m	T-m
1	51.17	21.17	-4.98	-22.28	-4.97	-22.21
2	117.80	84.48	15.18	-10.09	15.13	-10.06
3	113.71	78.88	11.76	-14.51	11.72	-14.47
4	113.71	78.88	14.51	-11.76	14.46	-11.72
5	117.80	84.48	10.09	-15.18	10.06	-15.13
6	51.17	21.17	22.28	4.98	22.21	4.96

8.3 Secondary Moments

Span	Left	Midspan	Right
	T-m	T-m	T-m
1	10.36	4.93	-0.51
2	-0.82	-1.42	-2.03
3	-4.13	-4.13	-4.14
4	-2.03	-1.42	-0.82
5	-0.51	4.93	10.36

Note: Moments are reported at face of support

13 - PUNCHING SHEAR REINFORCEMENT

13.1 Critical Section Geometry

Column	Layer	Cond.	a	d	b1	b2
			cm	cm	cm	cm
1	1	3	20.87	41.73	85.86	65.86
2	1	4	20.87	41.73	106.73	65.86
3	1	4	20.87	41.73	106.73	65.86
4	1	4	20.87	41.73	106.73	65.86
5	1	4	20.87	41.73	106.73	65.86
6	1	3	20.87	41.73	85.86	65.86

13.2 Critical Section Stresses

Label	Layer	Cond.	Factored shear	Factored moment	Stress due to shear	Stress due to moment	Total stress	Allowable stress	Stress ratio
			T	T-m	T/cm2	T/cm2	T/cm2	T/cm2	
1	1	3	-51.18	+44.49	0.01	0.006	0.014	0.016	0.847
2	1	4	-115.74	-6.79	0.01	0.001	0.012	0.016	0.772
3	1	4	-113.72	+2.88	0.01	0.000	0.012	0.016	0.730
4	1	4	-113.72	-2.88	0.01	0.000	0.012	0.016	0.730
5	1	4	-115.74	+6.80	0.01	0.001	0.012	0.016	0.772
6	1	3	-51.18	-44.49	0.01	0.006	0.014	0.016	0.847

13.3 Punching Shear Reinforcement

Reinforcement option: Stirrups
Bar Size: 4

Col.	Dist	N_Legs	Dist	N_Legs	Dist	N_Legs	Dist	N_Legs	Dist	N_Legs
	cm		cm		cm		cm		cm	
1										
2										
3										
4										
5										
6										

Dist. = Distance measured from the face of support
Note: Columns with --- have not been checked for punching shear.
Note: Columns with *** have exceeded the maximum allowable shear stress.

14 - DEFLECTIONS

14.1 Maximum Span Deflections - Service Combination 1

Span	SW	SW+PT	SW+PT+SDL	SW+PT+SDL+Creep	LL	X	Sustained	Total
	cm	cm	cm	cm	cm	cm	cm	cm
1	0.1	0.0	0.0	0.1(8128)	0.2(5197)	0.0(*****)	0.1(8128)	0.2(3235)
2	0.1	-0.1	0.0	-0.1(15270)	-0.1(13028)	0.0(*****)	-0.1(15270)	-0.1(7030)
3	0.1	0.0	0.0	0.1(14436)	0.1(5384)	0.0(*****)	0.1(14436)	0.2(3921)
4	0.1	-0.1	0.0	-0.1(15272)	-0.1(13028)	0.0(*****)	-0.1(15272)	-0.1(7030)
5	0.1	0.0	0.0	0.1(8128)	0.2(5196)	0.0(*****)	0.1(8128)	0.2(3235)

Note: Deflections are calculated using effective moment of inertia of cracked sections.

15 - FRICTION, ELONGATION AND LONG TERM LOSSES

15.1 Input Parameters

Parameter	Value	Parameter	Value
Type of Strand	Low Relaxation	Coefficient of Angular Friction (meu)	0.16000 1/rad
Age of Concrete at Stressing	3 days	Coefficient of Wobble Friction (K)	0.01600 rad/m
Ec at Stressing	235.00 T/cm2	Ratio of Jacking Stress	0.75
Average Relative Humidity	65.00 percent	Anchor Set	6.00 mm
Volume to Surface Ratio of Members	18.75 cm	Tendon_A Stressing Method	Both sides
Es of Strand	1970.00 T/cm2		

15.2 Long-term Losses

Tendon	Span	Left	Center	Right
		T/cm2	T/cm2	T/cm2
TENDON_A	1	0.58	0.60	0.62
TENDON_A	2	0.60	0.58	0.57
TENDON_A	3	0.57	0.56	0.57
TENDON_A	4	0.57	0.58	0.60
TENDON_A	5	0.62	0.60	0.58

15.3 Calculated Stresses After Friction and Long-term Losses

Tendon	Span	Stress Left FL Only	Stress Center FL Only	Stress Right FL Only	Stress Left FL+LTL	Stress Center FL+LTL	Stress Right FL+LTL
		T/cm2	T/cm2	T/cm2	T/cm2	T/cm2	T/cm2
TENDON_A	1	10.63	11.70	11.93	10.05	11.10	11.31
TENDON_A	2	11.93	10.73	9.74	11.31	10.16	9.17
TENDON_A	3	9.74	8.75	9.74	9.17	8.20	9.17
TENDON_A	4	9.74	10.73	11.93	9.17	10.16	11.31
TENDON_A	5	11.93	11.70	10.63	11.31	11.10	10.05

15.6 Summary

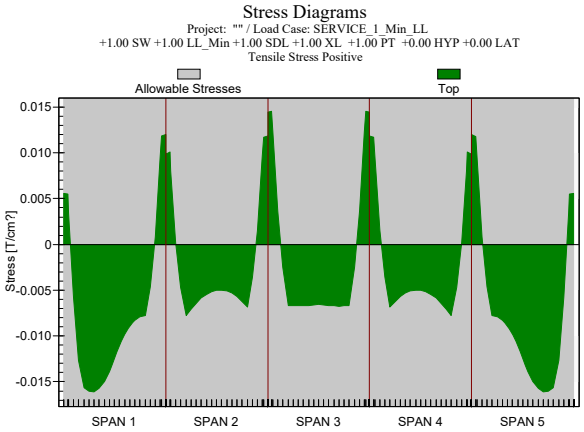
Tendon	Force	Ext. Left	Start Span	End Span	Ext. Right	Elong. Left	Elong Right	Anchor Left	Anchor Right	Max Stress ratio
	T					cm	cm			
TENDON_A	10.11	0.00	1	5	0.00	17.98	3.99	0.56	0.56	0.65

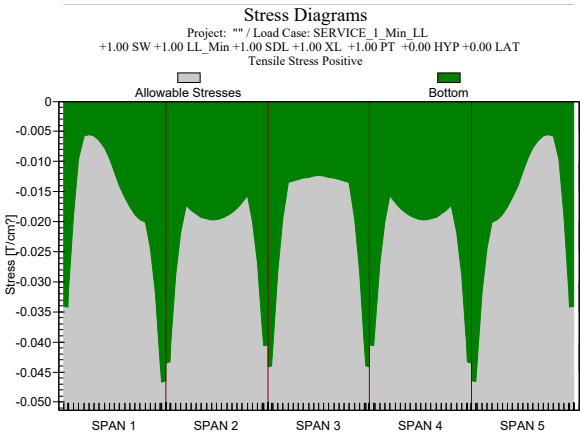
16 - Unbalanced Moment Reinforcement

16.1 Unbalanced Moment Reinforcement - No Redistribution

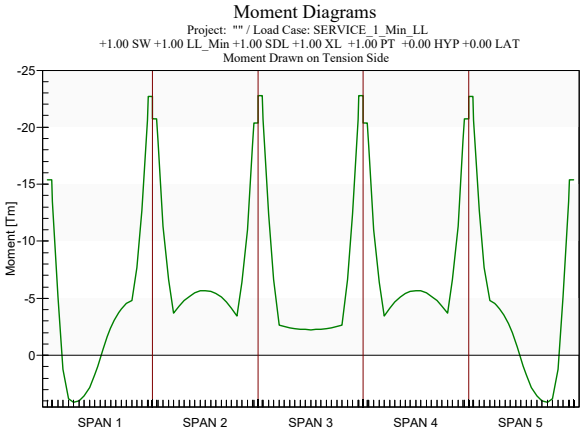
Joint	Gamma Left	Gamma Right	Width Left	Width Right	Moment Left Neg	Moment Left Pos	Moment Right Neg	Moment Right Pos	As Top	As Bot	n Bar Top	n Bar Bot
			m	m	T-m	T-m	T-m	T-m	cm2	cm2		
1	0.00	0.58	0.00	1.36	0.00	0.00	-28.59	0.00	0.00	0.00	0	0
2	0.58	0.58	1.36	1.36	-4.24	0.00	0.00	0.00	0.00	0.00	0	0
3	0.58	0.58	1.36	1.36	0.00	0.00	-3.06	0.00	0.00	0.00	0	0
4	0.58	0.58	1.36	1.36	-3.06	0.00	0.00	0.00	0.00	0.00	0	0
5	0.58	0.58	1.36	1.36	0.00	0.00	-4.24	0.00	0.00	0.00	0	0
6	0.58	0.00	1.36	0.00	-28.58	0.00	0.00	0.00	0.00	0.00	0	0

LOAD COMBINATION: SERVICE_1_Min_LL

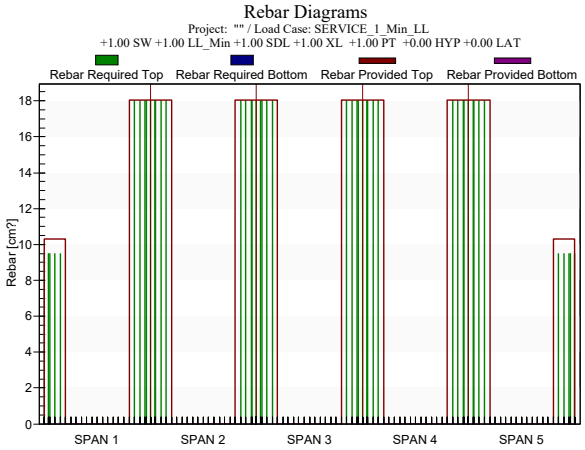




SERVICE COMBINATION STRESSES
(Tension stress positive)

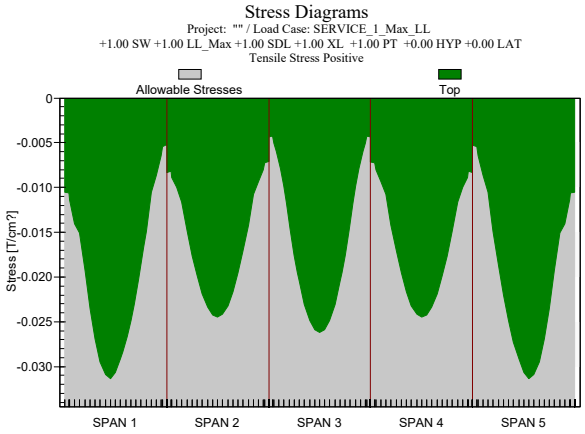


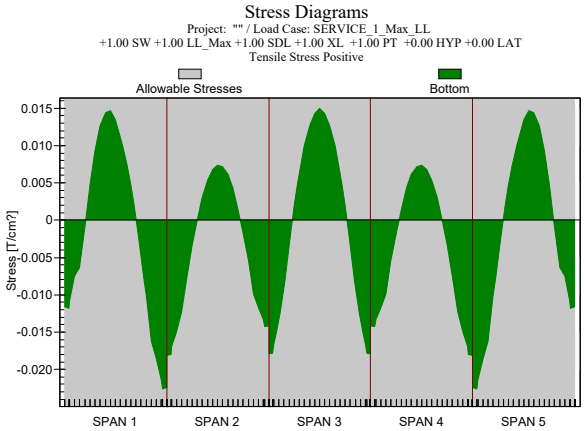
DESIGN MOMENT
(Moment is drawn on tension side)



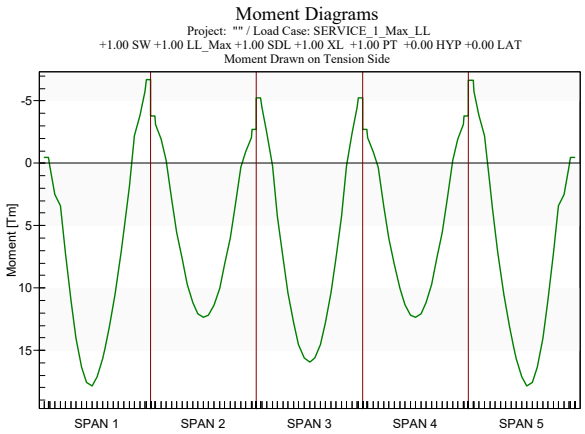
REINFORCEMENT
REQUIRED AND PROVIDED

LOAD COMBINATION: SERVICE_1_Max_LL

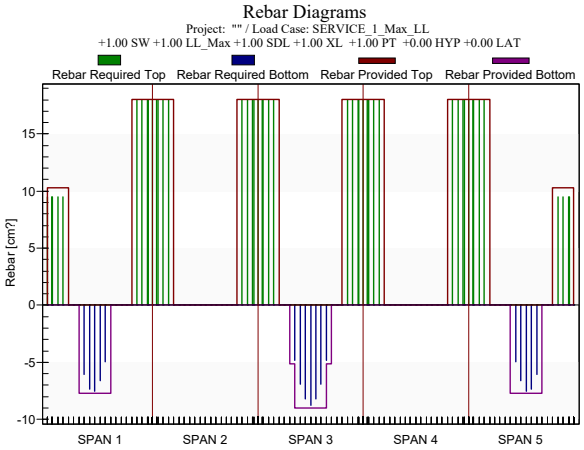




SERVICE COMBINATION STRESSES
(Tension stress positive)

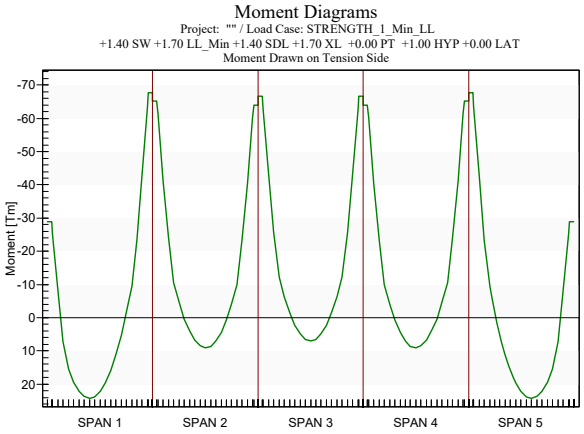


DESIGN MOMENT
(Moment is drawn on tension side)

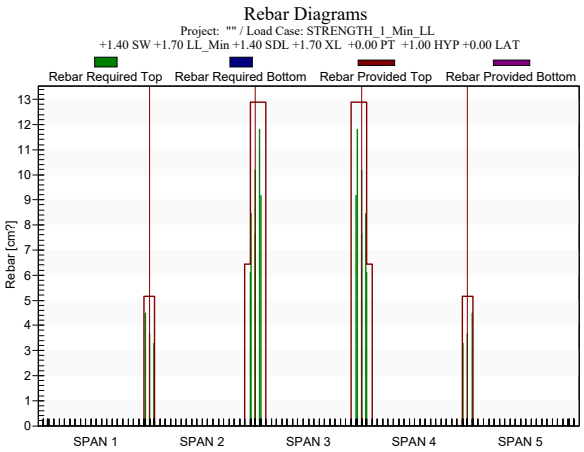


REINFORCEMENT
REQUIRED AND PROVIDED

LOAD COMBINATION: STRENGTH_1_Min_LL

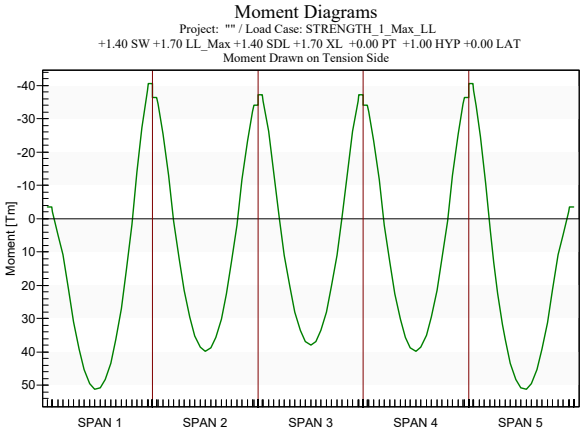


DESIGN MOMENT
(Moment is drawn on tension side)

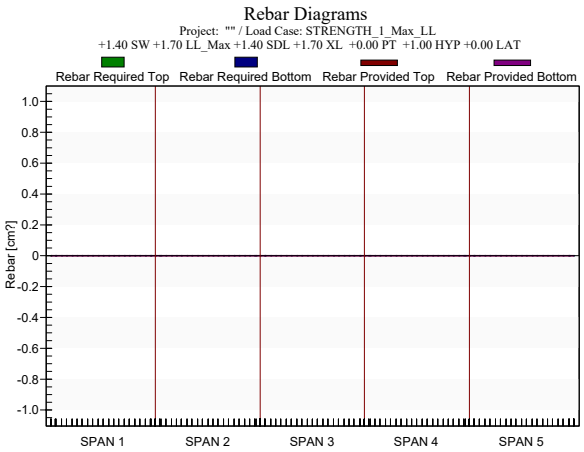


REINFORCEMENT
REQUIRED AND PROVIDED

LOAD COMBINATION: STRENGTH_1_Max_LL

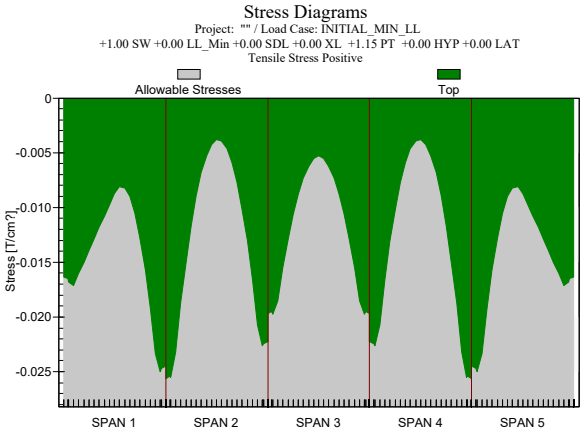


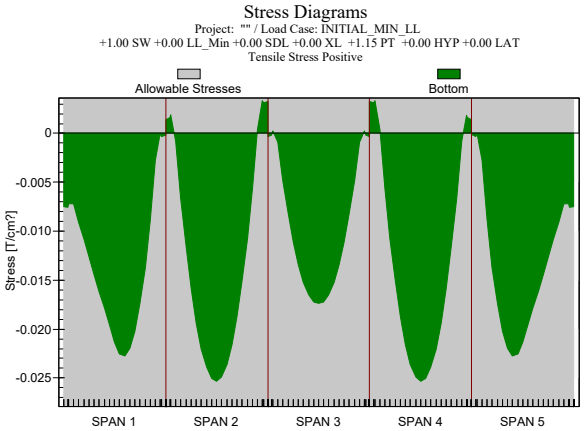
DESIGN MOMENT
(Moment is drawn on tension side)



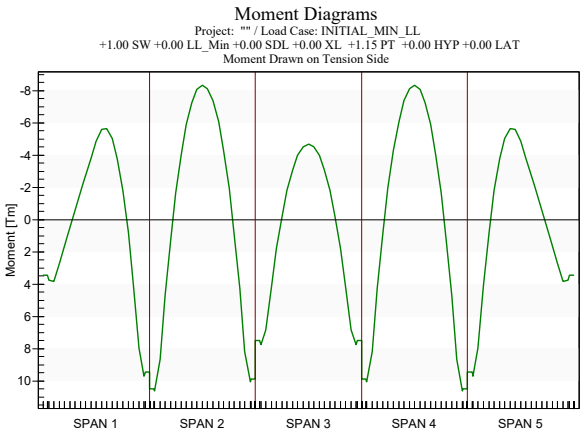
REINFORCEMENT
REQUIRED AND PROVIDED

LOAD COMBINATION: INITIAL_MIN_LL

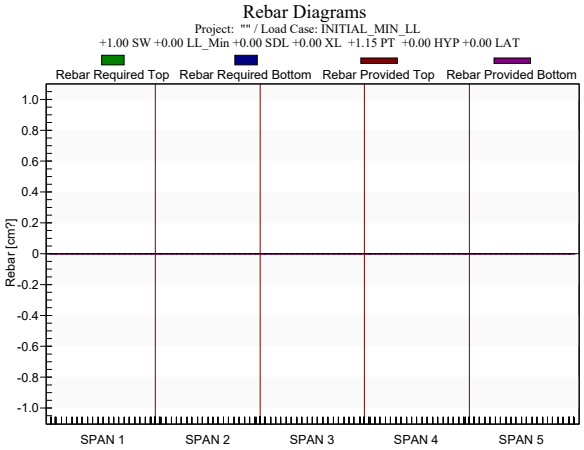




SERVICE COMBINATION STRESSES
(Tension stress positive)

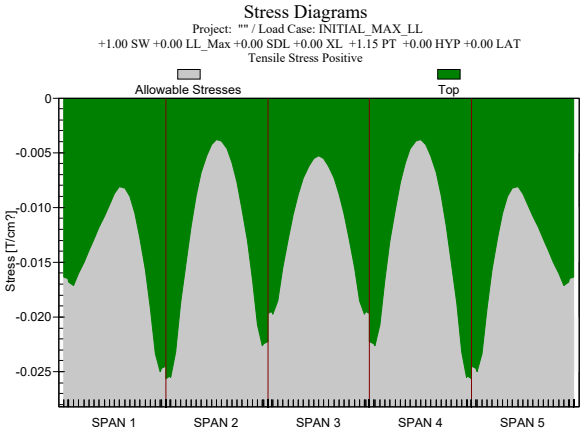


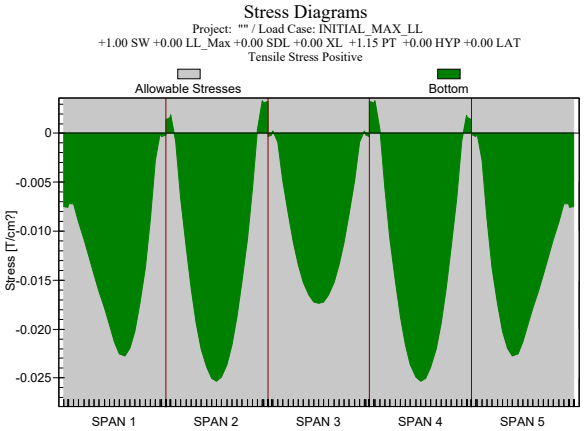
DESIGN MOMENT
(Moment is drawn on tension side)



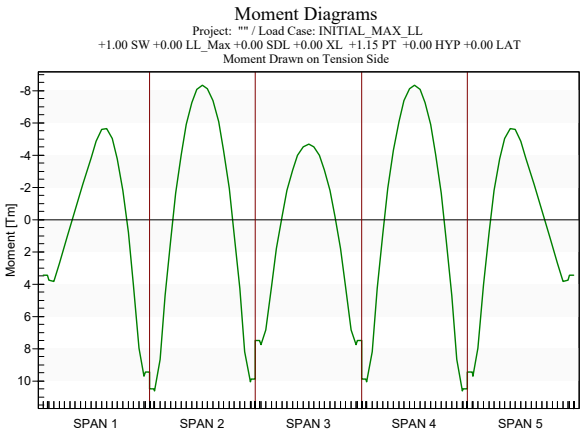
REINFORCEMENT
REQUIRED AND PROVIDED

LOAD COMBINATION: INITIAL_MAX_LL

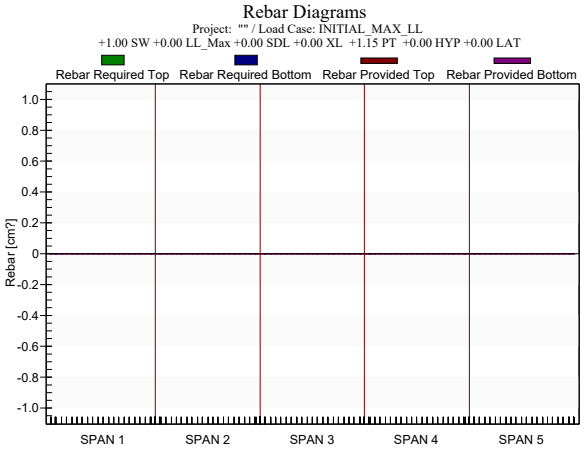




SERVICE COMBINATION STRESSES
(Tension stress positive)

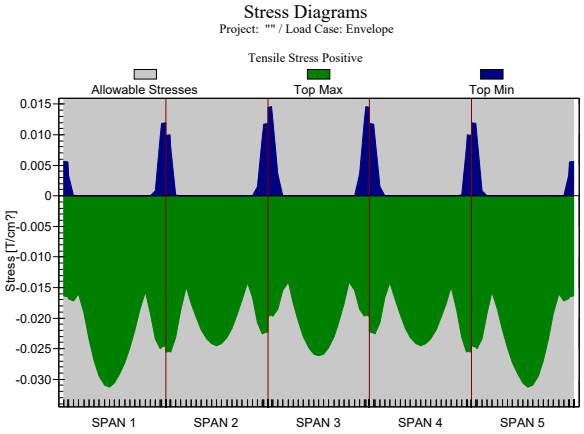


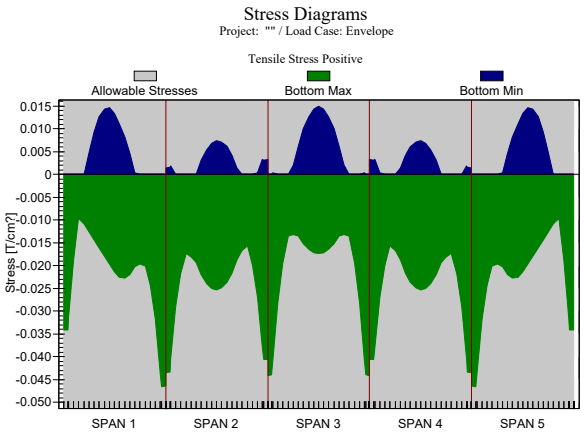
DESIGN MOMENT
(Moment is drawn on tension side)



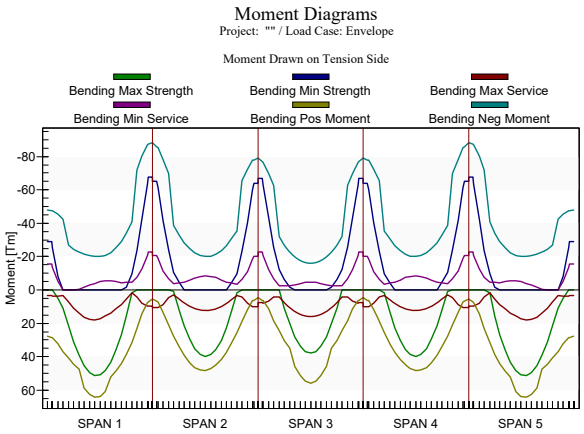
REINFORCEMENT
REQUIRED AND PROVIDED

LOAD COMBINATION: Envelope

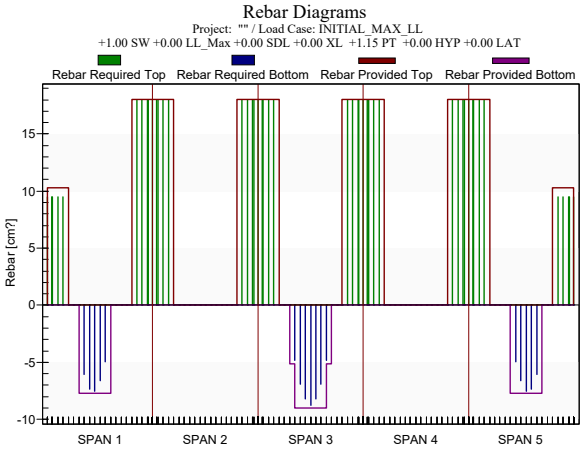




SERVICE COMBINATION STRESSES
(Tension stress positive)



DESIGN MOMENT
(Moment is drawn on tension side)



REINFORCEMENT
REQUIRED AND PROVIDED

4F -LINE-GK

1 - USER SPECIFIED GENERAL ANALYSIS AND DESIGN PARAMETERS

Parameter	Value	Parameter	Value
Concrete		Fy (Main bars)	4.70 T/cm 2
F'c for BEAMS/SLABS	320.00 Kg/cm 2	Fy (Shear reinforcement)	4.70 T/cm 2
F'ci for BEAMS/SLABS	240.00 Kg/cm 2	Minimum Cover at TOP	2.00 cm
For COLUMNS/WALLS	320.00 Kg/cm 2	Minimum Cover at BOTTOM	2.00 cm
Ec for BEAMS/SLABS	275.00 T/cm 2	Post-tensioning	
For COLUMNS/WALLS	275.00 T/cm 2	SYSTEM	BONDED
CREEP factor	2.00	Fpu	18.96 T/cm 2
CONCRETE WEIGHT	NORMAL	Fse	12.00 T/cm 2
UNIT WEIGHT	2400.00 Kg/m 3	Strand area	0.990 cm 2
Tension stress limits / (f'c)1/2		Min CGS from TOP	4.20 cm
At Top	1.616	Min CGS from BOT for interior spans	5.60 cm
At Bottom	1.616	Min CGS from BOT for exterior spans	5.60 cm
Compression stress limits / f'c		Min average precompression	8.80 Kg/cm 2
At all locations	0.450	Max spacing / slab depth	8.00
Tension stress limits (initial) / (f'c)1/2		Analysis and design options	
At Top	0.808	Structural system - Equiv Frame	TWO-WAY
At Bottom	0.808	Moments reduced to face of support	YES
Compression stress limits (initial) / f'c		Moment Redistribution	NO
At all locations	0.600	DESIGN CODE SELECTED	ACI-318 (1999)
Reinforcement			

2 - INPUT GEOMETRY

2.1 Principal Span Data of Uniform Spans

Span	Form	Length	Width	Depth	TF Width	TF Thick.	BF/MF Width	BF/MF Thick.	Rh	Right Mult.	Left Mult.
		m	cm	cm	cm	cm	cm	cm	cm		
1	1	6.53	100.00	30.00					0.00	3.26	0.33
2	1	6.53	100.00	30.00					0.00	3.26	0.33
3	1	6.53	100.00	30.00					0.00	3.26	0.33

2.5 Drop Cap and Drop Panel Data

Joint	Cap T	Cap B	Cap DL	Cap DR	Drop TL	Drop TR	Drop B	Drop L	Drop R
	cm	cm	cm	cm	cm	cm	cm	cm	cm
1	40.00	173.00	0.00	326.50	0.00	0.00	0.00	0.00	0.00
2	40.00	173.00	326.50	326.50	0.00	0.00	0.00	0.00	0.00
3	40.00	173.00	326.50	326.50	0.00	0.00	0.00	0.00	0.00
4	40.00	173.00	326.50	0.00	0.00	0.00	0.00	0.00	0.00

2.7 Support Width and Column Data

Joint	Support Width	Length LC	B(DIA.) LC	D LC	% LC	CBC LC	Length UC	B(DIA.) UC	D UC	% UC	CBC UC
	cm	m	cm	cm			m	cm	cm		
1	45.0	4.8	65.0	45.0	100	(1)	4.3	65.0	45.0	100	(1)
2	45.0	4.8	65.0	45.0	100	(1)	4.3	65.0	45.0	100	(1)
3	45.0	4.8	65.0	45.0	100	(1)	4.3	65.0	45.0	100	(1)
4	45.0	4.8	65.0	45.0	100	(1)	4.3	65.0	45.0	100	(1)

3 - INPUT APPLIED LOADING

3.1 Loading As Appears in User's Input Screen

Span	Class	Type	W	P1	P2	A	B	C	F	M
			T/m2	T/m	T/m	m	m	m	T	T-m
1	LL	U	1.200							
1	SDL	U	0.170							
1	SDL	L		1.080		0.000	6.530			
2	LL	U	1.200							
2	SDL	U	0.170							
2	SDL	L		1.080		0.000	6.530			
3	LL	U	1.200							
3	SDL	U	0.170							
3	SDL	L		1.080		0.000	6.530			

NOTE: SELFWEIGHT INCLUSION REQUIRED (SW= SELF WEIGHT Computed from geometry input and treated as dead loading. Unit selfweight W = 2400.0 Kg/m^3
NOTE: LIVE LOADING is SKIPPED with a skip factor of 1.00

3.2 Compiled loads

Span	Class	Type	P1	P2	F	M	A	B	C	Reduction Factor
			T/m	T/m	T	T-m	m	m	m	%
1	LL	P	4.308				0.000	6.530		0.000
1	SDL	P	0.610				0.000	6.530		
1	SDL	P	1.080				0.000	6.530		
1	SW	P	3.000				0.000	6.530		
2	LL	P	4.308				0.000	6.530		0.000
2	SDL	P	0.610				0.000	6.530		
2	SDL	P	1.080				0.000	6.530		
2	SW	P	3.000				0.000	6.530		
3	LL	P	4.308				0.000	6.530		0.000
3	SDL	P	0.610				0.000	6.530		
3	SDL	P	1.080				0.000	6.530		
3	SW	P	3.000				0.000	6.530		

7 - SELECTED POST-TENSIONING FORCES AND TENDON PROFILES

7.1 Tendon Profile

Tendon A

Span	Type	X1/L	X2/L	X3/L	A/L
1	1	0.100	0.500	0.100	---
2	1	0.100	0.500	0.100	---
3	1	0.100	0.500	0.100	---

7.2 Selected Post-Tensioning Forces and Tendon Drape

Tendon A

Span	Force	CGS Left	CGS C1	CGS C2	CGS Right	P/A	Wbal	WBal (%DL)
	T	cm	cm	cm	cm	kg/cm2	T/-	
1	133.428	-17.80	---	-29.00	-4.20	10.67	4.506	96
2	128.241	-4.20	---	-23.50	-4.20	10.26	4.644	99
3	133.428	-4.20	---	-29.00	-17.80	10.67	4.506	96

All Tendons

Span	Force	Total P/A	Total WBal (%DL)

	T	kg/cm2	
1	133.428	10.67	96
2	128.241	10.26	99
3	133.428	10.67	96

Approximate weight of strand: 192.0 Kg

7.3 Tendon Extents and Stressing Conditions

Type	Num	Force	Left End	Right End	From	To	Extension
A	12	11.14	Live	Live	1	3	---

7.4 Required Minimum Post-Tensioning Forces

	Based on Stress Conditions			Based on Minimum P/A		
Type	Left	Center	Right	Left	Center	Right
	T	T	T	T	T	T
1	0.00	37.97	55.76	110.00	110.00	110.00
2	48.80	3.22	48.79	110.00	110.00	110.00
3	55.75	37.97	0.00	110.00	110.00	110.00

7.5 Service Stresses (tension shown positive)

Envelope of Service 1

Span	Left Top Max-T	Left Top Max-C	Left Bot Max-T	Left Bot Max-C	Center Top Max-T	Center Top Max-C	Center Bot Max-T	Center Bot Max-C	Right Top Max-T	Right Top Max-C	Right Bot Max-T	Right Bot Max-C
	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2	kg/cm2
1	-----	-12.31	-----	-19.57	-----	-24.41	6.51	-15.23	7.07	-12.81	-----	-34.30
2	7.25	-12.19	-----	-34.09	-----	-21.47	3.77	-19.24	7.25	-12.20	-----	-34.09
3	7.07	-12.81	-----	-34.30	-----	-24.41	6.51	-15.23	-----	-12.31	-----	-19.57

7.6 Post-Tensioning Balance Moments, Shears and Reactions

Span Moments and Shears

Span	Moment Left	Moment Center	Moment Right	Shear Left	Shear Right
	T-m	T-m	T-m	T	T
1	6.59	-11.50	17.31	1.15	1.15
2	15.48	-8.69	15.48	0.00	0.00
3	17.31	-11.50	6.59	-1.15	-1.15

Reactions and Column Moments

Joint	Reaction	Moment Lower Column	Moment Upper Column
	T	T-m	T-m
1	-1.151	3.592	3.649
2	1.150	-0.876	-0.890
3	1.150	0.877	0.891
4	-1.150	-3.592	-3.649

Note: Moments are reported at face of support

8 - FACTORED MOMENTS AND REACTIONS ENVELOPE

8.1 Factored Design Moments (Not Redistributed)

Span	Left Max	Left Min	Middle Max	Middle Min	Right Max	Right Min
	T-m	T-m	T-m	T-m	T-m	T-m
1	-13.13	1.11	38.47	14.90	-49.54	-30.17
2	-48.89	-29.47	25.83	0.88	-48.88	-29.46
3	-49.54	-30.17	38.48	14.90	-13.13	1.11

8.2 Reactions and Column Moments

Joint	Reaction Max	Reaction Min	Moment Lower Column Max	Moment Lower Column Min	Moment Upper Column Max	Moment Upper Column Min
	T	T	T-m	T-m	T-m	T-m
1	41.21	15.99	-1.15	-10.94	-1.17	-11.11
2	99.50	69.54	7.41	-5.12	7.52	-5.21
3	99.50	69.54	5.12	-7.41	5.21	-7.53
4	41.21	15.99	10.94	1.15	11.11	1.17

8.3 Secondary Moments

Span	Left	Midspan	Right
	T-m	T-m	T-m
1	6.98	3.48	-0.02
2	-2.04	-2.04	-2.04
3	-0.01	3.49	6.98

Note: Moments are reported at face of support

13 - PUNCHING SHEAR REINFORCEMENT

13.1 Critical Section Geometry

Column	Layer	Cond.	a	d	b1	b2
			cm	cm	cm	cm
1	1	3	18.37	36.73	63.36	83.36
2	1	4	18.37	36.73	81.73	83.36
3	1	4	18.37	36.73	81.73	83.36
4	1	3	18.37	36.73	63.36	83.36

13.2 Critical Section Stresses

Label	Layer	Cond.	Factored shear	Factored moment	Stress due to shear	Stress due to moment	Total stress	Allowable stress	Stress ratio
			T	T-m	T/cm2	T/cm2	T/cm2	T/cm2	
1	1	3	-41.22	+22.05	0.01	0.002	0.010	0.015	0.660
2	1	4	-99.49	-1.59	0.01	0.000	0.011	0.015	0.737
3	1	4	-99.49	+1.59	0.01	0.000	0.011	0.015	0.737
4	1	3	-41.22	-22.05	0.01	0.002	0.010	0.015	0.660

13.3 Punching Shear Reinforcement

Reinforcement option: Stirrups

Bar Size: 5

Col.	Dist	N_Legs	Dist	N_Legs	Dist	N_Legs	Dist	N_Legs	Dist	N_Legs
	cm		cm		cm		cm		cm	
1										
2										
3										
4										

Dist. = Distance measured from the face of support

Note: Columns with --- have not been checked for punching shear.

Note: Columns with *** have exceeded the maximum allowable shear stress.

14 - DEFLECTIONS

14.1 Maximum Span Deflections - Service Combination 1

Span	SW	SW+PT	SW+PT+ SDL	SW+PT+SDL +Creep	LL	X	Sustained	Total
	cm	cm	cm	cm	cm	cm	cm	cm
1	0.1	0.0	0.0	0.0(34832)	0.1(5597)	0.0(*****)	0.0(34832)	0.1(5493)
2	0.0	0.0	0.0	0.0(21812)	-0.1(10917)	0.0(*****)	0.0(21812)	-0.1(7275)
3	0.1	0.0	0.0	0.0(34830)	0.1(5597)	0.0(*****)	0.0(34830)	0.1(5493)

Note: Deflections are calculated using effective moment of inertia of cracked sections.

15 - FRICTION, ELONGATION AND LONG TERM LOSSES

15.1 Input Parameters

Parameter	Value	Parameter	Value
Type of Strand	Low Relaxation	Coefficient of Angular Friction (meu)	0.16000 1/rad
Age of Concrete at Stressing	3 days	Coefficient of Wobble Friction (K)	0.01600 rad/m
Ec at Stressing	235.00 T/cm2	Ratio of Jacking Stress	0.75
Average Relative Humidity	65.00 percent	Anchor Set	6.00 mm
Volume to Surface Ratio of Members	19.00 cm	Tendon_A Stressing Method	Both sides
Es of Strand	1970.00 T/cm2		

15.2 Long-term Losses

Tendon	Span	Left	Center	Right
		T/cm2	T/cm2	T/cm2
TENDON_A	1	0.57	0.58	0.63
TENDON_A	2	0.61	0.58	0.61
TENDON_A	3	0.63	0.58	0.57

15.3 Calculated Stresses After Friction and Long-term Losses

Tendon	Span	Stress Left FL Only	Stress Center FL Only	Stress Right FL Only	Stress Left FL+LTL	Stress Center FL+LTL	Stress Right FL+LTL
		T/cm2	T/cm2	T/cm2	T/cm2	T/cm2	T/cm2
TENDON_A	1	10.85	11.83	12.50	10.28	11.25	11.88
TENDON_A	2	12.50	11.39	12.50	11.88	10.82	11.88
TENDON_A	3	12.50	11.83	10.85	11.88	11.25	10.28

15.6 Summary

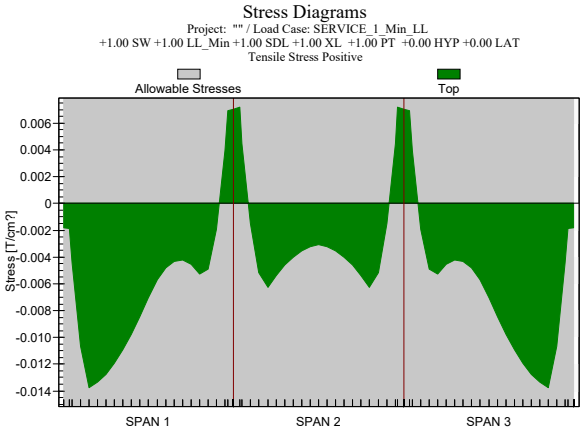
Tendon	Force	Ext. Left	Start Span	End Span	Ext. Right	Elong. Left	Elong Right	Anchor Left	Anchor Right	Max Stress ratio
	T					cm	cm			
TENDON_A	11.15	0.00	1	3	0.00	10.89	0.92	0.55	0.55	0.65

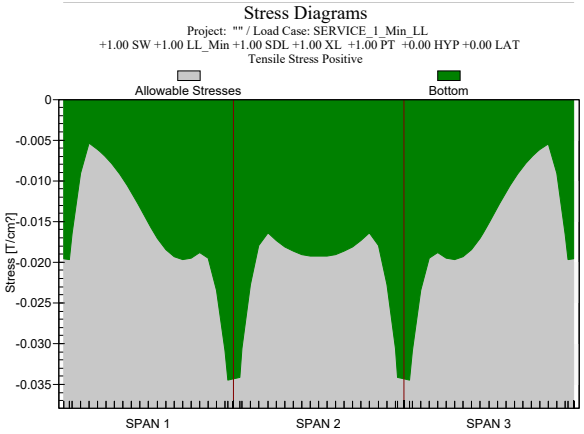
16 - Unbalanced Moment Reinforcement

16.1 Unbalanced Moment Reinforcement - No Redistribution

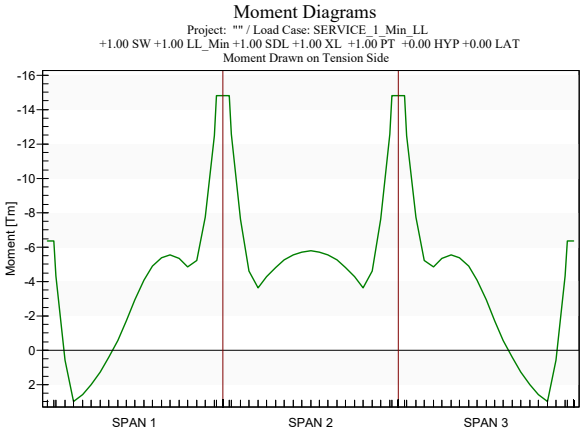
Joint	Gamma Left	Gamma Right	Width Left	Width Right	Moment Left Neg	Moment Left Pos	Moment Right Neg	Moment Right Pos	As Top	As Bot	n Bar Top	n Bar Bot
			m	m	T-m	T-m	T-m	T-m	cm2	cm2		
1	0.00	0.63	0.00	1.58	0.00	0.00	-13.13	1.11	0.00	0.00	0	0
2	0.63	0.63	1.58	1.58	-0.70	0.00	0.00	0.00	0.00	0.00	0	0
3	0.63	0.63	1.58	1.58	0.00	0.00	-0.70	0.00	0.00	0.00	0	0
4	0.63	0.00	1.58	0.00	-13.13	1.11	0.00	0.00	0.00	0.00	0	0

LOAD COMBINATION: SERVICE_1_Min_LL

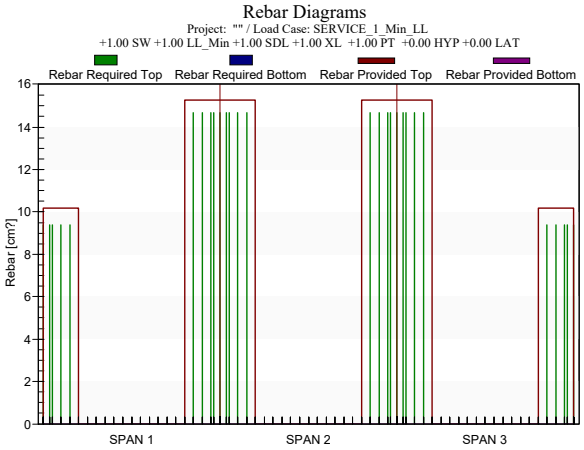




SERVICE COMBINATION STRESSES
(Tension stress positive)

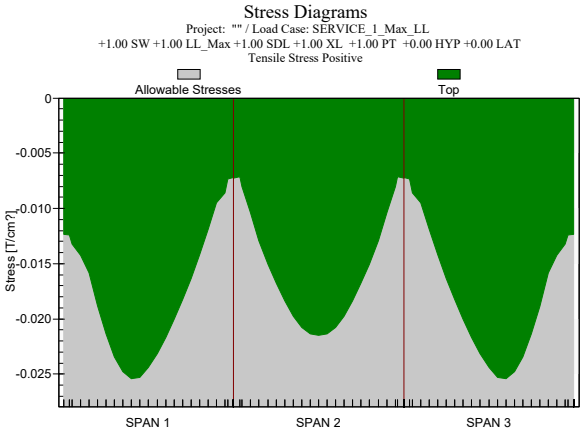


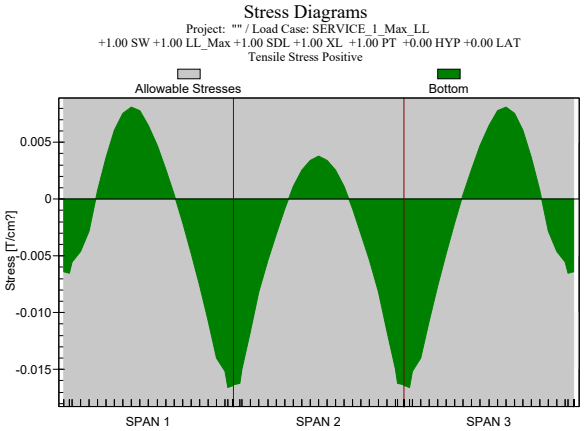
DESIGN MOMENT
(Moment is drawn on tension side)



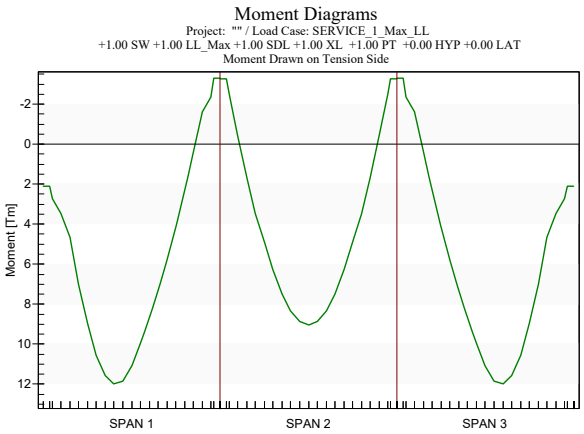
REINFORCEMENT
REQUIRED AND PROVIDED

LOAD COMBINATION: SERVICE_1_Max_LL

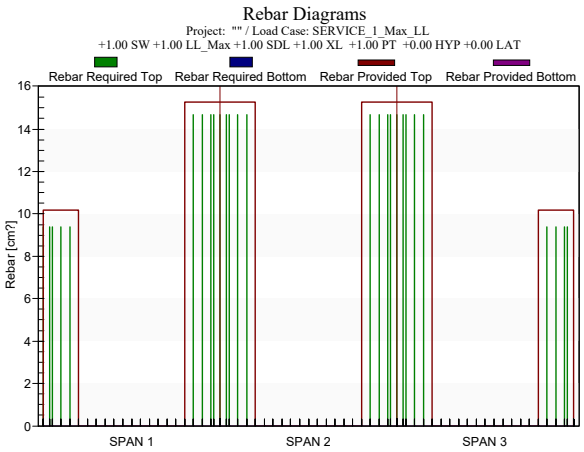




SERVICE COMBINATION STRESSES
(Tension stress positive)

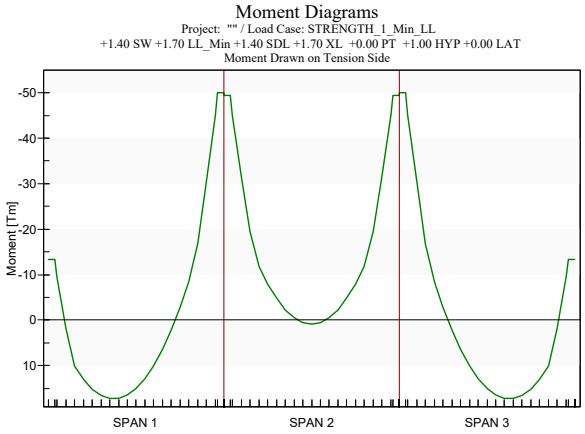


DESIGN MOMENT
(Moment is drawn on tension side)

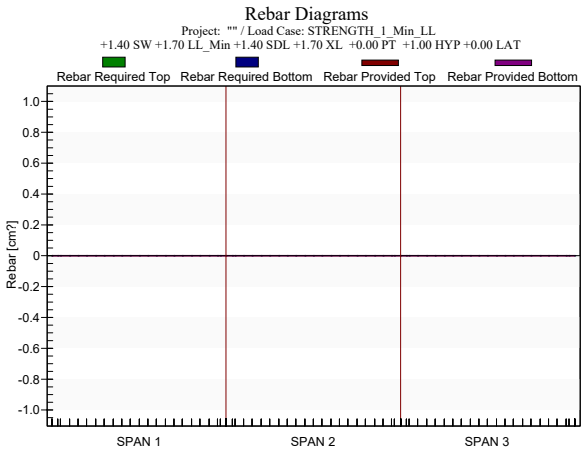


REINFORCEMENT
REQUIRED AND PROVIDED

LOAD COMBINATION: STRENGTH_1_Min_LL

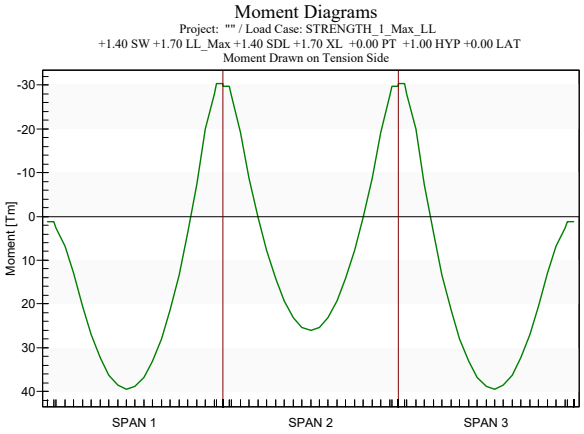


DESIGN MOMENT
(Moment is drawn on tension side)

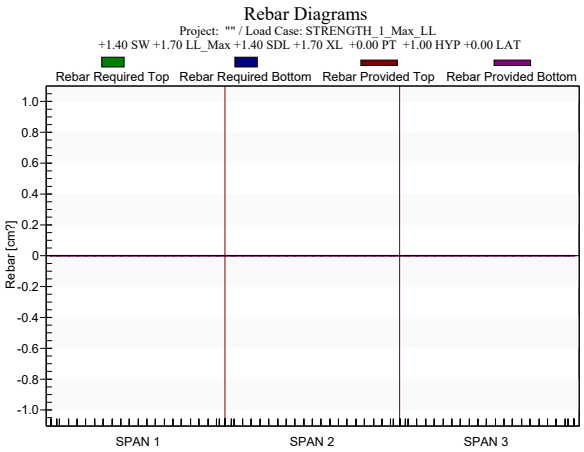


REINFORCEMENT
REQUIRED AND PROVIDED

LOAD COMBINATION: STRENGTH_1_Max_LL

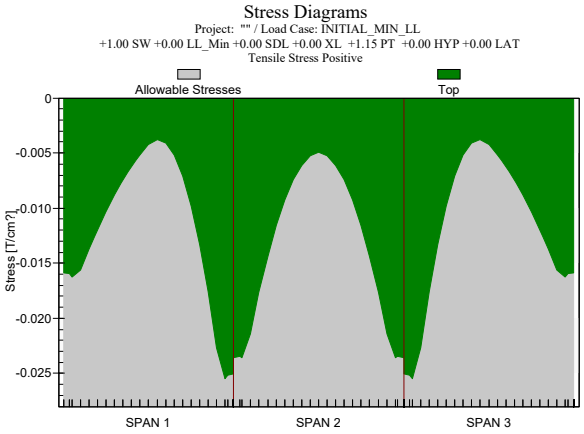


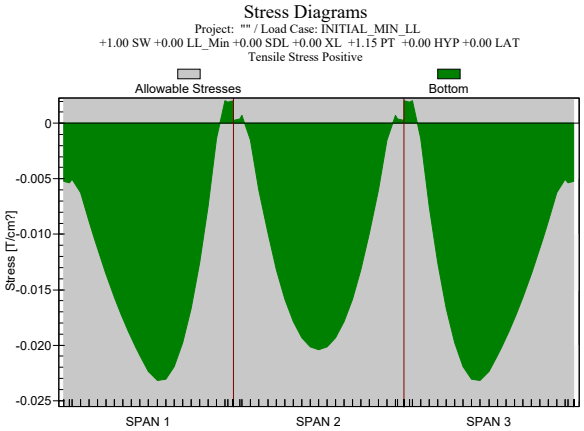
DESIGN MOMENT
(Moment is drawn on tension side)



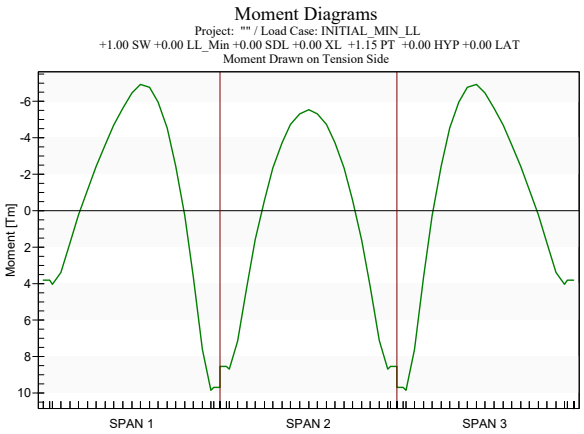
REINFORCEMENT
REQUIRED AND PROVIDED

LOAD COMBINATION: INITIAL_MIN_LL

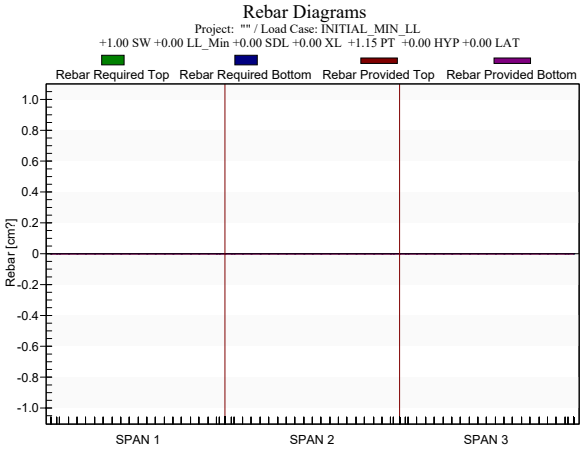




SERVICE COMBINATION STRESSES
(Tension stress positive)

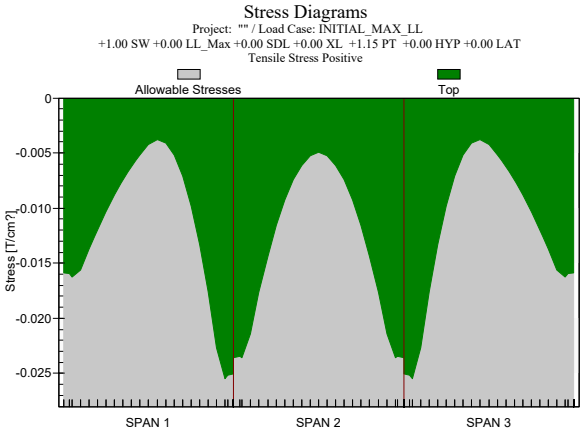


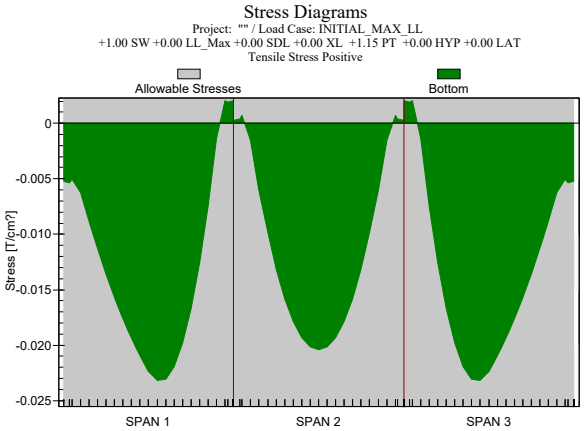
DESIGN MOMENT
(Moment is drawn on tension side)



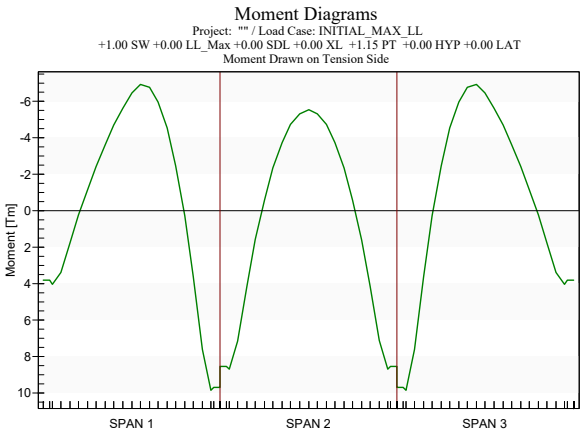
REINFORCEMENT
REQUIRED AND PROVIDED

LOAD COMBINATION: INITIAL_MAX_LL

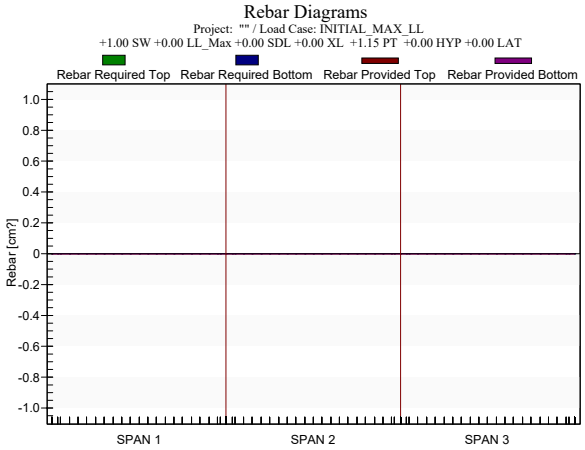




SERVICE COMBINATION STRESSES
(Tension stress positive)

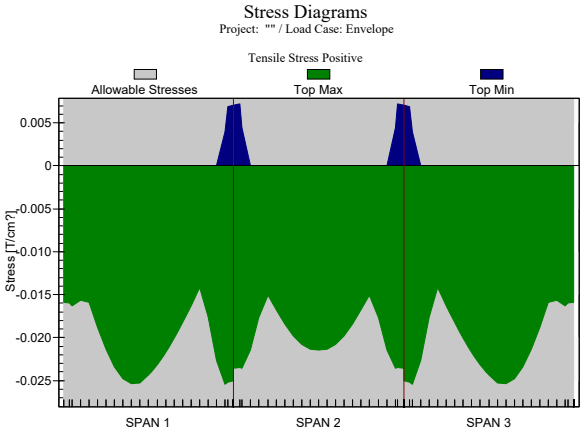


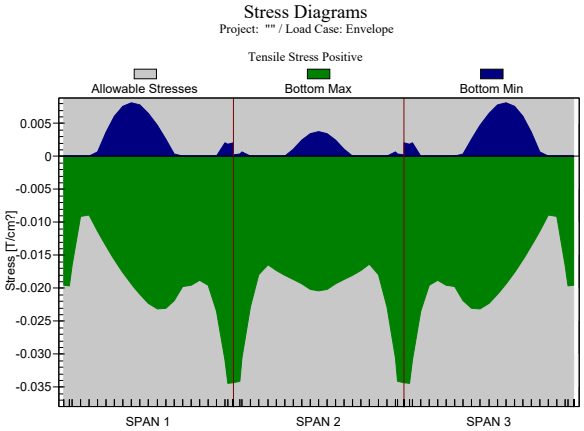
DESIGN MOMENT
(Moment is drawn on tension side)



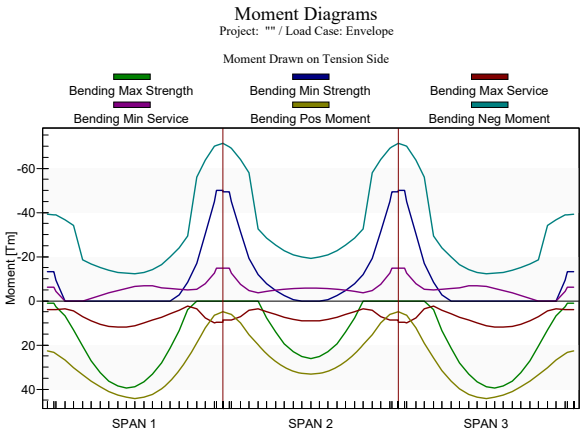
REINFORCEMENT
REQUIRED AND PROVIDED

LOAD COMBINATION: Envelope

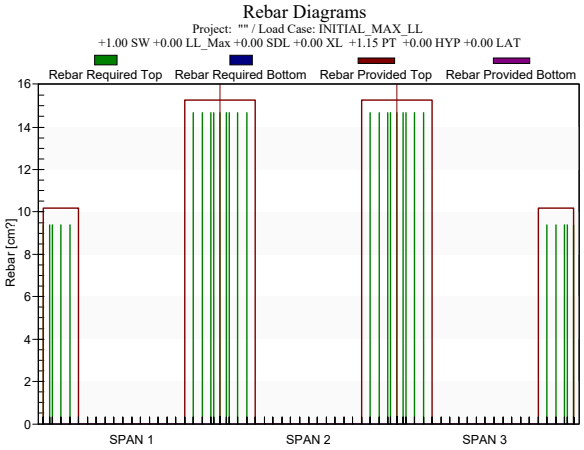




SERVICE COMBINATION STRESSES
(Tension stress positive)



DESIGN MOMENT
(Moment is drawn on tension side)



REINFORCEMENT
REQUIRED AND PROVIDED

รหัสโครงการ/Project No.:		**วันที่/Date:**	
ชื่อโครงการ/Project Name:		**จำนวนหน้า/Page:**	
วิศวกรผู้คำนวณ/Issued By:			

GS1 **(0.25)** L = 6.90

case 3 B = 6.00

k	=	1.15				
f_c'	=	320	ksc	t_{min} =	0.143	m.
Load factor			*DL*	=	1.40	
			LL	=	1.70	
DL	=	*1.4x*	*600*	=	840	kg/m^2
SDL+SCR	=	*1.4x*	*120*	=	168	kg/m^2
LL	=	*1.7x*	*3000*	=	5100	kg/m^2
w_u				=	**6108**	kg/m^2
M^+_B	=	*0.045*	w_uB^2	=	9785	kg-m
M^-_B	=	*0.059*	w_uB^2		12973	kg-m
M^+_L	=	*0.029*	w_uL^2	=	8288	kg-m
M^-_L	=	*0.038*	w_uL^2		10905	kg-m
M+,-B	=	*(9785+12973)/2*		=	11379	kg-m
M+,-L	=	*(8288+10905)/2*		=	9596	kg-m
			As min = 2.00	Sq.cm.		
			As min = 2.00	Sq.cm.		
As+B	=	12.76	cm^2		DB 16 mm. @	0.15 m
As+L	=	11.25	cm^2		DB 16 mm. @	0.175 m

GS1x **(0.25)** L = 3.00

case 1 B = 2.70

k	=	1.11				
f_c'	=	320	ksc	t_{min} =	0.063	m.
Load factor			*DL*	=	1.40	
			LL	=	1.70	
DL	=	*1.4x*	*600*	=	840	kg/m^2
SDL+SCR	=	*1.4x*	*120*	=	168	kg/m^2
LL	=	*1.7x*	*10000*	=	17000	kg/m^2
w_u				=	**18008**	kg/m^2
M^+_B	=	*0.071*	w_uB^2	=	9306	kg-m
M^-_B			w_uB^2			kg-m
M^+_L	=	*0.047*	w_uL^2	=	7635	kg-m
M^-_L			w_uL^2			kg-m
						kg-m
						kg-m
			As min = 2.00	Sq.cm.		
			As min = 2.00	Sq.cm.		
As+B	=	10.31	cm^2		DB 16 mm. @	0.175 m
As+L	=	8.84	cm^2		DB 16 mm. @	0.225 m

GS2 **(0.25)** L = 8.00

case 2 B = 6.00

k	=	1.33				
f_c'	=	320	ksc	t_{min} =	0.156	m.
Load factor			*DL*	=	1.40	
			LL	=	1.70	
DL	=	*1.4x*	*600*	=	840	kg/m^2
SDL+SCR	=	*1.4x*	*120*	=	168	kg/m^2
LL	=	*1.7x*	*3000*	=	5100	kg/m^2
w_u				=	**6108**	kg/m^2
M^+_B	=	*0.059*	w_uB^2	=	12973	kg-m
M^-_B	=	*0.078*	w_uB^2		17078	kg-m
M^+_L	=	*0.026*	w_uL^2	=	10033	kg-m
M^-_L			w_uL^2			kg-m
M+,-B	=	*(12973+17078)/2*		=	15026	kg-m
						kg-m
			As min = 2.00	Sq.cm.		
			As min = 2.00	Sq.cm.		
As+B	=	17.20	cm^2		DB 16 mm. @	0.1 m
As+L	=	11.79	cm^2		DB 16 mm. @	0.15 m

GS3 **(0.20)** L = 8.00

case 3 B = 6.53

k	=	1.23				
f_c'	=	320	ksc	t_{min} =	0.161	m.
Load factor				*DL* =	1.40	
				LL =	1.70	
DL	=	*1.4x*	*480*	=	672	kg/m^2
SDL+SCR	=	*1.4x*	*250*	=	350	kg/m^2
LL	=	*1.7x*	*600*	=	1020	kg/m^2
w_u				=	**2042**	kg/m^2
M^+_B	=	*0.048*	w_uB^2	=	4158	kg-m
M^-_B	=	*0.063*	w_uB^2		5486	kg-m
M^+_L	=	*0.025*	w_uL^2	=	3267	kg-m
M^-_L	=	*0.033*	w_uL^2		4279	kg-m
M+,-B	=	*(4158+5486)/2*		=	4822	kg-m
M+,-L	=	*(3267+4279)/2*		=	3773	kg-m

As min = 2.00 Sq.cm.
As min = 2.00 Sq.cm.

As+B	=	6.98	cm^2	DB 12 mm. @	0.15 m
As+L	=	5.80	cm^2	DB 12 mm. @	0.175 m

GS3x **(0.20)** L = 6.53

case 1 B = 4.60

k	=	1.42				
f_c'	=	320	ksc	t_{min} =	0.124	m.
Load factor				*DL* =	1.40	
				LL =	1.70	
DL	=	*1.4x*	*480*	=	672	kg/m^2
SDL+SCR	=	*1.4x*	*250*	=	350	kg/m^2
LL	=	*1.7x*	*600*	=	1020	kg/m^2
w_u				=	**2042**	kg/m^2
M^+_B	=	*0.094*	w_uB^2	=	4052	kg-m
M^-_B			w_uB^2			kg-m
M^+_L	=	*0.027*	w_uL^2	=	2387	kg-m
M^-_L			w_uL^2			kg-m
						kg-m
						kg-m

As min = 2.00 Sq.cm.
As min = 2.00 Sq.cm.

As+B	=	5.82	cm^2	DB 12 mm. @	0.175 m
As+L	=	3.62	cm^2	DB 12 mm. @	0.3 m

GS3a **(0.20)**

case cantilever L = 2.30

f_c'	=	320	ksc	t_{min} =	0.230	m.
Load factor				*DL* =	1.40	
				LL =	1.70	
DL	=	*1.4x*	*480*	=	672	kg/m^2
SDL+SCR	=	*1.4x*	*120*	=	168	kg/m^2
LL	=	*1.7x*	*400*	=	680	kg/m^2
w_u				=	**1520**	kg/m^2
$P_{u,end}$				=	2940	kg
$M^-_{L,w}$	=	*-0.50*	w_uL^2	=	-4020	kg-m
$M^-_{L,P}$	=	*-1.00*	P_uL	=	-6762	kg-m
M^-_L				=	10782	kg-m

As,B min = 3.20 Sq.cm.

$A_{s\,B}^-$	=	0.00	cm^2	DB 12 mm. @	0.3 m
$A_{s\,L}^-$	=	15.38	cm^2	DB 16 mm. @	0.125 m

GS4a **(0.30)**

case cantilever

L = 2.30

f_c'	=	320	ksc	t_{min} =	0.230	m.
Load factor			*DL*	=	1.40	
			LL	=	1.70	
DL	=	*1.4x*	*720*	=	1008	kg/m^2
SDL+SCR	=	*1.4x*	*120*	=	168	kg/m^2
LL	=	*1.7x*	*400*	=	680	kg/m^2
w_u				=	**1856**	kg/m^2
$P_{u,end}$				=	2940	kg
$M^-_{L,w}$	=	*-0.50*	$w_u L^2$	=	-4909	kg-m
$M^-_{L,P}$	=	*-1.00*	$P_u L$	=	-6762	kg-m
M^-_L				=	11671	kg-m

As,B min = 4.80 Sq.cm.

$A_{s\,B}^-$	=	0.00	cm^2	DB 12 mm. @ 0.225 m
$A_{s\,L}^-$	=	9.94	cm^2	DB 16 mm. @ 0.2 m

GS3y **(0.25)** L = 8.00

case 3

B = 6.53

k	=	1.23				
f_c'	=	320	ksc	t_{min} =	0.161	m.
Load factor			*DL*	=	1.40	
			LL	=	1.70	
DL	=	*1.4x*	*600*	=	840	kg/m^2
SDL+SCR	=	*1.4x*	*250*	=	350	kg/m^2
LL	=	*1.7x*	*600*	=	1020	kg/m^2
w_u				=	**2210**	kg/m^2
M^+_B	=	*0.048*	$w_u B^2$	=	4500	kg-m
M^-_B	=	*0.063*	$w_u B^2$		5937	kg-m
M^+_L	=	*0.025*	$w_u L^2$	=	3535	kg-m
M^-_L	=	*0.033*	$w_u L^2$		4631	kg-m
M+,-B	=	*(4500+5937)/2*		=	5219	kg-m
M+,-L	=	*(3535+4631)/2*		=	4083	kg-m

As min = 2.00 Sq.cm.

As min = 2.00 Sq.cm.

As+B	=	5.66	cm^2	DB 12 mm. @ 0.175 m
As+L	=	4.64	cm^2	DB 12 mm. @ 0.225 m

GS5a **(0.15)**

case cantilever

L = 1.00

f_c'	=	320	ksc	t_{min} =	0.100	m.
Load factor			*DL*	=	1.40	
			LL	=	1.70	
DL	=	*1.4x*	*360*	=	504	kg/m^2
SDL+SCR	=	*1.4x*	*120*	=	168	kg/m^2
LL	=	*1.7x*	*500*	=	850	kg/m^2
w_u				=	**1522**	kg/m^2
$P_{u,end}$				=	1008	kg
$M^-_{L,w}$	=	*-0.50*	$w_u L^2$	=	-761	kg-m
$M^-_{L,P}$	=	*-1.00*	$P_u L$	=	-1008	kg-m
M^-_L				=	1769	kg-m

As,B min = 3.75 Sq.cm.

$A_{s\,B}^-$	=	0.00	cm^2	RB 9 mm. @ 0.15 m
$A_{s\,L}^-$	=	3.36	cm^2	DB 10 mm. @ 0.225 m

GS4c **(0.25)**

case cantilever

L = 3.10

f_c'	=	320	ksc	t_{min} =	0.310 m.	
Load factor			*DL*	=	1.40	
			LL	=	1.70	
DL	=	*1.4x*	*600*	=	840	kg/m^2
SDL+SCR	=	*1.4x*	*120*	=	168	kg/m^2
LL	=	*1.7x*	*200*	=	340	kg/m^2
w_u				=	**1348**	kg/m^2
$P_{u,end}$				=	252	kg
$M^-_{L,w}$	=	*-0.50*	$w_u L^2$	=	-6477	kg-m
$M^-_{L,P}$	=	*-1.00*	$P_u L$	=	-781	kg-m
M^-_L				=	7258	kg-m

As,B min = 4.00 Sq.cm.

$A_{s\,B}^-$	=	0.00	cm^2	DB 12 mm. @	0.275 m
$A_{s\,L}^-$	=	7.57	cm^2	DB 12 mm. @	0.125 m

GS1a **(0.20)**

case cantilever

L = 0.50

f_c'	=	320	ksc	t_{min} =	0.050 m.	
Load factor			*DL*	=	1.40	
			LL	=	1.70	
DL	=	*1.4x*	*480*	=	672	kg/m^2
SDL+SCR	=	*1.4x*	*120*	=	168	kg/m^2
LL	=	*1.7x*	*400*	=	680	kg/m^2
w_u				=	**1520**	kg/m^2
$P_{u,end}$				=	3360	kg
$M^-_{L,w}$	=	*-0.50*	$w_u L^2$	=	-190	kg-m
$M^-_{L,P}$	=	*-1.00*	$P_u L$	=	-1680	kg-m
M^-_L				=	1870	kg-m

As,B min = 3.20 Sq.cm.
As min = 3.20 Sq.cm.

$A_{s\,B}^-$	=	0.00	cm^2	DB 12 mm. @	0.3 m
$A_{s\,L}^-$	=	2.48	cm^2	DB 12 mm. @	0.3 m

GRS1 **(0.20)** L = 6.60

case 1 B = 3.60

k	=	1.83				
f_c'	=	320	ksc	t_{min} =	0.113 m.	
Load factor			*DL*	=	1.40	
			LL	=	1.70	
DL	=	*1.4x*	*480*	=	672	kg/m^2
SDL+SCR	=	*1.4x*	*170*	=	238	kg/m^2
LL	=	*1.7x*	*400*	=	680	kg/m^2
w_u				=	**1590**	kg/m^2
M^+_B	=	*0.109*	w_uB^2	=	2239	kg-m
M^-_B			w_uB^2			kg-m
M^+_L	=	*0.016*	w_uL^2	=	1131	kg-m
M^-_L			w_uL^2			kg-m
						kg-m
						kg-m

As min = 2.00 Sq.cm.
As min = 2.00 Sq.cm.

As+B	=	2.98	cm^2	DB 12 mm. @	0.3 m
As+L	=	1.59	cm^2	DB 12 mm. @	0.3 m

GRS2 **(0.20)** L = 8.00

case 1 B = 6.60

k	=	1.21				
f_c'	=	320	ksc	t_{min} =	0.162 m.	
Load factor			*DL*	=	1.40	
			LL	=	1.70	
DL	=	*1.4x*	*480*	=	672	kg/m^2
SDL+SCR	=	*1.4x*	*170*	=	238	kg/m^2
LL	=	*1.7x*	*400*	=	680	kg/m^2
w_u				=	**1590**	kg/m^2
M^+_B	=	*0.079*	w_uB^2	=	5469	kg-m
M^-_B			w_uB^2			kg-m
M^+_L	=	*0.039*	w_uL^2	=	3984	kg-m
M^-_L			w_uL^2			kg-m
						kg-m
						kg-m

As min = 2.00 Sq.cm.
As min = 2.00 Sq.cm.

As+B	=	7.45	cm^2	DB 12 mm. @	0.15 m
As+L	=	5.72	cm^2	DB 12 mm. @	0.175 m

Stair GST3 **(0.175)** B = 1.60

case simple span L = 3.50

slope 35.8

f_c'	=	320	ksc	t_{min} =	0.175 m.	
Load factor			*DL*	=	1.40	
			LL	=	1.70	
DL	=	*1.4x*	*420*	=	725	kg/m^2
DL_{Step}		*1.4x*	*216*	=	302.4	kg/m^2
SDL+SCR	=	*1.4x*	*170*	=	238	kg/m^2
LL	=	*1.7x*	*400*	=	680	kg/m^2
w_u				=	**1945**	kg/m^2
$P_{u,end}$				=	0	kg
$M^+_{L,w}$	=	*0.125*	$w_u L^2$	=	2978	kg-m/m
$M^+_{L,P}$	=	*0.25*	$P_u L$	=	0	kg-m/m
M^+_L				=	2978	kg-m/m

As,B min = 4.38 Sq.cm.

$A_s^+{}_B$	=	0.00 cm^2	RB 9 mm. @	0.125 m
$A_s^+{}_L$	=	5.08 cm^2	DB 12 mm. @	0.2 m

Landing **(0.175)** B = 3.25

Stair GST3 case 1 L = 2.15

$k = L/B$ = 0.66

f_c'	=	320	ksc	t_{min} =	0.060 m.	
Load factor			*DL*	=	1.40	
			LL	=	1.70	
DL	=	*1.4x*	*420*	=	588	kg/m^2
SDL+SCR	=	*1.4x*	*170*	=	238	kg/m^2
LL	=	*1.7x*	*400*	=	680	kg/m^2
w_u				=	**1506**	kg/m^2
P_u				=	**3404**	kg/m^2
$M^+_{B=xr}$	=	*0.1045*	$w_u BL$	=	1100	kg-m/m
$M^+_{B=xm}$	=	*0.0639*	$w_u BL$	=	672	kg-m/m
$M^+_{B=xr}$	=	*0.2269*	$P_u B$	=	2510	kg-m/m
$M^+_{B=xm}$		*0.1064*	$P_u B$		1177	kg-m/m
$M^+_{B=xr}$	=			=	3610	kg-m/m
$M^+_{B=xm}$	=			=	1849	kg-m/m
$M^+_{L=ym}$	=	*0.0438*	$w_u BL$	=	461	kg-m/m
$M^+_{L=ym}$	=	*-0.0272*	$P_u B$	=	-301	kg-m/m
$M^+_{B=xm}$	=	*(3610+1849)/2*		=	2730	kg-m/m
$M^+_{L=ym}$	=	*(461+-301)*		=	461	kg-m/m

As min = 2.80 Sq.cm.

$A_s^+{}_{B=xm}$	=	4.64 cm^2	DB 12 mm. @	0.225 m
$A_s^+{}_{L=ym}$	=	0.76 cm^2	DB 12 mm. @	0.3 m
$A_s^+{}_{B=xr}$	=	6.68 cm^2	4-DB 16 mm @	0.075 m T&B

STAIR GST-4 C250x34.6

L

Material Properties

Fy =	2,400	ksc
E =	2,040,000	ksc

Internal Force input

Shear (kg)	1,056
Pa (kg)	0
M (kg-m)	650
M2 (kg-m)	0

Section Dimension input

SECTION	C250x34.6
d	25
bf	9
tw	0.9
tf	1.3

note ; for flange buckling not provide in table
For Flange 0.56*sqrt(E/Fy) = 16.33
For Web 1.49*sqrt(E/Fy) = 43.4

note : plate girder with different yeild strength not provide in this table
: for plate girder use Fb=0.6Fy

Section Properties

d' , h (cm)	22.4
A(cm2)	44.07
Ix(cm4)	4180
Iy(cm4)	294
Sx(cm3)	334
Sy(cm3)	65
rx(cm)	9.7
ry(cm)	2.6
wt(kg/m)	34.60

for flange		for web		
0.38*sqrt(E/Fy) =	11.08	3.76*sqrt(E/Fy) =	109.6	
0.56*sqrt(E/Fy) =	16.33	4.46*sqrt(E/Fy) =	130.0	
		5.76*sqrt(E/Fy) =	167.9	for plate girder

Note: Allowable Shear stess with out Tension field action
: not need stiffener when d/tw <260 and
shear allowable more than shear stress
(5E/Fy) ^ 0.5 = 65.19

Compression 0

Appendix C sectionC2 (for I-sectn only)			Appendix C sectionC3 (for I-sectn only)			
bf/2tf	chk. b/2tf ratio	reduce factor (Qs)	h/tw	chk d/tw ratio	eff. Width (be)	eff. Area (Qa)
3.46	no buckling	1.000	24.88889	no buckling	22.40	1.000

K	unbrace length (cm)	KL/r	Cc	Kl/r / Cc	inelastic Fa	elastic Fa	fa	fa/Fa
1	250	96.79	129.53	0.75	913.0324	-	0.00	0.000

Major Bending

unbrace length (cm)	bf/2tf	d/tw	ar	Rpg	chk unbrace length		
					0.444*bf	0.69*E	Lc (cm)
250	3.46	27.78	1.72	1.00	116.5	306.3	116.5

full lateral brace	not full lateral brace								Stress Check	
Section Classified	Fb	Cb	rT	sqrt(3.517)	sqrt(17.5)	L/rT	Fb1	Fb2	Fb	fb	fb/Fb
compact	-	1	2.08	54.68	122.26	120.39	1440	824.3095	1440	194.38	0.13

Minor bending

Stress Check		
Fb	fb	fb/Fb
1440	0.00	0.00

Combinded Sress

Cmx	Cmy	F'ex	F'ey	combined stress
0.85	0.85	15954.61	1122.166	0.13

Shear

a	Kv	Cv-a < 0.8	Cv-b > 0.8	Fv	Stress Check	
					fv	fv/Fv
3600	5.340	11.3578	3.0318	960.00	52.38	0.05

Deflection

Deflection=5ML^2/(48EI)= 0.00 cm *#DIV/0!*

Summary

fa/Fa	0.00
fb/Fb	0.13
fv/Fv	0.05

STAIR GST-4 H300x56.8

L

Material Properties

Fy =	2,400	ksc
E =	2,040,000	ksc

Internal Force input

Shear (kg)	3,150
Pa (kg)	0
M (kg-m)	3,150
M2 (kg-m)	0

Section Dimension input

SECTION	H300x56.8
d	29.4
bf	20
tw	0.8
tf	1.2

note ; for flange buckling not provide in table
For Flange 0.56*sqrt(E/Fy) = 16.33
For Web 1.49*sqrt(E/Fy) = 43.4

note : plate girder with different yeild strength not provide in this table
: for plate girder use Fb=0.6Fy

Section Properties

d' , h (cm)	27
A(cm2)	72.38
Ix(cm4)	11300
Iy(cm4)	1600
Sx(cm3)	769
Sy(cm3)	160
rx(cm)	12.5
ry(cm)	4.7
wt(kg/m)	56.80

for flange
0.38*sqrt(E/Fy) = 11.08
0.56*sqrt(E/Fy) = 16.33

for web
3.76*sqrt(E/Fy) = 109.6
4.46*sqrt(E/Fy) = 130.0
5.76*sqrt(E/Fy) = 167.9 for plate girder

Note: Allowable Shear stess with out Tension field action
: not need stiffener when d/tw <260 and
shear allowable more than shear stress
(5E/Fy) ^ 0.5 = 65.19

Compression 0

Appendix C sectionC2 (for I-sectn only)			Appendix C sectionC3 (for I-sectn only)			
bf/2tf	chk. b/2tf ratio	reduce factor (Qs)	h/tw	chk d/tw ratio	eff. Width (be)	eff. Area (Qa)
8.33	no buckling	1.000	33.75	no buckling	27.00	1.000

K	unbrace length (cm)	KL/r	Cc	Kl/r / Cc	inelastic Fa	elastic Fa	fa	fa/Fa
1	300	63.81	129.53	0.49	1148.308	-	0.00	0.000

Major Bending

unbrace length (cm)	bf/2tf	d/tw	ar	Rpg	chk unbrace length		
					0.444*bf	0.69*E	Lc (cm)
300	8.33	36.75	0.90	1.00	258.9	521.3	258.9

full lateral brace		not full lateral brace								Stress Check	
Section Classified	Fb	Cb	rT	sqrt(3.517)	sqrt(17.5)	L/rT	Fb1	Fb2	Fb	fb	fb/Fb
compact	-	1	5.06	54.68	122.26	59.23	1440	1412.244	1440	409.78	0.28

Minor bending

Stress Check		
Fb	fb	fb/Fb
1440	0.00	0.00

Combinded Sress

Cmx	Cmy	F'ex	F'ey	combined stress
0.85	0.85	18236.87	2582.211	0.28

Shear

a	Kv	Cv-a < 0.8	Cv-b > 0.8	Fv	Stress Check	
					fv	fv/Fv
3600	5.340	6.1768	2.2358	960.00	145.83	0.15

Deflection

Deflection=5ML^2/(48EI)= 0.00 cm *#DIV/0!*

Summary

fa/Fa	0.00
fb/Fb	0.28
fv/Fv	0.15

NBTC อาคาร G (Rev) 0

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NBTC อาคาร G (Rev) GB2(0.35x1.2)

Load factor	DL =	1.40				**GB2**					
	LL =	1.70		CANT L			SPAN 1			CANT R	
Span length	(m)			0.00			8.00			0.00	
Slab thickness	(m)			0.01			0.25			0.25	
Strip width	(m)			3.00			4.46			4.46	
Beam width	(m)			0.35			0.35			0.35	
Beam depth	(m)			1.20			1.20			1.20	
SDL	(kg/m)		120	360			535			535	
$DL_{,slab}$	(kg/m)		24	72			2676			2676	
$DL_{,girder}$	(kg/m)			1008			1008			1008	
$DL_{,total}$	(kg/m)			1440			4219			4219	
L.L.	(kg/m)		3000	9000	1.00		13380	1.00		13380	1.00
Service load	(kg/m)			10440			17599			17599	
Ultimate load	(kg/m)			17316			28653			28653	
Concentrate Load (kg)			Service load	Factor load	x (m)	Service load	Factor load	x (m)	Service load	Factor load	x (m)
Concentrate DL		1.40	0	0	0.00	0	0	4.00	0	0	0.00
			0	0	0.00	0	0	4.00	0	0	0.00
			0	0	0.00	0	0	4.00	0	0	0.00
Concentrate LL		1.70	0	0	0.00	0	0	4.00	0	0	0.00
			0	0	0.00	0	0	4.00	0	0	0.00
			0	0	0.00	0	0	4.00	0	0	0.00

	x	0.00	0.00	0.00		4.00	4.00	4.00		0.00	0.00	0.00
	P_L	0	0	0		0	0	0		0	0	0
	P_D	0	0	0		0	0	0		0	0	0
	w_D		1440				4219				4219	
	w_L						13380					
	L		*0.00*				8.00				0.00	

Result of structural analysis

Dead load	R (kg)	16877			16877	
Shear	(kg)	0	16877		16877	0
Moment	(kg-m)	0	-92	33661	-92	0
Live load	R (kg)	53520			53520	
Shear	(kg)	0	53520		53520	0
Moment	(kg-m)	0	-293	106747	-293	0
Service load	R (kg)	70397			70397	
Shear	(kg)	0	70397		70397	0
Moment	(kg-m)	0	-386	140408	-386	0
Factor load	R (kg)	114612			114612	
Shear	(kg)	0	114612		114612	0
Moment	(kg-m)	0	-628	228595	-628	0
M max(wind load)		0	0		0	0
V max(wind load)		0	0		0	0

Summary result of design

				GB2		
M^-_{design}	(kg-m)	-135	10106		10106	-224
M^+_{design}	(kg-m)			228595		
V_{design}	(kg)	0	84526		84526	0
$A_{s,required}$		0.04	2.87	58.31	2.87	0.06
Use		1 -DB25	1 -DB25	12 -DB25	1 -DB25	1 -DB25
$A_{s}^{'}{}_{,required}$		0.00	0.00	0.00	0.00	0.00
Use		0 -DB25	0 -DB25	0 -DB25	0 -DB25	0 -DB25
Stirrup		1-DB-12@0.25	1-DB-12@0.125		1-DB-12@0.125	1-DB-12@0.25

Serviceability						
Immediate deflection	(cm)	0.00		0.85		0.0000
control at		> 360 OK		> 360 OK		> 360 OK
Long term deflection	(cm)	0.00		1.41		0.0000
control at		> 480 OK		> 480 OK		> 480 OK
Crack width, w	(mm)	0.0000	-0.0218	0.2881	-0.0218	0.0000

NBTC อาคาร G (Rev) GB3(0.35x1)

Load factor	DL =	1.40				**GB3**					
	LL =	1.70		CANT L			SPAN 1			CANT R	
Span length	(m)			0.00			8.00			0.00	
Slab thickness	(m)			0.01			0.20			0.20	
Strip width	(m)			3.00			3.95			3.95	
Beam width	(m)			0.35			0.35			0.35	
Beam depth	(m)			1.00			1.00			1.00	
SDL	(kg/m)	250	750			988			988		
$DL_{,slab}$	(kg/m)	24	72			1896			1896		
$DL_{,girder}$	(kg/m)		840			840			840		
$DL_{,total}$	(kg/m)		1662			3724			3724		
L.L.	(kg/m)	600	1800	1.00		2370	1.00		2370	1.00	
Service load	(kg/m)		3462			6094			6094		
Ultimate load	(kg/m)		5387			9242			9242		
Concentrate Load (kg)		Service load	Factor load	x (m)	Service load	Factor load	x (m)	Service load	Factor load	x (m)	
Concentrate DL	1.40	0	0	0.00	11537	16152	3.00	0	0	0.00	
		0	0	0.00	0	0	6.00	0	0	0.00	
		0	0	0.00	0	0	6.00	0	0	0.00	
Concentrate LL	1.70	0	0	0.00	7920	13464	3.00	0	0	0.00	
		0	0	0.00	0	0	6.00	0	0	0.00	
		0	0	0.00	0	0	6.00	0	0	0.00	

	x	0.00	0.00	0.00		3.00	6.00	6.00		0.00	0.00	0.00		
	P_L	0	0	0		7920	0	0		0	0	0		
	P_D	0	0	0		11537	0	0		0	0	0		
	w_D		1662				3724				3724			
	w_L						2370							
	L		*0.00*				8.00				0.00			

Result of structural analysis

Dead load	R (kg)	22107			19218		
Shear	(kg)	0	22107		19218	0	
Moment	(kg-m)	0	-141	49424	-120	0	
Live load	R (kg)	14432			12448		
Shear	(kg)	0	14432		12448	0	
Moment	(kg-m)	0	-93	32538	-78	0	
Service load	R (kg)	36539			31666		
Shear	(kg)	0	36539		31666	0	
Moment	(kg-m)	0	-234	81962	-198	0	
Factor load	R (kg)	55484			48067		
Shear	(kg)	0	55484		48066	0	
Moment	(kg-m)	0	-356	124509	-300	0	
M max(wind load)		0	0		0	0	
V max(wind load)		0	0		0	0	

Summary result of design

				GB3		
M^-_{design}	(kg-m)	-42	4881		4227	-72
M^+_{design}	(kg-m)			124509		
V_{design}	(kg)	0	47351		39934	0

$A_{s,required}$		0.01	1.65	39.12	1.43	0.02
Use		1 -DB25	1 -DB25	8 -DB25	1 -DB25	1 -DB25
$A_{s}^{'},required$		0.00	0.00	14.70	14.70	14.70
Use		0 -DB25	0 -DB25	3 -DB25	3 -DB25	3 -DB25
Stirrup		1-DB-12@0.25	1-DB-12@0.25		1-DB-12@0.25	1-DB-12@0.25

Serviceability

Immediate deflection	(cm)	0.00		0.45		0.0000
control at		> 360 OK		> 360 OK		> 360 OK
Long term deflection	(cm)	0.00		1.55		0.0000
control at		> 480 OK		> 480 OK		> 480 OK
Crack width, w	(mm)	0.0000	-0.0183	0.2999	-0.0168	0.0000

NBTC อาคาร G (Rev) — 3B5 (0.25x0.70)

Load factor			CANT L	GB4x SPAN 1	GB4 SPAN 2	GB4 SPAN 3	GB4 SPAN 4	GB4 SPAN 5	CANT R
DL =	1.40								
LL =	1.70								
Span length	(m)		0.00	8.00	8.00	8.00	8.00	8.00	0.00
Slab thickness	(m)		0.25	0.25	0.20	0.20	0.20	0.20	0.20
Strip width	(m)		4.50	4.50	4.50	4.50	4.50	4.50	4.50
Beam width	(m)		0.35	0.35	0.35	0.35	0.35	0.35	0.35
Beam depth	(m)		1.20	1.20	1.00	1.00	1.00	1.00	1.00
SDL	(kg/m)	120	540	540	1125	1125	1125	1125	1125
DL_{slab}	(kg/m)	600	2700	2700	2160	2160	2160	2160	2160
DL_{girder}	(kg/m)		1008	1008	840	840	840	840	840
DL_{total}	(kg/m)		4248	4248	4125	4125	4125	4125	4125
L.L.	(kg/m)	3000	13500 1.00	13500 1.00	2700 1.00	2700 1.00	2700 1.00	2700 1.00	2700 1.00
Service load	(kg/m)		17748	17748	6825	6825	6825	6825	6825
Ultimate load	(kg/m)		28897	28897	10365	10365	10365	10365	10365

Concentrate Load (kg)		Service load	Factor load	x (m)	Service load	Factor load	x (m)	Service load	Factor load	x (m)	Service load	Factor load	x (m)	Service load	Factor load	x (m)	Service load	Factor load	x (m)	Service load	Factor load	x (m)
Concentrate DL	1.40	0	0	0.00	0	0	3.35	0	0	5.06	0	0	3.77	0	0	3.85	0	0	4.83	0	0	0.00
		0	0	0.00	0	0	3.35	0	0	5.06	0	0	3.77	0	0	3.85	0	0	4.83	0	0	0.00
		0	0	0.00	0	0	3.35	0	0	5.06	0	0	3.77	0	0	3.85	0	0	4.83	0	0	0.00
Concentrate LL	1.70	0	0	0.00	0	0	3.35	0	0	5.06	0	0	3.77	0	0	3.85	0	0	4.83	0	0	0.00
		0	0	0.00	0	0	3.35	0	0	5.06	0	0	3.77	0	0	3.85	0	0	4.83	0	0	0.00
		0	0	0.00	0	0	3.35	0	0	5.06	0	0	3.77	0	0	3.85	0	0	4.83	0	0	0.00

x	0.00	0.00	0.00		3.35	3.35	3.35		5.06	5.06	5.06		3.77	3.77	3.77		3.85	3.85	3.85		4.83	4.83	4.83		0.00	0.00										
P_L	0	0	0		0	0	0		0	0	0		0	0	0		0	0	0		0	0	0		0	0										
P_D	0	0	0		0	0	0		0	0	0		0	0	0		0	0	0		0	0	0		0	0										
w_D			4248				4248				4125				4125				4125				4125				4125								
w_L							13500				2700				2700				2700				2700												
L			0.00				8.00				8.00				8.00				8.00				8.00				0.00								

Result of structural analysis

Dead load	R (kg)			13663				37512				32357				32071				37354				13028												
Shear	(kg)			0	13663			20321	17191			15809	16547			16453	15619			17381	19972			13028	0											
Moment	(kg-m)			0	-45	21885		-26681	-26651	7527		-21125	-21159	11913		-20781	-20743	8818		-27793	-27816	20534		-38	0											
Live load	R (kg)			47533				77160				14286				22826				23993				8604												
Shear	(kg)			1	47531			60469	16692			4908	9378			12222	10604			10996	12997			8603	0											
Moment	(kg-m)			0	-151	83336		-51900	-51725	-1831		-4593	-4704	11461		-16081	-15988	4826		-17558	-17623	13657		-50	0											
Service load	R (kg)			61196				114672				46643				54897				61346				21632												
Shear	(kg)			2	61194			80790	33882			20718	25925			28675	26222			28378	32969			21631	1											
Moment	(kg-m)			0	-196	105221		-78581	-78376	5696		-25718	-25863	23373		-36862	-36731	13644		-45351	-45439	34190		-88	0											
Factor load	R (kg)			99934				183689				69586				83704				93083				32866												
Shear	(kg)			3	99931			131247	52443			30477	39109			43811	39893			43027	50055			32865	1											
Moment	(kg-m)			0	-320	172311		-125584	-125243	7425		-37383	-37620	36161		-56431	-56219	20549		-68759	-68902	51964		-139	0											

Summary result of design

				GB4x				GB4				GB4				GB4				GB4				GB4												
M^-_{design}	(kg-m)			-577	19088			-99913	-114962			-31495	-30005			-47876	-48448			-60361	-59098			6227	-207											
M^+_{design}	(kg-m)					172311				7425				36161				20549				51964												
V_{design}	(kg)			3	99931			131247	52443			30477	39109			43811	39893			43027	50055			32865	1											
$A_{s,required}$				0.16	5.29	39.19		27.20	36.61	2.51		10.78	10.34	10.78		16.56	16.72	7.03		20.01	19.66	13.68		2.11	0.07											
Use				1 -DB25	2 -DB25	8 -DB25		6 -DB25	8 -DB25	1 -DB25		3 -DB25	3 -DB25	3 -DB25		4 -DB25	4 -DB25	2 -DB25		5 -DB25	5 -DB25	3 -DB25		1 -DB25	1 -DB25											
$A'_{s,required}$				0.00	0.00	14.70		0.00	0.00	0.00		0.00	0.00	0.00		0.00	0.00	0.00		0.00	0.00	0.00		0.00	0.00											
Use				0 -DB25	0 -DB25	3 -DB25		0 -DB25	0 -DB25	0 -DB25		0 -DB25	0 -DB25	0 -DB25		0 -DB25	0 -DB25	0 -DB25		0 -DB25	0 -DB25	0 -DB25		0 -DB25	0 -DB25											
Stirrup				1-DB-12@0.25	1-DB-12@0.2			1-DB-12@0.1	1-DB-12@0.25			1-DB-12@0.25	1-DB-12@0.25			1-DB-12@0.25	1-DB-12@0.25			1-DB-12@0.25	1-DB-12@0.25			1-DB-12@0.25	1-DB-12@0.25											

Serviceability

Immediate deflection	(cm)			0.00				0.79				0.01				0.13				0.03				0.38												
control at				> 360	OK			> 360	OK			> 360	OK			> 360	OK			> 360	OK			> 360	OK											
Long term deflection	(cm)			0.00				1.14				0.04				0.26				0.09				0.72												
control at				> 480	OK			> 480	OK			> 480	OK			> 480	OK			> 480	OK			> 480	OK											
Crack width, w	(mm)			0.0000	-0.0232			0.2953		0.2814	0.2968			0.0316	0.1190	0.1203		0.0974	0.2317	0.2303		0.0504	0.2902	0.2922		0.2553	-0.0166	0.0000								
				OK	OK			OK		OK	OK			OK	OK	OK		OK	OK	OK		OK	OK	OK		OK	OK	OK								

NBTC อาคาร G (Rev) GB5(0.25x0.7),GB5x(0.25x0.7)

Load factor	DL =	1.40						**GB5**					**GB5x**										
	LL =	1.70		CANT L				SPAN 1					SPAN 2					CANT R					
Span length	(m)			0.00				3.25					4.75					0.00					
Slab thickness	(m)			0.30				0.30					0.30					0.30					
Strip width	(m)			3.30				3.30					3.30					3.30					
Beam width	(m)			0.25				0.25					0.25					0.25					
Beam depth	(m)			0.70				0.70					0.70					0.70					
SDL	(kg/m)	170	561					561					561					561					
$DL_{, slab}$	(kg/m)	720	2376					2376					2376					2376					
$DL_{, girder}$	(kg/m)		1140					1140					1140					1140					
$DL_{, total}$	(kg/m)		4077					4077					4077					4077					
L.L.	(kg/m)	1200	3960	1.00				3960	1.00				3960	1.00				3960	1.00				
Service load	(kg/m)		8037					8037					8037					8037					
Ultimate load	(kg/m)		12440					12440					12440					12440					
Concentrate Load (kg)		Service load	Factor load	x (m)	Service load	Factor load	x (m)	Service load	Factor load	x (m)	Service load	Factor load	x (m)										
Concentrate DL	1.40	0	0	0.00	0	0	0.79	6669	9337	2.70	0	0	0.00										
		0	0	0.00	0	0	0.79	0	0	3.38	0	0	0.00										
		0	0	0.00	0	0	0.79	0	0	3.38	0	0	0.00										
Concentrate LL	1.70	0	0	0.00	0	0	0.79	1900	3230	2.70	0	0	0.00										
		0	0	0.00	0	0	0.79	0	0	3.38	0	0	0.00										
		0	0	0.00	0	0	0.79	0	0	3.38	0	0	0.00										

x	0.00	0.00	0.00		0.79	0.79	0.79		2.70	3.38	3.38		0.00	0.00	0.00								
P_L	0	0	0		0	0	0		1900	0	0		0	0	0								
P_D	0	0	0		0	0	0		6669	0	0		0	0	0								
w_D	4077				4077				4077				4077										
w_L					3960				3960														
L	0.00				3.25				4.75				0.00										

Result of structural analysis

Dead load	R (kg)			2835				25568				10882											
Shear	(kg)			0	2835			10415	15153			10882	0										
Moment	(kg-m)			0	20	987		-12298	-12328	13724		-16	0										
Live load	R (kg)			3452				21684				8445											
Shear	(kg)			0	3452			9418	12266			8444	0										
Moment	(kg-m)			0	12	1503		-9684	-9704	8980		-10	0										
Service load	R (kg)			6287				47252				19327											
Shear	(kg)			0	6287			19834	27419			19326	1										
Moment	(kg-m)			0	32	2490		-21982	-22032	22704		-26	0										
Factor load	R (kg)			9837				72659				29591											
Shear	(kg)			0	9837			30593	42066			29590	1										
Moment	(kg-m)			0	48	3937		-33680	-33756	34480		-40	0										
M max(wind load)				0	0			0	0			0	0										
V max(wind load)				0	0			0	0			0	0										

Summary result of design

						GB5					**GB5x**												
M^-_{design}	(kg-m)			-62	727			-30683	-29611			2143	-62										
M^+_{design}	(kg-m)					3937				34480													
V_{design}	(kg)			0	2249			23004	34478			22001	1										
$A_{s, required}$				0.03	0.35	1.93		16.05	15.60	17.69		1.05	0.03										
Use				1 -DB25	1 -DB25	1 -DB25		4 -DB25	4 -DB25	4 -DB25		1 -DB25	1 -DB25										
$A_{s}^{'}{}_{, required}$				0.00	0.00	0.00		0.00	0.00	0.00		0.00	0.00										
Use				0 -DB25	0 -DB25	0 -DB25		0 -DB25	0 -DB25	0 -DB25		0 -DB25	0 -DB25										
Stirrup				1-DB-10@0.25	1-DB-10@0.25			1-DB-10@0.25	1-DB-10@0.125			1-DB-10@0.25	1-DB-10@0.25										

Serviceability

Immediate deflection	(cm)			0.00		0.00				0.23		0.0000											
control at				> 360 OK		> 360 OK				> 360 OK		> 360 OK											
Long term deflection	(cm)			0.00		0.00				0.70		0.0000											
control at				> 480 OK		> 480 OK				> 480 OK		> 480 OK											
Crack width, w	(mm)			0.0000	-0.0117	0.0342		0.2835	0.2870	0.2791		-0.0220	0.0000										
				OK	OK	OK		OK	OK	OK		OK	OK										

NBTC อาคาร G (Rev) GB6x(0.35x1),GB6(0.35x1),GB6x(0.35x1)

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NBTC อาคาร G (Rev) GB7x(0.35x1),GB7(0.35x1),GB7x(0.35x1)

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NBTC อาคาร G (Rev) GB8x(0.35x1),GB8(0.35x1),GB8x(0.35x1)

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NBTC อาคาร G (Rev) GB9(0.25x0.8)

Load factor	DL =	1.40				**GB9**					
	LL =	1.70		CANT L			SPAN 1			CANT R	
Span length	(m)			0.00			6.60			0.00	
Slab thickness	(m)			0.01			0.20			0.20	
Strip width	(m)			3.00			4.00			4.00	
Beam width	(m)			0.25			0.25			0.25	
Beam depth	(m)			0.80			0.80			0.80	
SDL	(kg/m)		250	750			1000			1000	
$DL_{,slab}$	(kg/m)		24	72			1920			1920	
$DL_{,girder}$	(kg/m)			480			480			480	
$DL_{,total}$	(kg/m)			1302			3400			3400	
L.L.	(kg/m)		600	1800	1.00		2400	1.00		2400	1.00
Service load	(kg/m)			3102			5800			5800	
Ultimate load	(kg/m)			4883			8840			8840	
Concentrate Load (kg)			Service load	Factor load	x (m)	Service load	Factor load	x (m)	Service load	Factor load	x (m)
Concentrate DL	1.40		0	0	0.00	0	0	3.30	0	0	0.00
			0	0	0.00	0	0	3.30	0	0	0.00
			0	0	0.00	0	0	3.30	0	0	0.00
Concentrate LL	1.70		0	0	0.00	0	0	3.30	0	0	0.00
			0	0	0.00	0	0	3.30	0	0	0.00
			0	0	0.00	0	0	3.30	0	0	0.00

	x	0.00	0.00	0.00		3.30	3.30	3.30		0.00	0.00	0.00					
	P_L	0	0	0		0	0	0		0	0	0					
	P_D	0	0	0		0	0	0		0	0	0					
	w_D		1302				3400				3400						
	w_L						2400										
	L		*0.00*				6.60				0.00						

Result of structural analysis

Dead load	R (kg)	11220			11220		
Shear	(kg)	0	11220		11220	0	
Moment	(kg-m)	0	-58	18455	-58	0	
Live load	R (kg)	7920			7920		
Shear	(kg)	0	7920		7920	0	
Moment	(kg-m)	0	-41	13027	-41	0	
Service load	R (kg)	19140			19140		
Shear	(kg)	0	19140		19140	0	
Moment	(kg-m)	0	-99	31482	-99	0	
Factor load	R (kg)	29172			29172		
Shear	(kg)	0	29172		29172	0	
Moment	(kg-m)	0	-151	47983	-151	0	
M max(wind load)		0	0		0	0	
V max(wind load)		0	0		0	0	

Summary result of design

				GB9		
M^-_{design}	(kg-m)	-38	2570		2570	-69
M^+_{design}	(kg-m)			47983		
V_{design}	(kg)	0	22896		22896	0
$A_{s,required}$		0.02	1.08	19.41	1.08	0.03
Use		1 -DB25	1 -DB25	4 -DB25	1 -DB25	1 -DB25
$A_{s}^{'},required$		0.00	0.00	0.00	0.00	0.00
Use		0 -DB25	0 -DB25	0 -DB25	0 -DB25	0 -DB25
Stirrup		1-DB-12@0.25	1-DB-12@0.25		1-DB-12@0.25	1-DB-12@0.25

Serviceability

Immediate deflection	(cm)	0.00		0.37		0.0000
control at		> 360 OK		> 360 OK		> 360 OK
Long term deflection	(cm)	0.00		1.17		0.0000
control at		> 480 OK		> 480 OK		> 480 OK
Crack width, w	(mm)	0.0000	-0.0198	0.2871	-0.0198	0.0000

NBTC อาคาร G (Rev) GB9x(0.2x0.5)

Load factor	DL =	1.40				**GB9x**					
	LL =	1.70		CANT L			SPAN 1			CANT R	
Span length	(m)			0.00			3.80			0.00	
Slab thickness	(m)			0.01			0.30			0.30	
Strip width	(m)			3.00			2.50			2.50	
Beam width	(m)			0.20			0.20			0.20	
Beam depth	(m)			0.50			0.50			0.50	
SDL	(kg/m)		300	900			750			750	
$DL_{,slab}$	(kg/m)		24	72			1800			1800	
$DL_{,girder}$	(kg/m)			960			960			960	
$DL_{,total}$	(kg/m)			1932			3510			3510	
L.L.	(kg/m)		400	1200	1.00		1000	1.00		1000	1.00
Service load	(kg/m)			3132			4510			4510	
Ultimate load	(kg/m)			4745			6614			6614	
Concentrate Load (kg)			Service load	Factor load	x (m)	Service load	Factor load	x (m)	Service load	Factor load	x (m)
Concentrate DL		1.40	0	0	0.00	0	0	1.90	0	0	0.00
			0	0	0.00	0	0	1.90	0	0	0.00
			0	0	0.00	0	0	1.90	0	0	0.00
Concentrate LL		1.70	0	0	0.00	0	0	1.90	0	0	0.00
			0	0	0.00	0	0	1.90	0	0	0.00
			0	0	0.00	0	0	1.90	0	0	0.00

	x	0.00	0.00	0.00		1.90	1.90	1.90		0.00	0.00	0.00					
	P_L	0	0	0		0	0	0		0	0	0					
	P_D	0	0	0		0	0	0		0	0	0					
	w_D		1932				3510				3510						
	w_L						1000										
	L		*0.00*				3.80				0.00						

Result of structural analysis

Dead load	R (kg)	6669			6669		
Shear	(kg)	0	6669		6669	0	
Moment	(kg-m)	0	-26	6309	-26	0	
Live load	R (kg)	1900			1900		
Shear	(kg)	0	1900		1900	0	
Moment	(kg-m)	0	-7	1798	-7	0	
Service load	R (kg)	8569			8569		
Shear	(kg)	0	8569		8569	0	
Moment	(kg-m)	0	-34	8107	-34	0	
Factor load	R (kg)	12567			12567		
Shear	(kg)	0	12567		12567	0	
Moment	(kg-m)	0	-50	11889	-50	0	
M max(wind load)		0	0		0	0	
V max(wind load)		0	0		0	0	

Summary result of design

				GB9x		
M^-_{design}	(kg-m)	-37	1102		1102	-52
M^+_{design}	(kg-m)			11889		
V_{design}	(kg)	0	9822		9822	0
$A_{s,required}$		0.03	0.79	7.89	0.79	0.04
Use		1 -DB16	1 -DB16	4 -DB16	1 -DB16	1 -DB16
$A_{s}^{'},required$		0.00	0.00	0.00	0.00	0.00
Use		0 -DB16	0 -DB16	0 -DB16	0 -DB16	0 -DB16
Stirrup		1-DB-10@0.2	1-DB-10@0.2		1-DB-10@0.2	1-DB-10@0.2

Serviceability						
Immediate deflection	(cm)	0.00		0.10		0.0000
control at		> 360 OK		> 360 OK		> 360 OK
Long term deflection	(cm)	0.00		0.58		0.0000
control at		> 480 OK		> 480 OK		> 480 OK
Crack width, w	(mm)	0.0000	-0.0213	0.2877	-0.0213	0.0000

NBTC อาคาร G (Rev) GB10(0.35x0.8),GB10(0.35x0.8),GB10(0.35x0.8)

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NBTC อาคาร G (Rev) GB11(0.25x0.6),GB11(0.25x0.6),GB11(0.25x0.6)

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NBTC อาคาร G (Rev) GB11(0.45x0.8),GB11(0.45x0.8),GB11(0.45x0.8)

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Shear & Torsion GB11x-TORSION (450x800)

		Pu	0	kN	
Require V_u		*@ d from col. edge =*	240	kN	
Require T_u		*@ d from col. edge =*	200	kN-m	
f_c'	32 Mpa	X_o		800	mm
f_{yv}	400 Mpa	Y_o		450	mm
f_{yl}	400 Mpa	X_1		708	mm
b_w	450 mm	Y_1		358	mm
h	800 mm	p_h		2,132	mm
Cover	46 mm	A_{cp}		360,000	mm^2
d	708 mm	A_{oh}		253,464	mm^2
V_c	302 kN	A_o		215,444	mm^2
T_u	200 kN-m	*cot(45deg)*		1.00	
V_u	240 kN				

Check minimum torsion, $T_{u,min}$ for prestressed concrete member

f_{se}	0.00 Mpa	$T_{u,min}$		20.89	kN-m

See design sheet below

Check capacity of section due to combined shear & torsion

shear stress		allowable	
3.98 Mpa	OK	4.03 Mpa	

A_v/S				0.06	mm^2/mm
$At/S = Tu/[0.75(2Ao\ fyv$	*cot(45))]*			1.37	mm^2/mm
$A_v/S+2A_t/S$				2.80	mm^2/mm
Used Spacing, S				125	mm
A_v+2A_t				350	mm^2
$(A_v+2A_t)_{min}$				49	mm^2
		Use stirrup	2 loops	DB	12
$A_l = (A_t/S(p_h f_{yv}/f_{yl})cot^2($	*45)*			2,913	mm^2
$A_{l,min} = 1.32f_c'^{0.5}A_{cp}/f_{yl} - A_t/S(p_h f_{yv}/f_{yl})$				-778	mm^2
A_l =				2,913	mm^2
		Use	10	DB	20
				@ 213.2	mm

NBTC อาคาร G (Rev) GB12(0.45x0.7),GB13(0.45x0.7)

Load factor																	
DL =	1.40					**GB12**				**GB13**							
LL =	1.70		CANT L			SPAN 1				SPAN 2				CANT R			
Span length	(m)		0.00			8.00				8.00				0.00			
Slab thickness	(m)		0.30			0.30				0.30				0.30			
Strip width	(m)		1.50			1.50				4.00				1.50			
Beam width	(m)		0.45			0.45				0.45				0.45			
Beam depth	(m)		0.70			0.70				0.70				0.70			
SDL	(kg/m)	170	255			255				1200				450			
$DL_{, slab}$	(kg/m)	720	1080			1080				2880				1080			
$DL_{, girder}$	(kg/m)		1476			1476				1476				1476			
$DL_{, total}$	(kg/m)		2811			2811				5556				3006			
L.L.	(kg/m)	300	450	1.00		450	1.00			1600	1.00			600	1.00		
Service load	(kg/m)		3261			3261				7156				3606			
Ultimate load	(kg/m)		4700			4700				10498				5228			
Concentrate Load (kg)		Service load	Factor load	x (m)		Service load	Factor load	x (m)		Service load	Factor load	x (m)		Service load	Factor load	x (m)	
Concentrate DL	1.40	0	0	0.00		0	0	2.38		0	0	4.72		0	0	0.00	
		0	0	0.00		0	0	2.38		0	0	4.72		0	0	0.00	
		0	0	0.00		0	0	2.38		0	0	4.72		0	0	0.00	
Concentrate LL	1.70	0	0	0.00		0	0	2.38		0	0	4.72		0	0	0.00	
		0	0	0.00		0	0	2.38		0	0	4.72		0	0	0.00	
		0	0	0.00		0	0	2.38		0	0	4.72		0	0	0.00	

	x	0.00	0.00	0.00		2.38	2.38	2.38		4.72	4.72	4.72		0.00	0.00	0.00			
	P_L	0	0	0		0	0	0		0	0	0		0	0	0			
	P_D	0	0	0		0	0	0		0	0	0		0	0	0			
	w_D		2811				2811				5556				3006				
	w_L						450				1600								
	L		*0.00*				8.00				8.00				0.00				

Result of structural analysis

Dead load	R (kg)			7061				41835				18041							
Shear	(kg)			0	7061			15427	26407			18041	0						
Moment	(kg-m)			0	29		8872	-33439	-33497		29258	-29	0						
Live load	R (kg)			775				10250				5375							
Shear	(kg)			0	775			2825	7425			5375	0						
Moment	(kg-m)			0	12		581	-8188	-8212		9011	-12	0						
Service load	R (kg)			7836				52085				23416							
Shear	(kg)			0	7836			18252	33832			23416	0						
Moment	(kg-m)			0	41		9453	-41627	-41709		38269	-41	0						
Factor load	R (kg)			11202				75994				34395							
Shear	(kg)			0	11202			26401	49593			34394	1						
Moment	(kg-m)			0	60		13409	-60735	-60856		56280	-60	0						
M max(wind load)				0	0			0	0			0	0						
V max(wind load)				0	0			0	0			0	0						

Summary result of design

						GB12				**GB13**									
M^-_{design}	(kg-m)			0	46			-60733	-60853			-59	0						
M^+_{design}	(kg-m)						13409				56280								
V_{design}	(kg)			0	8335			23534	43189			27990	1						
$A_{s, required}$				0.00	0.02		6.62		24.06	24.12		22.14		0.03	0.00				
Use				1 -DB20	1 -DB20		3 -DB20		8 -DB20	8 -DB20		8 -DB20		1 -DB20	1 -DB20				
$A_{s}^{'}{}_{, required}$				0.00	0.00		0.00		0.00	0.00		0.00		0.00	0.00				
Use				0 -DB20	0 -DB20		0 -DB20		0 -DB20	0 -DB20		0 -DB20		0 -DB20	0 -DB20				
Stirrup				2-DB-12@0.25	2-DB-12@0.25				2-DB-12@0.25	2-DB-12@0.25				2-DB-12@0.25	2-DB-12@0.25				

Serviceability

Immediate deflection	(cm)			0.00			0.01					0.41			0.0000				
control at				> 360 OK			> 360 OK					> 360 OK			> 360 OK				
Long term deflection	(cm)			0.00			0.18					2.14			0.0000				
control at				> 480 OK			> 480 OK					< 480 NG			> 480 OK				
Crack width, w	(mm)			0.0000	-0.0016		0.0480		0.3427	0.3426		0.3414		0.0014	0.0000				
				OK	OK		OK		NG	NG		NG		OK	OK				

Shear & Torsion GB12-TORSION (450x700)

		Pu	0	kN	
Require V_u		*@ d from col. edge =*	235	kN	
Require T_u		*@ d from col. edge =*	68	kN-m	
f_c'	32 Mpa	X_o		700	mm
f_{yv}	400 Mpa	Y_o		450	mm
f_{yl}	400 Mpa	X_1		608	mm
b_w	450 mm	Y_1		358	mm
h	700 mm	p_h		1,932	mm
Cover	46 mm	A_{cp}		315,000	mm^2
d	608 mm	A_{oh}		217,664	mm^2
V_c	259 kN	A_o		185,014	mm^2
T_u	68 kN-m	*cot(45deg)*		1.00	
V_u	235 kN				

Check minimum torsion, $T_{u,min}$ for prestressed concrete member

f_{se}	0.00 Mpa	$T_{u,min}$		17.38	kN-m

See design sheet below

Check capacity of section due to combined shear & torsion

shear stress		allowable	
1.85 Mpa	OK	4.03 Mpa	
A_v/S		0.22	mm^2/mm
$At/S = Tu/[0.75(2Ao\ fyv\ cot(45))]$		0.54	mm^2/mm
$A_v/S+2A_t/S$		1.31	mm^2/mm
Used Spacing, S		150	mm
A_v+2A_t		196	mm^2
$(A_v+2A_t)_{min}$		59	mm^2
	Use stirrup 1 loops	DB 12	
$A_l = (A_t/S(p_h f_{yv}/f_{yl})cot^2($ 45)		1,048	mm^2
$A_{l,min} = 1.32f_c'^{0.5}A_{cp}/f_{yl} - A_t/S(p_h f_{yv}/f_{yl})$		820	mm^2
A_l =		1,048	mm^2
	Use 4	DB 20	
		@ 300.0	mm

NBTC อาคาร G (Rev) GB13(0.45x0.7)

Load factor	DL =	1.40				**GB13**					
	LL =	1.70		CANT L			SPAN 1			CANT R	
Span length	(m)			0.00			8.00			0.00	
Slab thickness	(m)			0.01			0.30			0.30	
Strip width	(m)			3.00			4.00			4.00	
Beam width	(m)			0.45			0.45			0.45	
Beam depth	(m)			0.70			0.70			0.70	
SDL	(kg/m)	300	900			1200			1200		
$DL_{,slab}$	(kg/m)	24	72			2880			2880		
$DL_{,girder}$	(kg/m)		1476			1476			1476		
$DL_{,total}$	(kg/m)		2448			5556			5556		
L.L.	(kg/m)	400	1200	1.00		1600	1.00		1600	1.00	
Service load	(kg/m)		3648			7156			7156		
Ultimate load	(kg/m)		5467			10498			10498		
Concentrate Load (kg)		Service load	Factor load	x (m)	Service load	Factor load	x (m)	Service load	Factor load	x (m)	
Concentrate DL	1.40	0	0	0.00	0	0	4.00	0	0	0.00	
		0	0	0.00	0	0	4.00	0	0	0.00	
		0	0	0.00	0	0	4.00	0	0	0.00	
Concentrate LL	1.70	0	0	0.00	0	0	4.00	0	0	0.00	
		0	0	0.00	0	0	4.00	0	0	0.00	
		0	0	0.00	0	0	4.00	0	0	0.00	

	x	0.00	0.00	0.00		4.00	4.00	4.00		0.00	0.00	0.00		
	P_L	0	0	0		0	0	0		0	0	0		
	P_D	0	0	0		0	0	0		0	0	0		
	w_D		2448				5556				5556			
	w_L						1600							
	L		*0.00*				8.00				0.00			

Result of structural analysis

Dead load	R (kg)	22224			22224	
Shear	(kg)	0	22224		22224	0
Moment	(kg-m)	0	-24653	19795	-24653	0
Live load	R (kg)	6400			6400	
Shear	(kg)	0	6400		6400	0
Moment	(kg-m)	0	-7099	5701	-7099	0
Service load	R (kg)	28624			28624	
Shear	(kg)	0	28624		28624	0
Moment	(kg-m)	0	-31752	25496	-31752	0
Factor load	R (kg)	41994			41994	
Shear	(kg)	0	41994		41994	0
Moment	(kg-m)	0	-46583	37405	-46583	0
M max(wind load)		0	0		0	0
V max(wind load)		0	0		0	0

Summary result of design

				GB13		
M^-_{design}	(kg-m)	-289	-33489		-33489	-554
M^+_{design}	(kg-m)			37405		
V_{design}	(kg)	0	35590		35590	0
$A_{s,required}$		0.14	12.74	14.31	12.74	0.27
Use		1 -DB20	5 -DB20	5 -DB20	5 -DB20	1 -DB20
$A_{s}^{'},required$		0.00	0.00	0.00	0.00	0.00
Use		0 -DB20	0 -DB20	0 -DB20	0 -DB20	0 -DB20
Stirrup		1-DB-12@0.25	1-DB-12@0.25		1-DB-12@0.25	1-DB-12@0.25

Serviceability						
Immediate deflection	(cm)	0.00		0.51		0.0000
control at		> 360 OK		> 360 OK		> 360 OK
Long term deflection	(cm)	0.00		1.72		0.0000
control at		> 480 OK		< 480 NG		> 480 OK
Crack width, w	(mm)	0.0000	0.3899	0.2902	0.3899	0.0000

NBTC อาคาร G (Rev) GB15(0.2x0.5)

Load factor	DL =	1.40				**GB15**					
	LL =	1.70		CANT L			SPAN 1			CANT R	
Span length		(m)		0.00			2.20			0.00	
Slab thickness		(m)		0.01			0.45			0.45	
Strip width		(m)		3.00			2.60			2.60	
Beam width		(m)		0.20			0.20			0.20	
Beam depth		(m)		0.50			0.50			0.50	
SDL		(kg/m)	300	900			780			780	
$DL_{,slab}$		(kg/m)	24	72			2808			2808	
$DL_{,girder}$		(kg/m)		960			960			960	
$DL_{,total}$		(kg/m)		1932			4548			4548	
L.L.		(kg/m)	400	1200	1.00		1040	1.00		1040	1.00
Service load		(kg/m)		3132			5588			5588	
Ultimate load		(kg/m)		4745			8135			8135	
Concentrate Load (kg)			Service load	Factor load	x (m)	Service load	Factor load	x (m)	Service load	Factor load	x (m)
Concentrate DL		1.40	0	0	0.00	0	0	1.10	0	0	0.00
			0	0	0.00	0	0	1.10	0	0	0.00
			0	0	0.00	0	0	1.10	0	0	0.00
Concentrate LL		1.70	0	0	0.00	0	0	1.10	0	0	0.00
			0	0	0.00	0	0	1.10	0	0	0.00
			0	0	0.00	0	0	1.10	0	0	0.00

	x	0.00	0.00	0.00		1.10	1.10	1.10		0.00	0.00	0.00					
	P_L	0	0	0		0	0	0		0	0	0					
	P_D	0	0	0		0	0	0		0	0	0					
	w_D		1932				4548				4548						
	w_L						1040										
	L		*0.00*				2.20				0.00						

Result of structural analysis

Dead load	R (kg)	5003			5003	
Shear	(kg)	0	5003		5003	0
Moment	(kg-m)	0	-15	2736	-15	0
Live load	R (kg)	1144			1144	
Shear	(kg)	0	1144		1144	0
Moment	(kg-m)	0	-3	626	-3	0
Service load	R (kg)	6147			6147	
Shear	(kg)	0	6147		6147	0
Moment	(kg-m)	0	-19	3362	-19	0
Factor load	R (kg)	8949			8949	
Shear	(kg)	0	8949		8949	0
Moment	(kg-m)	0	-27	4895	-27	0
M max(wind load)		0	0		0	0
V max(wind load)		0	0		0	0

Summary result of design

				GB15		
M^-_{design}	(kg-m)	-95	1200		1200	-163
M^+_{design}	(kg-m)			4895		
V_{design}	(kg)	0	5451		5451	0
$A_{s,required}$		0.07	0.83	3.01	0.83	0.11
Use		1 -DB16	1 -DB16	2 -DB16	1 -DB16	1 -DB16
$A_{s}^{'}{}_{,required}$		0.00	0.00	0.00	0.00	0.00
Use		0 -DB16	0 -DB16	0 -DB16	0 -DB16	0 -DB16
Stirrup		1-DB-12@0.2	1-DB-12@0.2		1-DB-12@0.2	1-DB-12@0.2

Serviceability

Immediate deflection	(cm)	0.00		0.01		0.0000
control at		> 360 OK		> 360 OK		> 360 OK
Long term deflection	(cm)	0.00		0.05		0.0000
control at		> 480 OK		> 480 OK		> 480 OK
Crack width, w	(mm)	0.0000	-0.0230	0.0793	-0.0230	0.0000

NBTC อาคาร G (Rev) GB16(0.35x0.7),GB17(0.35x0.7),GB16(0.35x0.7)

| Load factor | | |

NBTC อาคาร G (Rev) GB18(0.45x0.7),GB18(0.45x0.7)

Load factor	DL =	1.40						**GB18**						**GB18**										
	LL =	1.70		CANT L				SPAN 1						SPAN 2					CANT R					
Span length	(m)			0.00				6.60						6.60					0.00					
Slab thickness	(m)			0.30				0.30						0.30					0.30					
Strip width	(m)			6.00				6.00						6.00					6.00					
Beam width	(m)			0.45				0.45						0.45					0.45					
Beam depth	(m)			0.70				0.70						0.70					0.70					
SDL	(kg/m)		300	1800				1800						1800					1800					
$DL_{, slab}$	(kg/m)		720	4320				4320						4320					4320					
$DL_{, girder}$	(kg/m)			1476				1476						1476					1476					
$DL_{, total}$	(kg/m)			7596				7596						7596					7596					
L.L.	(kg/m)		400	2400	1.00			2400	1.00					2400	1.00				2400	1.00				
Service load	(kg/m)			9996				9996						9996					9996					
Ultimate load	(kg/m)			14714				14714						14714					14714					
Concentrate Load (kg)			Service load	Factor load	x (m)		Service load	Factor load	x (m)		Service load	Factor load	x (m)		Service load	Factor load	x (m)		Service load	Factor load	x (m)			
Concentrate DL		1.40	0	0	0.00		0	0	2.48		0	0	4.13		0	0	0.00							
			0	0	0.00		0	0	2.48		0	0	4.13		0	0	0.00							
			0	0	0.00		0	0	2.48		0	0	4.13		0	0	0.00							
Concentrate LL		1.70	0	0	0.00		0	0	2.48		0	0	4.13		0	0	0.00							
			0	0	0.00		0	0	2.48		0	0	4.13		0	0	0.00							
			0	0	0.00		0	0	2.48		0	0	4.13		0	0	0.00							

	x	0.00	0.00	0.00		2.48	2.48	2.48		4.13	4.13	4.13		0.00	0.00	0.00								
	P_L	0	0	0		0	0	0		0	0	0		0	0	0								
	P_D	0	0	0		0	0	0		0	0	0		0	0	0								
	w_D		7596				7596				7596				7596									
	w_L						2400				2400													
	L		*0.00*				6.60				6.60				0.00									

Result of structural analysis

Dead load	R (kg)			18814				62640				18815												
Shear	(kg)			0	18814			31320	31320			18814	1											
Moment	(kg-m)			0	-60	23239		-41330	-41330	23239		-60	0											
Live load	R (kg)			5944				19791				5945												
Shear	(kg)			0	5944			9896	9896			5944	0											
Moment	(kg-m)			0	-19	7342		-13058	-13058	7342		-19	0											
Service load	R (kg)			24758				82431				24759												
Shear	(kg)			0	24758			41215	41215			24758	1											
Moment	(kg-m)			0	-79	30581		-54389	-54389	30581		-79	0											
Factor load	R (kg)			36445				121341				36446												
Shear	(kg)			0	36445			60670	60670			36445	1											
Moment	(kg-m)			0	-117	45016		-80062	-80062	45016		-117	0											
M max(wind load)				0	0			0	0			0	0											
V max(wind load)				0	0			0	0			0	0											

Summary result of design

								GB18						**GB18**										
M^-_{design}	(kg-m)			-294	5158			-68222	-68222			5158	-294											
M^+_{design}	(kg-m)					45016				45016														
V_{design}	(kg)			0	27469			51695	51695			27469	1											
$A_{s, required}$				0.14	2.52	25.41		37.36	37.36	25.41		2.52	0.14											
Use				1 -DB25	1 -DB25	6 -DB25		8 -DB25	8 -DB25	6 -DB25		1 -DB25	1 -DB25											
$A_{s}^{'}{}_{, required}$				0.00	0.00	0.00		0.00	0.00	0.00		0.00	0.00											
Use				0 -DB25	0 -DB25	0 -DB25		0 -DB25	0 -DB25	0 -DB25		0 -DB25	0 -DB25											
Stirrup				2-DB-12@0.25	2-DB-12@0.25			2-DB-12@0.25	2-DB-12@0.25			2-DB-12@0.25	2-DB-12@0.25											

Serviceability

Immediate deflection	(cm)			0.00		0.20				0.20		0.0000												
control at				> 360 OK		> 360 OK				> 360 OK		> 360 OK												
Long term deflection	(cm)			0.00		0.95				0.95		0.0000												
control at				> 480 OK		> 480 OK				> 480 OK		> 480 OK												
Crack width, w	(mm)			0.0000	-0.0279	0.2524		0.2821	0.2821	0.2524		-0.0279	0.0000											
				OK	OK	OK		OK	OK	OK		OK	OK											

NBTC อาคาร G (Rev) GB19(0.45x0.7)

Load factor	DL =	1.40				**GB19**					
	LL =	1.70		CANT L			SPAN 1			CANT R	
Span length	(m)			0.00			6.60			0.00	
Slab thickness	(m)			0.01			0.30			0.30	
Strip width	(m)			3.00			5.00			5.00	
Beam width	(m)			0.45			0.45			0.45	
Beam depth	(m)			0.70			0.70			0.70	
SDL	(kg/m)		170	510			850			850	
$DL_{,slab}$	(kg/m)		24	72			3600			3600	
$DL_{,girder}$	(kg/m)			1476			1476			1476	
$DL_{,total}$	(kg/m)			2058			5926			5926	
L.L.	(kg/m)		900	2700	1.00		4500	1.00		4500	1.00
Service load	(kg/m)			4758			10426			10426	
Ultimate load	(kg/m)			7471			15946			15946	
Concentrate Load (kg)			Service load	Factor load	x (m)	Service load	Factor load	x (m)	Service load	Factor load	x (m)
Concentrate DL		1.40	0	0	0.00	0	0	3.30	0	0	0.00
			0	0	0.00	0	0	3.30	0	0	0.00
			0	0	0.00	0	0	3.30	0	0	0.00
Concentrate LL		1.70	0	0	0.00	0	0	3.30	0	0	0.00
			0	0	0.00	0	0	3.30	0	0	0.00
			0	0	0.00	0	0	3.30	0	0	0.00

	x	0.00	0.00	0.00		3.30	3.30	3.30		0.00	0.00	0.00					
	P_L	0	0	0		0	0	0		0	0	0					
	P_D	0	0	0		0	0	0		0	0	0					
	w_D		2058				5926				5926						
	w_L						4500										
	L		*0.00*				6.60				0.00						

Result of structural analysis

Dead load	R (kg)	19556			19556		
Shear	(kg)	0	19556		19556	0	
Moment	(kg-m)	0	-13018	19249	-13018	0	
Live load	R (kg)	14850			14850		
Shear	(kg)	0	14850		14850	0	
Moment	(kg-m)	0	-9885	14617	-9885	0	
Service load	R (kg)	34406			34406		
Shear	(kg)	0	34406		34406	0	
Moment	(kg-m)	0	-22903	33867	-22903	0	
Factor load	R (kg)	52623			52623		
Shear	(kg)	0	52623		52623	0	
Moment	(kg-m)	0	-35029	51799	-35029	0	
M max(wind load)		0	0		0	0	
V max(wind load)		0	0		0	0	

Summary result of design

				GB19		
M^-_{design}	(kg-m)	-149	-24824		-24824	-319
M^+_{design}	(kg-m)			51799		
V_{design}	(kg)	0	43374		43374	0
$A_{s,required}$		0.08	14.85	30.47	14.85	0.16
Use		1 -DB20	5 -DB20	10 -DB20	5 -DB20	1 -DB20
$A_{s}^{'},required$		0.00	0.00	15.50	0.00	0.00
Use		0 -DB20	0 -DB20	5 -DB20	0 -DB20	0 -DB20
Stirrup		2-DB-12@0.25	2-DB-12@0.25		2-DB-12@0.25	2-DB-12@0.25

Serviceability

Immediate deflection	(cm)	0.00		0.68		0.0000
control at		> 360 OK		> 360 OK		> 360 OK
Long term deflection	(cm)	0.00		1.34		0.0000
control at		> 480 OK		> 480 OK		> 480 OK
Crack width, w	(mm)	0.0000	0.2102	0.2470	0.2102	0.0000

NBTC อาคาร G (Rev) GB20(0.35x0.9)

Load factor	DL =	1.40				**GB20**					
	LL =	1.70		CANT L			SPAN 1			CANT R	
Span length		(m)			0.00			6.60			0.00
Slab thickness		(m)			0.01			0.30			0.30
Strip width		(m)			3.00			8.00			8.00
Beam width		(m)			0.35			0.35			0.35
Beam depth		(m)			0.90			0.90			0.90
SDL		(kg/m)	170	510			1360			1360	
$DL_{,slab}$		(kg/m)	24	72			5760			5760	
$DL_{,girder}$		(kg/m)		1476			1476			1476	
$DL_{,total}$		(kg/m)		2058			8596			8596	
L.L.		(kg/m)	900	2700	1.00		7200	1.00		7200	1.00
Service load		(kg/m)		4758			15796			15796	
Ultimate load		(kg/m)		7471			24274			24274	
Concentrate Load (kg)			Service load	Factor load	x (m)	Service load	Factor load	x (m)	Service load	Factor load	x (m)
Concentrate DL		1.40	0	0	0.00	0	0	3.30	0	0	0.00
			0	0	0.00	0	0	3.30	0	0	0.00
			0	0	0.00	0	0	3.30	0	0	0.00
Concentrate LL		1.70	0	0	0.00	0	0	3.30	0	0	0.00
			0	0	0.00	0	0	3.30	0	0	0.00
			0	0	0.00	0	0	3.30	0	0	0.00

	x	0.00	0.00	0.00		3.30	3.30	3.30		0.00	0.00	0.00					
	P_L	0	0	0		0	0	0		0	0	0					
	P_D	0	0	0		0	0	0		0	0	0					
	w_D		2058				8596				8596						
	w_L						7200										
	L		*0.00*				6.60				0.00						

Result of structural analysis

Dead load	R (kg)	28367			28367		
Shear	(kg)	0	28367		28367	0	
Moment	(kg-m)	0	-162	46643	-162	0	
Live load	R (kg)	23760			23760		
Shear	(kg)	0	23760		23760	0	
Moment	(kg-m)	0	-136	39068	-136	0	
Service load	R (kg)	52127			52127		
Shear	(kg)	0	52127		52127	0	
Moment	(kg-m)	0	-298	85711	-298	0	
Factor load	R (kg)	80106			80106		
Shear	(kg)	0	80106		80106	0	
Moment	(kg-m)	0	-458	131716	-458	0	
M max(wind load)		0	0		0	0	
V max(wind load)		0	0		0	0	

Summary result of design

				GB20		
M^-_{design}	(kg-m)	-149	11308		11308	-485
M^+_{design}	(kg-m)			131716		
V_{design}	(kg)	0	61171		61171	0

$A_{s,required}$		0.06	4.34	48.06	4.34	0.18
Use		1 -DB25	1 -DB25	10 -DB25	1 -DB25	1 -DB25
$A_{s}^{'},required$		0.00	0.00	14.70	0.00	0.00
Use		0 -DB25	0 -DB25	3 -DB25	0 -DB25	0 -DB25
Stirrup		1-DB-12@0.25	1-DB-12@0.15		1-DB-12@0.15	1-DB-12@0.25

Serviceability

Immediate deflection	(cm)	0.00		0.45		0.0000
control at		> 360 OK		> 360 OK		> 360 OK
Long term deflection	(cm)	0.00		1.36		0.0000
control at		> 480 OK		> 480 OK		> 480 OK
Crack width, w	(mm)	0.0000	-0.0366	0.2868	-0.0366	0.0000

NBTC อาคาร G (Rev) GB21(0.35x0.6),GB21(0.35x0.6),GB21(0.35x0.6),GB21(0.35x0.6)

| | | |

Shear & Torsion GB21-TORSION (350x600)

		Pu	0	kN	
Require V_u		*@ d from col. edge =*	232	kN	
Require T_u		*@ d from col. edge =*	38	kN-m	
f_c'	32 Mpa	X_o		600	mm
f_{yv}	400 Mpa	Y_o		350	mm
f_{yl}	400 Mpa	X_1		508	mm
b_w	350 mm	Y_1		258	mm
h	600 mm	p_h		1,532	mm
Cover	46 mm	A_{cp}		210,000	mm^2
d	508 mm	A_{oh}		131,064	mm^2
V_c	168 kN	A_o		111,404	mm^2
T_u	38 kN-m	*cot(45deg)*		1.00	
V_u	232 kN				

Check minimum torsion, $T_{u,min}$ for prestressed concrete member

f_{se}	0.00 Mpa	$T_{u,min}$		9.35	kN-m

See design sheet below

Check capacity of section due to combined shear & torsion

shear stress		allowable	
2.38 Mpa	OK	4.03 Mpa	

A_v/S				0.69	mm^2/mm
$At/S = Tu/[0.75(2Ao\ fyv$	*cot(45))]*			0.50	mm^2/mm
$A_v/S+2A_t/S$				1.69	mm^2/mm
Used Spacing, S				125	mm
A_v+2A_t				212	mm^2
$(A_v+2A_t)_{min}$				38	mm^2
		Use stirrup	1 loops	DB 12	
$A_l = (A_t/S(p_h f_{yv}/f_{yl})cot^2($	*45)*			767	mm^2
$A_{l,min} = 1.32f_c'^{0.5}A_{cp}/f_{yl} - A_t/S(p_h f_{yv}/f_{yl})$				478	mm^2
A_l =				767	mm^2
		Use	3	DB 20	
				@ 300.0	mm

NBTC อาคาร G (Rev) GRB2(0.2x0.5)

Load factor	DL =	1.40				**GRB2**					
	LL =	1.70		CANT L			SPAN 1			CANT R	
Span length	(m)			0.00			2.40			0.00	
Slab thickness	(m)			0.01			0.20			0.20	
Strip width	(m)			3.00			2.50			2.50	
Beam width	(m)			0.20			0.20			0.20	
Beam depth	(m)			0.50			0.50			0.50	
SDL	(kg/m)	170	510			425			425		
$DL_{,slab}$	(kg/m)	24	72			1200			1200		
$DL_{,girder}$	(kg/m)		480			480			480		
$DL_{,total}$	(kg/m)		1062			2105			2105		
L.L.	(kg/m)	400	1200	1.00		1000	1.00		1000	1.00	
Service load	(kg/m)		2262			3105			3105		
Ultimate load	(kg/m)		3527			4647			4647		
Concentrate Load (kg)		Service load	Factor load	x (m)	Service load	Factor load	x (m)	Service load	Factor load	x (m)	
Concentrate DL	1.40	0	0	0.00	0	0	1.20	0	0	0.00	
		0	0	0.00	0	0	1.20	0	0	0.00	
		0	0	0.00	0	0	1.20	0	0	0.00	
Concentrate LL	1.70	0	0	0.00	0	0	1.20	0	0	0.00	
		0	0	0.00	0	0	1.20	0	0	0.00	
		0	0	0.00	0	0	1.20	0	0	0.00	

x	0.00	0.00	0.00		1.20	1.20	1.20		0.00	0.00	0.00
P_L	0	0	0		0	0	0		0	0	0
P_D	0	0	0		0	0	0		0	0	0
w_D		1062				2105				2105	
w_L						1000					
L		*0.00*				2.40				0.00	

Result of structural analysis

Dead load	R (kg)	2526			2526		
Shear	(kg)	0	2526		2526	0	
Moment	(kg-m)	0	-9	1507	-9	0	
Live load	R (kg)	1200			1200		
Shear	(kg)	0	1200		1200	0	
Moment	(kg-m)	0	-4	716	-4	0	
Service load	R (kg)	3726			3726		
Shear	(kg)	0	3726		3726	0	
Moment	(kg-m)	0	-13	2223	-13	0	
Factor load	R (kg)	5576			5576		
Shear	(kg)	0	5576		5576	0	
Moment	(kg-m)	0	-19	3326	-19	0	
M max(wind load)		0	0		0	0	
V max(wind load)		0	0		0	0	

Summary result of design

				GRB2		
M^-_{design}	(kg-m)	-71	752		752	-93
M^+_{design}	(kg-m)			3326		
V_{design}	(kg)	0	3671		3671	0

$A_{s,required}$	0.05	0.55	2.45	0.55	0.07	
Use	1 -DB16	1 -DB16	2 -DB16	1 -DB16	1 -DB16	
$A_s{}'_{,required}$	0.00	0.00	0.00	0.00	0.00	
Use	0 -DB16	0 -DB16	0 -DB16	0 -DB16	0 -DB16	
Stirrup	1-RB-9@0.2	1-RB-9@0.2		1-RB-9@0.2	1-RB-9@0.2	

Serviceability

Immediate deflection	(cm)	0.00		0.01		0.0000
control at		> 360 OK		> 360 OK		> 360 OK
Long term deflection	(cm)	0.00		0.03		0.0000
control at		> 480 OK		> 480 OK		> 480 OK
Crack width, w	(mm)	0.0000	-0.0178	0.0453	-0.0178	0.0000

NBTC อาคาร G (Rev) GRB3(0.25x0.6),GRB4(0.25x0.6)

Load factor	DL =	1.40					**GRB3**				**GRB4**								
	LL =	1.70		CANT L			SPAN 1				SPAN 2				CANT R				
Span length	(m)			0.00			4.00				5.00				0.00				
Slab thickness	(m)			0.20			0.20				0.20				0.20				
Strip width	(m)			3.65			3.65				3.65				3.65				
Beam width	(m)			0.25			0.25				0.25				0.25				
Beam depth	(m)			0.60			0.60				0.60				0.60				
SDL	(kg/m)		170	621			621				621				621				
$DL_{, slab}$	(kg/m)		480	1752			1752				1752				1752				
$DL_{, girder}$	(kg/m)			600			600				600				600				
$DL_{, total}$	(kg/m)			2973			2973				2973				2973				
L.L.	(kg/m)		400	1460	1.00		1460	1.00			1460	1.00			1460	1.00			
Service load	(kg/m)			4433			4433				4433				4433				
Ultimate load	(kg/m)			6644			6644				6644				6644				
Concentrate Load (kg)			Service load	Factor load	x (m)		Service load	Factor load	x (m)		Service load	Factor load	x (m)		Service load	Factor load	x (m)		
Concentrate DL	1.40		0	0	0.00		0	0	1.35		0	0	3.02		0	0	0.00		
			0	0	0.00		0	0	1.35		0	0	3.02		0	0	0.00		
			0	0	0.00		0	0	1.35		0	0	3.02		0	0	0.00		
Concentrate LL	1.70		0	0	0.00		0	0	1.35		0	0	3.02		0	0	0.00		
			0	0	0.00		0	0	1.35		0	0	3.02		0	0	0.00		
			0	0	0.00		0	0	1.35		0	0	3.02		0	0	0.00		

x	0.00	0.00	0.00		1.35	1.35	1.35		3.02	3.02	3.02		0.00	0.00	0.00								
P_L	0	0	0		0	0	0		0	0	0		0	0	0								
P_D	0	0	0		0	0	0		0	0	0		0	0	0								
w_D	2973				2973				2973				2973										
w_L					1460				1460														
L	*0.00*				4.00				5.00				0.00										

Result of structural analysis

Dead load	R (kg)			4001				16872				5879											
Shear	(kg)			0	4001			7889	8984			5879	0										
Moment	(kg-m)			0	-6		2687	-7781	-7799		5776	-38	0										
Live load	R (kg)			1965				8287				2888											
Shear	(kg)			0	1965			3875	4412			2888	0										
Moment	(kg-m)			0	-3		1320	-3822	-3831		2837	-18	0										
Service load	R (kg)			5966				25160				8767											
Shear	(kg)			0	5966			11764	13396			8767	0										
Moment	(kg-m)			0	-8		4007	-11603	-11630		8613	-56	0										
Factor load	R (kg)			8942				37710				13140											
Shear	(kg)			0	8942			17632	20078			13139	1										
Moment	(kg-m)			0	-13		6006	-17391	-17431		12909	-84	0										
M max(wind load)				0	0			0	0			0	0										
V max(wind load)				0	0			0	0			0	0										

Summary result of design

							GRB3								**GRB4**								
M^-_{design}	(kg-m)			-133	1232			-13998	-13548			1808	-133										
M^+_{design}	(kg-m)						6006				12909												
V_{design}	(kg)			0	5554			14243	16690			9751	1										

$A_{s, required}$				0.08	0.72		3.56	8.39	8.18		5.87	1.06	0.08										
Use				1 -DB20	1 -DB20		2 -DB20	3 -DB20	3 -DB20		2 -DB20	1 -DB20	1 -DB20										
$A_{s}^{'}{}_{, required}$				0.00	0.00		0.00	0.00	0.00		0.00	0.00	0.00										
Use				0 -DB20	0 -DB20		0 -DB20	0 -DB20	0 -DB20		0 -DB20	0 -DB20	0 -DB20										
Stirrup				1-DB-12@0.25	1-DB-12@0.25			1-DB-12@0.25	1-DB-12@0.25			1-DB-12@0.25	1-DB-12@0.25										

Serviceability

Immediate deflection	(cm)			0.00			0.02				0.21		0.0000										
control at				> 360 OK			> 360 OK				> 360 OK		> 360 OK										
Long term deflection	(cm)			0.00			0.06				0.47		0.0000										
control at				> 480 OK			> 480 OK				> 480 OK		> 480 OK										
Crack width, w	(mm)			0.0000	-0.0184		0.0500	0.2736	0.2760		0.2327	-0.0225	0.0000										
				OK	OK		OK	OK	OK		OK	OK	OK										

NBTC อาคาร G (Rev) GRB5(0.25x0.8)

Load factor	DL =	1.40				**GRB5**					
	LL =	1.70		CANT L			SPAN 1			CANT R	
Span length	(m)			0.00			8.00			0.00	
Slab thickness	(m)			0.01			0.20			0.20	
Strip width	(m)			3.00			2.25			2.25	
Beam width	(m)			0.25			0.25			0.25	
Beam depth	(m)			0.80			0.80			0.80	
SDL	(kg/m)	170	510			383			383		
$DL_{,slab}$	(kg/m)	24	72			1080			1080		
$DL_{,girder}$	(kg/m)		720			720			720		
$DL_{,total}$	(kg/m)		1302			2183			2183		
L.L.	(kg/m)	400	1200	1.00		900	1.00		900	1.00	
Service load	(kg/m)		2502			3083			3083		
Ultimate load	(kg/m)		3863			4586			4586		
Concentrate Load (kg)		Service load	Factor load	x (m)	Service load	Factor load	x (m)	Service load	Factor load	x (m)	
Concentrate DL	1.40	0	0	0.00	0	0	4.00	0	0	0.00	
		0	0	0.00	0	0	4.00	0	0	0.00	
		0	0	0.00	0	0	4.00	0	0	0.00	
Concentrate LL	1.70	0	0	0.00	0	0	4.00	0	0	0.00	
		0	0	0.00	0	0	4.00	0	0	0.00	
		0	0	0.00	0	0	4.00	0	0	0.00	

	x	0.00	0.00	0.00		4.00	4.00	4.00		0.00	0.00	0.00		
	P_L	0	0	0		0	0	0		0	0	0		
	P_D	0	0	0		0	0	0		0	0	0		
	w_D		1302				2183				2183			
	w_L						900							
	L		*0.00*				8.00				0.00			

Result of structural analysis

Dead load	R (kg)	8730			8730	
Shear	(kg)	0	8730		8730	0
Moment	(kg-m)	0	-82	17378	-82	0
Live load	R (kg)	3600			3600	
Shear	(kg)	0	3600		3600	0
Moment	(kg-m)	0	-34	7166	-34	0
Service load	R (kg)	12330			12330	
Shear	(kg)	0	12330		12330	0
Moment	(kg-m)	0	-116	24544	-116	0
Factor load	R (kg)	18342			18342	
Shear	(kg)	0	18342		18342	0
Moment	(kg-m)	0	-172	36512	-172	0
M max(wind load)		0	0		0	0
V max(wind load)		0	0		0	0

Summary result of design

				GRB5		
M^-_{design}	(kg-m)	-77	2553		2553	-92
M^+_{design}	(kg-m)			36512		
V_{design}	(kg)	0	15086		15086	0
$A_{s,required}$		0.03	1.07	15.20	1.07	0.04
Use		1 -DB25	1 -DB25	4 -DB25	1 -DB25	1 -DB25
$A_{s',required}$		0.00	0.00	9.80	0.00	0.00
Use		0 -DB25	0 -DB25	2 -DB25	0 -DB25	0 -DB25
Stirrup		1-DB-12@0.25	1-DB-12@0.25		1-DB-12@0.25	1-DB-12@0.25

Serviceability

Immediate deflection	(cm)	0.00		0.34		0.0000
control at		> 360 OK		> 360 OK		> 360 OK
Long term deflection	(cm)	0.00		1.41		0.0000
control at		> 480 OK		> 480 OK		> 480 OK
Crack width, w	(mm)	0.0000	-0.0203	0.2829	-0.0203	0.0000

NBTC อาคาร G (Rev) GRB6(0.25x0.6)

Load factor	DL =	1.40				**GRB6**					
	LL =	1.70		CANT L			SPAN 1			CANT R	
Span length	(m)			0.00			6.60			0.00	
Slab thickness	(m)			0.01			0.20			0.20	
Strip width	(m)			3.00			2.10			2.10	
Beam width	(m)			0.25			0.25			0.25	
Beam depth	(m)			0.60			0.60			0.60	
SDL	(kg/m)	170	510			357			357		
$DL_{,slab}$	(kg/m)	24	72			1008			1008		
$DL_{,girder}$	(kg/m)		600			600			600		
$DL_{,total}$	(kg/m)		1182			1965			1965		
L.L.	(kg/m)	400	1200	1.00		840	1.00		840	1.00	
Service load	(kg/m)		2382			2805			2805		
Ultimate load	(kg/m)		3695			4179			4179		
Concentrate Load (kg)		Service load	Factor load	x (m)	Service load	Factor load	x (m)	Service load	Factor load	x (m)	
Concentrate DL	1.40	0	0	0.00	0	0	3.30	0	0	0.00	
		0	0	0.00	0	0	3.30	0	0	0.00	
		0	0	0.00	0	0	3.30	0	0	0.00	
Concentrate LL	1.70	0	0	0.00	0	0	3.30	0	0	0.00	
		0	0	0.00	0	0	3.30	0	0	0.00	
		0	0	0.00	0	0	3.30	0	0	0.00	

	x	0.00	0.00	0.00		3.30	3.30	3.30		0.00	0.00	0.00		
	P_L	0	0	0		0	0	0		0	0	0		
	P_D	0	0	0		0	0	0		0	0	0		
	w_D		1182				1965				1965			
	w_L						840							
	L		*0.00*				6.60				0.00			

Result of structural analysis

Dead load	R (kg)	6485			6485	
Shear	(kg)	0	6484		6485	0
Moment	(kg-m)	0	-71	10628	-71	0
Live load	R (kg)	2772			2772	
Shear	(kg)	0	2772		2772	0
Moment	(kg-m)	0	-31	4543	-31	0
Service load	R (kg)	9257			9257	
Shear	(kg)	0	9256		9257	0
Moment	(kg-m)	0	-102	15171	-102	0
Factor load	R (kg)	13791			13791	
Shear	(kg)	0	13791		13791	0
Moment	(kg-m)	0	-152	22603	-152	0
M max(wind load)		0	0		0	0
V max(wind load)		0	0		0	0

Summary result of design

				GRB6		
M^-_{design}	(kg-m)	-74	1892		1892	-84
M^+_{design}	(kg-m)			22603		
V_{design}	(kg)	0	11659		11659	0
$A_{s,required}$		0.04	1.11	15.67	1.11	0.05
Use		1 -DB25	1 -DB25	4 -DB25	1 -DB25	1 -DB25
$A_{s',required}$		0.00	0.00	9.80	0.00	0.00
Use		0 -DB25	0 -DB25	2 -DB25	0 -DB25	0 -DB25
Stirrup		1-DB-12@0.25	1-DB-12@0.25		1-DB-12@0.25	1-DB-12@0.25

Serviceability

Immediate deflection	(cm)	0.00		0.31		0.0000
control at		> 360 OK		> 360 OK		> 360 OK
Long term deflection	(cm)	0.00		1.34		0.0000
control at		> 480 OK		> 480 OK		> 480 OK
Crack width, w	(mm)	0.0000	-0.0261	0.2659	-0.0261	0.0000

NBTC อาคาร G (Rev) GRB7(0.25x0.6),GRB7(0.25x0.6)

Load factor	DL =	1.40						**GRB7**						**GRB7**										
	LL =	1.70		CANT L				SPAN 1						SPAN 2						CANT R				
Span length	(m)			0.00				6.60						6.60						0.00				
Slab thickness	(m)			0.20				0.20						0.20						0.20				
Strip width	(m)			2.10				2.10						2.10						2.10				
Beam width	(m)			0.25				0.25						0.25						0.25				
Beam depth	(m)			0.60				0.60						0.60						0.60				
SDL	(kg/m)		170	357				357						357						357				
$DL_{, slab}$	(kg/m)		480	1008				1008						1008						1008				
$DL_{, girder}$	(kg/m)			600				600						600						600				
$DL_{, total}$	(kg/m)			1965				1965						1965						1965				
L.L.	(kg/m)		400	840	1.00			840	1.00					840	1.00					840	1.00			
Service load	(kg/m)			2805				2805						2805						2805				
Ultimate load	(kg/m)			4179				4179						4179						4179				
Concentrate Load (kg)			Service load	Factor load	x (m)	Service load	Factor load	x (m)	Service load	Factor load	x (m)	Service load	Factor load	x (m)	Service load	Factor load	x (m)	Service load	Factor load	x (m)				
Concentrate DL	1.40		0	0	0.00	0	0	2.48	0	0	4.12	0	0	0.00										
			0	0	0.00	0	0	2.48	0	0	4.12	0	0	0.00										
			0	0	0.00	0	0	2.48	0	0	4.12	0	0	0.00										
Concentrate LL	1.70		0	0	0.00	0	0	2.48	0	0	4.12	0	0	0.00										
			0	0	0.00	0	0	2.48	0	0	4.12	0	0	0.00										
			0	0	0.00	0	0	2.48	0	0	4.12	0	0	0.00										

	x	0.00	0.00	0.00		2.48	2.48	2.48		4.12	4.12	4.12		0.00	0.00	0.00								
	P_L	0	0	0		0	0	0		0	0	0		0	0	0								
	P_D	0	0	0		0	0	0		0	0	0		0	0	0								
	w_D	1965				1965				1965				1965										
	w_L					840				840														
	L	*0.00*				6.60				6.60				0.00										

Result of structural analysis

Dead load	R (kg)			4873					16191					4874										
Shear	(kg)			0	4873				8096	8096				4873	0									
Moment	(kg-m)			0	-44		5999		-10677	-10677		5999		-44	0									
Live load	R (kg)			2083					6921					2083										
Shear	(kg)			0	2083				3461	3461				2083	0									
Moment	(kg-m)			0	-19		2564		-4564	-4564		2564		-19	0									
Service load	R (kg)			6957					23112					6957										
Shear	(kg)			0	6957				11556	11556				6957	0									
Moment	(kg-m)			0	-63		8564		-15242	-15242		8564		-63	0									
Factor load	R (kg)			10365					34434					10365										
Shear	(kg)			0	10364				17217	17217				10364	0									
Moment	(kg-m)			0	-94		12758		-22707	-22707		12758		-94	0									
M max(wind load)				0	0				0	0				0	0									
V max(wind load)				0	0				0	0				0	0									

Summary result of design

								GRB7						**GRB7**										
M^-_{design}	(kg-m)			-84	1421				-19348	-19348				1421	-83									
M^+_{design}	(kg-m)						12758					12758												
V_{design}	(kg)			0	8233				15086	15086				8233	0									
$A_{s, required}$				0.05	0.83		5.80		12.02	12.02		5.80		0.83	0.05									
Use				1 -DB20	1 -DB20		2 -DB20		4 -DB20	4 -DB20		2 -DB20		1 -DB20	1 -DB20									
$A_{s}^{'}{}_{, required}$				0.00	0.00		0.00		0.00	0.00		0.00		0.00	0.00									
Use				0 -DB20	0 -DB20		0 -DB20		0 -DB20	0 -DB20		0 -DB20		0 -DB20	0 -DB20									
Stirrup				1-DB-12@0.25	1-DB-12@0.25				1-DB-12@0.25	1-DB-12@0.25				1-DB-12@0.25	1-DB-12@0.25									

Serviceability

Immediate deflection	(cm)			0.00			0.31					0.31			0.0000									
control at				> 360 OK			> 360 OK					> 360 OK			> 360 OK									
Long term deflection	(cm)			0.00			0.77					0.77			0.0000									
control at				> 480 OK			> 480 OK					> 480 OK			> 480 OK									
Crack width, w	(mm)			0.0000	-0.0191		0.2314		0.2842	0.2842		0.2314		-0.0191	0.0000									
				OK	OK		OK		OK	OK		OK		OK	OK									

TABLE: Concrete Column Design Summary - ACI 318

Story	Label	UniqueName	DesignSect	PMMCombo	AsMin	As	VMajCombo	VMajRebar	VMinCombo	VMinRebar
					cm²	cm²		cm²/m		cm²/m
TOP ROOF	C128	1112	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
TOP ROOF	C129	1172	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
TOP ROOF	C147	439	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
TOP ROOF	C148	1173	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
TOP ROOF	C149	440	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
TOP ROOF	C150	1174	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
ROOF	C17	131	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL2y_1.2DL+LL+EQ	5.54
ROOF	C21	155	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL4Y-_1.2DL+LL+1.6WL	5.54
ROOF	C46	171	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
ROOF	C54	163	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL4Y-_1.2DL+LL+1.6WL	5.54
ROOF	C62	147	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL4Y-_1.2DL+LL+1.6WL	5.54
ROOF	C66	139	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL4Y-_1.2DL+LL+1.6WL	5.54
ROOF	C126	43	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
ROOF	C127	51	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL1_1.4DL+1.7LL	5.54
ROOF	C128	59	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
ROOF	C129	67	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
ROOF	C130	75	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL1_1.4DL+1.7LL	5.54
ROOF	C131	83	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
ROOF	C143	179	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL4Y-_1.2DL+LL+1.6WL	3.41	UL5Y-_0.9DL+1.6WL	0.00
ROOF	C144	187	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL4Y+_1.2DL+LL+1.6WL	3.41	UL5Y-_0.9DL+1.6WL	0.00
ROOF	C145	195	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
ROOF	C146	203	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
ROOF	C147	211	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
ROOF	C148	219	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
ROOF	C149	227	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
ROOF	C150	235	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
ROOF	C151	243	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
ROOF	C152	251	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
ROOF	C153	259	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL4Y-_1.2DL+LL+1.6WL	3.41	UL5Y-_0.9DL+1.6WL	0.00
ROOF	C154	267	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL4Y-_1.2DL+LL+1.6WL	3.41	UL5Y-_0.9DL+1.6WL	0.00

TABLE: Concrete Column Design Summary - ACI 318

Story	Label	UniqueName	DesignSect	PMMCombo	AsMin	As	VMajCombo	VMajRebar	VMinCombo	VMinRebar
					cm²	cm²		cm²/m		cm²/m
Metal ROOF	C17	319	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Metal ROOF	C21	18	C_400x650	UL1_1.4DL+1.7LL	26.00	34.80	UL5Y-_0.9DL+1.6WL	0.00	UL4Y-_1.2DL+LL+1.6WL	5.54
Metal ROOF	C46	20	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Metal ROOF	C54	19	C_400x650	UL1_1.4DL+1.7LL	26.00	33.85	UL5Y-_0.9DL+1.6WL	0.00	UL4Y-_1.2DL+LL+1.6WL	5.54
Metal ROOF	C62	17	C_400x650	UL1_1.4DL+1.7LL	26.00	34.58	UL5Y-_0.9DL+1.6WL	0.00	UL4Y-_1.2DL+LL+1.6WL	5.54
Metal ROOF	C66	12	C_400x650	UL1_1.4DL+1.7LL	26.00	35.14	UL5Y-_0.9DL+1.6WL	0.00	UL4Y-_1.2DL+LL+1.6WL	5.54
Metal ROOF	C126	233	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Metal ROOF	C127	2	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL1_1.4DL+1.7LL	5.54
Metal ROOF	C128	3	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Metal ROOF	C129	4	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Metal ROOF	C130	9	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL2y_1.2DL+LL+EQ	5.54
Metal ROOF	C131	10	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Metal ROOF	C143	631	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Metal ROOF	C144	630	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL2x_1.2DL+LL+EQ	3.41	UL5Y-_0.9DL+1.6WL	0.00
Metal ROOF	C145	27	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Metal ROOF	C146	28	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Metal ROOF	C147	33	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Metal ROOF	C148	34	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Metal ROOF	C149	35	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Metal ROOF	C150	36	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Metal ROOF	C151	41	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Metal ROOF	C152	42	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Metal ROOF	C153	44	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL4Y-_1.2DL+LL+1.6WL	3.41	UL5Y-_0.9DL+1.6WL	0.00
Metal ROOF	C154	49	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL4Y-_1.2DL+LL+1.6WL	3.41	UL5Y-_0.9DL+1.6WL	0.00
Story5	C12	389	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story5	C13	390	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story5	C14	391	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story5	C15	392	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story5	C16	393	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story5	C17	394	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00

TABLE: Concrete Column Design Summary - ACI 318

Story	Label	UniqueName	DesignSect	PMMCombo	AsMin	As	VMajCombo	VMajRebar	VMinCombo	VMinRebar
					cm²	cm²		cm²/m		cm²/m
Story5	C21	397	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story5	C46	399	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story5	C54	398	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story5	C62	396	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story5	C66	395	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story5	C126	383	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story5	C127	384	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story5	C128	385	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story5	C129	386	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story5	C130	387	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story5	C131	388	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story5	C143	400	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story5	C144	401	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story5	C145	402	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story5	C146	403	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story5	C147	404	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story5	C148	405	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story5	C149	406	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story5	C150	407	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story5	C151	408	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story5	C152	409	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story5	C153	410	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story5	C154	411	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story5	C6	413	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story5	C7	412	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story5	C1	378	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story5	C2	379	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story5	C3	380	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story5	C4	381	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story5	C5	382	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00

TABLE: Concrete Column Design Summary - ACI 318

Story	Label	UniqueName	DesignSect	PMMCombo	AsMin	As	VMajCombo	VMajRebar	VMinCombo	VMinRebar
					cm²	cm²		cm²/m		cm²/m
Story4	C12	93	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story4	C13	101	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story4	C14	109	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story4	C15	117	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story4	C16	125	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story4	C17	133	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story4	C21	157	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story4	C46	173	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story4	C54	165	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story4	C62	149	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story4	C66	141	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story4	C126	45	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story4	C127	53	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story4	C128	61	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story4	C129	69	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story4	C130	77	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story4	C131	85	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story4	C143	181	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story4	C144	189	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story4	C145	197	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story4	C146	205	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story4	C147	213	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story4	C148	221	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story4	C149	229	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story4	C150	237	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story4	C151	245	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story4	C152	253	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story4	C153	261	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story4	C154	269	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story4	C6	285	C_400x650	UL4X+_1.2DL+LL+1.6WL	26.00	38.34	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00

TABLE: Concrete Column Design Summary - ACI 318

Story	Label	UniqueName	DesignSect	PMMCombo	AsMin	As	VMajCombo	VMajRebar	VMinCombo	VMinRebar
					cm²	cm²		cm²/m		cm²/m
Story4	C7	277	C_400x650	UL4X+_1.2DL+LL+1.6WL	26.00	37.60	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story4	C1	5	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story4	C2	13	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story4	C3	21	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story4	C4	29	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story4	C5	37	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story3	C12	94	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story3	C13	102	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story3	C14	110	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story3	C15	118	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story3	C16	126	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story3	C17	134	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story3	C21	158	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story3	C46	174	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story3	C54	166	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story3	C62	150	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story3	C66	142	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story3	C126	46	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story3	C127	54	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story3	C128	62	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story3	C129	70	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story3	C130	78	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story3	C131	86	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story3	C143	182	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story3	C144	190	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story3	C145	198	C_550x550	UL1_1.4DL+1.7LL	30.25	34.96	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story3	C146	206	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story3	C147	214	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story3	C148	222	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story3	C149	230	C_550x550	UL1_1.4DL+1.7LL	30.25	33.79	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00

TABLE: Concrete Column Design Summary - ACI 318

Story	Label	UniqueName	DesignSect	PMMCombo	AsMin	As	VMajCombo	VMajRebar	VMinCombo	VMinRebar
					cm²	cm²		cm²/m		cm²/m
Story3	C150	238	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story3	C151	246	C_550x550	UL1_1.4DL+1.7LL	30.25	40.23	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story3	C152	254	C_550x550	UL1_1.4DL+1.7LL	30.25	37.29	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story3	C153	262	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story3	C154	270	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story3	C6	286	C_400x650	UL1_1.4DL+1.7LL	26.00	64.53	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story3	C7	278	C_400x650	UL1_1.4DL+1.7LL	26.00	64.56	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story3	C1	6	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story3	C2	14	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story3	C3	22	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story3	C4	30	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story3	C5	38	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story2	C12	95	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story2	C13	103	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story2	C14	111	C_400x650	UL5Y+_0.9DL+1.6WL	26.00	34.22	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story2	C15	119	C_400x650	UL5Y+_0.9DL+1.6WL	26.00	31.96	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story2	C16	127	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story2	C17	135	C_400x650	UL2x_1.2DL+LL+EQ	26.00	30.95	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story2	C21	159	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story2	C46	175	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story2	C54	167	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story2	C62	151	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story2	C66	143	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story2	C126	47	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story2	C127	55	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story2	C128	63	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story2	C129	71	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story2	C130	79	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story2	C131	87	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story2	C143	183	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00

TABLE: Concrete Column Design Summary - ACI 318

Story	Label	UniqueName	DesignSect	PMMCombo	AsMin	As	VMajCombo	VMajRebar	VMinCombo	VMinRebar
					cm²	cm²		cm²/m		cm²/m
Story2	C144	191	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story2	C145	199	C_550x550	UL1_1.4DL+1.7LL	30.25	87.75	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story2	C146	207	C_550x550	UL1_1.4DL+1.7LL	30.25	48.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story2	C147	215	C_550x550	UL1_1.4DL+1.7LL	30.25	82.67	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story2	C148	223	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story2	C149	231	C_550x550	UL1_1.4DL+1.7LL	30.25	85.67	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story2	C150	239	C_550x550	UL5Y-_0.9DL+1.6WL	30.25	30.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story2	C151	247	C_550x550	UL1_1.4DL+1.7LL	30.25	95.05	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story2	C152	255	C_550x550	UL1_1.4DL+1.7LL	30.25	93.41	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story2	C153	263	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story2	C154	271	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story2	C6	287	C_400x650	UL4X+_1.2DL+LL+1.6WL	26.00	37.31	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story2	C7	279	C_400x650	UL4X+_1.2DL+LL+1.6WL	26.00	35.59	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story2	C1	7	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story2	C2	15	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story2	C3	23	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	35.78	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story2	C4	31	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	34.24	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story2	C5	39	C_400x650	UL5Y-_0.9DL+1.6WL	26.00	26.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story1	C12	96	C_460x710	UL5Y-_0.9DL+1.6WL	32.66	32.66	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story1	C13	104	C_460x710	UL5Y-_0.9DL+1.6WL	32.66	32.66	UL1_1.2DL+1.6LL	3.92	UL5Y-_0.9DL+1.6WL	0.00
Story1	C14	112	C_460x710	UL5Y-_0.9DL+1.6WL	32.66	32.66	UL1_1.2DL+1.6LL	3.92	UL5Y-_0.9DL+1.6WL	0.00
Story1	C15	120	C_460x710	UL5Y-_0.9DL+1.6WL	32.66	32.66	UL2y_1.2DL+LL+EQ	3.92	UL5Y-_0.9DL+1.6WL	0.00
Story1	C16	128	C_460x710	UL5Y-_0.9DL+1.6WL	32.66	32.66	UL1_1.2DL+1.6LL	3.92	UL5Y-_0.9DL+1.6WL	0.00
Story1	C17	136	C_460x710	UL5Y-_0.9DL+1.6WL	32.66	32.66	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story1	C21	160	C_460x710	UL5Y-_0.9DL+1.6WL	32.66	32.66	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story1	C46	176	C_460x710	UL5Y-_0.9DL+1.6WL	32.66	32.66	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story1	C54	168	C_460x710	UL5Y-_0.9DL+1.6WL	32.66	32.66	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story1	C62	152	C_460x710	UL5Y-_0.9DL+1.6WL	32.66	32.66	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story1	C66	144	C_460x710	UL5Y-_0.9DL+1.6WL	32.66	32.66	UL5Y-_0.9DL+1.6WL	0.00	UL2y_1.2DL+LL+EQ	6.05
Story1	C126	48	C_460x710	UL5Y-_0.9DL+1.6WL	32.66	32.66	UL5Y-_0.9DL+1.6WL	0.00	UL4Y-_1.2DL+LL+1.6WL	6.05

TABLE: Concrete Column Design Summary - ACI 318

Story	Label	UniqueName	DesignSect	PMMCombo	AsMin	As	VMajCombo	VMajRebar	VMinCombo	VMinRebar
					cm²	cm²		cm²/m		cm²/m
Story1	C127	56	C_460x710	UL5Y-_0.9DL+1.6WL	32.66	32.66	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story1	C128	64	C_460x710	UL5Y-_0.9DL+1.6WL	32.66	32.66	UL3y_0.9DL+EQ	3.92	UL5Y-_0.9DL+1.6WL	0.00
Story1	C129	72	C_460x710	UL5Y-_0.9DL+1.6WL	32.66	32.66	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story1	C130	80	C_460x710	UL5Y-_0.9DL+1.6WL	32.66	32.66	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story1	C131	88	C_460x710	UL5Y-_0.9DL+1.6WL	32.66	32.66	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story1	C143	184	C_460x710	UL1_1.4DL+1.7LL	32.66	61.96	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story1	C144	192	C_460x710	UL1_1.4DL+1.7LL	32.66	42.61	UL5Y-_0.9DL+1.6WL	0.00	UL4Y-_1.2DL+LL+1.6WL	6.05
Story1	C145	200	C_610x610	UL1_1.4DL+1.7LL	37.21	149.80	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story1	C146	208	C_610x610	UL1_1.4DL+1.7LL	37.21	110.34	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story1	C147	216	C_610x610	UL1_1.4DL+1.7LL	37.21	89.99	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story1	C148	224	C_610x610	UL5Y-_0.9DL+1.6WL	37.21	37.21	UL3y_0.9DL+EQ	5.19	UL5Y-_0.9DL+1.6WL	0.00
Story1	C149	232	C_610x610	UL1_1.4DL+1.7LL	37.21	96.01	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story1	C150	240	C_610x610	UL5Y-_0.9DL+1.6WL	37.21	37.21	UL5Y-_0.9DL+1.6WL	0.00	UL3y_0.9DL+EQ	5.19
Story1	C151	248	C_610x610	UL1_1.4DL+1.7LL	37.21	107.28	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story1	C152	256	C_610x610	UL1_1.4DL+1.7LL	37.21	106.00	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story1	C153	264	C_460x710	UL5Y-_0.9DL+1.6WL	32.66	32.66	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story1	C154	272	C_460x710	UL5Y-_0.9DL+1.6WL	32.66	32.66	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story1	C157	671	C_450x450	UL5Y-_0.9DL+1.6WL	20.25	20.25	UL5Y-_0.9DL+1.6WL	0.00	UL1_1.2DL+1.6LL	3.83
Story1	C158	672	C_450x450	UL5Y-_0.9DL+1.6WL	20.25	20.25	UL5Y-_0.9DL+1.6WL	0.00	UL1_1.2DL+1.6LL	3.83
Story1	C159	673	C_450x450	UL5Y-_0.9DL+1.6WL	20.25	20.25	UL5Y-_0.9DL+1.6WL	0.00	UL1_1.2DL+1.6LL	3.83
Story1	C160	674	C_450x450	UL5Y-_0.9DL+1.6WL	20.25	20.25	UL5Y-_0.9DL+1.6WL	0.00	UL1_1.2DL+1.6LL	3.83
Story1	C161	675	C_450x450	UL5Y-_0.9DL+1.6WL	20.25	20.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story1	C162	676	C_450x450	UL5Y-_0.9DL+1.6WL	20.25	20.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story1	C163	677	C_450x450	UL5Y-_0.9DL+1.6WL	20.25	20.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story1	C164	678	C_450x450	UL5Y-_0.9DL+1.6WL	20.25	20.25	UL5Y-_0.9DL+1.6WL	0.00	UL5Y-_0.9DL+1.6WL	0.00
Story1	C6	288	C_460x710	UL5Y-_0.9DL+1.6WL	32.66	32.66	UL2y_1.2DL+LL+EQ	3.92	UL5Y-_0.9DL+1.6WL	0.00
Story1	C7	280	C_460x710	UL5Y-_0.9DL+1.6WL	32.66	32.66	UL2y_1.2DL+LL+EQ	3.92	UL5Y-_0.9DL+1.6WL	0.00
Story1	C1	8	C_460x710	UL5Y-_0.9DL+1.6WL	32.66	32.66	UL5Y-_0.9DL+1.6WL	0.00	UL2y_1.2DL+LL+EQ	6.05
Story1	C2	16	C_460x710	UL5Y-_0.9DL+1.6WL	32.66	32.66	UL4Y-_1.2DL+LL+1.6WL	3.92	UL5Y-_0.9DL+1.6WL	0.00
Story1	C3	24	C_460x710	UL5Y-_0.9DL+1.6WL	32.66	32.66	UL4Y-_1.2DL+LL+1.6WL	3.92	UL5Y-_0.9DL+1.6WL	0.00

TABLE: Concrete Column Design Summary - ACI 318

Story	Label	UniqueName	DesignSect	PMMCombo	AsMin	As	VMajCombo	VMajRebar	VMinCombo	VMinRebar
					cm²	cm²		cm²/m		cm²/m
Story1	C4	32	C_460x710	UL5Y-_0.9DL+1.6WL	32.66	32.66	UL4Y-_1.2DL+LL+1.6WL	3.92	UL5Y-_0.9DL+1.6WL	0.00
Story1	C5	40	C_460x710	UL5Y-_0.9DL+1.6WL	32.66	32.66	UL4Y-_1.2DL+LL+1.6WL	3.92	UL5Y-_0.9DL+1.6WL	0.00

TABLE: Shear Wall Pier Design Summary - ACI 318

Story	Pier Label	Station	Required Reinf. Percentage	Pier Leg	Leg X1	Leg Y1	Leg X2	Leg Y2	Shear Rebar	Compressive Stress Left	Compressive Stress Right	Compressive Stress Limit
			%		m	m	m	m	cm²/m	kgf/cm²	kgf/cm²	kgf/cm²
TOP ROOF	P2	Top	0.25	Top Leg 1	46	14.56	46	19.59	5	1.90	0.90	65.26
TOP ROOF	P2	Bottom	0.40	Bottom Leg 1	46	14.56	46	19.59	5	4.62	2.83	65.26
ROOF	P2	Top	0.45	Top Leg 1	46	14.56	46	19.59	5	12.75	5.30	65.26
ROOF	P2	Bottom	0.25	Bottom Leg 1	46	14.56	46	19.59	5	10.10	8.11	65.26
Metal ROOF	P2	Top	0.25	Top Leg 1	46	14.56	46	19.59	5	10.61	7.69	65.26
Metal ROOF	P2	Bottom	0.50	Bottom Leg 1	46	14.56	46	19.59	5	9.43	9.54	65.26
Story5	P2	Top	0.40	Top Leg 1	46	14.56	46	19.59	5	18.39	12.29	65.26
Story5	P2	Bottom	0.33	Bottom Leg 1	46	14.56	46	19.59	5	20.48	10.33	65.26
Story4	P2	Top	0.25	Top Leg 1	46	14.56	46	19.59	5	28.68	13.56	65.26
Story4	P2	Bottom	0.25	Bottom Leg 1	46	14.56	46	19.59	5	25.18	21.39	65.26
Story3	P2	Top	0.25	Top Leg 1	46	14.56	46	19.59	5	49.43	0.00	65.26
Story3	P2	Bottom	0.25	Bottom Leg 1	46	14.56	46	19.59	5	61.56	32.89	65.26
Story2	P2	Top	0.25	Top Leg 1	46	14.56	46	19.59	5	62.38	23.11	65.26
Story2	P2	Bottom	0.25	Bottom Leg 1	46	14.56	46	19.59	5	81.53	47.10	65.26
Story1	P2	Top	0.25	Top Leg 1	46	13.06	46	19.59	5	52.20	48.24	65.26
Story1	P2	Bottom	0.25	Bottom Leg 1	46	13.06	46	19.59	5	58.11	45.94	65.26
TOP ROOF	P3	Top	0.25	Top Leg 1	49.16	13.06	49.16	19.59	5	13.52	0.00	65.26
TOP ROOF	P3	Bottom	0.25	Bottom Leg 1	49.16	13.06	49.16	19.59	5	12.62	0.00	65.26
ROOF	P3	Top	0.25	Top Leg 1	49.16	13.06	49.16	19.59	5	20.68	0.00	65.26
ROOF	P3	Bottom	0.25	Bottom Leg 1	49.16	13.06	49.16	19.59	5	16.99	9.17	65.26
Metal ROOF	P3	Top	0.25	Top Leg 1	49.16	13.06	49.16	19.59	5	17.00	9.14	65.26
Metal ROOF	P3	Bottom	0.25	Bottom Leg 1	49.16	13.06	49.16	19.59	5	15.83	10.06	65.26
Story5	P3	Top	0.25	Top Leg 1	49.16	13.06	49.16	19.59	5	25.07	10.82	65.26
Story5	P3	Bottom	0.25	Bottom Leg 1	49.16	13.06	49.16	19.59	5	22.02	0.00	65.26
Story4	P3	Top	0.25	Top Leg 1	49.16	13.06	49.16	19.59	5	34.95	0.00	65.26
Story4	P3	Bottom	0.25	Bottom Leg 1	49.16	13.06	49.16	19.59	5	49.44	19.97	65.26
Story3	P3	Top	0.25	Top Leg 1	49.16	13.06	49.16	19.59	5	54.88	0.00	65.26

TABLE: Shear Wall Pier Design Summary - ACI 318

Story	Pier Label	Station	Required Reinf. Percentage	Pier Leg	Leg X1	Leg Y1	Leg X2	Leg Y2	Shear Rebar	Compressive Stress Left	Compressive Stress Right	Compressive Stress Limit
			%		m	m	m	m	cm²/m	kgf/cm²	kgf/cm²	kgf/cm²
Story3	P3	Bottom	0.25	Bottom Leg 1	49.16	13.06	49.16	19.59	5	71.40	36.65	65.26
Story2	P3	Top	0.25	Top Leg 1	49.16	13.06	49.16	19.59	5	76.26	29.88	65.26
Story2	P3	Bottom	0.44	Bottom Leg 1	49.16	13.06	49.16	19.59	5	96.66	54.45	65.26
Story1	P3	Top	0.35	Top Leg 1	49.16	13.06	49.16	19.59	5	98.94	44.95	65.26
Story1	P3	Bottom	0.34	Bottom Leg 1	49.16	13.06	49.16	19.59	5	98.86	43.53	65.26
TOP ROOF	P4	Top	0.25	Top Leg 1	51.86	16.84	51.86	19.59	5	8.36	5.85	65.26
TOP ROOF	P4	Bottom	0.41	Bottom Leg 1	51.86	16.84	51.86	19.59	5	12.27	8.78	65.26
ROOF	P4	Top	0.48	Top Leg 1	51.86	16.84	51.86	19.59	5	19.71	0.00	65.26
ROOF	P4	Bottom	0.25	Bottom Leg 1	51.86	16.84	51.86	19.59	5	17.98	13.12	65.26
Metal ROOF	P4	Top	0.25	Top Leg 1	51.86	16.84	51.86	19.59	5	11.38	11.80	65.26
Metal ROOF	P4	Bottom	0.51	Bottom Leg 1	51.86	16.84	51.86	19.59	5	16.18	13.97	65.26
Story5	P4	Top	0.54	Top Leg 1	51.86	16.84	51.86	19.59	5	19.78	14.66	65.26
Story5	P4	Bottom	0.42	Bottom Leg 1	51.86	16.84	51.86	19.59	5	20.07	14.58	65.26
Story4	P4	Top	0.43	Top Leg 1	51.86	16.84	51.86	19.59	5	23.78	12.24	65.26
Story4	P4	Bottom	0.50	Bottom Leg 1	51.86	16.84	51.86	19.59	5	30.39	24.15	65.26
Story3	P4	Top	0.39	Top Leg 1	51.86	16.84	51.86	19.59	5	30.49	0.00	65.26
Story3	P4	Bottom	0.51	Bottom Leg 1	51.86	16.84	51.86	19.59	5	48.79	40.07	65.26
Story2	P4	Top	0.42	Top Leg 1	51.86	16.84	51.86	19.59	5	51.48	25.38	65.26
Story2	P4	Bottom	0.54	Bottom Leg 1	51.86	16.84	51.86	19.59	5	66.62	54.09	65.26
Story1	P4	Top	0.48	Top Leg 1	51.86	16.84	51.86	19.59	5	65.96	46.04	65.26
Story1	P4	Bottom	0.46	Bottom Leg 1	51.86	16.84	51.86	19.59	5	63.87	44.78	65.26
TOP ROOF	P5-1	Top	0.25	Top Leg 1	49.16	16.84	50.01	16.84	5	12.00	18.27	65.26
TOP ROOF	P5-1	Bottom	0.25	Bottom Leg 1	49.16	16.84	50.01	16.84	5	14.14	15.51	65.26
ROOF	P5-1	Top	0.25	Top Leg 1	49.16	16.84	50.01	16.84	5	13.02	22.29	65.26
ROOF	P5-1	Bottom	0.25	Bottom Leg 1	49.16	16.84	50.01	16.84	5	13.36	12.36	65.26
Metal ROOF	P5-1	Top	0.25	Top Leg 1	49.16	16.84	50.01	16.84	5	12.84	11.52	65.26
Metal ROOF	P5-1	Bottom	0.25	Bottom Leg 1	49.16	16.84	50.01	16.84	5	19.86	15.11	65.26

TABLE: Shear Wall Pier Design Summary - ACI 318

Story	Pier Label	Station	Required Reinf. Percentage	Pier Leg	Leg X1	Leg Y1	Leg X2	Leg Y2	Shear Rebar	Compressive Stress Left	Compressive Stress Right	Compressive Stress Limit
			%		m	m	m	m	cm²/m	kgf/cm²	kgf/cm²	kgf/cm²
Story5	P5-1	Top	0.25	Top Leg 1	49.16	16.84	50.01	16.84	5	22.74	20.58	65.26
Story5	P5-1	Bottom	0.25	Bottom Leg 1	49.16	16.84	50.01	16.84	5	21.71	24.66	65.26
Story4	P5-1	Top	0.25	Top Leg 1	49.16	16.84	50.01	16.84	5	27.12	29.24	65.26
Story4	P5-1	Bottom	0.25	Bottom Leg 1	49.16	16.84	50.01	16.84	5	28.62	30.56	65.26
Story3	P5-1	Top	0.25	Top Leg 1	49.16	16.84	50.01	16.84	5	33.93	36.31	65.26
Story3	P5-1	Bottom	0.25	Bottom Leg 1	49.16	16.84	50.01	16.84	5	48.77	49.06	65.26
Story2	P5-1	Top	0.25	Top Leg 1	49.16	16.84	50.01	16.84	5	47.24	47.94	65.26
Story2	P5-1	Bottom	0.25	Bottom Leg 1	49.16	16.84	50.01	16.84	5	52.16	66.23	65.26
Story1	P5-1	Top	0.25	Top Leg 1	49.16	16.84	50.01	16.84	5	46.42	33.60	65.26
Story1	P5-1	Bottom	0.25	Bottom Leg 1	49.16	16.84	50.01	16.84	5	22.63	22.71	65.26
TOP ROOF	P5-2	Top	0.52	Top Leg 1	51.01	16.84	51.86	16.84	5	0.00	37.92	0.00
TOP ROOF	P5-2	Bottom	0.28	Bottom Leg 1	51.01	16.84	51.86	16.84	5	25.37	0.00	65.26
ROOF	P5-2	Top	0.51	Top Leg 1	51.01	16.84	51.86	16.84	5	0.00	44.46	0.00
ROOF	P5-2	Bottom	0.25	Bottom Leg 1	51.01	16.84	51.86	16.84	5	30.53	0.00	65.26
Metal ROOF	P5-2	Top	0.25	Top Leg 1	51.01	16.84	51.86	16.84	5	29.53	0.00	65.26
Metal ROOF	P5-2	Bottom	0.25	Bottom Leg 1	51.01	16.84	51.86	16.84	5	34.97	0.00	65.26
Story5	P5-2	Top	0.43	Top Leg 1	51.01	16.84	51.86	16.84	5	28.58	45.73	65.26
Story5	P5-2	Bottom	0.25	Bottom Leg 1	51.01	16.84	51.86	16.84	5	22.81	20.41	65.26
Story4	P5-2	Top	0.31	Top Leg 1	51.01	16.84	51.86	16.84	5	27.52	48.15	65.26
Story4	P5-2	Bottom	0.25	Bottom Leg 1	51.01	16.84	51.86	16.84	5	49.79	28.33	65.26
Story3	P5-2	Top	0.25	Top Leg 1	51.01	16.84	51.86	16.84	5	35.88	55.24	65.26
Story3	P5-2	Bottom	0.39	Bottom Leg 1	51.01	16.84	51.86	16.84	5	66.21	51.42	65.26
Story2	P5-2	Top	0.27	Top Leg 1	51.01	16.84	51.86	16.84	5	53.66	61.28	65.26
Story2	P5-2	Bottom	0.62	Bottom Leg 1	51.01	16.84	51.86	16.84	5	96.41	74.33	65.26
Story1	P5-2	Top	0.54	Top Leg 1	51.01	16.84	51.86	16.84	5	55.28	89.10	65.26
Story1	P5-2	Bottom	0.31	Bottom Leg 1	51.01	16.84	51.86	16.84	5	51.45	51.26	65.26
TOP ROOF	P1	Top	0.25	Top Leg 1	49.16	19.59	51.86	19.59	5	0.00	0.00	0.00

TABLE: Shear Wall Pier Design Summary - ACI 318

Story	Pier Label	Station	Required Reinf. Percentage	Pier Leg	Leg X1	Leg Y1	Leg X2	Leg Y2	Shear Rebar	Compressive Stress Left	Compressive Stress Right	Compressive Stress Limit
			%		m	m	m	m	cm²/m	kgf/cm²	kgf/cm²	kgf/cm²
TOP ROOF	P1	Bottom	0.25	Bottom Leg 1	49.16	19.59	51.86	19.59	5	7.48	9.75	65.26
ROOF	P1	Top	0.25	Top Leg 1	49.16	19.59	51.86	19.59	5	6.78	7.80	65.26
ROOF	P1	Bottom	0.25	Bottom Leg 1	49.16	19.59	51.86	19.59	5	11.23	10.80	65.26
Metal ROOF	P1	Top	0.25	Top Leg 1	49.16	19.59	51.86	19.59	5	10.72	13.42	65.26
Metal ROOF	P1	Bottom	0.25	Bottom Leg 1	49.16	19.59	51.86	19.59	5	14.01	14.72	65.26
Story5	P1	Top	0.25	Top Leg 1	49.16	19.59	51.86	19.59	5	15.72	14.10	65.26
Story5	P1	Bottom	0.25	Bottom Leg 1	49.16	19.59	51.86	19.59	5	8.88	14.01	65.26
Story4	P1	Top	0.25	Top Leg 1	49.16	19.59	51.86	19.59	5	13.96	14.94	65.26
Story4	P1	Bottom	0.25	Bottom Leg 1	49.16	19.59	51.86	19.59	5	18.44	25.27	65.26
Story3	P1	Top	0.25	Top Leg 1	49.16	19.59	51.86	19.59	5	17.04	18.27	65.26
Story3	P1	Bottom	0.43	Bottom Leg 1	49.16	19.59	51.86	19.59	5	35.31	42.22	65.26
Story2	P1	Top	0.37	Top Leg 1	49.16	19.59	51.86	19.59	5	29.94	32.95	65.26
Story2	P1	Bottom	0.68	Bottom Leg 1	49.16	19.59	51.86	19.59	5	60.05	63.23	65.26
Story1	P1	Top	0.36	Top Leg 1	47.175	19.59	51.86	19.59	5	22.99	39.60	65.26
Story1	P1	Top	0.36	Top Leg 2	46	19.59	47.175	19.59	5	9.37	10.19	65.26
Story1	P1	Bottom	0.32	Bottom Leg 1	47.175	19.59	51.86	19.59	5	24.90	39.85	65.26
Story1	P1	Bottom	0.32	Bottom Leg 2	46	19.59	47.175	19.59	5	30.15	13.94	65.26

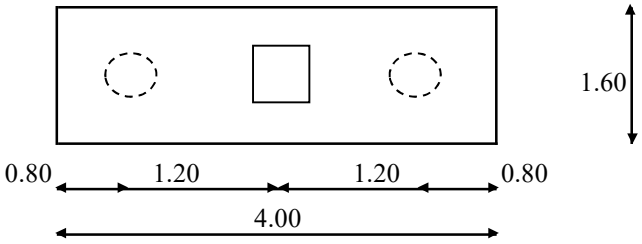
Typical Footing

Driven pile dia. 0.8 with safe load not less than 200 Tons/Pile

GF1D 1.6 x 1.6 x 1.5 Use **1** Driven pile **dia. 0.80**

Safe load **200** Tons/Pile $P_{w,all}$ 200 Tons

GF2D 4 x 1.6 x 1.5



Use	2	Driven pile		dia.	0.80	
Safe load	200	Tons/Pile	$P_{w,all}$	376.96	Tons	
L.F. =	1.55		W	23.04	Tons	6.11%
f_c' =	320	ksc	f_y =	5000	ksc	
h =	**1.50**	m	d =	140	cm	
b =	160	cm	Column	**0.40**	m	

Flexural Design

M_u	=	310000	kg-m	
$A_{s,deep\ beam}$	=	66.24	cm^2	
A_s	=	50.24	cm^2	
$A_{s,min}$	=	62.72	cm^2	
Use	**22**	**DB -**	**20**	@ 6.66 cm

One-way Shear

V_u	=	310000	kg		
$3.5-2.5M_u/V_ud$	=	1.71			
V_c	=	315724	kg	OK	
A_{vh} Use		**DB - 20**	**26.0**	OK	
P_{vh}	**2** =	0.0030		OK	
A_{vv} Use		**DB - 12**	**17.5**	OK	
P_{vv}	**2** =	0.0016		OK	
V_s	=	205856			
$V_{u,all}$	=	521580	kg	Vu,all > Vu OK	
$V_{u,max,all}$		722067	kg	Vu,all > Vu OK	

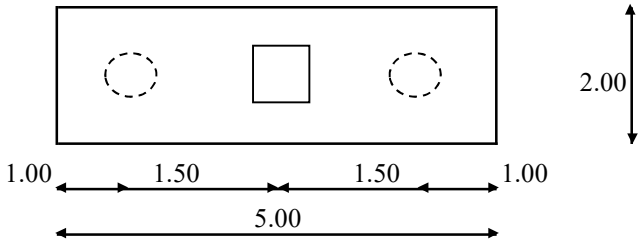
Steel (kg)	Conc. (m^3)	Form. (m^3)	Steel (B)	Conc. (B)	Form. (B)	Total(B)
1228	9.60	16.8	31918	22560	6888	**61366**

Typical Footing

Driven pile dia. 1 with safe load not less than 300 Tons/Pile

GF1E	2 x 2 x 2	Use	**1**	Driven pile	**dia.**	**1.00**	
	Safe load	**300**	Tons/Pile	$P_{w,all}$	300	Tons	

GF2E 5 x 2 x 2



Use	2	Driven pile	dia.	1.00		
Safe load	300	Tons/Pile	$P_{w,all}$	552.00	Tons	
L.F. =	1.55		W	48.00	Tons	8.70%
f_c' =	320	ksc	f_y =	5000	ksc	
h =	**2.00**	m	d =	190	cm	
b =	200	cm	Column	**0.40**	m	

Flexural Design

M_u	=	604500	kg-m	
$A_{s,deep\ beam}$	=	98.77	cm^2	
A_s	=	71.95	cm^2	
$A_{s,min}$	=	106.40	cm^2	
Use	**22**	**DB -**	**25**	@ 8.57 cm

One-way Shear

V_u	=	465000	kg		
$3.5-2.5M_u/V_ud$	=	1.79			
V_c	=	558609	kg	OK	
A_{vh} Use		**DB - 16**	**20.0**	OK	
P_{vh}	**3** =	0.0030		OK	
A_{vv} Use		**DB - 16**	**17.5**	OK	
P_{vv}	**3** =	0.0034		OK	
V_s	=	401621			
$V_{u,all}$	=	960230	kg	Vu,all > Vu OK	
$V_{u,max,all}$		1224936	kg	Vu,all > Vu OK	

Steel (kg)	Conc. (m^3)	Form. (m^3)	Steel (B)	Conc. (B)	Form. (B)	Total(B)
3012	20.00	28	78313	47000	11480	**136793**

Design

GF8Dx

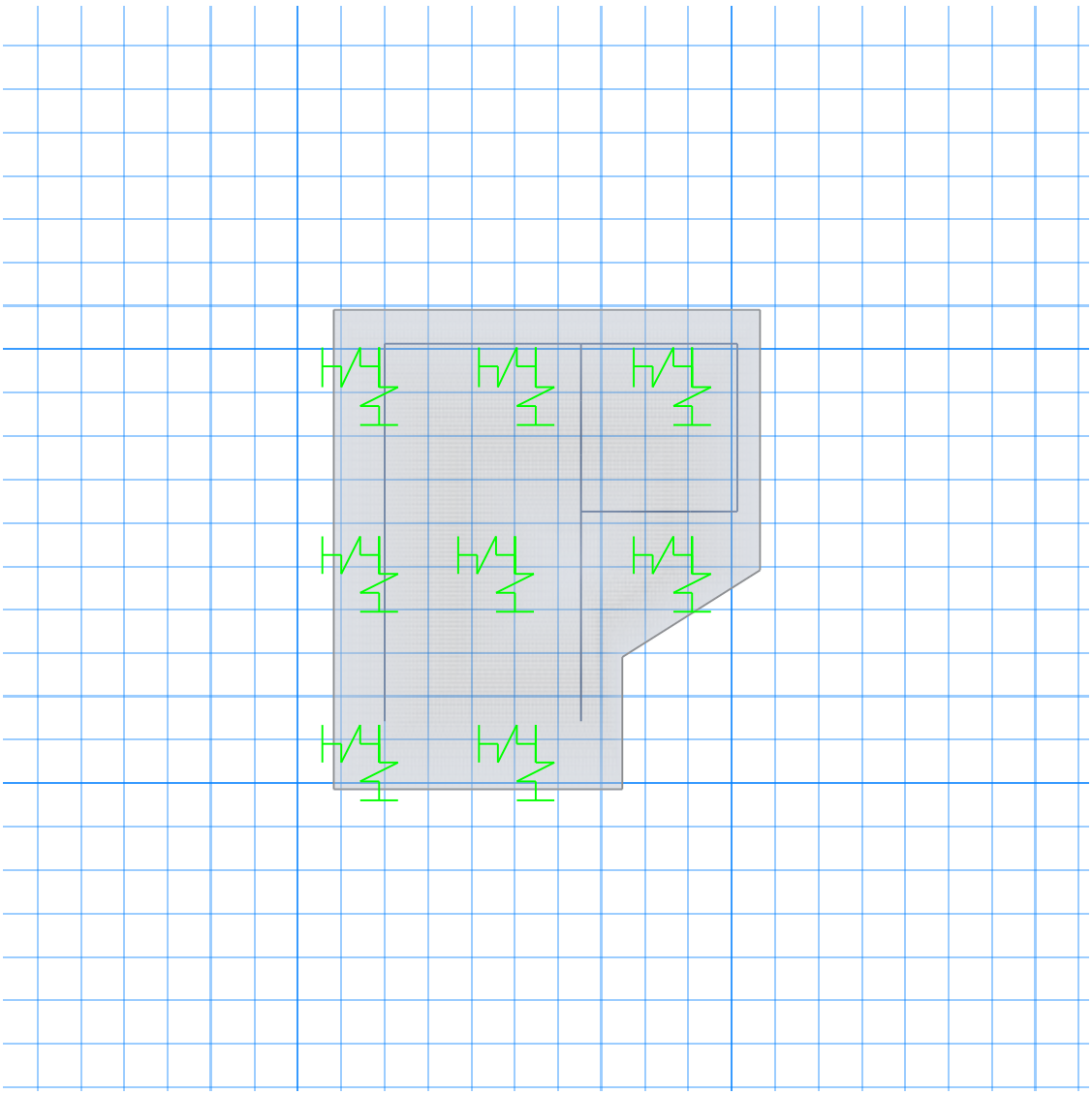


Figure: Finite element model

Design summary

This section provides design information for beams, strips, and punching checks.

Preferences

Table: Design Preferences 01 - Resistance Factors

Table: Design Preferences 01 - Resistance Factors

PhiTen	PhiComp	PhiShear
0.900000	0.650000	0.750000

Table: Design Preferences 02 - Rebar Cover - Slabs

Table: Design Preferences 02 - Rebar Cover - Slabs

CoverTop	CoverBot	BarSize	InnerLayer	PTCGSTop	PTCGSBotExt	PTCGSBotInt	SlabType
m	m			m	m	m	
0.015000	0.015000	18	B	0.025000	0.040000	0.025000	Two Way

Table: Design Preferences 03 - Rebar Cover - Beams

Table: Design Preferences 03 - Rebar Cover - Beams

CoverTop	CoverBot	BarSizeF	BarSizeS	PTCGSTop	PTCGSBot
m	m			m	m
0.040000	0.040000	28	12	0.050000	0.050000

Table: Design Preferences 04 - Prestress Data

Table: Design Preferences 04 - Prestress Data

UserStress	InitConcRat	LLFraction
No	0.800000	0.500000

Overwrites

Table: Slab Design Overwrites 02 - Finite Element Based, Part 1 of 2

Table: Slab Design Overwrites 02 - Finite Element Based, Part 1 of 2

Area	RebarMat
5	CSA-G30.18Gr400

Table: Slab Design Overwrites 02 - Finite Element Based, Part 2 of 2

Table: Slab Design Overwrites 02 - Finite Element Based, Part 2 of 2

Area	RLLF	Design	IgnorePT
5	1.000000	Yes	No

Table: Beam Design Overwrites

Table: Beam Design Overwrites

Line	CoverType	RLLF	IgnorePT
W1-W	Section	1.000000	No
W3-W	Section	1.000000	No
W4-W	Section	1.000000	No
W5-W	Section	1.000000	No
W6-W	Section	1.000000	No
W7-W	Section	1.000000	No
W8-W	Section	1.000000	No
W9-W	Section	1.000000	No
W10-W	Section	1.000000	No
W12-W	Section	1.000000	No
W13-W	Section	1.000000	No
W14-W	Section	1.000000	No
W15-W	Section	1.000000	No
W16-W	Section	1.000000	No

Table: Punching Shear Design Overwrites 01 - General

Table: Punching Shear Design Overwrites 01 - General

Point	Check	LocType	EffDepth	ReinfType
72	Program Determined	Auto	Auto	None
252	Program Determined	Auto	Auto	None
307	Program Determined	Auto	Auto	None
346	Program Determined	Auto	Auto	None
347	Program Determined	Auto	Auto	None
348	Program Determined	Auto	Auto	None
349	Program Determined	Auto	Auto	None
350	Program Determined	Auto	Auto	None
351	Program Determined	Auto	Auto	None
352	Program Determined	Auto	Auto	None

Punching check/design

Table: Concrete Slab Design 02 - Punching Shear Data, Part 1 of 3

Table: Concrete Slab Design 02 - Punching Shear Data, Part 1 of 3

Point	GlobalX	GlobalY	Location	Perimeter	Depth	Status	Ratio
	m	m		m	m		
72	45.75000	19.59000				Not Calculated	
252	45.75000	13.06000				Not Calculated	
307	45.65000	19.18500	Corner	15.367500	1.467000	OK	0.021054
346	48.35000	19.18500				Not Calculated	
347	51.05000	19.18500				Not Calculated	
348	45.65000	15.93500				Not Calculated	
349	48.00000	15.93500	Edge	11.034500	1.467000	OK	0.322062
350	51.05000	15.93500	Corner	4.125938	1.467000	OK	0.396739
351	45.65000	12.68500				Not Calculated	
352	48.35000	12.68500	Edge	4.534500	1.467000	OK	0.418732

Table: Concrete Slab Design 02 - Punching Shear Data, Part 2 of 3

Table: Concrete Slab Design 02 - Punching Shear Data, Part 2 of 3

Point	Combo	Vu	Gamma_v2	Gamma_v3	ShrStrMax	Mu2	ShrStrCap
		Tonf			kgf/cm2	Tonf-m	kgf/cm2
72							
252							
307	UL1_1.4DL+1.7LL	56	0.410988	0.400000	0.29	-23.32073	13.60
346							
347							
348							
349	UL1_1.4DL+1.7LL	581	0.546252	0.269636	4.48	-170.48165	13.91
350	UL1_1.4DL+1.7LL	259	0.415143	0.400000	5.52	-37.72056	13.91
351							
352	UL2y_1.2DL+LL+EQ	363	0.405351	0.394673	5.83	-22.98832	13.91

Table: Concrete Slab Design 02 - Punching Shear Data, Part 3 of 3

Table: Concrete Slab Design 02 - Punching Shear Data, Part 3 of 3

Point	Mu3	ReinfType	UnbalMu2	UnbalMu3	NumRails	StudPerRail
	Tonf-m		Tonf-m	Tonf-m		
72		None				
252		None				
307	4.57920	None	-9.58454	1.83168		
346		None				
347		None				

Table: Concrete Slab Design 02 - Punching Shear Data, Part 3 of 3

Point	Mu3	ReinfType	UnbalMu2	UnbalMu3	NumRails	StudPerRail
	Tonf-m		Tonf-m	Tonf-m		
348		None				
349	-108.91752	None	-93.12590	-29.36814		
350	-70.69938	None	-15.65941	-28.27975		
351		None				
352	-1.136E-012	None	-9.31834	-4.483E-013		

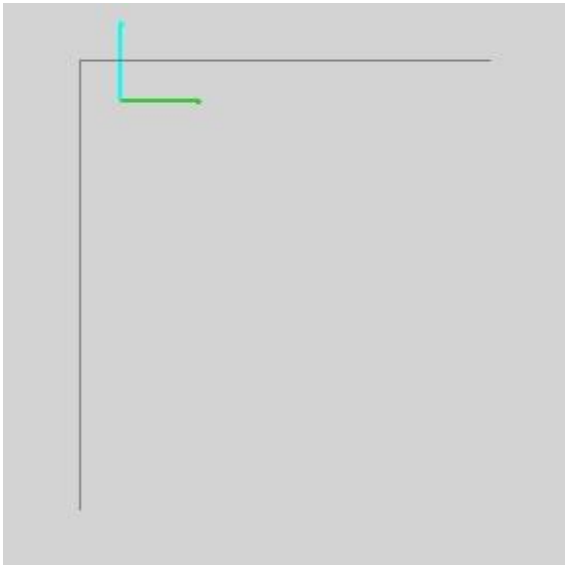
ACI 318 Punching Shear Check & Design

Geometric Properties

Combination = 19
Point Label = 307
Column Shape = Rectangular
Column Location = Corner
Global X-Coordinate = 45.65 m
Global Y-Coordinate = 19.185 m

Support Punching Check

Avg. Eff. Slab Thickness = 1.467 m
Eff. Punching Perimeter = 15.3675 m
Cover = 0.033 m
Conc. Comp. Strength = 305.91 kgf/cm2
Reinforcement Ratio = 0.0000
Section Inertia I22 = 156.251422 m4
Section Inertia I33 = 125.774128 m4
Section Inertia I23 = 0 m4
Gamma_v2 = 0.410988
Gamma_v3 = 0.4
Moment Mu2 = -23.32073 Tonf-m
Moment Mu3= 4.5792 Tonf-m
Shear Force = 56 Tonf
Unbalanced Moment Mu2 = -9.58454 Tonf-m



Column Punching Perimeter

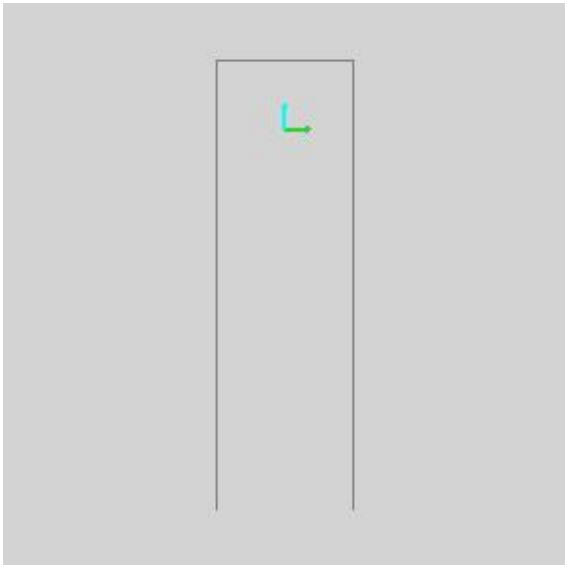
ACI 318 Punching Shear Check & Design

Geometric Properties

Combination = 19
Point Label = 349
Column Shape = Rectangular
Column Location = Edge
Global X-Coordinate = 48 m
Global Y-Coordinate = 15.935 m

Support Punching Check

Avg. Eff. Slab Thickness = 1.467 m
Eff. Punching Perimeter = 11.0345 m
Cover = 0.033 m
Conc. Comp. Strength = 305.91 kgf/cm2
Reinforcement Ratio = 0.0000
Section Inertia I22 = 39.958563 m4
Section Inertia I33 = 8.323338 m4
Section Inertia I23 = 0 m4
Gamma_v2 = 0.546252
Gamma_v3 = 0.269636
Moment Mu2 = -170.48165 Tonf-m
Moment Mu3= -108.91752 Tonf-m
Shear Force = 581 Tonf
Unbalanced Moment Mu2 = -93.1259 Tonf-m



Column Punching Perimeter

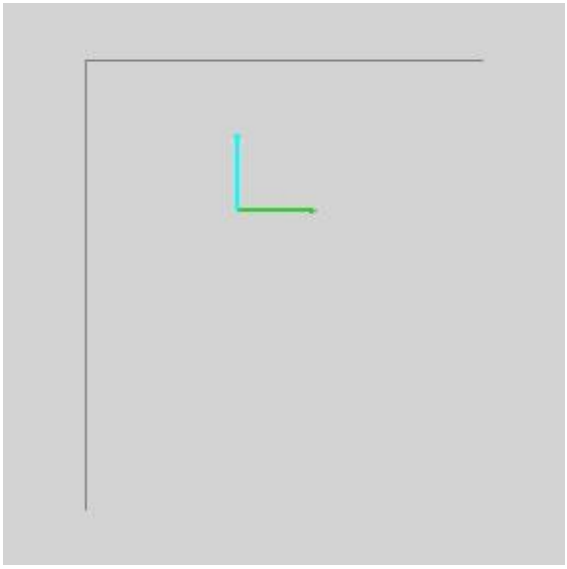
ACI 318 Punching Shear Check & Design

Geometric Properties

Combination = 19
Point Label = 350
Column Shape = Rectangular
Column Location = Corner
Global X-Coordinate = 51.05 m
Global Y-Coordinate = 15.935 m

Support Punching Check

Avg. Eff. Slab Thickness = 1.467 m
Eff. Punching Perimeter = 4.125938 m
Cover = 0.033 m
Conc. Comp. Strength = 305.91 kgf/cm2
Reinforcement Ratio = 0.0000
Section Inertia I22 = 3.675492 m4
Section Inertia I33 = 2.8018 m4
Section Inertia I23 = 0 m4
Gamma_v2 = 0.415143
Gamma_v3 = 0.4
Moment Mu2 = -37.72056 Tonf-m
Moment Mu3= -70.69938 Tonf-m
Shear Force = 259 Tonf
Unbalanced Moment Mu2 = -15.65941 Tonf-m



Column Punching Perimeter

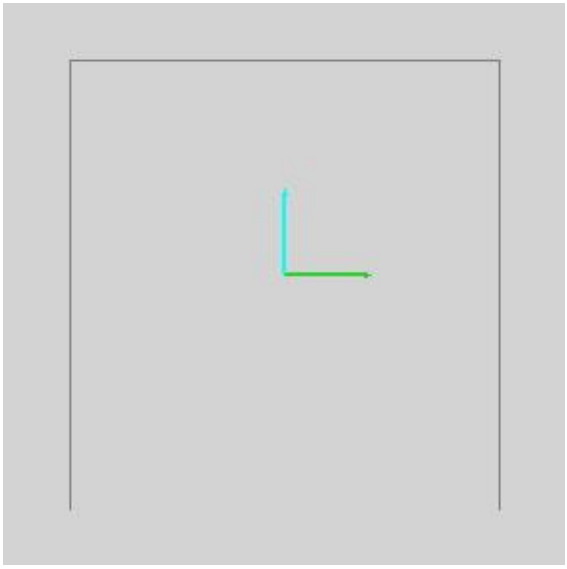
ACI 318 Punching Shear Check & Design

Geometric Properties

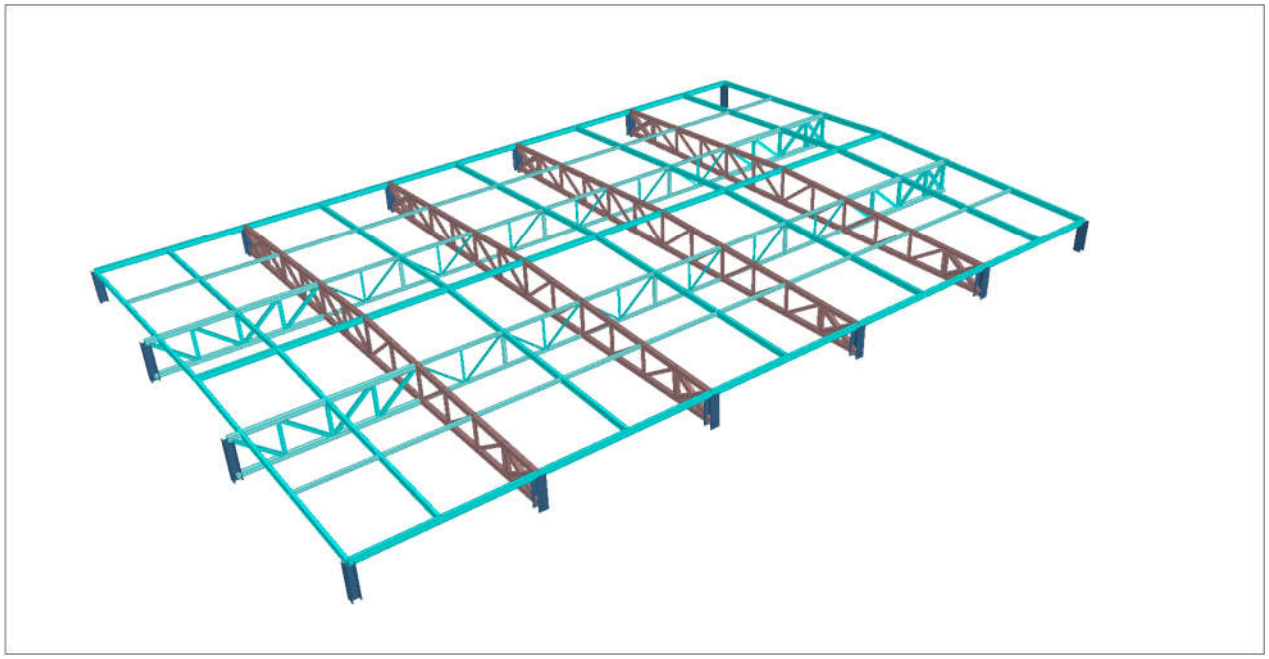
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Column Shape = Rectangular
Column Location = Edge
Global X-Coordinate = 48.35 m
Global Y-Coordinate = 12.685 m

Support Punching Check

Avg. Eff. Slab Thickness = 1.467 m
Eff. Punching Perimeter = 4.5345 m
Cover = 0.033 m
Conc. Comp. Strength = 305.91 kgf/cm2
Reinforcement Ratio = 0.0000
Section Inertia I22 = 2.545367 m4
Section Inertia I33 = 3.193027 m4
Section Inertia I23 = 0 m4
Gamma_v2 = 0.405351
Gamma_v3 = 0.394673
Moment Mu2 = -22.98832 Tonf-m
Moment Mu3= -1.136E-012 Tonf-m
Shear Force = 363 Tonf
Unbalanced Moment Mu2 = -9.31834 Tonf-m



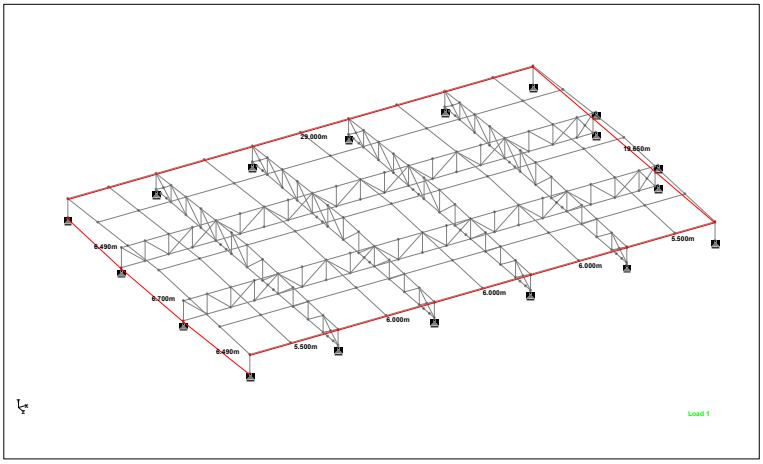
Column Punching Perimeter



3D Rendered View

Materials

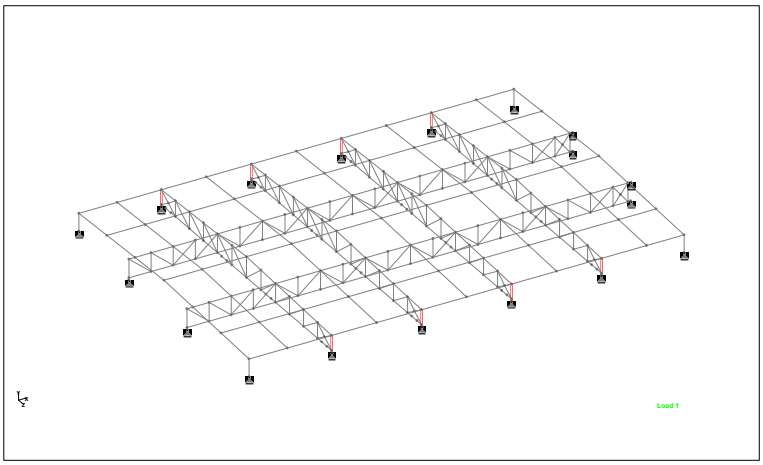
Mat	Name	E (kN/mm^2)	ν	Density (kg/m^3)	α (/°C)
1	STEEL	205.000	0.300	7.83E+3	12E -6
2	STAINLESSSTEEL	197.930	0.300	7.83E+3	18E -6
3	ALUMINUM	68.948	0.330	2.71E+3	23E -6
4	CONCRETE	21.718	0.170	2.4E+3	10E -6



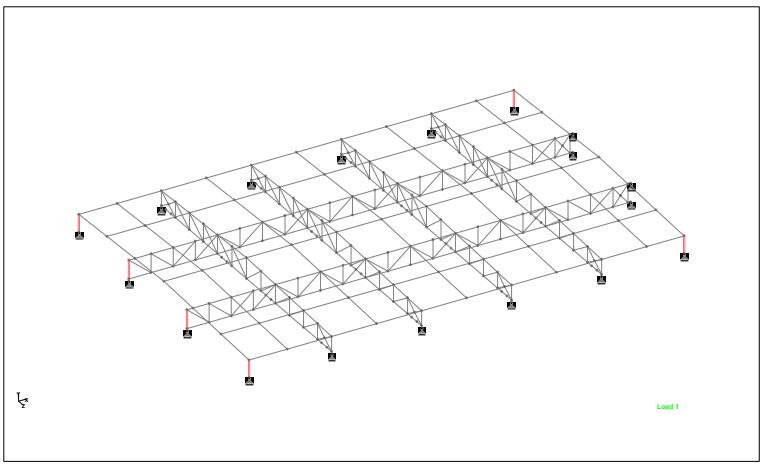
Dimensions

Section Properties

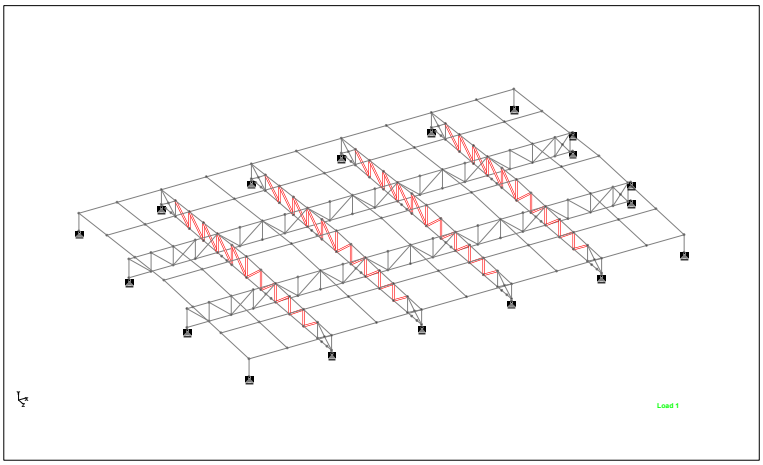
Prop	Section	Area (cm^2)	I_{yy} (cm^4)	I_{zz} (cm^4)	J (cm^4)	Material
1	PIP216.3X8.0	52.350	2.84E+3	2.84E+3	5.69E+3	STEEL
2	PIP114.3X3.2	11.170	172.000	172.000	344.939	STEEL
3	H250X250X9	91.430	3.65E+3	10.7E+3	51.468	STEEL
4	TUB1001004.5	16.670	249.000	249.000	391.943	STEEL
5	SHS50X50X3.2	5.727	20.400	20.400	32.801	STEEL
6	TUB1501504.5	25.670	896.000	896.000	1.39E+3	STEEL
7	SHS100X100X4.5	16.670	249.000	249.000	391.943	STEEL
8	RHS200X100X4.5	25.670	455.000	1.33E+3	1.08E+3	STEEL
9	TUB1001003.2	12.130	187.000	187.000	290.253	STEEL
10	H300X300X10	118.500	6.75E+3	20.2E+3	77.000	STEEL



H300x300



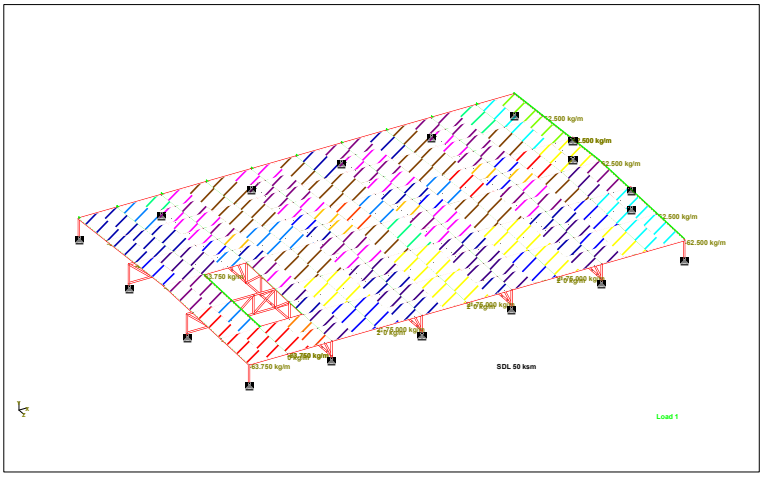
H250x250



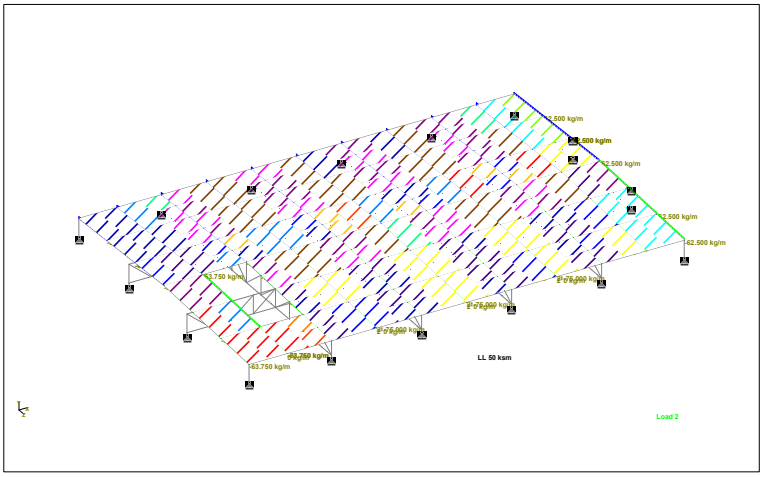
pipe114.3

Primary Load Cases

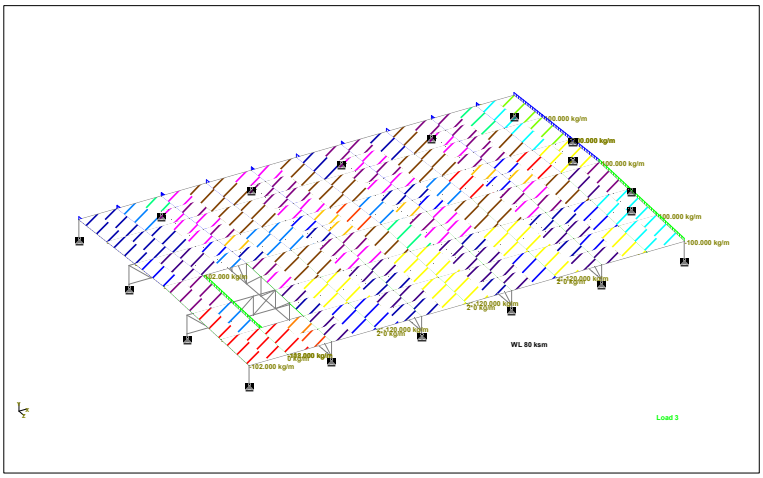
Number	Name	Type
1	DL	Dead
2	LL	Live
3	WL	Wind



DL+SDL



LL



WL

Combination Load Cases

Comb.	Combination L/C Name	Primary	Primary L/C Name	Factor
4	DL+LL	1	DL	1.00
		2	LL	1.00
5	DL+0.75(LL+WL)	1	DL	1.00
		2	LL	0.75
		3	WL	0.75

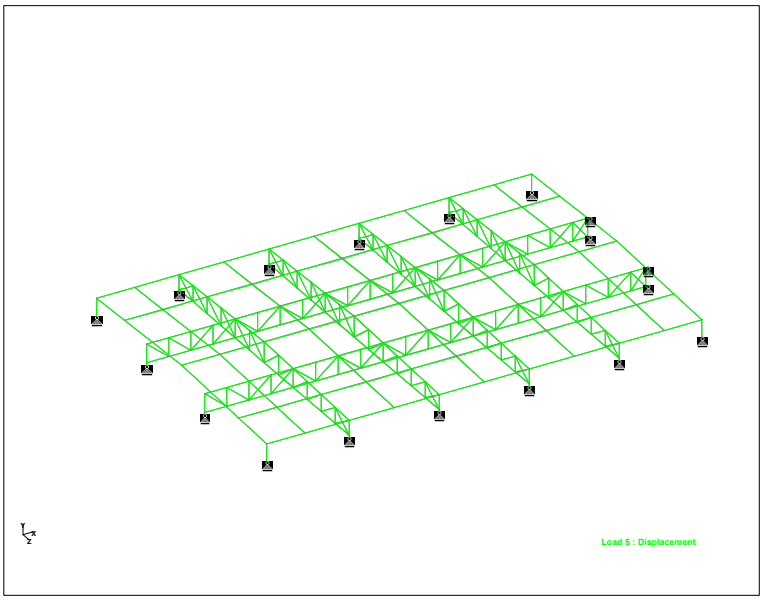
Node Displacement Summary

	Node	L/C	X (mm)	Y (mm)	Z (mm)	Resultant (mm)	rX (rad)	rY (rad)	rZ (rad)
Max X	158	5:DL+0.75(LL+	**2.491**	-0.030	-0.084	2.493	-0.000	-0.000	-0.002
Min X	134	5:DL+0.75(LL+	**-0.638**	-7.289	-0.474	7.332	-0.001	-0.000	0.001
Max Y	16	1:DL	0.000	**0.000**	0.000	0.000	-0.000	0.000	-0.000
Min Y	387	5:DL+0.75(LL+	0.352	**-22.993**	0.132	22.996	0.001	0.000	0.000
Max Z	65	5:DL+0.75(LL+	0.205	-2.906	**1.668**	3.357	0.002	0.000	-0.000
Min Z	75	5:DL+0.75(LL+	0.195	-2.883	**-1.652**	3.328	-0.002	-0.000	-0.000
Max rX	194	5:DL+0.75(LL+	0.008	-4.928	-0.592	4.964	**0.008**	0.000	0.000
Min rX	191	5:DL+0.75(LL+	0.011	-4.929	0.595	4.965	**-0.008**	-0.000	0.000
Max rY	247	5:DL+0.75(LL+	1.162	-15.241	-0.420	15.291	-0.000	**0.001**	-0.000
Min rY	31	5:DL+0.75(LL+	1.354	-11.739	0.360	11.822	0.000	**-0.001**	-0.001
Max rZ	391	5:DL+0.75(LL+	0.211	-5.065	0.180	5.072	-0.000	0.000	**0.003**
Min rZ	383	5:DL+0.75(LL+	0.517	-5.464	0.167	5.491	0.000	0.000	**-0.004**
Max Rst	387	5:DL+0.75(LL+	0.352	-22.993	0.132	**22.996**	0.001	0.000	0.000

Beam Displacement Detail Summary

Displacements shown in italic indicate the presence of an offset

	Beam	L/C	d (m)	X (mm)	Y (mm)	Z (mm)	Resultant (mm)
Max X	133	5:DL+0.75(LL+	0.000	**2.491**	-0.030	-0.084	2.493
Min X	243	5:DL+0.75(LL+	1.458	**-0.645**	-7.176	-0.493	7.222
Max Y	8	1:DL	0.150	0.000	**0.000**	0.000	0.000
Min Y	176	5:DL+0.75(LL+	2.916	0.372	**-23.118**	0.135	23.122
Max Z	56	5:DL+0.75(LL+	1.620	0.205	-2.906	**1.668**	3.357
Min Z	37	5:DL+0.75(LL+	1.620	0.195	-2.883	**-1.652**	3.328
Max Rst	176	5:DL+0.75(LL+	2.916	0.372	-23.118	0.135	**23.122**



Whole Structure Displacements 400mm:1m 5 DL+0.75(LL+WL)

Beam End Displacement Summary

Displacements shown in italic indicate the presence of an offset

	Beam	Node	L/C	X (mm)	Y (mm)	Z (mm)	Resultant (mm)
Max X	133	158	5:DL+0.75(LL+	**2.491**	-0.030	-0.084	2.493
Min X	106	134	5:DL+0.75(LL+	**-0.639**	-7.289	-0.474	7.333
Max Y	8	16	1:DL	0.000	**0.000**	0.000	0.000
Min Y	176	387	5:DL+0.75(LL+	0.352	**-22.993**	0.132	22.996
Max Z	56	65	5:DL+0.75(LL+	0.205	-2.906	**1.668**	3.357
Min Z	37	75	5:DL+0.75(LL+	0.195	-2.883	**-1.652**	3.328
Max Rst	176	387	5:DL+0.75(LL+	0.352	-22.993	0.132	**22.996**

Beam End Force Summary

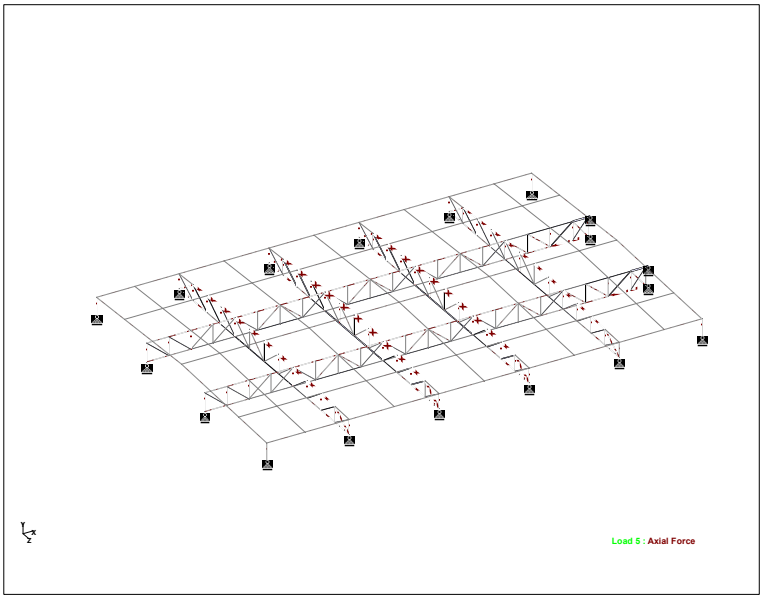
The signs of the forces at end B of each beam have been reversed. For example: this means that the Min Fx entry gives the largest tension value for an beam.

				Axial	Shear		Torsion	Bending	
	Beam	Node	L/C	Fx (kg)	Fy (kg)	Fz (kg)	Mx (kg¯m)	My (kg¯m)	Mz (kg¯m)
Max Fx	45	51	5:DL+0.75(LL+	**34.2E+3**	296.31	-56.40	0.176	98.772	-307.612
Min Fx	601	337	5:DL+0.75(LL+	**-17.1E+3**	-3484.60	708.82	0.000	-127.586	-627.548
Max Fy	39	39	5:DL+0.75(LL+	10.7E+3	**23.7E+3**	5.57	0.000	-0.836	3.55E+3
Min Fy	41	55	5:DL+0.75(LL+	10.7E+3	**-23.7E+3**	-0.67	-0.000	0.101	-3.55E+3
Max Fz	62	75	5:DL+0.75(LL+	666.59	-10.27	**1370.60**	4.708	-720.960	-6.138
Min Fz	57	65	5:DL+0.75(LL+	689.84	-10.32	**-1379.36**	-2.955	725.897	-5.712
Max Mx	447	12	5:DL+0.75(LL+	855.58	599.72	-67.93	**192.629**	98.917	849.172
Min Mx	435	186	5:DL+0.75(LL+	664.69	599.80	23.91	**-194.437**	-20.850	719.255
Max My	779	186	5:DL+0.75(LL+	1390.05	-680.70	-848.53	-0.000	**1.02E+3**	-816.845
Min My	778	185	5:DL+0.75(LL+	1327.79	-617.94	804.32	0.000	**-965.178**	-741.530
Max Mz	39	39	5:DL+0.75(LL+	10.7E+3	23.7E+3	5.57	0.000	-0.836	**3.55E+3**
Min Mz	41	55	5:DL+0.75(LL+	10.7E+3	-23.7E+3	-0.67	-0.000	0.101	**-3.55E+3**

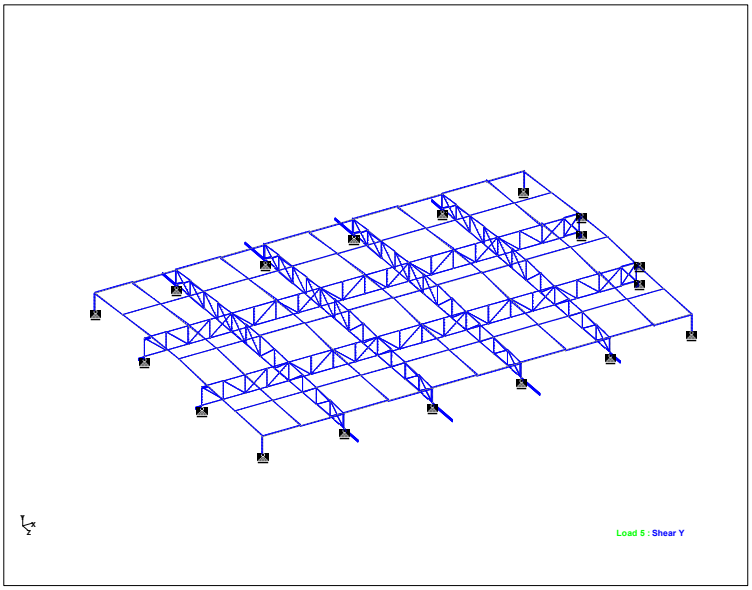
Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

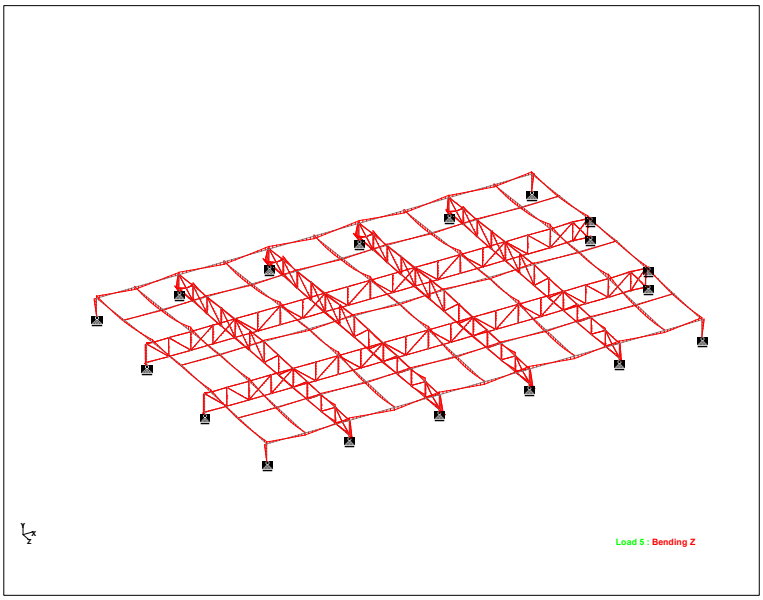
	Beam	L/C	d	Axial	Shear		Torsion	Bending	
			(m)	Fx (kg)	Fy (kg)	Fz (kg)	Mx (kg-m)	My (kg-m)	Mz (kg-m)
Max Fx	45	5:DL+0.75(LL+	0.000	**34.2E+3**	296.31	-56.40	0.176	98.772	-307.612
Min Fx	601	5:DL+0.75(LL+	0.000	**-17.1E+3**	-3484.60	708.82	0.000	-127.586	-627.548
Max Fy	39	5:DL+0.75(LL+	0.000	10.7E+3	**23.7E+3**	5.57	0.000	-0.836	3.55E+3
Min Fy	41	5:DL+0.75(LL+	0.000	10.7E+3	**-23.7E+3**	-0.67	-0.000	0.101	-3.55E+3
Max Fz	62	5:DL+0.75(LL+	0.000	666.59	-10.27	**1370.60**	4.708	-720.960	-6.138
Min Fz	57	5:DL+0.75(LL+	0.000	689.84	-10.32	**-1379.36**	-2.955	725.897	-5.712
Max Mx	447	5:DL+0.75(LL+	0.000	855.58	599.72	-67.93	**192.629**	98.917	849.172
Min Mx	435	5:DL+0.75(LL+	0.000	664.69	599.80	23.91	**-194.437**	-20.850	719.255
Max My	779	5:DL+0.75(LL+	0.000	1390.05	-680.70	-848.53	-0.000	**1.02E+3**	-816.845
Min My	778	5:DL+0.75(LL+	0.000	1327.79	-617.94	804.32	0.000	**-965.178**	-741.530
Max Mz	39	5:DL+0.75(LL+	0.000	10.7E+3	23.7E+3	5.57	0.000	-0.836	**3.55E+3**
Min Mz	41	5:DL+0.75(LL+	0.000	10.7E+3	-23.7E+3	-0.67	-0.000	0.101	**-3.55E+3**



Whole Structure Fx 224338kg:1m 5 DL+0.75(LL+WL)



Whole Structure Fy 10197.2kg:1m 5 DL+0.75(LL+WL)



Whole Structure Mz 5098.58kg-m:1m 5 DL+0.75(LL+WL)

Utilization Ratio

Beam	Analysis Property	Design Property	Actual Ratio	Allowable Ratio	Ratio (Act./Allow.)	Clause	L/C	Ax (cm^2)	Iz (cm^4)	Iy (cm^4)	Ix (cm^4)
2	PIP216.3X8.	PIP216.3X8.	0.232	1.000	0.232	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
3	PIP216.3X8.	PIP216.3X8.	0.141	1.000	0.141	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
4	PIP216.3X8.	PIP216.3X8.	0.123	1.000	0.123	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
5	PIP216.3X8.	PIP216.3X8.	0.157	1.000	0.157	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
6	PIP216.3X8.	PIP216.3X8.	0.525	1.000	0.525	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
7	PIP216.3X8.	PIP216.3X8.	0.642	1.000	0.642	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
8	H300X300X'	H300X300X'	0.627	1.000	0.627	SHEAR -Y	5	118.500	20.2E+3	6.75E+3	76.500
9	H300X300X'	H300X300X'	0.095	1.000	0.095	AISC- H1-3	5	118.500	20.2E+3	6.75E+3	76.500
10	H300X300X'	H300X300X'	0.627	1.000	0.627	SHEAR -Y	5	118.500	20.2E+3	6.75E+3	76.500
11	PIP114.3X3..	PIP114.3X3..	0.196	1.000	0.196	AISC- H2-1	5	11.170	172.000	172.000	344.000
12	PIP114.3X3..	PIP114.3X3..	0.262	1.000	0.262	AISC- H1-3	5	11.170	172.000	172.000	344.000
13	PIP114.3X3..	PIP114.3X3..	0.267	1.000	0.267	AISC- H1-2	5	11.170	172.000	172.000	344.000
14	PIP216.3X8.	PIP216.3X8.	0.606	1.000	0.606	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
15	PIP216.3X8.	PIP216.3X8.	0.559	1.000	0.559	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
16	PIP114.3X3..	PIP114.3X3..	0.598	1.000	0.598	AISC- H1-2	5	11.170	172.000	172.000	344.000
17	PIP114.3X3..	PIP114.3X3..	0.543	1.000	0.543	AISC- H1-2	5	11.170	172.000	172.000	344.000
18	H300X300X'	H300X300X'	0.095	1.000	0.095	AISC- H1-3	5	118.500	20.2E+3	6.75E+3	76.500
19	PIP216.3X8.	PIP216.3X8.	0.304	1.000	0.304	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
20	PIP216.3X8.	PIP216.3X8.	0.295	1.000	0.295	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
21	PIP216.3X8.	PIP216.3X8.	0.166	1.000	0.166	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
22	PIP216.3X8.	PIP216.3X8.	0.181	1.000	0.181	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
23	PIP216.3X8.	PIP216.3X8.	0.096	1.000	0.096	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
24	PIP216.3X8.	PIP216.3X8.	0.436	1.000	0.436	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
25	PIP216.3X8.	PIP216.3X8.	0.580	1.000	0.580	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
26	PIP216.3X8.	PIP216.3X8.	0.139	1.000	0.139	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
27	PIP114.3X3..	PIP114.3X3..	0.429	1.000	0.429	AISC- H1-2	5	11.170	172.000	172.000	344.000
28	PIP114.3X3..	PIP114.3X3..	0.058	1.000	0.058	AISC- H1-3	5	11.170	172.000	172.000	344.000
29	PIP114.3X3..	PIP114.3X3..	0.111	1.000	0.111	AISC- H1-3	5	11.170	172.000	172.000	344.000
30	PIP114.3X3..	PIP114.3X3..	0.403	1.000	0.403	AISC- H1-2	5	11.170	172.000	172.000	344.000
31	PIP216.3X8.	PIP216.3X8.	0.127	1.000	0.127	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
33	PIP216.3X8.	PIP216.3X8.	0.332	1.000	0.332	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
34	PIP216.3X8.	PIP216.3X8.	0.219	1.000	0.219	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
35	PIP216.3X8.	PIP216.3X8.	0.206	1.000	0.206	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
36	PIP216.3X8.	PIP216.3X8.	0.193	1.000	0.193	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
37	PIP216.3X8.	PIP216.3X8.	0.790	1.000	0.790	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
38	PIP216.3X8.	PIP216.3X8.	0.871	1.000	0.871	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3

Utilization Ratio Cont...

Beam	Analysis Property	Design Property	Actual Ratio	Allowable Ratio	Ratio (Act./Allow.)	Clause	L/C	Ax (cm^2)	Iz (cm^4)	Iy (cm^4)	Ix (cm^4)
39	H300X300X´	H300X300X´	0.894	1.000	0.894	SHEAR -Y	5	118.500	20.2E+3	6.75E+3	76.500
40	H300X300X´	H300X300X´	0.126	1.000	0.126	AISC- H1-3	5	118.500	20.2E+3	6.75E+3	76.500
41	H300X300X´	H300X300X´	0.894	1.000	0.894	SHEAR -Y	5	118.500	20.2E+3	6.75E+3	76.500
42	PIP114.3X3..	PIP114.3X3..	0.099	1.000	0.099	AISC- H2-1	5	11.170	172.000	172.000	344.000
43	PIP114.3X3..	PIP114.3X3..	0.410	1.000	0.410	AISC- H1-2	5	11.170	172.000	172.000	344.000
44	PIP114.3X3..	PIP114.3X3..	0.410	1.000	0.410	AISC- H1-2	5	11.170	172.000	172.000	344.000
45	PIP216.3X8.	PIP216.3X8.	0.853	1.000	0.853	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
46	PIP216.3X8.	PIP216.3X8.	0.773	1.000	0.773	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
47	PIP114.3X3..	PIP114.3X3..	0.833	1.000	0.833	AISC- H1-2	5	11.170	172.000	172.000	344.000
48	PIP114.3X3..	PIP114.3X3..	0.826	1.000	0.826	AISC- H1-2	5	11.170	172.000	172.000	344.000
49	H300X300X´	H300X300X´	0.126	1.000	0.126	AISC- H1-3	5	118.500	20.2E+3	6.75E+3	76.500
50	PIP216.3X8.	PIP216.3X8.	0.450	1.000	0.450	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
51	PIP216.3X8.	PIP216.3X8.	0.441	1.000	0.441	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
52	PIP216.3X8.	PIP216.3X8.	0.202	1.000	0.202	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
53	PIP216.3X8.	PIP216.3X8.	0.230	1.000	0.230	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
54	PIP216.3X8.	PIP216.3X8.	0.131	1.000	0.131	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
55	PIP216.3X8.	PIP216.3X8.	0.654	1.000	0.654	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
56	PIP216.3X8.	PIP216.3X8.	0.796	1.000	0.796	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
57	PIP216.3X8.	PIP216.3X8.	0.189	1.000	0.189	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
58	PIP114.3X3..	PIP114.3X3..	0.647	1.000	0.647	AISC- H1-2	5	11.170	172.000	172.000	344.000
59	PIP114.3X3..	PIP114.3X3..	0.062	1.000	0.062	AISC- H1-3	5	11.170	172.000	172.000	344.000
60	PIP114.3X3..	PIP114.3X3..	0.075	1.000	0.075	AISC- H1-3	5	11.170	172.000	172.000	344.000
61	PIP114.3X3..	PIP114.3X3..	0.641	1.000	0.641	AISC- H1-2	5	11.170	172.000	172.000	344.000
62	PIP216.3X8.	PIP216.3X8.	0.188	1.000	0.188	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
64	PIP216.3X8.	PIP216.3X8.	0.307	1.000	0.307	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
65	PIP216.3X8.	PIP216.3X8.	0.203	1.000	0.203	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
66	PIP216.3X8.	PIP216.3X8.	0.189	1.000	0.189	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
67	PIP216.3X8.	PIP216.3X8.	0.166	1.000	0.166	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
68	PIP216.3X8.	PIP216.3X8.	0.737	1.000	0.737	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
69	PIP216.3X8.	PIP216.3X8.	0.786	1.000	0.786	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
70	H300X300X´	H300X300X´	0.835	1.000	0.835	SHEAR -Y	5	118.500	20.2E+3	6.75E+3	76.500
71	H300X300X´	H300X300X´	0.121	1.000	0.121	AISC- H1-3	5	118.500	20.2E+3	6.75E+3	76.500
72	H300X300X´	H300X300X´	0.835	1.000	0.835	SHEAR -Y	5	118.500	20.2E+3	6.75E+3	76.500
73	PIP114.3X3..	PIP114.3X3..	0.116	1.000	0.116	AISC- H2-1	5	11.170	172.000	172.000	344.000
74	PIP114.3X3..	PIP114.3X3..	0.373	1.000	0.373	AISC- H1-2	5	11.170	172.000	172.000	344.000
75	PIP114.3X3..	PIP114.3X3..	0.373	1.000	0.373	AISC- H1-2	5	11.170	172.000	172.000	344.000
76	PIP216.3X8.	PIP216.3X8.	0.781	1.000	0.781	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
77	PIP216.3X8.	PIP216.3X8.	0.729	1.000	0.729	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
78	PIP114.3X3..	PIP114.3X3..	0.771	1.000	0.771	AISC- H1-2	5	11.170	172.000	172.000	344.000
79	PIP114.3X3..	PIP114.3X3..	0.772	1.000	0.772	AISC- H1-2	5	11.170	172.000	172.000	344.000
80	H300X300X´	H300X300X´	0.121	1.000	0.121	AISC- H1-3	5	118.500	20.2E+3	6.75E+3	76.500
81	PIP216.3X8.	PIP216.3X8.	0.414	1.000	0.414	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
82	PIP216.3X8.	PIP216.3X8.	0.410	1.000	0.410	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
83	PIP216.3X8.	PIP216.3X8.	0.195	1.000	0.195	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
84	PIP216.3X8.	PIP216.3X8.	0.201	1.000	0.201	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
85	PIP216.3X8.	PIP216.3X8.	0.118	1.000	0.118	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
86	PIP216.3X8.	PIP216.3X8.	0.616	1.000	0.616	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
87	PIP216.3X8.	PIP216.3X8.	0.737	1.000	0.737	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
88	PIP216.3X8.	PIP216.3X8.	0.176	1.000	0.176	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
89	PIP114.3X3..	PIP114.3X3..	0.589	1.000	0.589	AISC- H1-2	5	11.170	172.000	172.000	344.000
90	PIP114.3X3..	PIP114.3X3..	0.074	1.000	0.074	AISC- H1-3	5	11.170	172.000	172.000	344.000
91	PIP114.3X3..	PIP114.3X3..	0.073	1.000	0.073	AISC- H1-3	5	11.170	172.000	172.000	344.000
92	PIP114.3X3..	PIP114.3X3..	0.590	1.000	0.590	AISC- H1-2	5	11.170	172.000	172.000	344.000
93	PIP216.3X8.	PIP216.3X8.	0.176	1.000	0.176	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
95	PIP216.3X8.	PIP216.3X8.	0.162	1.000	0.162	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
96	PIP216.3X8.	PIP216.3X8.	0.090	1.000	0.090	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
97	PIP216.3X8.	PIP216.3X8.	0.093	1.000	0.093	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
98	PIP216.3X8.	PIP216.3X8.	0.076	1.000	0.076	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
99	PIP216.3X8.	PIP216.3X8.	0.414	1.000	0.414	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3

Utilization Ratio Cont...

Beam	Analysis Property	Design Property	Actual Ratio	Allowable Ratio	Ratio (Act./Allow.)	Clause	L/C	Ax (cm^2)	Iz (cm^4)	Iy (cm^4)	Ix (cm^4)
100	PIP216.3X8.	PIP216.3X8.	0.400	1.000	0.400	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
101	H300X300X′	H300X300X′	0.463	1.000	0.463	SHEAR -Y	5	118.500	20.2E+3	6.75E+3	76.500
102	H300X300X′	H300X300X′	0.075	1.000	0.075	AISC- H1-3	5	118.500	20.2E+3	6.75E+3	76.500
103	H300X300X′	H300X300X′	0.463	1.000	0.463	SHEAR -Y	5	118.500	20.2E+3	6.75E+3	76.500
104	PIP114.3X3..	PIP114.3X3..	0.146	1.000	0.146	AISC- H1-3	5	11.170	172.000	172.000	344.000
105	PIP114.3X3..	PIP114.3X3..	0.143	1.000	0.143	AISC- H1-3	5	11.170	172.000	172.000	344.000
106	PIP114.3X3..	PIP114.3X3..	0.144	1.000	0.144	AISC- H1-3	5	11.170	172.000	172.000	344.000
107	PIP216.3X8.	PIP216.3X8.	0.426	1.000	0.426	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
108	PIP216.3X8.	PIP216.3X8.	0.443	1.000	0.443	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
109	PIP114.3X3..	PIP114.3X3..	0.414	1.000	0.414	AISC- H1-2	5	11.170	172.000	172.000	344.000
110	PIP114.3X3..	PIP114.3X3..	0.414	1.000	0.414	AISC- H1-2	5	11.170	172.000	172.000	344.000
111	H300X300X′	H300X300X′	0.075	1.000	0.075	AISC- H1-3	5	118.500	20.2E+3	6.75E+3	76.500
112	PIP216.3X8.	PIP216.3X8.	0.217	1.000	0.217	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
113	PIP216.3X8.	PIP216.3X8.	0.219	1.000	0.219	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
114	PIP216.3X8.	PIP216.3X8.	0.139	1.000	0.139	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
115	PIP216.3X8.	PIP216.3X8.	0.089	1.000	0.089	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
116	PIP216.3X8.	PIP216.3X8.	0.060	1.000	0.060	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
117	PIP216.3X8.	PIP216.3X8.	0.357	1.000	0.357	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
118	PIP216.3X8.	PIP216.3X8.	0.414	1.000	0.414	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
119	PIP216.3X8.	PIP216.3X8.	0.100	1.000	0.100	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
120	PIP114.3X3..	PIP114.3X3..	0.259	1.000	0.259	AISC- H1-3	5	11.170	172.000	172.000	344.000
121	PIP114.3X3..	PIP114.3X3..	0.133	1.000	0.133	AISC- H1-3	5	11.170	172.000	172.000	344.000
122	PIP114.3X3..	PIP114.3X3..	0.133	1.000	0.133	AISC- H1-3	5	11.170	172.000	172.000	344.000
123	PIP114.3X3..	PIP114.3X3..	0.259	1.000	0.259	AISC- H1-3	5	11.170	172.000	172.000	344.000
124	PIP216.3X8.	PIP216.3X8.	0.100	1.000	0.100	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
125	PIP216.3X8.	PIP216.3X8.	0.256	1.000	0.256	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
126	PIP216.3X8.	PIP216.3X8.	0.173	1.000	0.173	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
127	PIP216.3X8.	PIP216.3X8.	0.134	1.000	0.134	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
128	PIP216.3X8.	PIP216.3X8.	0.265	1.000	0.265	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
129	TUB150150/	TUB150150/	0.077	1.000	0.077	AISC- H2-1	5	25.670	896.000	896.000	1.39E+3
130	TUB150150/	TUB150150/	0.215	1.000	0.215	AISC- H1-1	5	25.670	896.000	896.000	1.39E+3
131	TUB150150/	TUB150150/	0.051	1.000	0.051	AISC- H2-1	5	25.670	896.000	896.000	1.39E+3
132	TUB150150/	TUB150150/	0.183	1.000	0.183	AISC- H1-3	5	25.670	896.000	896.000	1.39E+3
133	H250X250X9	H250X250X9	0.072	1.000	0.072	AISC- H1-3	5	91.430	10.7E+3	3.65E+3	51.100
134	H250X250X9	H250X250X9	0.058	1.000	0.058	AISC- H1-3	5	91.430	10.7E+3	3.65E+3	51.100
135	H250X250X9	H250X250X9	0.209	1.000	0.209	SHEAR -Y	5	91.430	10.7E+3	3.65E+3	51.100
136	H250X250X9	H250X250X9	0.196	1.000	0.196	SHEAR -Y	5	91.430	10.7E+3	3.65E+3	51.100
139	TUB150150/	TUB150150/	0.344	1.000	0.344	AISC- H1-3	5	25.670	896.000	896.000	1.39E+3
140	TUB150150/	TUB150150/	0.289	1.000	0.289	AISC- H1-1	5	25.670	896.000	896.000	1.39E+3
141	TUB150150/	TUB150150/	0.297	1.000	0.297	AISC- H1-3	5	25.670	896.000	896.000	1.39E+3
142	TUB150150/	TUB150150/	0.262	1.000	0.262	AISC- H1-1	5	25.670	896.000	896.000	1.39E+3
143	TUB100100/	TUB100100/	0.440	1.000	0.440	AISC- H1-1	5	16.670	249.000	249.000	391.940
144	TUB100100/	TUB100100/	0.392	1.000	0.392	AISC- H1-1	5	16.670	249.000	249.000	391.940
145	TUB100100/	TUB100100/	0.329	1.000	0.329	AISC- H1-1	5	16.670	249.000	249.000	391.940
146	TUB100100/	TUB100100/	0.168	1.000	0.168	AISC- H2-1	5	16.670	249.000	249.000	391.940
147	TUB100100/	TUB100100/	0.129	1.000	0.129	AISC- H2-1	5	16.670	249.000	249.000	391.940
148	TUB100100/	TUB100100/	0.100	1.000	0.100	AISC- H2-1	5	16.670	249.000	249.000	391.940
149	TUB100100/	TUB100100/	0.414	1.000	0.414	AISC- H1-1	5	16.670	249.000	249.000	391.940
150	TUB100100/	TUB100100/	0.393	1.000	0.393	AISC- H1-1	5	16.670	249.000	249.000	391.940
151	TUB100100/	TUB100100/	0.324	1.000	0.324	AISC- H1-1	5	16.670	249.000	249.000	391.940
152	TUB100100/	TUB100100/	0.153	1.000	0.153	AISC- H2-1	5	16.670	249.000	249.000	391.940
153	TUB100100/	TUB100100/	0.140	1.000	0.140	AISC- H2-1	5	16.670	249.000	249.000	391.940
154	TUB100100/	TUB100100/	0.106	1.000	0.106	AISC- H2-1	5	16.670	249.000	249.000	391.940
169	RHS200X10	RHS200X10	0.380	1.000	0.380	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
170	RHS200X10	RHS200X10	0.760	1.000	0.760	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
171	RHS200X10	RHS200X10	0.420	1.000	0.420	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
172	RHS200X10	RHS200X10	0.493	1.000	0.493	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
173	RHS200X10	RHS200X10	0.450	1.000	0.450	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
174	RHS200X10	RHS200X10	0.670	1.000	0.670	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3

Utilization Ratio Cont...

Beam	Analysis Property	Design Property	Actual Ratio	Allowable Ratio	Ratio (Act./Allow.)	Clause	L/C	Ax (cm^2)	Iz (cm^4)	Iy (cm^4)	Ix (cm^4)
175	RHS200X10	RHS200X10	0.452	1.000	0.452	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
176	RHS200X10	RHS200X10	0.633	1.000	0.633	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
177	RHS200X10	RHS200X10	0.455	1.000	0.455	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
178	RHS200X10	RHS200X10	0.685	1.000	0.685	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
187	RHS200X10	RHS200X10	0.643	1.000	0.643	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
188	RHS200X10	RHS200X10	0.643	1.000	0.643	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
189	RHS200X10	RHS200X10	0.593	1.000	0.593	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
190	RHS200X10	RHS200X10	0.594	1.000	0.594	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
191	RHS200X10	RHS200X10	0.623	1.000	0.623	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
192	RHS200X10	RHS200X10	0.630	1.000	0.630	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
193	RHS200X10	RHS200X10	0.509	1.000	0.509	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
194	RHS200X10	RHS200X10	0.496	1.000	0.496	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
195	RHS200X10	RHS200X10	0.650	1.000	0.650	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
196	RHS200X10	RHS200X10	0.469	1.000	0.469	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
197	PIP216.3X8.	PIP216.3X8.	0.303	1.000	0.303	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
198	PIP216.3X8.	PIP216.3X8.	0.155	1.000	0.155	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
199	PIP216.3X8.	PIP216.3X8.	0.075	1.000	0.075	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
200	PIP216.3X8.	PIP216.3X8.	0.058	1.000	0.058	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
201	PIP216.3X8.	PIP216.3X8.	0.497	1.000	0.497	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
202	PIP216.3X8.	PIP216.3X8.	0.573	1.000	0.573	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
203	PIP216.3X8.	PIP216.3X8.	0.563	1.000	0.563	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
204	PIP216.3X8.	PIP216.3X8.	0.222	1.000	0.222	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
205	PIP216.3X8.	PIP216.3X8.	0.159	1.000	0.159	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
206	PIP216.3X8.	PIP216.3X8.	0.122	1.000	0.122	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
207	PIP216.3X8.	PIP216.3X8.	0.593	1.000	0.593	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
208	PIP216.3X8.	PIP216.3X8.	0.068	1.000	0.068	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
209	PIP216.3X8.	PIP216.3X8.	0.451	1.000	0.451	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
210	PIP216.3X8.	PIP216.3X8.	0.200	1.000	0.200	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
211	PIP216.3X8.	PIP216.3X8.	0.129	1.000	0.129	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
212	PIP216.3X8.	PIP216.3X8.	0.071	1.000	0.071	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
213	PIP216.3X8.	PIP216.3X8.	0.660	1.000	0.660	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
214	PIP216.3X8.	PIP216.3X8.	0.773	1.000	0.773	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
215	PIP216.3X8.	PIP216.3X8.	0.845	1.000	0.845	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
216	PIP216.3X8.	PIP216.3X8.	0.331	1.000	0.331	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
217	PIP216.3X8.	PIP216.3X8.	0.213	1.000	0.213	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
218	PIP216.3X8.	PIP216.3X8.	0.184	1.000	0.184	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
219	PIP216.3X8.	PIP216.3X8.	0.857	1.000	0.857	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
220	PIP216.3X8.	PIP216.3X8.	0.072	1.000	0.072	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
221	PIP216.3X8.	PIP216.3X8.	0.414	1.000	0.414	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
222	PIP216.3X8.	PIP216.3X8.	0.196	1.000	0.196	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
223	PIP216.3X8.	PIP216.3X8.	0.119	1.000	0.119	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
224	PIP216.3X8.	PIP216.3X8.	0.069	1.000	0.069	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
225	PIP216.3X8.	PIP216.3X8.	0.616	1.000	0.616	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
226	PIP216.3X8.	PIP216.3X8.	0.729	1.000	0.729	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
227	PIP216.3X8.	PIP216.3X8.	0.782	1.000	0.782	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
228	PIP216.3X8.	PIP216.3X8.	0.307	1.000	0.307	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
229	PIP216.3X8.	PIP216.3X8.	0.189	1.000	0.189	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
230	PIP216.3X8.	PIP216.3X8.	0.166	1.000	0.166	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
231	PIP216.3X8.	PIP216.3X8.	0.788	1.000	0.788	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
232	PIP216.3X8.	PIP216.3X8.	0.069	1.000	0.069	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
233	PIP216.3X8.	PIP216.3X8.	0.216	1.000	0.216	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
234	PIP216.3X8.	PIP216.3X8.	0.139	1.000	0.139	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
235	PIP216.3X8.	PIP216.3X8.	0.060	1.000	0.060	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
236	PIP216.3X8.	PIP216.3X8.	0.059	1.000	0.059	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
237	PIP216.3X8.	PIP216.3X8.	0.357	1.000	0.357	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
238	PIP216.3X8.	PIP216.3X8.	0.443	1.000	0.443	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
239	PIP216.3X8.	PIP216.3X8.	0.426	1.000	0.426	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
240	PIP216.3X8.	PIP216.3X8.	0.162	1.000	0.162	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
241	PIP216.3X8.	PIP216.3X8.	0.092	1.000	0.092	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3

Utilization Ratio Cont...

Beam	Analysis Property	Design Property	Actual Ratio	Allowable Ratio	Ratio (Act./Allow.)	Clause	L/C	Ax (cm^2)	Iz (cm^4)	Iy (cm^4)	Ix (cm^4)
242	PIP216.3X8.	PIP216.3X8.	0.076	1.000	0.076	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
243	PIP216.3X8.	PIP216.3X8.	0.401	1.000	0.401	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
244	PIP216.3X8.	PIP216.3X8.	0.059	1.000	0.059	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
245	TUB150150/	TUB150150/	0.282	1.000	0.282	AISC- H1-1	5	25.670	896.000	896.000	1.39E+3
246	TUB150150/	TUB150150/	0.219	1.000	0.219	AISC- H1-3	5	25.670	896.000	896.000	1.39E+3
247	TUB100100/	TUB100100/	0.410	1.000	0.410	AISC- H1-1	5	16.670	249.000	249.000	391.940
248	TUB100100/	TUB100100/	0.381	1.000	0.381	AISC- H1-1	5	16.670	249.000	249.000	391.940
249	TUB100100/	TUB100100/	0.293	1.000	0.293	AISC- H1-1	5	16.670	249.000	249.000	391.940
250	TUB100100/	TUB100100/	0.403	1.000	0.403	AISC- H1-1	5	16.670	249.000	249.000	391.940
251	TUB100100/	TUB100100/	0.383	1.000	0.383	AISC- H1-1	5	16.670	249.000	249.000	391.940
252	TUB100100/	TUB100100/	0.289	1.000	0.289	AISC- H1-1	5	16.670	249.000	249.000	391.940
257	TUB100100/	TUB100100/	0.240	1.000	0.240	AISC- H2-1	5	16.670	249.000	249.000	391.940
258	TUB100100/	TUB100100/	0.202	1.000	0.202	AISC- H2-1	5	16.670	249.000	249.000	391.940
259	TUB100100/	TUB100100/	0.172	1.000	0.172	AISC- H2-1	5	16.670	249.000	249.000	391.940
260	TUB100100/	TUB100100/	0.234	1.000	0.234	AISC- H2-1	5	16.670	249.000	249.000	391.940
261	TUB100100/	TUB100100/	0.213	1.000	0.213	AISC- H2-1	5	16.670	249.000	249.000	391.940
262	TUB100100/	TUB100100/	0.179	1.000	0.179	AISC- H2-1	5	16.670	249.000	249.000	391.940
265	SHS100X10(	SHS100X10(	0.244	1.000	0.244	AISC- H1-3	5	16.670	249.000	249.000	401.871
266	SHS100X10(	SHS100X10(	0.155	1.000	0.155	AISC- H1-3	5	16.670	249.000	249.000	401.871
267	TUB100100/	TUB100100/	0.077	1.000	0.077	AISC- H2-1	5	16.670	249.000	249.000	391.940
268	TUB100100/	TUB100100/	0.085	1.000	0.085	AISC- H2-1	5	16.670	249.000	249.000	391.940
269	TUB100100/	TUB100100/	0.067	1.000	0.067	AISC- H2-1	5	16.670	249.000	249.000	391.940
270	TUB100100/	TUB100100/	0.069	1.000	0.069	AISC- H2-1	5	16.670	249.000	249.000	391.940
273	TUB100100/	TUB100100/	0.096	1.000	0.096	AISC- H2-1	5	16.670	249.000	249.000	391.940
274	TUB100100/	TUB100100/	0.096	1.000	0.096	AISC- H2-1	5	16.670	249.000	249.000	391.940
279	TUB100100/	TUB100100/	0.432	1.000	0.432	AISC- H1-1	5	16.670	249.000	249.000	391.940
280	TUB100100/	TUB100100/	0.377	1.000	0.377	AISC- H1-1	5	16.670	249.000	249.000	391.940
281	TUB100100/	TUB100100/	0.328	1.000	0.328	AISC- H1-1	5	16.670	249.000	249.000	391.940
282	TUB100100/	TUB100100/	0.229	1.000	0.229	AISC- H2-1	5	16.670	249.000	249.000	391.940
283	TUB100100/	TUB100100/	0.202	1.000	0.202	AISC- H2-1	5	16.670	249.000	249.000	391.940
284	TUB100100/	TUB100100/	0.159	1.000	0.159	AISC- H2-1	5	16.670	249.000	249.000	391.940
285	TUB100100/	TUB100100/	0.409	1.000	0.409	AISC- H1-1	5	16.670	249.000	249.000	391.940
286	TUB100100/	TUB100100/	0.381	1.000	0.381	AISC- H1-1	5	16.670	249.000	249.000	391.940
287	TUB100100/	TUB100100/	0.325	1.000	0.325	AISC- H1-1	5	16.670	249.000	249.000	391.940
288	TUB100100/	TUB100100/	0.229	1.000	0.229	AISC- H2-1	5	16.670	249.000	249.000	391.940
289	TUB100100/	TUB100100/	0.213	1.000	0.213	AISC- H2-1	5	16.670	249.000	249.000	391.940
290	TUB100100/	TUB100100/	0.166	1.000	0.166	AISC- H2-1	5	16.670	249.000	249.000	391.940
297	TUB100100/	TUB100100/	0.418	1.000	0.418	AISC- H1-1	5	16.670	249.000	249.000	391.940
298	TUB100100/	TUB100100/	0.397	1.000	0.397	AISC- H1-1	5	16.670	249.000	249.000	391.940
299	TUB100100/	TUB100100/	0.303	1.000	0.303	AISC- H1-1	5	16.670	249.000	249.000	391.940
300	TUB100100/	TUB100100/	0.406	1.000	0.406	AISC- H1-1	5	16.670	249.000	249.000	391.940
301	TUB100100/	TUB100100/	0.396	1.000	0.396	AISC- H1-1	5	16.670	249.000	249.000	391.940
302	TUB100100/	TUB100100/	0.298	1.000	0.298	AISC- H1-1	5	16.670	249.000	249.000	391.940
307	TUB100100/	TUB100100/	0.123	1.000	0.123	AISC- H2-1	5	16.670	249.000	249.000	391.940
308	TUB100100/	TUB100100/	0.116	1.000	0.116	AISC- H2-1	5	16.670	249.000	249.000	391.940
309	TUB100100/	TUB100100/	0.403	1.000	0.403	AISC- H1-1	5	16.670	249.000	249.000	391.940
310	TUB100100/	TUB100100/	0.125	1.000	0.125	AISC- H2-1	5	16.670	249.000	249.000	391.940
311	TUB100100/	TUB100100/	0.122	1.000	0.122	AISC- H2-1	5	16.670	249.000	249.000	391.940
312	TUB100100/	TUB100100/	0.386	1.000	0.386	AISC- H1-1	5	16.670	249.000	249.000	391.940
319	SHS50X50X	SHS50X50X	0.094	1.000	0.094	AISC- H2-1	5	5.727	20.400	20.400	33.890
320	SHS50X50X	SHS50X50X	0.120	1.000	0.120	AISC- H2-1	5	5.727	20.400	20.400	33.890
321	SHS50X50X	SHS50X50X	0.104	1.000	0.104	AISC- H1-3	5	5.727	20.400	20.400	33.890
322	SHS50X50X	SHS50X50X	0.112	1.000	0.112	AISC- H1-3	5	5.727	20.400	20.400	33.890
323	SHS50X50X	SHS50X50X	0.111	1.000	0.111	AISC- H2-1	5	5.727	20.400	20.400	33.890
324	SHS50X50X	SHS50X50X	0.110	1.000	0.110	AISC- H2-1	5	5.727	20.400	20.400	33.890
325	SHS50X50X	SHS50X50X	0.116	1.000	0.116	AISC- H2-1	5	5.727	20.400	20.400	33.890
326	SHS50X50X	SHS50X50X	0.118	1.000	0.118	AISC- H2-1	5	5.727	20.400	20.400	33.890
327	SHS50X50X	SHS50X50X	0.079	1.000	0.079	AISC- H1-3	5	5.727	20.400	20.400	33.890
328	SHS50X50X	SHS50X50X	0.079	1.000	0.079	AISC- H1-3	5	5.727	20.400	20.400	33.890

Utilization Ratio Cont...

Beam	Analysis Property	Design Property	Actual Ratio	Allowable Ratio	Ratio (Act./Allow.)	Clause	L/C	Ax (cm^2)	Iz (cm^4)	Iy (cm^4)	Ix (cm^4)
329	SHS50X50X	SHS50X50X	0.122	1.000	0.122	AISC- H1-3	5	5.727	20.400	20.400	33.890
330	SHS50X50X	SHS50X50X	0.123	1.000	0.123	AISC- H1-3	5	5.727	20.400	20.400	33.890
351	PIP216.3X8.	PIP216.3X8.	0.061	1.000	0.061	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
352	PIP114.3X3..	PIP114.3X3..	0.642	1.000	0.642	AISC- H2-1	5	11.170	172.000	172.000	344.000
353	PIP114.3X3..	PIP114.3X3..	0.672	1.000	0.672	AISC- H2-1	5	11.170	172.000	172.000	344.000
354	PIP114.3X3..	PIP114.3X3..	0.463	1.000	0.463	AISC- H2-1	5	11.170	172.000	172.000	344.000
355	PIP114.3X3..	PIP114.3X3..	0.102	1.000	0.102	AISC- H2-1	5	11.170	172.000	172.000	344.000
356	PIP114.3X3..	PIP114.3X3..	0.091	1.000	0.091	AISC- H1-3	5	11.170	172.000	172.000	344.000
357	PIP114.3X3..	PIP114.3X3..	0.075	1.000	0.075	AISC- H1-3	5	11.170	172.000	172.000	344.000
358	PIP114.3X3..	PIP114.3X3..	0.113	1.000	0.113	AISC- H2-1	5	11.170	172.000	172.000	344.000
359	PIP114.3X3..	PIP114.3X3..	0.459	1.000	0.459	AISC- H2-1	5	11.170	172.000	172.000	344.000
360	PIP114.3X3..	PIP114.3X3..	0.665	1.000	0.665	AISC- H2-1	5	11.170	172.000	172.000	344.000
361	PIP114.3X3..	PIP114.3X3..	0.637	1.000	0.637	AISC- H2-1	5	11.170	172.000	172.000	344.000
362	PIP216.3X8.	PIP216.3X8.	0.080	1.000	0.080	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
363	PIP216.3X8.	PIP216.3X8.	0.388	1.000	0.388	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
364	PIP216.3X8.	PIP216.3X8.	0.224	1.000	0.224	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
365	PIP216.3X8.	PIP216.3X8.	0.215	1.000	0.215	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
366	PIP216.3X8.	PIP216.3X8.	0.389	1.000	0.389	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
367	PIP216.3X8.	PIP216.3X8.	0.359	1.000	0.359	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
368	PIP216.3X8.	PIP216.3X8.	0.197	1.000	0.197	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
369	PIP216.3X8.	PIP216.3X8.	0.198	1.000	0.198	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
370	PIP216.3X8.	PIP216.3X8.	0.359	1.000	0.359	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
371	PIP216.3X8.	PIP216.3X8.	0.186	1.000	0.186	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
372	PIP216.3X8.	PIP216.3X8.	0.088	1.000	0.088	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
373	PIP216.3X8.	PIP216.3X8.	0.089	1.000	0.089	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
374	PIP216.3X8.	PIP216.3X8.	0.185	1.000	0.185	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
375	PIP216.3X8.	PIP216.3X8.	0.058	1.000	0.058	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
376	PIP114.3X3..	PIP114.3X3..	0.596	1.000	0.596	AISC- H2-1	5	11.170	172.000	172.000	344.000
377	PIP114.3X3..	PIP114.3X3..	0.613	1.000	0.613	AISC- H2-1	5	11.170	172.000	172.000	344.000
378	PIP114.3X3..	PIP114.3X3..	0.419	1.000	0.419	AISC- H2-1	5	11.170	172.000	172.000	344.000
379	PIP114.3X3..	PIP114.3X3..	0.107	1.000	0.107	AISC- H2-1	5	11.170	172.000	172.000	344.000
380	PIP114.3X3..	PIP114.3X3..	0.072	1.000	0.072	AISC- H1-3	5	11.170	172.000	172.000	344.000
381	PIP114.3X3..	PIP114.3X3..	0.073	1.000	0.073	AISC- H1-3	5	11.170	172.000	172.000	344.000
382	PIP114.3X3..	PIP114.3X3..	0.107	1.000	0.107	AISC- H2-1	5	11.170	172.000	172.000	344.000
383	PIP114.3X3..	PIP114.3X3..	0.419	1.000	0.419	AISC- H2-1	5	11.170	172.000	172.000	344.000
384	PIP114.3X3..	PIP114.3X3..	0.614	1.000	0.614	AISC- H2-1	5	11.170	172.000	172.000	344.000
385	PIP114.3X3..	PIP114.3X3..	0.597	1.000	0.597	AISC- H2-1	5	11.170	172.000	172.000	344.000
386	PIP216.3X8.	PIP216.3X8.	0.076	1.000	0.076	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
387	PIP216.3X8.	PIP216.3X8.	0.041	1.000	0.041	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
388	PIP114.3X3..	PIP114.3X3..	0.323	1.000	0.323	AISC- H2-1	5	11.170	172.000	172.000	344.000
389	PIP114.3X3..	PIP114.3X3..	0.276	1.000	0.276	AISC- H2-1	5	11.170	172.000	172.000	344.000
390	PIP114.3X3..	PIP114.3X3..	0.151	1.000	0.151	AISC- H2-1	5	11.170	172.000	172.000	344.000
391	PIP114.3X3..	PIP114.3X3..	0.104	1.000	0.104	AISC- H2-1	5	11.170	172.000	172.000	344.000
392	PIP114.3X3..	PIP114.3X3..	0.062	1.000	0.062	AISC- H2-1	5	11.170	172.000	172.000	344.000
393	PIP114.3X3..	PIP114.3X3..	0.062	1.000	0.062	AISC- H2-1	5	11.170	172.000	172.000	344.000
394	PIP114.3X3..	PIP114.3X3..	0.103	1.000	0.103	AISC- H2-1	5	11.170	172.000	172.000	344.000
395	PIP114.3X3..	PIP114.3X3..	0.152	1.000	0.152	AISC- H2-1	5	11.170	172.000	172.000	344.000
396	PIP114.3X3..	PIP114.3X3..	0.276	1.000	0.276	AISC- H2-1	5	11.170	172.000	172.000	344.000
397	PIP114.3X3..	PIP114.3X3..	0.324	1.000	0.324	AISC- H2-1	5	11.170	172.000	172.000	344.000
398	PIP216.3X8.	PIP216.3X8.	0.046	1.000	0.046	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
399	PIP216.3X8.	PIP216.3X8.	0.049	1.000	0.049	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
400	PIP114.3X3..	PIP114.3X3..	0.465	1.000	0.465	AISC- H2-1	5	11.170	172.000	172.000	344.000
401	PIP114.3X3..	PIP114.3X3..	0.454	1.000	0.454	AISC- H2-1	5	11.170	172.000	172.000	344.000
402	PIP114.3X3..	PIP114.3X3..	0.296	1.000	0.296	AISC- H2-1	5	11.170	172.000	172.000	344.000
403	PIP114.3X3..	PIP114.3X3..	0.056	1.000	0.056	AISC- H2-1	5	11.170	172.000	172.000	344.000
404	PIP114.3X3..	PIP114.3X3..	0.135	1.000	0.135	AISC- H1-3	5	11.170	172.000	172.000	344.000
405	PIP114.3X3..	PIP114.3X3..	0.074	1.000	0.074	AISC- H2-1	5	11.170	172.000	172.000	344.000
406	PIP114.3X3..	PIP114.3X3..	0.112	1.000	0.112	AISC- H2-1	5	11.170	172.000	172.000	344.000
407	PIP114.3X3..	PIP114.3X3..	0.299	1.000	0.299	AISC- H2-1	5	11.170	172.000	172.000	344.000

Utilization Ratio Cont...

Beam	Analysis Property	Design Property	Actual Ratio	Allowable Ratio	Ratio (Act./Allow.)	Clause	L/C	Ax (cm^2)	Iz (cm^4)	Iy (cm^4)	Ix (cm^4)
408	PIP114.3X3..	PIP114.3X3..	0.415	1.000	0.415	AISC- H2-1	5	11.170	172.000	172.000	344.000
409	PIP114.3X3..	PIP114.3X3..	0.419	1.000	0.419	AISC- H2-1	5	11.170	172.000	172.000	344.000
410	PIP216.3X8.	PIP216.3X8.	0.052	1.000	0.052	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
411	SHS50X50X	SHS50X50X	0.229	1.000	0.229	AISC- H2-1	5	5.727	20.400	20.400	33.890
412	SHS50X50X	SHS50X50X	0.401	1.000	0.401	AISC- H1-1	5	5.727	20.400	20.400	33.890
413	SHS50X50X	SHS50X50X	0.551	1.000	0.551	AISC- H1-1	5	5.727	20.400	20.400	33.890
414	SHS50X50X	SHS50X50X	0.313	1.000	0.313	AISC- H2-1	5	5.727	20.400	20.400	33.890
415	SHS50X50X	SHS50X50X	0.269	1.000	0.269	AISC- H2-1	5	5.727	20.400	20.400	33.890
416	SHS50X50X	SHS50X50X	0.462	1.000	0.462	AISC- H1-1	5	5.727	20.400	20.400	33.890
417	SHS50X50X	SHS50X50X	0.484	1.000	0.484	AISC- H1-1	5	5.727	20.400	20.400	33.890
418	SHS50X50X	SHS50X50X	0.280	1.000	0.280	AISC- H2-1	5	5.727	20.400	20.400	33.890
419	SHS50X50X	SHS50X50X	0.194	1.000	0.194	AISC- H2-1	5	5.727	20.400	20.400	33.890
420	SHS50X50X	SHS50X50X	0.315	1.000	0.315	AISC- H1-1	5	5.727	20.400	20.400	33.890
421	SHS50X50X	SHS50X50X	0.629	1.000	0.629	AISC- H1-1	5	5.727	20.400	20.400	33.890
422	SHS50X50X	SHS50X50X	0.361	1.000	0.361	AISC- H2-1	5	5.727	20.400	20.400	33.890
423	SHS50X50X	SHS50X50X	0.262	1.000	0.262	AISC- H2-1	5	5.727	20.400	20.400	33.890
424	SHS50X50X	SHS50X50X	0.455	1.000	0.455	AISC- H1-1	5	5.727	20.400	20.400	33.890
425	SHS50X50X	SHS50X50X	0.495	1.000	0.495	AISC- H1-1	5	5.727	20.400	20.400	33.890
426	SHS50X50X	SHS50X50X	0.284	1.000	0.284	AISC- H2-1	5	5.727	20.400	20.400	33.890
427	SHS50X50X	SHS50X50X	0.264	1.000	0.264	AISC- H2-1	5	5.727	20.400	20.400	33.890
428	SHS50X50X	SHS50X50X	0.452	1.000	0.452	AISC- H1-1	5	5.727	20.400	20.400	33.890
429	SHS50X50X	SHS50X50X	0.493	1.000	0.493	AISC- H1-1	5	5.727	20.400	20.400	33.890
430	SHS50X50X	SHS50X50X	0.285	1.000	0.285	AISC- H2-1	5	5.727	20.400	20.400	33.890
431	SHS50X50X	SHS50X50X	0.192	1.000	0.192	AISC- H2-1	5	5.727	20.400	20.400	33.890
432	SHS50X50X	SHS50X50X	0.310	1.000	0.310	AISC- H1-1	5	5.727	20.400	20.400	33.890
433	SHS50X50X	SHS50X50X	0.633	1.000	0.633	AISC- H1-1	5	5.727	20.400	20.400	33.890
434	SHS50X50X	SHS50X50X	0.364	1.000	0.364	AISC- H2-1	5	5.727	20.400	20.400	33.890
435	RHS200X10	RHS200X10	0.406	1.000	0.406	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
436	RHS200X10	RHS200X10	0.461	1.000	0.461	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
437	RHS200X10	RHS200X10	0.533	1.000	0.533	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
438	RHS200X10	RHS200X10	0.582	1.000	0.582	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
439	RHS200X10	RHS200X10	0.558	1.000	0.558	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
440	RHS200X10	RHS200X10	0.577	1.000	0.577	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
441	RHS200X10	RHS200X10	0.544	1.000	0.544	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
442	RHS200X10	RHS200X10	0.524	1.000	0.524	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
445	RHS200X10	RHS200X10	0.375	1.000	0.375	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
446	RHS200X10	RHS200X10	0.422	1.000	0.422	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
447	RHS200X10	RHS200X10	0.530	1.000	0.530	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
448	RHS200X10	RHS200X10	0.582	1.000	0.582	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
449	RHS200X10	RHS200X10	0.558	1.000	0.558	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
450	RHS200X10	RHS200X10	0.577	1.000	0.577	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
451	RHS200X10	RHS200X10	0.545	1.000	0.545	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
452	RHS200X10	RHS200X10	0.523	1.000	0.523	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
584	RHS200X10	RHS200X10	0.402	1.000	0.402	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
585	TUB150150/	TUB150150/	0.101	1.000	0.101	AISC- H2-1	5	25.670	896.000	896.000	1.39E+3
587	RHS200X10	RHS200X10	0.225	1.000	0.225	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
588	TUB150150/	TUB150150/	0.104	1.000	0.104	AISC- H2-1	5	25.670	896.000	896.000	1.39E+3
589	RHS200X10	RHS200X10	0.402	1.000	0.402	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
601	TUB150150/	TUB150150/	0.862	1.000	0.862	AISC- H2-1	5	25.670	896.000	896.000	1.39E+3
602	RHS200X10	RHS200X10	0.419	1.000	0.419	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
603	TUB150150/	TUB150150/	0.858	1.000	0.858	AISC- H2-1	5	25.670	896.000	896.000	1.39E+3
605	RHS200X10	RHS200X10	0.435	1.000	0.435	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
607	RHS200X10	RHS200X10	0.498	1.000	0.498	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
608	RHS200X10	RHS200X10	0.498	1.000	0.498	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
609	RHS200X10	RHS200X10	0.399	1.000	0.399	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
610	TUB150150/	TUB150150/	0.289	1.000	0.289	AISC- H2-1	5	25.670	896.000	896.000	1.39E+3
611	RHS200X10	RHS200X10	0.134	1.000	0.134	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
612	TUB150150/	TUB150150/	0.292	1.000	0.292	AISC- H2-1	5	25.670	896.000	896.000	1.39E+3
613	RHS200X10	RHS200X10	0.399	1.000	0.399	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3

Utilization Ratio Cont...

Beam	Analysis Property	Design Property	Actual Ratio	Allowable Ratio	Ratio (Act./Allow.)	Clause	L/C	Ax (cm^2)	Iz (cm^4)	Iy (cm^4)	Ix (cm^4)
614	RHS200X10	RHS200X10	0.438	1.000	0.438	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
615	RHS200X10	RHS200X10	0.695	1.000	0.695	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
616	RHS200X10	RHS200X10	0.695	1.000	0.695	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
617	RHS200X10	RHS200X10	0.783	1.000	0.783	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
618	RHS200X10	RHS200X10	0.106	1.000	0.106	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
619	RHS200X10	RHS200X10	0.303	1.000	0.303	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
620	RHS200X10	RHS200X10	0.301	1.000	0.301	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
621	RHS200X10	RHS200X10	0.304	1.000	0.304	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
622	RHS200X10	RHS200X10	0.305	1.000	0.305	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
623	RHS200X10	RHS200X10	0.280	1.000	0.280	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
624	RHS200X10	RHS200X10	0.302	1.000	0.302	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
627	TUB150150	TUB150150	0.167	1.000	0.167	AISC- H1-3	5	25.670	896.000	896.000	1.39E+3
628	TUB150150	TUB150150	0.163	1.000	0.163	AISC- H1-3	5	25.670	896.000	896.000	1.39E+3
631	TUB150150	TUB150150	0.948	1.000	0.948	AISC- H1-1	5	25.670	896.000	896.000	1.39E+3
632	TUB150150	TUB150150	0.940	1.000	0.940	AISC- H1-1	5	25.670	896.000	896.000	1.39E+3
633	SHS100X10	SHS100X10	0.324	1.000	0.324	AISC- H1-3	5	16.670	249.000	249.000	401.871
634	SHS100X10	SHS100X10	0.325	1.000	0.325	AISC- H1-3	5	16.670	249.000	249.000	401.871
635	TUB150150	TUB150150	0.161	1.000	0.161	AISC- H2-1	5	25.670	896.000	896.000	1.39E+3
636	TUB150150	TUB150150	0.163	1.000	0.163	AISC- H2-1	5	25.670	896.000	896.000	1.39E+3
639	TUB150150	TUB150150	0.255	1.000	0.255	AISC- H1-1	5	25.670	896.000	896.000	1.39E+3
640	TUB150150	TUB150150	0.251	1.000	0.251	AISC- H1-1	5	25.670	896.000	896.000	1.39E+3
645	SHS100X10	SHS100X10	0.189	1.000	0.189	AISC- H2-1	5	16.670	249.000	249.000	401.871
657	SHS100X10	SHS100X10	0.225	1.000	0.225	AISC- H1-1	5	16.670	249.000	249.000	401.871
673	PIP216.3X8.	PIP216.3X8.	0.305	1.000	0.305	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
674	PIP216.3X8.	PIP216.3X8.	0.442	1.000	0.442	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
675	PIP216.3X8.	PIP216.3X8.	0.410	1.000	0.410	AISC- H1-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
676	PIP216.3X8.	PIP216.3X8.	0.219	1.000	0.219	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
677	RHS200X10	RHS200X10	0.164	1.000	0.164	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
686	RHS200X10	RHS200X10	0.548	1.000	0.548	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
687	RHS200X10	RHS200X10	0.436	1.000	0.436	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
688	RHS200X10	RHS200X10	0.463	1.000	0.463	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
689	RHS200X10	RHS200X10	0.435	1.000	0.435	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
690	RHS200X10	RHS200X10	0.678	1.000	0.678	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
691	RHS200X10	RHS200X10	0.451	1.000	0.451	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
692	RHS200X10	RHS200X10	0.633	1.000	0.633	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
693	RHS200X10	RHS200X10	0.452	1.000	0.452	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
694	RHS200X10	RHS200X10	0.685	1.000	0.685	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
695	RHS200X10	RHS200X10	0.456	1.000	0.456	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
696	RHS200X10	RHS200X10	0.436	1.000	0.436	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
697	RHS200X10	RHS200X10	0.419	1.000	0.419	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
698	RHS200X10	RHS200X10	0.783	1.000	0.783	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
699	RHS200X10	RHS200X10	0.438	1.000	0.438	AISC- H1-3	5	25.670	1.33E+3	455.000	1.1E+3
700	TUB100100	TUB100100	0.470	1.000	0.470	AISC- H1-3	5	12.130	187.000	187.000	290.250
701	TUB100100	TUB100100	0.647	1.000	0.647	AISC- H1-3	5	12.130	187.000	187.000	290.250
702	TUB100100	TUB100100	0.694	1.000	0.694	AISC- H1-3	5	12.130	187.000	187.000	290.250
703	TUB100100	TUB100100	0.780	1.000	0.780	AISC- H1-3	5	12.130	187.000	187.000	290.250
704	TUB100100	TUB100100	0.754	1.000	0.754	AISC- H1-3	5	12.130	187.000	187.000	290.250
705	TUB100100	TUB100100	0.769	1.000	0.769	AISC- H1-3	5	12.130	187.000	187.000	290.250
706	TUB100100	TUB100100	0.733	1.000	0.733	AISC- H1-3	5	12.130	187.000	187.000	290.250
707	TUB100100	TUB100100	0.693	1.000	0.693	AISC- H1-3	5	12.130	187.000	187.000	290.250
708	TUB100100	TUB100100	0.562	1.000	0.562	AISC- H1-3	5	12.130	187.000	187.000	290.250
709	TUB100100	TUB100100	0.392	1.000	0.392	AISC- H1-3	5	12.130	187.000	187.000	290.250
710	TUB100100	TUB100100	0.356	1.000	0.356	AISC- H1-3	5	12.130	187.000	187.000	290.250
711	TUB100100	TUB100100	0.540	1.000	0.540	AISC- H1-3	5	12.130	187.000	187.000	290.250
712	TUB100100	TUB100100	0.691	1.000	0.691	AISC- H1-3	5	12.130	187.000	187.000	290.250
713	TUB100100	TUB100100	0.775	1.000	0.775	AISC- H1-3	5	12.130	187.000	187.000	290.250
714	TUB100100	TUB100100	0.753	1.000	0.753	AISC- H1-3	5	12.130	187.000	187.000	290.250
715	TUB100100	TUB100100	0.768	1.000	0.768	AISC- H1-3	5	12.130	187.000	187.000	290.250
716	TUB100100	TUB100100	0.733	1.000	0.733	AISC- H1-3	5	12.130	187.000	187.000	290.250

Utilization Ratio Cont...

Beam	Analysis Property	Design Property	Actual Ratio	Allowable Ratio	Ratio (Act./Allow.)	Clause	L/C	Ax (cm^2)	Iz (cm^4)	Iy (cm^4)	Ix (cm^4)
717	TUB100100(	TUB100100(	0.692	1.000	0.692	AISC- H1-3	5	12.130	187.000	187.000	290.250
718	TUB100100(	TUB100100(	0.562	1.000	0.562	AISC- H1-3	5	12.130	187.000	187.000	290.250
719	TUB100100(	TUB100100(	0.392	1.000	0.392	AISC- H1-3	5	12.130	187.000	187.000	290.250
720	PIP216.3X8.	PIP216.3X8.	0.081	1.000	0.081	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
721	PIP216.3X8.	PIP216.3X8.	0.061	1.000	0.061	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
722	PIP216.3X8.	PIP216.3X8.	0.076	1.000	0.076	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
723	PIP216.3X8.	PIP216.3X8.	0.058	1.000	0.058	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
724	PIP216.3X8.	PIP216.3X8.	0.046	1.000	0.046	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
725	PIP216.3X8.	PIP216.3X8.	0.041	1.000	0.041	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
726	PIP216.3X8.	PIP216.3X8.	0.064	1.000	0.064	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
727	PIP216.3X8.	PIP216.3X8.	0.047	1.000	0.047	AISC- H2-1	5	52.350	2.84E+3	2.84E+3	5.68E+3
728	PIP216.3X8.	PIP216.3X8.	0.244	1.000	0.244	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
729	PIP216.3X8.	PIP216.3X8.	0.193	1.000	0.193	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
730	PIP216.3X8.	PIP216.3X8.	0.328	1.000	0.328	AISC- H1-2	5	52.350	2.84E+3	2.84E+3	5.68E+3
731	PIP216.3X8.	PIP216.3X8.	0.256	1.000	0.256	AISC- H1-2	5	52.350	2.84E+3	2.84E+3	5.68E+3
732	PIP216.3X8.	PIP216.3X8.	0.307	1.000	0.307	AISC- H1-2	5	52.350	2.84E+3	2.84E+3	5.68E+3
733	PIP216.3X8.	PIP216.3X8.	0.239	1.000	0.239	AISC- H1-2	5	52.350	2.84E+3	2.84E+3	5.68E+3
734	PIP216.3X8.	PIP216.3X8.	0.183	1.000	0.183	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
735	PIP216.3X8.	PIP216.3X8.	0.141	1.000	0.141	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
736	PIP216.3X8.	PIP216.3X8.	0.141	1.000	0.141	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
737	PIP216.3X8.	PIP216.3X8.	0.183	1.000	0.183	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
738	PIP216.3X8.	PIP216.3X8.	0.239	1.000	0.239	AISC- H1-2	5	52.350	2.84E+3	2.84E+3	5.68E+3
739	PIP216.3X8.	PIP216.3X8.	0.307	1.000	0.307	AISC- H1-2	5	52.350	2.84E+3	2.84E+3	5.68E+3
740	PIP216.3X8.	PIP216.3X8.	0.254	1.000	0.254	AISC- H1-2	5	52.350	2.84E+3	2.84E+3	5.68E+3
741	PIP216.3X8.	PIP216.3X8.	0.326	1.000	0.326	AISC- H1-2	5	52.350	2.84E+3	2.84E+3	5.68E+3
742	PIP216.3X8.	PIP216.3X8.	0.181	1.000	0.181	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
743	PIP216.3X8.	PIP216.3X8.	0.233	1.000	0.233	AISC- H1-3	5	52.350	2.84E+3	2.84E+3	5.68E+3
744	TUB150150(	TUB150150(	0.111	1.000	0.111	AISC- H2-1	5	25.670	896.000	896.000	1.39E+3
745	TUB150150(	TUB150150(	0.253	1.000	0.253	AISC- H1-1	5	25.670	896.000	896.000	1.39E+3
746	TUB150150(	TUB150150(	0.060	1.000	0.060	AISC- H2-1	5	25.670	896.000	896.000	1.39E+3
747	TUB150150(	TUB150150(	0.194	1.000	0.194	AISC- H1-3	5	25.670	896.000	896.000	1.39E+3
748	TUB150150(	TUB150150(	0.115	1.000	0.115	AISC- H1-3	5	25.670	896.000	896.000	1.39E+3
749	TUB150150(	TUB150150(	0.109	1.000	0.109	AISC- H1-3	5	25.670	896.000	896.000	1.39E+3
750	TUB150150(	TUB150150(	0.174	1.000	0.174	AISC- H1-3	5	25.670	896.000	896.000	1.39E+3
751	TUB150150(	TUB150150(	0.148	1.000	0.148	AISC- H1-3	5	25.670	896.000	896.000	1.39E+3
752	SHS100X10(	SHS100X10(	0.228	1.000	0.228	AISC- H1-3	5	16.670	249.000	249.000	401.871
753	SHS100X10(	SHS100X10(	0.191	1.000	0.191	AISC- H2-1	5	16.670	249.000	249.000	401.871
754	SHS100X10(	SHS100X10(	0.179	1.000	0.179	AISC- H2-1	5	16.670	249.000	249.000	401.871
755	SHS100X10(	SHS100X10(	0.029	1.000	0.029	AISC- H2-1	5	16.670	249.000	249.000	401.871
756	SHS100X10(	SHS100X10(	0.063	1.000	0.063	AISC- H1-3	5	16.670	249.000	249.000	401.871
757	SHS100X10(	SHS100X10(	0.047	1.000	0.047	AISC- H2-1	5	16.670	249.000	249.000	401.871
758	SHS100X10(	SHS100X10(	0.150	1.000	0.150	AISC- H2-1	5	16.670	249.000	249.000	401.871
759	SHS100X10(	SHS100X10(	0.172	1.000	0.172	AISC- H1-3	5	16.670	249.000	249.000	401.871
760	SHS100X10(	SHS100X10(	0.132	1.000	0.132	AISC- H2-1	5	16.670	249.000	249.000	401.871
761	SHS100X10(	SHS100X10(	0.046	1.000	0.046	AISC- H1-3	5	16.670	249.000	249.000	401.871
762	SHS100X10(	SHS100X10(	0.041	1.000	0.041	AISC- H2-1	5	16.670	249.000	249.000	401.871
763	SHS100X10(	SHS100X10(	0.034	1.000	0.034	AISC- H1-3	5	16.670	249.000	249.000	401.871
764	SHS100X10(	SHS100X10(	0.188	1.000	0.188	AISC- H2-1	5	16.670	249.000	249.000	401.871
765	SHS100X10(	SHS100X10(	0.225	1.000	0.225	AISC- H1-1	5	16.670	249.000	249.000	401.871
766	SHS100X10(	SHS100X10(	0.265	1.000	0.265	AISC- H1-1	5	16.670	249.000	249.000	401.871
767	TUB150150(	TUB150150(	0.617	1.000	0.617	AISC- H1-2	5	25.670	896.000	896.000	1.39E+3
768	TUB150150(	TUB150150(	0.614	1.000	0.614	AISC- H1-2	5	25.670	896.000	896.000	1.39E+3
769	TUB150150(	TUB150150(	0.567	1.000	0.567	AISC- H2-1	5	25.670	896.000	896.000	1.39E+3
770	TUB150150(	TUB150150(	0.569	1.000	0.569	AISC- H2-1	5	25.670	896.000	896.000	1.39E+3
771	SHS100X10(	SHS100X10(	0.177	1.000	0.177	AISC- H1-3	5	16.670	249.000	249.000	401.871
772	SHS100X10(	SHS100X10(	0.177	1.000	0.177	AISC- H1-3	5	16.670	249.000	249.000	401.871
773	SHS100X10(	SHS100X10(	0.373	1.000	0.373	AISC- H2-1	5	16.670	249.000	249.000	401.871
774	SHS100X10(	SHS100X10(	0.265	1.000	0.265	AISC- H1-1	5	16.670	249.000	249.000	401.871
775	SHS100X10(	SHS100X10(	0.374	1.000	0.374	AISC- H2-1	5	16.670	249.000	249.000	401.871

Utilization Ratio Cont...

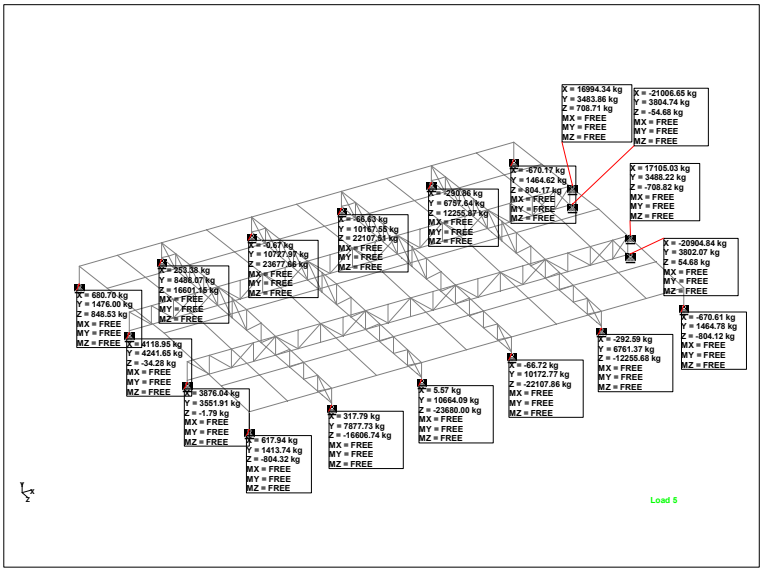
Beam	Analysis Property	Design Property	Actual Ratio	Allowable Ratio	Ratio (Act./Allow.)	Clause	L/C	Ax (cm^2)	Iz (cm^4)	Iy (cm^4)	Ix (cm^4)
778	H250X250X9	H250X250X9	0.249	1.000	0.249	AISC- H1-3	5	91.430	10.7E+3	3.65E+3	51.100
779	H250X250X9	H250X250X9	0.265	1.000	0.265	AISC- H1-3	5	91.430	10.7E+3	3.65E+3	51.100
780	H250X250X9	H250X250X9	0.254	1.000	0.254	AISC- H1-3	5	91.430	10.7E+3	3.65E+3	51.100
781	H250X250X9	H250X250X9	0.254	1.000	0.254	AISC- H1-3	5	91.430	10.7E+3	3.65E+3	51.100
793	TUB150150x	TUB150150x	0.932	1.000	0.932	AISC- H1-2	5	25.670	896.000	896.000	1.39E+3
794	SHS100X10I	SHS100X10I	0.305	1.000	0.305	AISC- H1-3	5	16.670	249.000	249.000	401.871
795	TUB150150x	TUB150150x	0.935	1.000	0.935	AISC- H1-2	5	25.670	896.000	896.000	1.39E+3
796	SHS100X10I	SHS100X10I	0.305	1.000	0.305	AISC- H1-3	5	16.670	249.000	249.000	401.871
797	SHS100X10I	SHS100X10I	0.387	1.000	0.387	AISC- H2-1	5	16.670	249.000	249.000	401.871
798	SHS100X10I	SHS100X10I	0.355	1.000	0.355	AISC- H1-2	5	16.670	249.000	249.000	401.871
799	SHS100X10I	SHS100X10I	0.388	1.000	0.388	AISC- H2-1	5	16.670	249.000	249.000	401.871
800	SHS100X10I	SHS100X10I	0.355	1.000	0.355	AISC- H1-2	5	16.670	249.000	249.000	401.871
801	SHS100X10I	SHS100X10I	0.245	1.000	0.245	AISC- H2-1	5	16.670	249.000	249.000	401.871
802	SHS100X10I	SHS100X10I	0.468	1.000	0.468	AISC- H1-2	5	16.670	249.000	249.000	401.871
803	SHS100X10I	SHS100X10I	0.246	1.000	0.246	AISC- H2-1	5	16.670	249.000	249.000	401.871
804	SHS100X10I	SHS100X10I	0.467	1.000	0.467	AISC- H1-2	5	16.670	249.000	249.000	401.871

Failed Members

There is no data of this type.

Reaction Summary

	Node	L/C	Horizontal FX (kg)	Vertical FY (kg)	Horizontal FZ (kg)	Moment MX (kg-m)	MY (kg-m)	MZ (kg-m)
Max FX	333	5:DL+0.75(LL+	**17.1E+3**	3488.22	-708.82	0.000	0.000	0.000
Min FX	361	5:DL+0.75(LL+	**-21E+3**	3804.74	-54.68	0.000	0.000	0.000
Max FY	56	5:DL+0.75(LL+	-0.67	**10.7E+3**	23.7E+3	0.000	0.000	0.000
Min FY	414	2:LL	183.68	**395.77**	-245.15	0.000	0.000	0.000
Max FZ	56	5:DL+0.75(LL+	-0.67	10.7E+3	**23.7E+3**	0.000	0.000	0.000
Min FZ	54	5:DL+0.75(LL+	5.57	10.7E+3	**-23.7E+3**	0.000	0.000	0.000
Max MX	16	1:DL	128.85	3766.76	-7637.63	**0.000**	0.000	0.000
Min MX	16	1:DL	128.85	3766.76	-7637.63	**0.000**	0.000	0.000
Max MY	16	1:DL	128.85	3766.76	-7637.63	0.000	**0.000**	0.000
Min MY	16	1:DL	128.85	3766.76	-7637.63	0.000	**0.000**	0.000
Max MZ	16	1:DL	128.85	3766.76	-7637.63	0.000	0.000	**0.000**
Min MZ	16	1:DL	128.85	3766.76	-7637.63	0.000	0.000	**0.000**

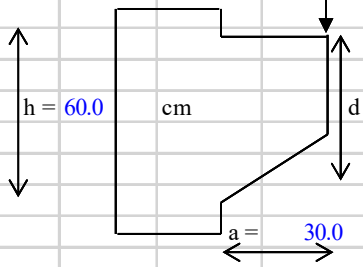


Reactions

G building

CARBEL A(0.3x0.6)

V_u = 1674 kg



b_w = 30.0 cm

f_c' =	320	ksc
f_y =	5000	ksc
f_{yv} =	4000	ksc

μ	1.0		OK Corbel				
V_{max} =	104244	kg					
$M_u = V_u a + N_u (h-d)$	459	kg.m		A_f =		0.14	cm^2
V_u	1674	kg	< Vmax OK	A_{vf} =		0.49	cm^2
$N_u = 0.2 V_u$	335	kg		A_n =		0.08	cm^2
				A_{smin} =		7.01	cm^2

Top reinforcement

A_{s1} =	0.41	cm^2		A_{s2} =	0.22	cm^2
$A_{s,req}$ =	0.41	cm^2		$A_{h,req}$ (in 2d/3) =	0.16	cm^2

Summary of the reinforcement

m	7.01	cm^2	Use	4	DB -	16	@ 8.61 cm
A_h (in 2d/3)	3.46	cm^2	Use	2	DB -	12	U stir. @ 40 cm

ข้อกำหนดที่ใช้ในการออกแบบ (DESIGN CRITERIA)

โครงการ : กสทช

อาคารห้องเครื่องกำเนิดไฟฟ้า (Generator)

การออกแบบโดยวิธีกำลัง (Ultimate Strength design method)

สัมประสิทธิ์น้ำหนักบรรทุก (Load factor)

น้ำหนักบรรทุคงที่ (Dead load : DL)	=	*1.40*
น้ำหนักบรรทุกจร (Live load : LL)	=	*1.70*
แรงลม (Wind load : WL)	=	*1.70*
แรงแผ่นดินไหว (Earthquake load : EL)	=	*1.87*

กำลังที่ต้องการเพื่อต้านน้ำหนักบรรทุก (U = Required strength to resist factored load)

U = 1.4DL + 1.7 LL

U = 0.75 (1.4DL + 1.7LL + 1.7WL) หรือ 0.9DL + 1.3WL

U = 0.75(1.4DL + 1.7LL + 1.87EL) หรือ 0.9DL + 1.43EL

ตัวคูณลดกำลัง (Strength reduction factor)

สำหรับแรงดัด (Bending)	=	*0.90*
สำหรับแแรงเฉือน (Shear)	=	*0.85*
สำหรับแรงเฉือน (Compression)	=	*0.70*

คอนกรีต (Concrete)

กำลังอัดประลัย (Ultimate Strength) Fc'	=	*320*	ksc
แรงเฉือนแบบคาน Vc	=	*9.481*	ksc (For Beam Shear)
แรงเฉือนทะลุ Vc	=	*18.962*	ksc (For Punching Shear)

เหล็กเส้นกลม (Round Bar)

กำลังดึงสูงสุด (Yield Strength)	Fy	=	*2400*	ksc	(SR 24)

เหล็กเส้นข้ออ้อย (Deformed Bar)

กำลังดึงสูงสุด (Yield Strength)	Fy	=	*4000*	ksc	(SD 40)
กำลังดึงสูงสุด (Yield Strength)	Fy	=	*5000*	ksc	(SD 50)

เหล็กรูปพรรณ (Structural Steel)

Structural steel shape	GRADE	SS400
High strength bolt (HTB)	GRADE	F10T
Welding electrode	GRADE	E70
Anchor bolt	GRADE	SS400

น้ำหนักบรรทุกคงที่ (Dead Load)

น้ำหนักคอนกรีต (DL. of Concrete)	=	2400	กก. ต่อ ลบ.ม.	(kg/Cu.m.)
น้ำหนักอิฐมอญเต็มแผ่น (DL. of Brick Wall)	=	360	กก. ต่อ ตร.ม.	(kg/Sq.m.)
น้ำหนักอิฐมอญครึ่งแผ่น (DL. of Half Brick Wall)	=	180	กก. ต่อ ตร.ม.	(kg/Sq.m.)
น้ำหนักผนังก่ออิฐบล็อกหนา 9 ซ.ม.	=	160	กก. ต่อ ตร.ม.	(kg/Sq.m.)
น้ำหนักผนังกระจก	=	120	กก. ต่อ ตร.ม.	(kg/Sq.m.)

น้ำหนักบรรทุกจร (Live Load)

น้ำหนักบรรทุกจรหลังคาคอนกรีตเสริมเหล็ก	=	200	กก. ต่อ ตร.ม.	(kg/Sq.m.)
น้ำหนักบรรทุกจรห้องเครื่องกำเนิดไฟฟ้า (Generator)	=	2000	กก. ต่อ ตร.ม.	(kg/Sq.m.)

EGS1 **(0.20)** L = 3.20

case 1 B = 2.50

k = 1.28

f_c' = 320 ksc t_{min} = 0.063 m.

Load factor *DL* = 1.40

LL = 1.70

DL	=	*1.4x* *480*	=	672	kg/m^2
SDL+SCR	=	*1.4x* *120*	=	168	kg/m^2
LL	=	*1.7x* *2000*	=	3400	kg/m^2
w_u			=	**4240**	kg/m^2
M^+_B	=	*0.084* $w_u B^2$	=	2237	kg-m
M^-_B		$w_u B^2$			kg-m
M^+_L	=	*0.034* $w_u L^2$	=	1494	kg-m
M^-_L		$w_u L^2$			kg-m
					kg-m
					kg-m

As min = 4.00 Sq.cm.

As min = 4.00 Sq.cm.

As+B	=	3.96	cm^2	DB 12 mm. @	0.275 m
As+L	=	2.62	cm^2	DB 12 mm. @	0.275 m

ERS1 **(0.15)** L = 7.50

case 1 B = 4.00

k = 1.88

f_c' = 320 ksc t_{min} = 0.128 m.

Load factor *DL* = 1.40

LL = 1.70

DL	=	*1.4x* *360*	=	504	kg/m^2
SDL+SCR	=	*1.4x* *170*	=	238	kg/m^2
LL	=	*1.7x* *200*	=	340	kg/m^2
w_u			=	**1082**	kg/m^2
M^+_B	=	*0.110* $w_u B^2$	=	1896	kg-m
M^-_B		$w_u B^2$			kg-m
M^+_L	=	*0.013* $w_u L^2$	=	761	kg-m
M^-_L		$w_u L^2$			kg-m
					kg-m
					kg-m

As min = 3.00 Sq.cm.

As+B	=	4.51	cm^2	DB 12 mm. @	0.25 m
As+L	=	1.78	cm^2	DB 12 mm. @	0.3 m

EGS1x **(0.20)**

case simple span L = 0.80

f_c' = 320 ksc t_{min} = 0.040 m.

Load factor *DL* = 1.40

LL = 1.70

DL	=	*1.4x* *480*	=	672	kg/m^2
SDL+SCR	=	*1.4x* *120*	=	168	kg/m^2
LL	=	*1.7x* *2000*	=	3400	kg/m^2
w_u			=	**4240**	kg/m^2
$P_{u,mid}$			=	0	kg
$M^+_{L,w}$	=	*0.13* $w_u L^2$	=	339	kg-m
$M^+_{L,P}$	=	*0.25* $P_u L$	=	0	kg-m
M^+_L			=	339	kg-m

As,B min = 4.00 Sq.cm.

As min = 4.00 Sq.cm.

$A_s{}^+_B$	=	0.00	cm^2	DB 12 mm. @	0.275 m
$A_s{}^+_L$	=	0.59	cm^2	DB 12 mm. @	0.275 m

ERS1a **(0.15)**

case cantilever L = 1.00

f_c' = 320 ksc t_{min} = 0.083 m.

Load factor *DL* = 1.40

LL = 1.70

DL	=	*1.4x* *360*	=	504	kg/m^2
SDL+SCR	=	*1.4x* *170*	=	238	kg/m^2
LL	=	*1.7x* *200*	=	340	kg/m^2
w_u			=	**1082**	kg/m^2
$P_{u,end}$			=	302	kg
$M^+_{L,w}$	=	*-0.50* $w_u L^2$	=	-541	kg-m
$M^+_{L,P}$	=	*-1.00* $P_u L$	=	-302	kg-m
M^+_L			=	843	kg-m

As,B min = 3.00 Sq.cm.

As min = 3.00 Sq.cm.

$A_s{}^+_B$	=	0.00	cm^2	DB 12 mm. @	0.3 m
$A_s{}^+_L$	=	1.98	cm^2	DB 12 mm. @	0.3 m

EGS1a **(0.20)**

case cantilever L = 1.00

f_c' = 320 ksc t_{min} = 0.083 m.

Load factor *DL* = 1.40

LL = 1.70

DL	=	*1.4x* *480*	=	672	kg/m^2
SDL+SCR	=	*1.4x* *120*	=	168	kg/m^2
LL	=	*1.7x* *2000*	=	3400	kg/m^2
w_u			=	**4240**	kg/m^2
$P_{u,end}$			=	970	kg
$M^-_{L,w}$	=	*-0.50* $w_u L^2$	=	-2120	kg-m
$M^-_{L,P}$	=	*-1.00* $P_u L$	=	-970	kg-m
M^-_L			=	3090	kg-m

As,B min = 4.00 Sq.cm.

$A_s{}^-_B$	=	0.00	cm^2	DB 12 mm. @	0.275 m
$A_s{}^-_L$	=	5.17	cm^2	DB 12 mm. @	0.2 m

Approach **(0.20)**

case simple span L = 2.40

f_c' = 240 ksc t_{min} = 0.120 m.

Load factor *DL* = 1.40

LL = 1.70

DL	=	*1.4x* *480*	=	672	kg/m^2
SDL+SCR	=	*1.4x* *0*	=	0	kg/m^2
LL	=	*1.7x* *2000*	=	3400	kg/m^2
w_u			=	**4072**	kg/m^2
$P_{u,mid}$			=	0	kg
$M^+_{L,w}$	=	*0.13* $w_u L^2$	=	2932	kg-m
$M^+_{L,P}$	=	*0.25* $P_u L$	=	0	kg-m
M^+_L			=	2932	kg-m

As,B min = 4.00 Sq.cm.

$A_s{}^+_B$	=	0.00	cm^2	DB 12 mm. @	0.275 m
$A_s{}^+_L$	=	5.26	cm^2	DB 12 mm. @	0.2 m

NBTC Building G Generator room EGB1(0.25x0.5),EGB1(0.25x0.5),EGB1(0.25x0.5),EGB1(0.25x0.5)

| | | |

NBTC Building G Generator room EGB2(0.25x0.8)

Load factor				**EGB2**							
DL =	1.40			CANT L			SPAN 1			CANT R	
LL =	1.70										
Span length	(m)			0.00			3.20			1.00	
Slab thickness	(m)			0.01			0.20			0.20	
Strip width	(m)			3.00			1.00			0.25	
Beam width	(m)			0.25			0.25			0.25	
Beam depth	(m)			0.80			0.80			0.80	
SDL	(kg/m)	120	360			120			30		
$DL_{, slab}$	(kg/m)	24	72			480			120		
$DL_{, girder}$	(kg/m)		1200			1200			1200		
$DL_{, total}$	(kg/m)		1632			1800			1350		
L.L.	(kg/m)	2000	6000	1.00		2000	1.00		500	1.00	
Service load	(kg/m)		7632			3800			1850		
Ultimate load	(kg/m)		12485			5920			2740		
Concentrate Load (kg)		Service load	Factor load	x (m)		Service load	Factor load	x (m)	Service load	Factor load	x (m)
Concentrate DL	1.40	0	0	0.00		0	0	0.24	11577	16208	1.00
		0	0	0.00		0	0	0.24	0	0	1.00
		0	0	0.00		0	0	0.24	0	0	1.00
Concentrate LL	1.70	0	0	0.00		0	0	0.24	4701	7991	1.00
		0	0	0.00		0	0	0.24	0	0	1.00
		0	0	0.00		0	0	0.24	0	0	1.00

x		0.00	0.00	0.00		0.24	0.24	0.24		1.00	1.00	1.00	
P_L		0	0	0		0	0	0		4701	0	0	
P_D		0	0	0		0	0	0		11577	0	0	
w_D			1632				1800				1350		
w_L							2000						
L			*0.00*				3.20				1.00		

Result of structural analysis

Dead load	R (kg)	-933			19621		
Shear	(kg)	0	-933		6693	12927	
Moment	(kg-m)	0	-5	-286	-12208	-12252	
Live load	R (kg)	1659			9942		
Shear	(kg)	0	1659		4741	5201	
Moment	(kg-m)	0	-7	339	-4937	-4951	
Service load	R (kg)	726			29562		
Shear	(kg)	0	726		11434	18128	
Moment	(kg-m)	0	-12	52	-17145	-17203	
Factor load	R (kg)	1514			44370		
Shear	(kg)	0	1514		17430	26939	
Moment	(kg-m)	0	-18	175	-25485	-25569	
M max(wind load)		0	0		0	0	
V max(wind load)		0	0		0	0	

Summary result of design

		EGB2				
M^{-}_{design}	(kg-m)	-98	93		-23352	-22223
M^{+}_{design}	(kg-m)			175		
V_{design}	(kg)	0	-2017		13227	26939
$A_{s, required}$		0.05	0.05	0.09	9.51	9.03
Use		1 -DB16	1 -DB16	1 -DB16	5 -DB16	5 -DB16
$A_{s}^{'}{}_{, required}$		0.00	0.00	0.00	0.00	0.00
Use		0 -DB16	0 -DB16	0 -DB16	0 -DB16	0 -DB16
Stirrup		1-DB-12@0.25	1-DB-12@0.25		1-DB-12@0.25	1-DB-12@0.25

Serviceability

Immediate deflection	(cm)	0.00		0.00		0.0286
control at		> 360 OK		> 360 OK		> 360 OK
Long term deflection	(cm)	0.00		-0.01		0.0693
control at		> 480 OK		> 480 OK		> 480 OK
Crack width, w	(mm)	0.0000	-0.0014	0.0012	0.1812	0.1845

NBTC Building G Generator room EGB3(0.25x0.6)

Load factor						**EGB3**					
DL =	1.40			CANT L			SPAN 1			CANT R	
LL =	1.70										
Span length	(m)			0.00			3.20			1.00	
Slab thickness	(m)			0.01			0.20			0.20	
Strip width	(m)			3.00			2.00			0.50	
Beam width	(m)			0.25			0.25			0.25	
Beam depth	(m)			0.60			0.60			0.60	
SDL	(kg/m)	120	360			240			60		
$DL_{, slab}$	(kg/m)	24	72			960			240		
$DL_{, girder}$	(kg/m)		1080			1080			1080		
$DL_{, total}$	(kg/m)		1512			2280			1380		
L.L.	(kg/m)	2000	6000	1.00		4000	1.00		1000	1.00	
Service load	(kg/m)		7512			6280			2380		
Ultimate load	(kg/m)		12317			9992			3632		
Concentrate Load (kg)		Service load	Factor load	x (m)		Service load	Factor load	x (m)	Service load	Factor load	x (m)
Concentrate DL	1.40	0	0	0.00		0	0	1.00	4318	6045	1.00
		0	0	0.00		0	0	1.00	0	0	1.00
		0	0	0.00		0	0	1.00	0	0	1.00
Concentrate LL	1.70	0	0	0.00		0	0	1.00	6500	11051	1.00
		0	0	0.00		0	0	1.00	0	0	1.00
		0	0	0.00		0	0	1.00	0	0	1.00

x		0.00	0.00	0.00		1.00	1.00	1.00		1.00	1.00	1.00	
P_L		0	0	0		0	0	0		6500	0	0	
P_D		0	0	0		0	0	0		4318	0	0	
w_D			1512				2280				1380		
w_L							4000						
L			*0.00*				3.20				1.00		

Result of structural analysis

Dead load	R (kg)	2090			10905		
Shear	(kg)	0	2090		5206	5698	
Moment	(kg-m)	0	-8	942	-4995	-5008	
Live load	R (kg)	4222			16079		
Shear	(kg)	0	4222		8578	7500	
Moment	(kg-m)	0	-14	2207	-6985	-7000	
Service load	R (kg)	6311			26983		
Shear	(kg)	0	6311		13785	13199	
Moment	(kg-m)	0	-22	3149	-11980	-12009	
Factor load	R (kg)	10102			42600		
Shear	(kg)	0	10102		21872	20728	
Moment	(kg-m)	0	-35	5071	-18868	-18912	
M max(wind load)		0	0		0	0	
V max(wind load)		0	0		0	0	

Summary result of design

				EGB3		
M^-_{design}	(kg-m)	-96	862		-16212	-16349
M^+_{design}	(kg-m)			5071		
V_{design}	(kg)	0	5006		16776	20728
$A_{s, required}$		0.07	0.63	3.74	9.33	9.42
Use		1 -DB16	1 -DB16	2 -DB16	5 -DB16	5 -DB16
$A_{s}^{'}{}_{, required}$		0.00	0.00	0.00	0.00	0.00
Use		0 -DB16	0 -DB16	0 -DB16	0 -DB16	0 -DB16
Stirrup		1-DB-12@0.25	1-DB-12@0.25		1-DB-12@0.25	1-DB-12@0.25

Serviceability

Immediate deflection	(cm)	0.00		0.01		0.0771
control at		> 360 OK		> 360 OK		> 360 OK
Long term deflection	(cm)	0.00		0.02		0.1116
control at		> 480 OK		> 480 OK		> 480 OK
Crack width, w	(mm)	0.0000	-0.0107	0.0332	0.2328	0.2326

NBTC Building G Generator room EGB4(0.25x1)

Load factor	DL =	1.40				**EGB4**						
	LL =	1.70		CANT L			SPAN 1			CANT R		
Span length	(m)			0.00			3.20			1.00		
Slab thickness	(m)			0.01			0.20			0.20		
Strip width	(m)			3.00			2.00			0.50		
Beam width	(m)			0.25			0.25			0.25		
Beam depth	(m)			1.00			1.00			1.00		
SDL	(kg/m)		120	360			240			60		
$DL_{, slab}$	(kg/m)		24	72			960			240		
$DL_{, girder}$	(kg/m)			1320			1320			1320		
$DL_{, total}$	(kg/m)			1752			2520			1620		
L.L.	(kg/m)		2000	6000	1.00		4000	1.00		1000	1.00	
Service load	(kg/m)			7752			6520			2620		
Ultimate load	(kg/m)			12653			10328			3968		
Concentrate Load (kg)			Service load	Factor load	x (m)	Service load	Factor load	x (m)	Service load	Factor load	x (m)	
Concentrate DL		1.40	0	0	0.00	0	0	0.51	14068	19695	1.00	
			0	0	0.00	0	0	0.51	0	0	1.00	
			0	0	0.00	0	0	0.51	0	0	1.00	
Concentrate LL		1.70	0	0	0.00	0	0	0.51	8450	14366	1.00	
			0	0	0.00	0	0	0.51	0	0	1.00	
			0	0	0.00	0	0	0.51	0	0	1.00	

	x	0.00	0.00	0.00		0.51	0.51	0.51		1.00	1.00	1.00		
	P_L	0	0	0		0	0	0		8450	0	0		
	P_D	0	0	0		0	0	0		14068	0	0		
	w_D		1752				2520				1620			
	w_L						4000							
	L		*0.00*				3.20				1.00			

Result of structural analysis

Dead load	R (kg)	-599			24351	
Shear	(kg)	0	-599		8663	15688
Moment	(kg-m)	0	-8	-649	-14827	-14878
Live load	R (kg)	3614			18636	
Shear	(kg)	0	3614		9186	9450
Moment	(kg-m)	0	-13	1316	-8928	-8950
Service load	R (kg)	3015			42987	
Shear	(kg)	0	3015		17849	25139
Moment	(kg-m)	0	-21	667	-23755	-23829
Factor load	R (kg)	5306			65773	
Shear	(kg)	0	5305		27744	38029
Moment	(kg-m)	0	-34	1329	-35936	-36045
M max(wind load)		0	0		0	0
V max(wind load)		0	0		0	0

Summary result of design

				EGB4		
M^-_{design}	(kg-m)	-99	412		-32548	-31322
M^+_{design}	(kg-m)			1329		
V_{design}	(kg)	0	-3070		18346	38029
$A_{s, required}$		0.04	0.17	0.54	10.28	9.88
Use		1 -DB16	1 -DB16	1 -DB16	6 -DB16	5 -DB16
$A_{s}^{'}{}_{, required}$		0.00	0.00	0.00	0.00	0.00
Use		0 -DB16	0 -DB16	0 -DB16	0 -DB16	0 -DB16
Stirrup		1-DB-12@0.25	1-DB-12@0.25		1-DB-12@0.25	1-DB-12@0.25

Serviceability						
Immediate deflection	(cm)	0.00		0.00		0.0236
control at		> 360 OK		> 360 OK		> 360 OK
Long term deflection	(cm)	0.00		0.00		0.0411
control at		> 480 OK		> 480 OK		> 480 OK
Crack width, w	(mm)	0.0000	-0.0028	0.0054	0.1403	0.1419

NBTC Building G Generator room ERB1(0.25x0.6),ERB1(0.25x0.6)

Load factor	DL =	1.40						**ERB1**						**ERB1**									
	LL =	1.70		CANT L				SPAN 1						SPAN 2						CANT R			
Span length	(m)			0.00				7.50						7.50						0.00			
Slab thickness	(m)			0.15				0.15						0.15						0.15			
Strip width	(m)			2.30				2.30						2.30						2.30			
Beam width	(m)			0.25				0.25						0.25						0.25			
Beam depth	(m)			0.60				0.60						0.60						0.60			
SDL	(kg/m)		170	391				391						391						391			
DL_{slab}	(kg/m)		360	828				828						828						828			
DL_{girder}	(kg/m)			576				576						576						576			
DL_{total}	(kg/m)			1795				1795						1795						1795			
L.L.	(kg/m)		200	460	1.00			460	1.00					460	1.00					460	1.00		
Service load	(kg/m)			2255				2255						2255						2255			
Ultimate load	(kg/m)			3295				3295						3295						3295			
Concentrate Load (kg)			Service load	Factor load	x (m)		Service load	Factor load	x (m)		Service load	Factor load	x (m)		Service load	Factor load	x (m)		Service load	Factor load	x (m)		
Concentrate DL	1.40		0	0	0.00		0	0	2.81		0	0	4.69		0	0	0.00						
			0	0	0.00		0	0	2.81		0	0	4.69		0	0	0.00						
			0	0	0.00		0	0	2.81		0	0	4.69		0	0	0.00						
Concentrate LL	1.70		0	0	0.00		0	0	2.81		0	0	4.69		0	0	0.00						
			0	0	0.00		0	0	2.81		0	0	4.69		0	0	0.00						
			0	0	0.00		0	0	2.81		0	0	4.69		0	0	0.00						

x	0.00	0.00	0.00		2.81	2.81	2.81		4.69	4.69	4.69		0.00	0.00	0.00								
P_L	0	0	0		0	0	0		0	0	0		0	0	0								
P_D	0	0	0		0	0	0		0	0	0		0	0	0								
w_D		1795				1795				1795				1795									
w_L						460				460													
L		*0.00*				7.50				7.50				0.00									

Result of structural analysis																							
Dead load	R (kg)			5050					16824					5050									
Shear	(kg)			0	5050				8412	8412				5050	0								
Moment	(kg-m)			0	-9		7095		-12617	-12617		7095		-9	0								
Live load	R (kg)			1294					4312					1294									
Shear	(kg)			0	1294				2156	2156				1294	0								
Moment	(kg-m)			0	-2		1818		-3233	-3233		1818		-2	0								
Service load	R (kg)			6345					21136					6345									
Shear	(kg)			0	6344				10568	10568				6344	0								
Moment	(kg-m)			0	-11		8914		-15850	-15850		8914		-11	0								
Factor load	R (kg)			9271					30884					9271									
Shear	(kg)			0	9271				15442	15442				9271	0								
Moment	(kg-m)			0	-17		13025		-23160	-23160		13025		-17	0								
M max(wind load)				0	0				0	0				0	0								
V max(wind load)				0	0				0	0				0	0								
Summary result of design																							
							ERB1							**ERB1**									
M^-_{design}	(kg-m)			-26	837				-21255	-21255				837	-26								
M^+_{design}	(kg-m)						13025					13025											
V_{design}	(kg)			0	7689				13860	13860				7689	0								
$A_{s,required}$				0.02	0.65		7.92		13.40	13.40		7.92		0.65	0.02								
Use				1 -DB16	1 -DB16		4 -DB16		7 -DB16	7 -DB16		4 -DB16		1 -DB16	1 -DB16								
$A_{s}^{'},_{required}$				0.00	0.00		0.00		0.00	0.00		0.00		0.00	0.00								
Use				0 -DB16	0 -DB16		0 -DB16		0 -DB16	0 -DB16		0 -DB16		0 -DB16	0 -DB16								
Stirrup				1-RB-9@0.225	1-RB-9@0.225				1-RB-9@0.225	1-RB-9@0.225				1-RB-9@0.225	1-RB-9@0.225								
Serviceability																							
Immediate deflection	(cm)			0.00			0.28					0.28			0.0000								
control at				> 360 OK			> 360 OK					> 360 OK			> 360 OK								
Long term deflection	(cm)			0.00			1.09					1.09			0.0000								
control at				> 480 OK			> 480 OK					> 480 OK			> 480 OK								
Crack width, w	(mm)			0.0000	-0.0119		0.2027		0.2996	0.2996		0.2027		-0.0119	0.0000								
				OK	OK		OK		OK	OK		OK		OK	OK								

NBTC Building G Generator room ERB2(0.25x0.5)

Load factor	DL =	1.40				**ERB2**					
	LL =	1.70		CANT L			SPAN 1			CANT R	
Span length	(m)			0.00			4.00			0.00	
Slab thickness	(m)			0.01			0.15			0.15	
Strip width	(m)			3.00			2.50			2.50	
Beam width	(m)			0.25			0.25			0.25	
Beam depth	(m)			0.50			0.50			0.50	
SDL	(kg/m)		170	510			425			425	
$DL_{, slab}$	(kg/m)		24	72			900			900	
$DL_{, girder}$	(kg/m)			300			300			300	
$DL_{, total}$	(kg/m)			882			1625			1625	
L.L.	(kg/m)		200	600	1.00		500	1.00		500	1.00
Service load	(kg/m)			1482			2125			2125	
Ultimate load	(kg/m)			2255			3125			3125	
Concentrate Load (kg)			Service load	Factor load	x (m)	Service load	Factor load	x (m)	Service load	Factor load	x (m)
Concentrate DL		1.40	0	0	0.00	0	0	2.00	0	0	0.00
			0	0	0.00	0	0	2.00	0	0	0.00
			0	0	0.00	0	0	2.00	0	0	0.00
Concentrate LL		1.70	0	0	0.00	0	0	2.00	0	0	0.00
			0	0	0.00	0	0	2.00	0	0	0.00
			0	0	0.00	0	0	2.00	0	0	0.00

	x	0.00	0.00	0.00		2.00	2.00	2.00		0.00	0.00	0.00
	P_L	0	0	0		0	0	0		0	0	0
	P_D	0	0	0		0	0	0		0	0	0
	w_D		882				1625				1625	
	w_L						500					
	L		*0.00*				4.00				0.00	

Result of structural analysis

Dead load	R (kg)	3250			3250		
Shear	(kg)	0	3250		3250	0	
Moment	(kg-m)	0	-13	3237	-13	0	
Live load	R (kg)	1000			1000		
Shear	(kg)	0	1000		1000	0	
Moment	(kg-m)	0	-4	996	-4	0	
Service load	R (kg)	4250			4250		
Shear	(kg)	0	4250		4250	0	
Moment	(kg-m)	0	-17	4233	-17	0	
Factor load	R (kg)	6250			6250		
Shear	(kg)	0	6250		6250	0	
Moment	(kg-m)	0	-24	6226	-24	0	
M max(wind load)		0	0		0	0	
V max(wind load)		0	0		0	0	

Summary result of design

				ERB2		
M^-_{design}	(kg-m)	-18	549		549	-24
M^+_{design}	(kg-m)			6226		
V_{design}	(kg)	0	4969		4969	0
$A_{s, required}$		0.02	0.50	4.35	0.50	0.02
Use		1 -DB16	1 -DB16	3 -DB16	1 -DB16	1 -DB16
$A_{s}^{'}{}_{, required}$		0.00	0.00	0.00	0.00	0.00
Use		0 -DB16	0 -DB16	0 -DB16	0 -DB16	0 -DB16
Stirrup		1-RB-9@0.2	1-RB-9@0.2		1-RB-9@0.2	1-RB-9@0.2

Serviceability						
Immediate deflection	(cm)	0.00		0.05		0.0000
control at		> 360 OK		> 360 OK		> 360 OK
Long term deflection	(cm)	0.00		0.17		0.0000
control at		> 480 OK		> 480 OK		> 480 OK
Crack width, w	(mm)	0.0000	-0.0112	0.0834	-0.0112	0.0000

Project NBTC Building G (Generator room) **COL. TYPE C1** **21**

COL. LINE GI,GK/1 **FOOTING TYPE F2A**

LOAD FACTOR	DL	1.4
	LL	1.7

FLOOR	SLAB 1			SLAB 2			BEAM 1		BEAM 2		WALL 1			WALL 2			COL		TRANS. LOAD		LOAD/ FLOOR		SUM LOAD(WKL)			LOAD/ AREA	SUM LOAD (ULL.)
	DL. (kg/m^2)	LL. (kg/m^2)	AREA (m^2)	DL. (kg/m^2)	LL. (kg/m^2)	AREA (m^2)	w (kg/m)	L (m)	w (kg/m)	L (m)	w (kg/m^2)	H (m)	L (m)	w (kg/m^2)	H (m)	L (m)	w (kg/m)	H (m)	DL. (kg)	LL. (kg)	DL. (kg)	LL. (kg)	DL. (kg)	LL. (kg)	TOTAL (kg)	(kg/m^2)	(kg)
Roof	530	200	7.50				300	2.00	360	3.75	180	1.20	5.75								7,767	1,500	7,767	1,500	9,267	1,236	13,424
1	600	1500	2.00	480	1500	2.00	300	1.25	480	1.60	180	4.00	2.85				150	4.00			5,701	6,000	13,468	7,500	20,968	2,925	31,605
PIER																	231	1.50									
																										1,823	kg/m²

COL. LINE NBTC Building G (Generator room) **COL. TYPE C0** **31**

GI,GK/2 **FOOTING TYPE F3A**

LOAD FACTOR	DL	1.4
	LL	1.7

FLOOR	SLAB 1			SLAB 2			BEAM 1		BEAM 2		WALL 1			WALL 2			COL		TRANS. LOAD		LOAD/ FLOOR		SUM LOAD(WKL)			LOAD/ AREA	SUM LOAD (ULL.)
	DL. (kg/m^2)	LL. (kg/m^2)	AREA (m^2)	DL. (kg/m^2)	LL. (kg/m^2)	AREA (m^2)	w (kg/m)	L (m)	w (kg/m)	L (m)	w (kg/m^2)	H (m)	L (m)	w (kg/m^2)	H (m)	L (m)	w (kg/m)	H (m)	DL. (kg)	LL. (kg)	DL. (kg)	LL. (kg)	DL. (kg)	LL. (kg)	TOTAL (kg)	(kg/m^2)	(kg)
Roof	530	200	9.75				300	2.00	360	3.75	180	1.20	2.60				0	0.00			8,279	1,950	8,279	1,950	10,229	1,049	14,906
1	600	1500	4.50	480	1500	3.00	300	2.50	480	3.60	180	4.00	3.60				150	4.00			9,556	11,250	17,835	13,200	31,035	2,774	47,409
PIER																	231	1.50									
																										1,799	kg/m²

COL. LINE NBTC Building G (Generator room) **COL. TYPE C0** **12**

GI-GJ/1,GJ-GK/1 **FOOTING TYPE F1A**

LOAD FACTOR	DL	1.4
	LL	1.7

FLOOR	SLAB 1			SLAB 2			BEAM 1		BEAM 2		WALL 1			WALL 2			COL		TRANS. LOAD		LOAD/ FLOOR		SUM LOAD(WKL)			LOAD/ AREA	SUM LOAD (ULL.)
	DL. (kg/m^2)	LL. (kg/m^2)	AREA (m^2)	DL. (kg/m^2)	LL. (kg/m^2)	AREA (m^2)	w (kg/m)	L (m)	w (kg/m)	L (m)	w (kg/m^2)	H (m)	L (m)	w (kg/m^2)	H (m)	L (m)	w (kg/m)	H (m)	DL. (kg)	LL. (kg)	DL. (kg)	LL. (kg)	DL. (kg)	LL. (kg)	TOTAL (kg)	(kg/m^2)	(kg)
Roof																											
1	600	1500	4.00				300	2.50	360	1.60	180	4.00	2.50								5,872	6,000	5,872	6,000	11,872	2,968	18,421
PIER																	231	1.50									
																										2,968	kg/m²

Project **NBTC Building G (Generator room)**
COL. LINE **GI,GK/1**
COL. TYPE **C1**

											LOAD FACTOR											
											DL.	LL.										
											1.4	1.7										
FLOOR	D (m)	B (m)	H	Ag (m^2)	LOAD (kg)	fc' (ksc)	fy (ksc)	Ar (m^2)	fr (ksc)	As (cm^2)	Pg %As	Pg %(As+Ar)	DB 32	DB 28	DB 25	DB 20	DB 16	DB 12	As sq.cm.	LOAD KG	PERCENT %	
1	0.25	0.25	4.00	0.063	13,424	320	4000			6.25	1.00%	1.00%					8		16.08	128,770	2.57%	OK
PIER	0.31	0.31	1.50	0.096	31,605	320	4000			9.61	1.00%	1.00%					8		16.08	179,949	1.67%	OK
																						0

Project **NBTC Building G (Generator room)**
COL. LINE **GI,GK/2**
COL. TYPE **C0**

											LOAD FACTOR											
											DL.	LL.										
											1.4	1.7										
FLOOR	D (m)	B (m)	H	Ag (m^2)	LOAD (kg)	fc' (ksc)	fy (ksc)	Ar (m^2)	fr (ksc)	As (cm^2)	Pg %As	Pg %(As+Ar)	DB 32	DB 28	DB 25	DB 20	DB 16	DB 12	As sq.cm.	LOAD KG	PERCENT %	
1	0.25	0.25	4.00	0.063	14,906	320	4000			6.25	1.00%	1.00%					8		16.08	128,770	2.57%	OK
PIER	0.31	0.31	1.50	0.096	47,409	320	4000			9.61	1.00%	1.00%					8		16.08	179,949	1.67%	OK
																						0

Project **NBTC Building G (Generator room)**
COL. LINE **GI-GJ/1,GJ-GK/1**
COL. TYPE **C0**

											LOAD FACTOR											
											DL.	LL.										
											1.4	1.7										
FLOOR	D (m)	B (m)	H	Ag (m^2)	LOAD (kg)	fc' (ksc)	fy (ksc)	Ar (m^2)	fr (ksc)	As (cm^2)	Pg %As	Pg %(As+Ar)	DB 32	DB 28	DB 25	DB 20	DB 16	DB 12	As sq.cm.	LOAD KG	PERCENT %	
1																						
PIER	0.31	0.31	1.50	0.096	18,421	320	4000			9.61	1.00%	1.00%					8		16.08	179,949	1.67%	OK
																						0

Project NBTC Building G (Generator room) **COL. TYPE C0 24**

COL. LINE GI-GJ/1,GJ-GK/2 **FOOTING TYPE F2A**

FLOOR	SLAB 1			SLAB 2			BEAM 1		BEAM 2		WALL 1			WALL 2			COL		TRANS. LOAD		LOAD/ FLOOR		SUM LOAD(WKL)			LOAD FACTOR	DL	1.4
																											LL	1.7
	DL.	LL.	AREA	DL.	LL.	AREA	w	L	w	L	w	H	L	w	H	L	w	H	DL.	LL.	DL.	LL.	DL.	LL.	TOTAL	LOAD/ AREA	SUM LOAD (ULL.)
	(kg/m^2)	(kg/m^2)	(m^2)	(kg/m^2)	(kg/m^2)	(m^2)	(kg/m)	(m)	(kg/m)	(m)	(kg/m^2)	(m)	(m)	(kg/m^2)	(m)	(m)	(kg/m)	(m)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg/m^2)	(kg)
Roof																											
1	600	1500	9.00				300	5.00	360	3.60	180	4.00	2.50								10,342	13,500	10,342	13,500	23,842	2,649	37,429
PIER																	231	1.50									
																										2,649	kg/m^2

Project NBTC Building G (Generator room) **COL. TYPE C1 29**

COL. LINE GJ/1 **FOOTING TYPE F2A**

FLOOR	SLAB 1			SLAB 2			BEAM 1		BEAM 2		WALL 1			WALL 2			COL		TRANS. LOAD		LOAD/ FLOOR		SUM LOAD(WKL)			LOAD FACTOR	DL	1.4
																											LL	1.7
	DL.	LL.	AREA	DL.	LL.	AREA	w	L	w	L	w	H	L	w	H	L	w	H	DL.	LL.	DL.	LL.	DL.	LL.	TOTAL	LOAD/ AREA	SUM LOAD (ULL.)
	(kg/m^2)	(kg/m^2)	(m^2)	(kg/m^2)	(kg/m^2)	(m^2)	(kg/m)	(m)	(kg/m)	(m)	(kg/m^2)	(m)	(m)	(kg/m^2)	(m)	(m)	(kg/m)	(m)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg/m^2)	(kg)
Roof	530	200	15.00				300	2.00	360	7.50	180	1.20	7.50								13,470	3,000	13,470	3,000	16,470	1,098	23,958
1	600	1500	4.00				300	2.50	600	1.60	180	4.00	2.50				150	4.00			6,256	6,000	19,726	9,000	28,726	3,064	42,916
PIER																	231	1.50									
																										1,512	kg/m^2

Project NBTC Building G (Generator room) **COL. TYPE C0 44**

COL. LINE GJ/2 **FOOTING TYPE F3A**

FLOOR	SLAB 1			SLAB 2			BEAM 1		BEAM 2		WALL 1			WALL 2			COL		TRANS. LOAD		LOAD/ FLOOR		SUM LOAD(WKL)			LOAD FACTOR	DL	1.4
																											LL	1.7
	DL.	LL.	AREA	DL.	LL.	AREA	w	L	w	L	w	H	L	w	H	L	w	H	DL.	LL.	DL.	LL.	DL.	LL.	TOTAL	LOAD/ AREA	SUM LOAD (ULL.)
	(kg/m^2)	(kg/m^2)	(m^2)	(kg/m^2)	(kg/m^2)	(m^2)	(kg/m)	(m)	(kg/m)	(m)	(kg/m^2)	(m)	(m)	(kg/m^2)	(m)	(m)	(kg/m)	(m)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg/m^2)	(kg)
Roof	530	200	19.50				300	2.00	360	7.50	180	1.20	7.50				0	0.00			15,855	3,900	15,855	3,900	19,755	1,013	28,827
1	600	1500	9.00				300	5.00	600	3.60	180	4.00	2.50				150	4.00			11,206	13,500	27,061	17,400	44,461	2,745	67,465
PIER																	231	1.50									
																										1,560	kg/m^2

Project **NBTC Building G (Generator room)**
COL. LINE **GI-GJ/1,GJ-GK/2**
COL. TYPE **C0**

											LOAD FACTOR											
											DL.	LL.										
											1.4	1.7										
FLOOR	D (m)	B (m)	H	Ag (m^2)	LOAD (kg)	fc' (ksc)	fy (ksc)	Ar (m^2)	fr (ksc)	As (cm^2)	Pg %As	Pg %(As+Ar)	DB 32	DB 28	DB 25	DB 20	DB 16	DB 12	As sq.cm.	LOAD KG	PERCENT %	
1																						
PIER	0.31	0.31	1.50	0.096	37,429	320	4000			9.61	1.00%	1.00%					8		16.08	179,949	1.67%	OK
																						0

Project **NBTC Building G (Generator room)**
COL. LINE **GJ/1**
COL. TYPE **C1**

											LOAD FACTOR											
											DL.	LL.										
											1.4	1.7										
FLOOR	D (m)	B (m)	H	Ag (m^2)	LOAD (kg)	fc' (ksc)	fy (ksc)	Ar (m^2)	fr (ksc)	As (cm^2)	Pg %As	Pg %(As+Ar)	DB 32	DB 28	DB 25	DB 20	DB 16	DB 12	As sq.cm.	LOAD KG	PERCENT %	
1	0.25	0.25	4.00	0.063	23,958	320	4000			6.25	1.00%	1.00%					8		16.08	128,770	2.57%	OK
PIER	0.31	0.31	1.50	0.096	42,916	320	4000			9.61	1.00%	1.00%					8		16.08	179,949	1.67%	OK
																						0

Project **NBTC Building G (Generator room)**
COL. LINE **GJ/2**
COL. TYPE **C0**

											LOAD FACTOR											
											DL.	LL.										
											1.4	1.7										
FLOOR	D (m)	B (m)	H	Ag (m^2)	LOAD (kg)	fc' (ksc)	fy (ksc)	Ar (m^2)	fr (ksc)	As (cm^2)	Pg %As	Pg %(As+Ar)	DB 32	DB 28	DB 25	DB 20	DB 16	DB 12	As sq.cm.	LOAD KG	PERCENT %	
1	0.25	0.25	4.00	0.063	28,827	320	4000			6.25	1.00%	1.00%					8		16.08	128,770	2.57%	OK
PIER	0.31	0.31	1.50	0.096	67,465	320	4000			9.61	1.00%	1.00%					8		16.08	179,949	1.67%	OK
																						0

Typical Footing

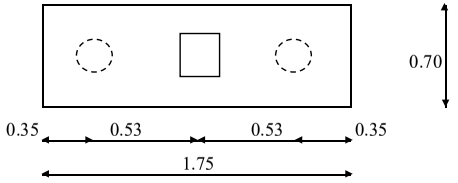
Bored pile0.35 x 0.35 with safe load not less than 15 Tons/Pile

Cost	Mat.	Workman	total
Concrete (m^3)	2100	250	2350
Steel (kg)	23	3	26
Formwork (m^2)	300	110	410

F1 0.7 x 0.7 x 0.6 Use **1** Bored pile **0.35 x 0.35**

Safe load 15 Tons/Pile $P_{w,all}$ 15 Tons

F2 1.75 x 0.7 x 0.6



Use	2	Bored pile	0.35 x	0.35		
Safe load	15	Tons/Pile	$P_{w,all}$	28.24	Tons	
L.F. =	1.55		W	1.76	Tons	6.25%
f_c' =	320	ksc	f_y =	4000	ksc	
h =	**0.60**	m	d =	50	cm	
b =	70	cm	Column	**0.25**	m	

Flexural Design

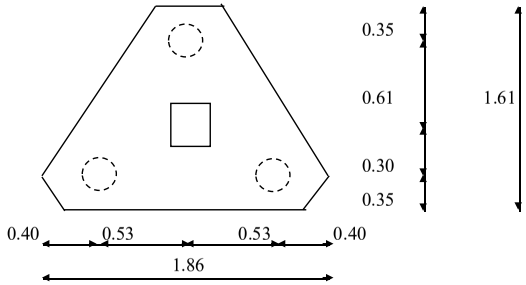
M_u	=	9300	kg-m	
$A_{s,deep\ beam}$	=	6.30	cm^2	
A_s	=	5.22	cm^2	
$A_{s,min}$	=	12.25	cm^2	
Use	**4**	**DB -**	**20**	@ 16.66 cm

One-way Shear

V_u	=	23250	kg		
$3.5-2.5M_u/V_ud$	=	1.50			
V_c	=	43350	kg	OK	
A_{vh}	Use	**DB -**	**12**	**16.0**	OK
P_{vh}	**2**	=	0.0040		OK
A_{vv}	Use	**DB -**	**12**	**10.0**	OK
P_{vv}	**2**	=	0.0065		OK
V_s	=	55517			
$V_{u,all}$	=	98867	kg	Vu,all > Vu	OK
$V_{u,max,all}$		112823	kg	Vu,all > Vu	OK

Steel (kg)	Conc. (m^3)	Form. (m^3)	Steel (B)	Conc. (B)	Form. (B)	Total(B)
176	0.74	2.94	4573	1727	1205	**7506**

F3 1.86 x 1.61 x 0.6



Use	3	Bored pile	0.35 x	0.35		
Safe load	15	Tons/Pile	$P_{w,all}$	42.11	Tons	
L.F. =	1.55		W	2.89	Tons	6.85%
f_c' =	320	ksc	f_y =	4000	ksc	
h =	**0.60**	m	d =	50	cm	
b =	161	cm	b_{moment} =	131	cm	
Column	**0.25**	m	b_{shear} =	88	cm	

Flexural Design

M_u	=	11188	kg-m	
A_s	=	6.26	cm^2	
$A_{s,min}$	=	8.35	cm^2	
Use	**8**	**DB -**	**12**	
		@	20.13	cm three-way

One-way Shear

V_u	=	10376	kg	0.446
V_c	=	35329	kg	OK

Two-way Shear

V_u	=	69750	kg	3.000
V_c	=	241764	kg	OK

Steel (kg)	Conc. (m^3)	Form. (m^3)	Steel (B)	Conc. (B)	Form. (B)	Total(B)
50	1.20	3.34488	1306	2826	1371	**5504**

Typical Footing

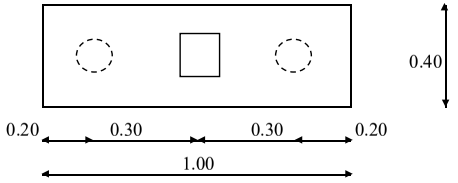
Bored pile0.2 x 0.2 with safe load not less than 15 Tons/Pile

Cost	Mat.	Workman	total
Concrete (m^3)	2100	250	2350
Steel (kg)	23	3	26
Formwork (m^2)	300	110	410

F1 0.4 x 0.4 x 0.6 Use **1** Bored pile **0.2 x 0.20**

Safe load 15 Tons/Pile $P_{w,all}$ 15 Tons

F2 1 x 0.4 x 0.6



Use	2	Bored pile	0.2 x	0.20		
Safe load	15	Tons/Pile	$P_{w,all}$	29.42	Tons	
L.F. =	1.55		W	0.58	Tons	1.96%
f_c' =	320	ksc	f_y =	4000	ksc	
h =	**0.60**	m	d =	50	cm	
b =	40	cm	Column	**0.25**	m	

Flexural Design

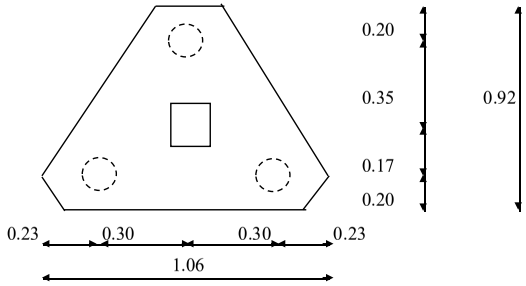
M_u	=	4068.75	kg-m	
$A_{s,deep\ beam}$	=	3.53	cm^2	
A_s	=	2.28	cm^2	
$A_{s,min}$	=	7.00	cm^2	
Use	**4**	**DB -**	**16**	@ 6.66 cm

One-way Shear

V_u	=	23250	kg		
$3.5-2.5M_u/V_ud$	=	2.50			
V_c	=	45493	kg	OK	
A_{vh}	Use	**DB -**	**12**	**16.0**	OK
P_{vh}	**2**	=	0.0071		OK
A_{vv}	Use	**DB -**	**12**	**10.0**	OK
P_{vv}	**2**	=	0.0113		OK
V_s	=	53354			
$V_{u,all}$	=	98847	kg	Vu,all > Vu	OK
$V_{u,max,all}$		64470	kg	Vu,all > Vu	OK

Steel (kg)	Conc. (m^3)	Form. (m^3)	Steel (B)	Conc. (B)	Form. (B)	Total(B)
70	0.24	1.68	1829	564	689	**3081**

F3 1.07 x 0.92 x 0.5



Use	3	Bored pile	0.2 x	0.20		
Safe load	15	Tons/Pile	$P_{w,all}$	44.21	Tons	
L.F. =	1.55		W	0.79	Tons	1.78%
f_c' =	320	ksc	f_y =	4000	ksc	
h =	**0.50**	m	d =	40	cm	
b =	92	cm	b_{moment} =	69	cm	
Column	**0.25**	m	b_{shear} =	37	cm	

Flexural Design

M_u	=	5148	kg-m	
A_s	=	3.61	cm^2	
$A_{s,min}$	=	4.81	cm^2	
Use	**5**	**DB -**	**12**	
		@	17.99	cm three-way

One-way Shear

V_u	=	0	kg	0.000
V_c	=	11896	kg	OK

Two-way Shear

V_u	=	42338	kg	1.821
V_c	=	167623	kg	OK

Steel (kg)	Conc. (m^3)	Form. (m^3)	Steel (B)	Conc. (B)	Form. (B)	Total(B)
19	0.33	1.5928	506	769	653	**1928**