APPENDICES

APPENDICES

APPENDIX A: LOAD CALCULATIONS iii
A.1 Snow Loading iv
A.2 Lateral Loading vi
A.2.1 Wind vi
A.2.2 Seismic xi
APPENDIX B: PRELIMINARY MEMBER DESIGN xiii
B.1 Post-tensioned Slab xiv
B.2 Columns xvi
B.3 Beams xix
B.4 Shearwalls xxi
APPENDIX C: PLANS xxii
C.1 Composite Steel-Foundation xxiii
C.2 Composite Steel-Typical Floor xxiv
C.3 Post-tensioned Concrete-Foundation xxv
C.4 Post-tensioned Concrete-Floor Framing xxvi
C.5 Post-tensioned Concrete-Reinforcement xxviii
APPENDIX D: BREADTH STUDIES xxxii
D.1 Mechanical Studies xxxiii
D.2 Construction Studies xxxiv
D.2.1 Material Takeoffs xxxiv
D.2.2 Estimates xxxv
D.2.3 Schedule xxxvii

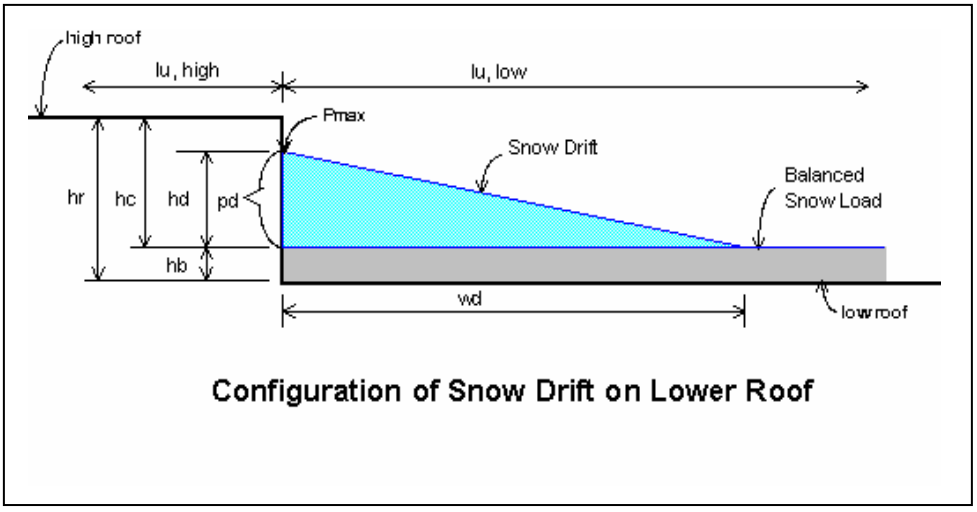
APPENDIX A: LOAD CALCULATIONS

A.I Snow Loading

Design Parameters		
P_g	25.00 psf	Ground Snow Load - Figure 1608.2
	Above Tree Line	Terrain Category - Section 1609.4
	Fully Exposed	Roof Exposure - Table 1608.3.1b
C_e	0.8	Exposure Factor - Table 1608.3.1
C_t	1.00	Thermal Factor - Section 1608.3.2
	I	Importance Category - Table 1604.5
I	1.0	Importance Factor - Table 1609.5
P_f	20.00 psf	Flat Roof Snow Load, Pf = 0.7 * Ce * Ct * Is * Pg - Section 1608.3
D	17 pcf	Snow density,D = 0.13Pg +14 <= 30 pcf - 1608.7
h_b	1'	Height of minimum roof snow load, (Default, Pf/D) - 1608.7
h_r	19'	Difference in height between upper and lower roofs
h_c	17'	Difference in height between upper roof and top of flat roof snow
$l_{u,\ high}$	36'	Horizontal dimension of upper roof normal to the line of change of roof level
$l_{u,\ low}$	48'	Horizontal dimension of lower roof normal to the line of change of roof level

Drift Calculations					
Drift location	**Calc. h_d (ft)**	**Corrected h_d (ft)**	**P_d (psf)**	**P_{max} (psf)**	**W_d**
Windward Drift	1.73	1.73	29.77	49.77	6.90
Leeward Drift	1.95	1.95	33.70	53.70	7.81
Design Drift	***1.95***	***1.95***	***33.7***	***53.7***	***7.8***

X	Y	A1 (psf)	A2 (psf)	Total (psf)
2.0	45	45	4	**49**
4.0	36	36	4	**41**
6.0	28	28	4	**32**
7.8	20	20	4	**24**



Configuration of Snow Drift on Lower Roof

Design Parameters		
P_g	25.00 psf	Ground Snow Load - Figure 1608.2
	Above Tree Line	Terrain Category - Section 1609.4
	Fully Exposed	Roof Exposure - Table 1608.3.1b
C_e	0.7	Exposure Factor - Table 1608.3.1
C_t	1.00	Thermal Factor - Section 1608.3.2
	I	Importance Category - Table 1604.5
I	1.0	Importance Factor - Table 1609.5
P_f	20.00 psf	Flat Roof Snow Load, Pf = 0.7 * Ce * Ct * Is * Pg - Section 1608.3
D	17.25 pcf	Snow density,D = 0.13Pg +14 <= 30 pcf - 1608.7
h_b	1.16'	Height of minimum roof snow load, (Default, Pf/D) - 1608.7
h_r	18.5'	Difference in height between upper and lower roofs
h_c	17.3'	Difference in height between upper roof and top of flat roof snow
$l_{u,\ high}$	44'	Horizontal dimension of upper roof normal to the line of change of roof level
$l_{u,\ low}$	130'	Horizontal dimension of lower roof normal to the line of change of roof level

Drift Calculations					
Drift location	**Calc. h_d (ft)**	**Corrected h_d (ft)**	**P_d (psf)**	**P_{max} (psf)**	**W_d**
Windward Drift	2.85	2.85	49.14	69.14	11.39
Leeward Drift	2.19	2.19	37.82	57.82	8.77
Design Drift	***2.85***	***2.85***	***49.1***	***69.1***	***11.4***

X	Y	A1 (psf)	A2 (psf)	Total (psf)
2.0	61	61	4	**65**
4.0	52	52	4	**56**
6.0	43	43	4	**48**
8.0	35	35	4	**39**
10.0	26	26	4	**30**
11.4	20	20	3	**23**

A.2 Lateral Loading

A.2.1 Wind

Input Information

	L: Length of Building in X- Direction	B: Length of Building in Y - Direction	L/B	B/L	Story Heights (ft)	Building Story Height (ft)
						210.50 ft
R	270.00 ft	88.00 ft	3.07	0.33	14.50 ft	210.50 ft
15	270.00 ft	88.00 ft	3.07	0.33	13.50 ft	196.00 ft
14	270.00 ft	88.00 ft	3.07	0.33	13.50 ft	182.50 ft
13	270.00 ft	88.00 ft	3.07	0.33	13.50 ft	169.00 ft
12	270.00 ft	88.00 ft	3.07	0.33	13.50 ft	155.50 ft
11	270.00 ft	88.00 ft	3.07	0.33	13.50 ft	142.00 ft
10	270.00 ft	88.00 ft	3.07	0.33	13.50 ft	128.50 ft
9	270.00 ft	88.00 ft	3.07	0.33	13.50 ft	115.00 ft
8	270.00 ft	88.00 ft	3.07	0.33	13.50 ft	101.50 ft
7	270.00 ft	88.00 ft	3.07	0.33	13.50 ft	88.00 ft
6	270.00 ft	88.00 ft	3.07	0.33	13.50 ft	74.50 ft
5	270.00 ft	88.00 ft	3.07	0.33	13.50 ft	61.00 ft
4	270.00 ft	88.00 ft	3.07	0.33	13.50 ft	47.50 ft
3	270.00 ft	88.00 ft	3.07	0.33	13.50 ft	34.00 ft
2	270.00 ft	88.00 ft	3.07	0.33	10.25 ft	20.50 ft
Int.	270.00 ft	88.00 ft	3.07	0.33	10.25 ft	10.25 ft

210.50 ft

h	210.50 ft	*Mean Roof Height of Building*
H	210.50 ft	*Total Height of Roof*
Ct	0.030	*Fundamental Period Coefficient, ASCE 7-02 Table 9.5.5.3.2*
x	0.750	*Fundamental Period Factor, ASCE 7-02 Table 9.5.5.3.2*
Ta	0.60 Hz	*Structure is flexible so G will be calculated per ASCE Section 6.5.8.2*
Θ	0.0 deg	*Angle of Roof Slope*
V	90 mph	
I	1.00	
Exposure	B	
Roof Diapragm	2	*Is roof diaphragm considered rigid or flexible??*

Calculated Information

Height	HIGH	*"High" for Buildings >60', "Low" for Buildings < 60'*
Cp-w	0.8	*Windward Wall Pressure Coefficient, ASCE 7-02 Figure 6-6*
Cp-S	-0.7	*Side Wall Pressure Coefficient, ASCE 7-02 Figure 6-6*
Kd	0.85	*Wind Directionality Factor, ASCE 7-02 Table 6-4*
Gcpi	0.18	*Internal Pressure Coefficients for Enclosed Buildings, ASCE 7-02 Figure 6-5*

Criteria			Reference/Description
h	210.5		height of building
zmin	30		RIGID: From Table 6-2 of ASCE 7-02
zbar	126.3		RIGID: 0.6*h > zmin: ASCE 7-02 Section 6.5.8.1
c	0.3		RIGID: From Table 6-2 of ASCE
g_q	3.4		per section 6.5.8.1 and 6.5.8.2 of ASCE 7-02
g_v	3.4		per section 6.5.8.1 and 6.5.8.2 of ASCE 7-02
l	320		RIGID: Table 6-2 of ASCE 7-02
e	0.33		RIGID: Table 6-2 of ASCE 7-02
n_1, Y-dir	0.561		Natural Period
n_1, X-dir	0.81		Natural Period
b	0.05		Damping Factor
V	90		Basic Wind Speed
bbar	0.45		FLEXIBLE: Table 6-2 ASCE 7-02
abar	0.25		FLEXIBLE: Table 6-2 ASCE 7-02
L_z	0.2398684		Equation 6-5 ASCE 7-02
L_{zz}	500.52643		Equation 6-7 ASCE 7-02
	Y - Direction	X - Direction	
g_r	4.0493434	4.1389373	FLEXIBLE: Equation 6-9
V_z	75.529414	75.529414	FLEXIBLE: Equation 6-14
h_h	10.384339	10.384339	FLEXIBLE: Section 6.5.8.2
R_h	0.0916621	0.0916621	FLEXIBLE: Section 6.5.8.2
N_1	5.367795	5.367795	FLEXIBLE: Equation 6-12
R_n	0.0485013	0.0485013	FLEXIBLE: Equation 6-11

Stiff Building Calculations / Flexible Building Calculations

Level	Height	B	L	Q	G stiff X-dir	nl	nb	Rl	Rb	R	G flex X-dir
Int.	10.25	88	270	0.829	0.833	44.592	4.341	0.0222	0.204	0.099	0.838
3	13.5	88	270	0.829	0.833	44.592	4.341	0.0222	0.204	0.099	0.838
4	13.5	88	270	0.829	0.833	44.592	4.341	0.0222	0.204	0.099	0.838
5	13.5	88	270	0.829	0.833	44.592	4.341	0.0222	0.204	0.099	0.838
6	13.5	88	270	0.829	0.833	44.592	4.341	0.0222	0.204	0.099	0.838
7	13.5	88	270	0.829	0.833	44.592	4.341	0.0222	0.204	0.099	0.838
8	13.5	88	270	0.829	0.833	44.592	4.341	0.0222	0.204	0.099	0.838
9	13.5	88	270	0.829	0.833	44.592	4.341	0.0222	0.204	0.099	0.838
10	13.5	88	270	0.829	0.833	44.592	4.341	0.0222	0.204	0.099	0.838
11	13.5	88	270	0.829	0.833	44.592	4.341	0.0222	0.204	0.099	0.838
12	13.5	88	270	0.829	0.833	44.592	4.341	0.0222	0.204	0.099	0.838
13	13.5	88	270	0.829	0.833	44.592	4.341	0.0222	0.204	0.099	0.838
14	13.5	88	270	0.829	0.833	44.592	4.341	0.0222	0.204	0.099	0.838
15	13.5	88	270	0.829	0.833	44.592	4.341	0.0222	0.204	0.099	0.838
R	14.5	88	270	0.829	0.833	44.592	4.341	0.0222	0.204	0.099	0.838
0	0	0	0	0.856	0.848	0.000	0.000	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Stiff Building Calculations / Flexible Building Calculations

Level	Height	B	L		G stiff Y-dir	nl	nb	Rl	Rb	R	G flex Y-dir
Int.	10.25	270	88	0.787	0.811	10.066	9.225	0.0944	0.103	0.072	0.813
3	13.5	270	88	0.787	0.811	10.066	9.225	0.0944	0.103	0.072	0.813
4	13.5	270	88	0.787	0.811	10.066	9.225	0.0944	0.103	0.072	0.813
5	13.5	270	88	0.787	0.811	10.066	9.225	0.0944	0.103	0.072	0.813
6	13.5	270	88	0.787	0.811	10.066	9.225	0.0944	0.103	0.072	0.813
7	13.5	270	88	0.787	0.811	10.066	9.225	0.0944	0.103	0.072	0.813
8	13.5	270	88	0.787	0.811	14.534	13.320	0.0664	0.072	0.060	0.812
9	13.5	270	88	0.787	0.811	14.534	13.320	0.0664	0.072	0.060	0.812
10	13.5	270	88	0.787	0.811	14.534	13.320	0.0664	0.072	0.060	0.812
11	13.5	270	88	0.787	0.811	14.534	13.320	0.0664	0.072	0.060	0.812
12	13.5	270	88	0.787	0.811	14.534	13.320	0.0664	0.072	0.060	0.812
13	13.5	270	88	0.787	0.811	14.534	13.320	0.0664	0.072	0.060	0.812
14	13.5	270	88	0.787	0.811	14.534	13.320	0.0664	0.072	0.060	0.812
15	13.5	270	88	0.787	0.811	14.534	13.320	0.0664	0.072	0.060	0.812
R	14.5	270	88	0.787	0.811	14.534	13.320	0.0664	0.072	0.060	0.812
0	0	0	0	0.856	0.848	0.000	0.000	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Summary

h			G flex Y-dir	G flex X-dir		height	par to short	par to long
10	0	1	0.813	0.838	1	0	0.813	0.838
24	20	3	0.813	0.838	2	15	0.813	0.838
37.3	30	5	0.813	0.838	3	20	0.813	0.838
50.8	50	7	0.813	0.838	4	25	0.813	0.838
64	60	8	0.813	0.838	5	30	0.813	0.838
78	70	9	0.813	0.838	6	40	0.813	0.838
91	90	11	0.812	0.838	7	50	0.813	0.838
105	100	12	0.812	0.838	8	60	0.813	0.838
118	110	13	0.812	0.838	9	70	0.813	0.838
132	130	15	0.812	0.838	10	80	0.813	0.838
145	140	16	0.812	0.838	11	90	0.812	0.838
159	150	17	0.812	0.838	12	100	0.812	0.838
172	170	19	0.812	0.838	13	110	0.812	0.838
172	170	19	#DIV/0!	#DIV/0!	14	120	0.812	0.838

Design Wind Pressures on Main-Wind-Force-Resisting-Systems

ASCE Section 6.5

Height above ground level, z	Kz	G X-Dir	G Y-Dir	L/B	B/L	Cp Leeward X-Dir	Cp Leeward Y-Dir	Velocity Pressure, qz	Velocity Pressure, qh	Design Windward Wall Pressure in X- Dir	Design Windward Wall Pressure in Y-Dir	Design Leeward Wall Pressure in X-Dir	Design Leeward Wall Pressure in Y-Dir	Total Pressure for MWFRS in X-Dir	Total Pressure for MWFRS in Y Dir	Building Floor Elevation
0 ft	0.575	0.8378	0.8131	3.07	0.33	-0.248	-0.500	10.1 psf	21.2 psf	6.8 psf	6.6 psf	-4.4 psf	-8.6 psf	**11.2 psf**	**15.2 psf**	10.25 ft
15 ft	0.575	0.8378	0.8131	3.07	0.33	-0.248	-0.500	10.1 psf	21.2 psf	6.8 psf	6.6 psf	-4.4 psf	-8.6 psf	**11.2 psf**	**15.2 psf**	20.50 ft
20 ft	0.624	0.8378	0.8131	3.07	0.33	-0.248	-0.500	11.0 psf	21.2 psf	7.4 psf	7.2 psf	-4.4 psf	-8.6 psf	**11.8 psf**	**15.8 psf**	34.00 ft
25 ft	0.665	0.8378	0.8131	3.07	0.33	-0.248	-0.500	11.7 psf	21.2 psf	7.9 psf	7.6 psf	-4.4 psf	-8.6 psf	**12.3 psf**	**16.3 psf**	47.50 ft
30 ft	0.701	0.8378	0.8131	3.07	0.33	-0.248	-0.500	12.3 psf	21.2 psf	8.3 psf	8.0 psf	-4.4 psf	-8.6 psf	**12.7 psf**	**16.7 psf**	61.00 ft
40 ft	0.761	0.8378	0.8131	3.07	0.33	-0.248	-0.500	13.4 psf	21.2 psf	9.0 psf	8.7 psf	-4.4 psf	-8.6 psf	**13.4 psf**	**17.4 psf**	74.50 ft
50 ft	0.811	0.8378	0.8131	3.07	0.33	-0.248	-0.500	14.3 psf	21.2 psf	9.6 psf	9.3 psf	-4.4 psf	-8.6 psf	**14.0 psf**	**17.9 psf**	88.00 ft
60 ft	0.854	0.8378	0.8131	3.07	0.33	-0.248	-0.500	15.1 psf	21.2 psf	10.1 psf	9.8 psf	-4.4 psf	-8.6 psf	**14.5 psf**	**18.4 psf**	101.50 ft
70 ft	0.892	0.8378	0.8131	3.07	0.33	-0.248	-0.500	15.7 psf	21.2 psf	10.5 psf	10.2 psf	-4.4 psf	-8.6 psf	**14.9 psf**	**18.9 psf**	115.00 ft
80 ft	0.927	0.8378	0.8131	3.07	0.33	-0.248	-0.500	16.3 psf	21.2 psf	11.0 psf	10.6 psf	-4.4 psf	-8.6 psf	**15.4 psf**	**19.3 psf**	128.50 ft
90 ft	0.959	0.8378	0.8124	3.07	0.33	-0.248	-0.500	16.9 psf	21.2 psf	11.3 psf	11.0 psf	-4.4 psf	-8.6 psf	**15.7 psf**	**19.6 psf**	142.00 ft
100 ft	0.988	0.8378	0.8124	3.07	0.33	-0.248	-0.500	17.4 psf	21.2 psf	11.7 psf	11.3 psf	-4.4 psf	-8.6 psf	**16.1 psf**	**19.9 psf**	155.50 ft
120 ft	1.041	0.8378	0.8124	3.07	0.33	-0.248	-0.500	18.3 psf	21.2 psf	12.3 psf	11.9 psf	-4.4 psf	-8.6 psf	**16.7 psf**	**20.6 psf**	169.00 ft
140 ft	1.088	0.8378	0.8124	3.07	0.33	-0.248	-0.500	19.2 psf	21.2 psf	12.9 psf	12.5 psf	-4.4 psf	-8.6 psf	**17.3 psf**	**21.1 psf**	182.50 ft
160 ft	1.130	0.8378	0.8124	3.07	0.33	-0.248	-0.500	19.9 psf	21.2 psf	13.4 psf	12.9 psf	-4.4 psf	-8.6 psf	**17.8 psf**	**21.6 psf**	196.00 ft
180 ft	1.169	0.8378	0.8124	3.07	0.33	-0.248	-0.500	20.6 psf	21.2 psf	13.8 psf	13.4 psf	-4.4 psf	-8.6 psf	**18.2 psf**	**22.0 psf**	210.50 ft
200 ft	1.205	0.8378	0.8124	3.07	0.33	-0.248	-0.500	21.2 psf	21.2 psf	14.2 psf	13.8 psf	-4.4 psf	-8.6 psf	**18.6 psf**	**22.4 psf**	210.50 ft
250 ft	1.284	0.8378	0.8124	3.07	0.33	-0.248	-0.500	22.6 psf	21.2 psf	15.2 psf	14.7 psf	-4.4 psf	-8.6 psf	**19.6 psf**	**23.3 psf**	
300 ft	1.353	0.8378	0.8124													
350 ft	1.414	0.8378	0.8124													
400 ft	1.469	0.8378	0.8124													
450 ft	1.519	0.8378	0.8124													
500 ft	1.565	0.8378	0.8124													

Total Pressure for Frames Resisting Wind Forces Parellel to Y Direction

Total, Windward, Leeward? Total

Height above ground level, z	Total Design Pressure	0.5	2	3	4	5	6	7	8	9	10	11	12	13	14	15	R
Floor To Floor Heights		10.25 ft	10.25 ft	13.50 ft	13.50 ft	13.50 ft	13.50 ft	13.50 ft	13.50 ft	13.50 ft	13.50 ft	13.50 ft	13.50 ft	13.50 ft	13.50 ft	13.50 ft	14.50 ft
Story Elevations		10.25 ft	20.50 ft	34.00 ft	47.50 ft	61.00 ft	74.50 ft	88.00 ft	101.50 ft	115.00 ft	128.50 ft	142.00 ft	155.50 ft	169.00 ft	182.50 ft	196.00 ft	210.50 ft
Mid - Story Elevations		15.38 ft	27.25 ft	40.75 ft	54.25 ft	67.75 ft	81.25 ft	94.75 ft	108.25 ft	121.75 ft	135.25 ft	148.75 ft	162.25 ft	175.75 ft	189.25 ft	203.25 ft	210.50 ft
0 ft	15.2 psf																
15 ft	15.2 psf	156.0 plf	228.3 plf	228.3 plf	228.3 plf	228.3 plf	228.3 plf	228.3 plf	228.3 plf	228.3 plf	228.3 plf	228.3 plf	228.3 plf	228.3 plf	228.3 plf	228.3 plf	228.3 plf
20 ft	15.8 psf		78.9 plf	78.9 plf	78.9 plf	78.9 plf	78.9 plf	78.9 plf	78.9 plf	78.9 plf	78.9 plf	78.9 plf	78.9 plf	78.9 plf	78.9 plf	78.9 plf	78.9 plf
25 ft	16.3 psf		8.1 plf	81.3 plf	81.3 plf	81.3 plf	81.3 plf	81.3 plf	81.3 plf	81.3 plf	81.3 plf	81.3 plf	81.3 plf	81.3 plf	81.3 plf	81.3 plf	81.3 plf
30 ft	16.7 psf			83.3 plf	83.3 plf	83.3 plf	83.3 plf	83.3 plf	83.3 plf	83.3 plf	83.3 plf	83.3 plf	83.3 plf	83.3 plf	83.3 plf	83.3 plf	83.3 plf
40 ft	17.4 psf			69.4 plf	173.5 plf	173.5 plf	173.5 plf	173.5 plf	173.5 plf	173.5 plf	173.5 plf	173.5 plf	173.5 plf	173.5 plf	173.5 plf	173.5 plf	173.5 plf
50 ft	17.9 psf				134.5 plf	179.3 plf	179.3 plf	179.3 plf	179.3 plf	179.3 plf	179.3 plf	179.3 plf	179.3 plf	179.3 plf	179.3 plf	179.3 plf	179.3 plf
60 ft	18.4 psf					184.2 plf	184.2 plf	184.2 plf	184.2 plf	184.2 plf	184.2 plf	184.2 plf	184.2 plf	184.2 plf	184.2 plf	184.2 plf	184.2 plf
70 ft	18.9 psf					18.9 plf	188.7 plf	188.7 plf	188.7 plf	188.7 plf	188.7 plf	188.7 plf	188.7 plf	188.7 plf	188.7 plf	188.7 plf	188.7 plf
80 ft	19.3 psf						86.7 plf	192.6 plf	192.6 plf	192.6 plf	192.6 plf	192.6 plf	192.6 plf	192.6 plf	192.6 plf	192.6 plf	192.6 plf
90 ft	19.6 psf							156.9 plf	196.1 plf	196.1 plf	196.1 plf	196.1 plf	196.1 plf	196.1 plf	196.1 plf	196.1 plf	196.1 plf
100 ft	19.9 psf								199.5 plf	199.5 plf	199.5 plf	199.5 plf	199.5 plf	199.5 plf	199.5 plf	199.5 plf	199.5 plf
120 ft	20.6 psf								30.8 plf	308.3 plf	411.0 plf	411.0 plf	411.0 plf	411.0 plf	411.0 plf	411.0 plf	411.0 plf
140 ft	21.1 psf										179.3 plf	421.8 plf	421.8 plf	421.8 plf	421.8 plf	421.8 plf	421.8 plf
160 ft	21.6 psf											43.1 plf	334.4 plf	431.5 plf	431.5 plf	431.5 plf	431.5 plf
180 ft	22.0 psf													198.1 plf	440.3 plf	440.3 plf	440.3 plf
200 ft	22.4 psf														56.1 plf	358.8 plf	448.5 plf
250 ft	23.3 psf																245.0 plf
300 ft																	
350 ft																	
400 ft																	
450 ft																	
500 ft																	
Total Story Shear @ Floor		0 plf	87 plf	313 plf	552 plf	799 plf	1056 plf	1319 plf	1588 plf	1866 plf	2148 plf	2433 plf	2725 plf	3020 plf	3318 plf	3621 plf	3956 plf
Story Force per Floor		0.000 klf	0.087 klf	0.226 klf	0.239 klf	0.248 klf	0.256 klf	0.263 klf	0.270 klf	0.277 klf	0.282 klf	0.286 klf	0.291 klf	0.295 klf	0.298 klf	0.303 klf	0.335 klf

Total Wind Force on MWFRS in Y Direction

Floor Level	0.5	2	3	4	5	6	7	8	9	10	11	12	13	14	15	R
Length of Building	270.0 ft	270.0 ft	270.0 ft	270.0 ft	270.0 ft	270.0 ft	270.0 ft	270.0 ft	270.0 ft	270.0 ft	270.0 ft	270.0 ft	270.0 ft	270.0 ft	270.0 ft	270.0 ft
Frame Story Force per Floor	0.0 k	23.5 k	61.0 k	64.4 k	66.9 k	69.2 k	71.0 k	72.8 k	74.9 k	76.1 k	77.1 k	78.6 k	79.7 k	80.5 k	81.7 k	90.4 k
Frame Story Shear per Floor	1068.0 k	1068.0 k	1044.5 k	983.5 k	919.1 k	852.1 k	782.9 k	711.9 k	639.2 k	564.2 k	488.1 k	411.0 k	332.3 k	252.6 k	172.1 k	90.4 k

Total Pressure for Frames Resisting Wind Forces Parellel to X Direction

Total, Windward, Leeward? Total

Height above ground level, z	Total Design Pressure	Int.	2	3	4	5	6	7	8	9	10	11	12	13	14	15	R
Floor To Floor Heights		**10.25 ft**	**10.25 ft**	**13.50 ft**	**13.50 ft**	**13.50 ft**	**13.50 ft**	**13.50 ft**	**13.50 ft**	**13.50 ft**	**13.50 ft**	**13.50 ft**	**13.50 ft**	**13.50 ft**	**13.50 ft**	**13.50 ft**	**14.50 ft**
Story Elevations		10.25 ft	20.50 ft	34.00 ft	47.50 ft	61.00 ft	74.50 ft	88.00 ft	101.50 ft	115.00 ft	128.50 ft	142.00 ft	155.50 ft	169.00 ft	182.50 ft	196.00 ft	210.50 ft
Mid - Story Elevations		15.38 ft	27.25 ft	40.75 ft	54.25 ft	67.75 ft	81.25 ft	94.75 ft	108.25 ft	121.75 ft	135.25 ft	148.75 ft	162.25 ft	175.75 ft	189.25 ft	203.25 ft	210.50 ft
0 ft	11.2 psf																
20 ft	11.8 psf		58.9 plf	58.9 plf	58.9 plf	58.9 plf	58.9 plf	58.9 plf	58.9 plf	58.9 plf	58.9 plf	58.9 plf	58.9 plf	58.9 plf	58.9 plf	58.9 plf	58.9 plf
25 ft	12.3 psf		6.1 plf	61.3 plf	61.3 plf	61.3 plf	61.3 plf	61.3 plf	61.3 plf	61.3 plf	61.3 plf	61.3 plf	61.3 plf	61.3 plf	61.3 plf	61.3 plf	61.3 plf
30 ft	12.7 psf			63.4 plf	63.4 plf	63.4 plf	63.4 plf	63.4 plf	63.4 plf	63.4 plf	63.4 plf	63.4 plf	63.4 plf	63.4 plf	63.4 plf	63.4 plf	63.4 plf
40 ft	13.4 psf			53.6 plf	133.9 plf	133.9 plf	133.9 plf	133.9 plf	133.9 plf	133.9 plf	133.9 plf	133.9 plf	133.9 plf	133.9 plf	133.9 plf	133.9 plf	133.9 plf
50 ft	14.0 psf				104.8 plf	139.8 plf	139.8 plf	139.8 plf	139.8 plf	139.8 plf	139.8 plf	139.8 plf	139.8 plf	139.8 plf	139.8 plf	139.8 plf	139.8 plf
60 ft	14.5 psf					144.9 plf	144.9 plf	144.9 plf	144.9 plf	144.9 plf	144.9 plf	144.9 plf	144.9 plf	144.9 plf	144.9 plf	144.9 plf	144.9 plf
70 ft	14.9 psf					14.9 plf	149.5 plf	149.5 plf	149.5 plf	149.5 plf	149.5 plf	149.5 plf	149.5 plf	149.5 plf	149.5 plf	149.5 plf	149.5 plf
80 ft	15.4 psf						69.1 plf	153.6 plf	153.6 plf	153.6 plf	153.6 plf	153.6 plf	153.6 plf	153.6 plf	153.6 plf	153.6 plf	153.6 plf
90 ft	15.7 psf							125.8 plf	157.3 plf	157.3 plf	157.3 plf	157.3 plf	157.3 plf	157.3 plf	157.3 plf	157.3 plf	157.3 plf
100 ft	16.1 psf								160.8 plf	160.8 plf	160.8 plf	160.8 plf	160.8 plf	160.8 plf	160.8 plf	160.8 plf	160.8 plf
120 ft	16.7 psf								25.1 plf	250.5 plf	334.0 plf	334.0 plf	334.0 plf	334.0 plf	334.0 plf	334.0 plf	334.0 plf
140 ft	17.3 psf										146.7 plf	345.1 plf	345.1 plf	345.1 plf	345.1 plf	345.1 plf	345.1 plf
160 ft	17.8 psf											35.5 plf	275.2 plf	355.1 plf	355.1 plf	355.1 plf	355.1 plf
180 ft	18.2 psf													163.9 plf	364.2 plf	364.2 plf	364.2 plf
200 ft	18.6 psf														46.6 plf	298.1 plf	372.7 plf
250 ft	19.6 psf																205.5 plf
300 ft																	
350 ft																	
400 ft																	
450 ft																	
500 ft																	
Total Story Shear @ Floor		0.0 plf	65.0 plf	237.1 plf	422.3 plf	617.1 plf	820.7 plf	1031.0 plf	1248.3 plf	1473.8 plf	1704.0 plf	1937.9 plf	2177.6 plf	2421.4 plf	2668.4 plf	2919.9 plf	3200.0 plf
Story Force per Floor		**0.000 klf**	**0.065 klf**	**0.172 klf**	**0.185 klf**	**0.195 klf**	**0.204 klf**	**0.210 klf**	**0.217 klf**	**0.225 klf**	**0.230 klf**	**0.234 klf**	**0.240 klf**	**0.244 klf**	**0.247 klf**	**0.252 klf**	**0.280 klf**

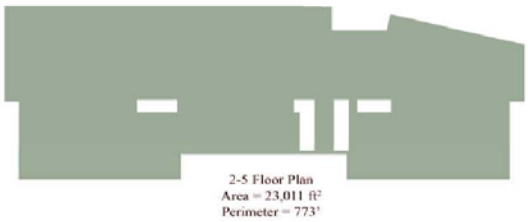
Total Wind Force on MWFRS in X Direction

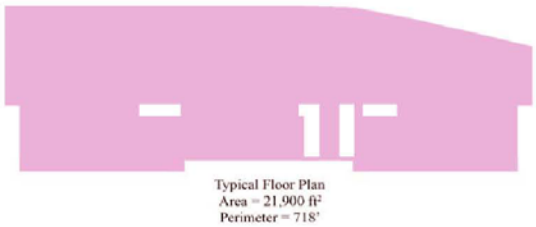
Floor Level	Int.	2	3	4	5	6	7	8	9	10	11	12	13	14	15	R
Length of Building	**88.0 ft**	**88.0 ft**	**88.0 ft**	**88.0 ft**	**88.0 ft**	**88.0 ft**	**88.0 ft**	**88.0 ft**	**88.0 ft**	**88.0 ft**	**88.0 ft**	**88.0 ft**	**88.0 ft**	**88.0 ft**	**88.0 ft**	**88.0 ft**
Frame Story Force per Floor	0.0 k	5.7 k	15.1 k	16.3 k	17.1 k	17.9 k	18.5 k	19.1 k	19.8 k	20.3 k	20.6 k	21.1 k	21.5 k	21.7 k	22.1 k	24.6 k
Frame Story Shear per Floor	281.6 k	281.6 k	275.9 k	260.7 k	244.4 k	227.3 k	209.4 k	190.9 k	171.7 k	151.9 k	131.6 k	111.1 k	90.0 k	68.5 k	46.8 k	24.6 k

A.2.2 Seismic

Input Information

D	Site Class - Section 1615.1.1
II	Seismic Use Group - Section 1616.2
B	Seismic Design Category - Section 1616.3
.300g	S_S, Spectral Accelerations for Short Periods - Section 1615.1
.075g	S_1, Spectral Accelerations for 1 Second Period - Section 1615.1
1.56	F_a, Site Coefficient - Table 1615.1.2(1)
2.4	F_v, Site Coefficient - Table 1615.1.2(2)
0.468	S_{MS}, Maximum Spectral Accelerations for Short Periods - Section 1615.1.2
0.18	S_{M1}, Maximum Spectral Accelerations for 1 Second Period - Section 1615.1.2
0.312	S_{DS}, Design Spectral Accelerations for Short Periods - Section 1615.1.3
0.12	S_{D1}, Design Spectral Accelerations for 1 Second Period - Section 1615.1.3
0.03	C_T , Building Period Coefficient - Section 1617.4.2.1
0.75	x
210.5 ft	h_n , Building Height - Section 1617.4.2.1
1.66	$T_a = C_T * h_n^{3/4}$ - Approximate Fundamental Period - Section 1617.4.2.1
0.077	$T_O = 0.2 * (S_{D1}/S_{DS})$- Section 1615.1.4
0.385	$T_S = S_{D1}/S_{DS}$ - Section 1615.1.4
0.072	S_a, Spectral Response Acceleration - Section 1615.1.4
1.25	I_e, Seismic Occupancy Importance Factor - Table 1604.5
5	R, Response Modification Factor - Table 1617.6
0.0780	C_S, Seismic Response Coefficient - Section 1617.4.1.1
0.0172	C_S (min) - Section 1617.4.1.1
0.0181	C_S (Max) - Section 1617.4.1.1
0.0181	C_S (Actual) - Section 1617.4.1.1
39,207 k	W, Effective Seismic Weight of Structure - Section 1617.4.1
709.4	$V = C_S * W$ - Seismic Base Shear - Section 1617.4.1
1.579	k, Distribution Exponent - Section 1617.4.3





	Mass Calculations						Force Calculations				
Floor	**Floor-Floor Height (ft)**	**Area (ft^2)**	**Floor Load (psf)**	**Perimeter**	**Wall Loading (psf)**	**Weight**	**Height from Ground**	**$w_x h_x^k$**	**Cvx, (Eq. 9.5.4-2)**	**Story Force (k)**	**Story Shear (k)**
						0 k	210.5 ft	0	0	0.0 k	0.0 k
R		21,900	65.0 psf	718 ft	15.0 psf	1424 k	210.5 ft	6632316	0.0889	63.1 k	63.1 k
15	14.5 ft	21,900	115.0 psf	718 ft	15.0 psf	2597 k	196 ft	10,808,579	0.145	102.8 k	165.9 k
14	13.5 ft	21,900	115.0 psf	718 ft	15.0 psf	2669 k	182.5 ft	9,927,131	0.133	94.4 k	260.3 k
13	13.5 ft	21,900	115.0 psf	718 ft	15.0 psf	2664 k	169 ft	8,775,004	0.118	83.5 k	343.8 k
12	13.5 ft	21,900	115.0 psf	718 ft	15.0 psf	2664 k	155.5 ft	7,694,106	0.103	73.2 k	416.9 k
11	13.5 ft	21,900	115.0 psf	718 ft	15.0 psf	2664 k	142 ft	6,666,241	0.089	63.4 k	480.3 k
10	13.5 ft	21,900	115.0 psf	718 ft	15.0 psf	2664 k	128.5 ft	5,693,479	0.076	54.2 k	534.5 k
9	13.5 ft	21,900	115.0 psf	718 ft	15.0 psf	2664 k	115 ft	4,778,194	0.064	45.4 k	579.9 k
8	13.5 ft	21,900	115.0 psf	718 ft	15.0 psf	2664 k	101.5 ft	3,923,145	0.053	37.3 k	617.3 k
7	13.5 ft	21,900	115.0 psf	718 ft	15.0 psf	2664 k	88 ft	3,131,594	0.042	29.8 k	647.0 k
6	13.5 ft	21,900	115.0 psf	718 ft	15.0 psf	2664 k	74.5 ft	2,407,495	0.032	22.9 k	669.9 k
5	13.5 ft	23,000	115.0 psf	773 ft	15.0 psf	2802 k	61 ft	1,846,499	0.025	17.6 k	687.5 k
4	13.5 ft	23,000	115.0 psf	773 ft	15.0 psf	2802 k	47.5 ft	1,243,992	0.017	11.8 k	699.3 k
3	13.5 ft	23,000	115.0 psf	773 ft	15.0 psf	2802 k	34 ft	733,720	0.010	7.0 k	706.3 k
2	13.5 ft	23,000	115.0 psf	773 ft	15.0 psf	2802 k	20.5 ft	330,061	0.004	3.1 k	709.4 k
Gnd	20.5 ft	23,000					**TOTAL**	**74,591,555**	**1.000**	**709.45**	
TOTAL	**210.5 ft**	**355,900**				**39,207 k**					

APPENDIX B: PRELIMINARY MEMBER DESIGN

B.I Post-tensioned Slab

Given: Live Load = 80 psf

Dead Load = 100 psf (assuming 8" thick slab)

Total Load = 180 psf

Preliminary Design:

- Balance Load:
- Net Load: $\omega_n = TL - \omega_{pre}$
  $\omega_n = 180\,psf - 90\,psf = 90\,psf$
- Design limits
  - Cover: ¾" from top and bottom
  - Allowable Stresses: Class U
    - At time of jacking
      - $f'_c = 6{,}000\,psi$
      - Compression (18.4.2a) $= 0.60\,f'_c = 0.6(6{,}000\,psi) = 3{,}600\,psi$
      - Tension (18.4.2b) $= 3\sqrt{f'_c} = 3\sqrt{6000\,psi} = 232\,psi$
    - At service
      - $f'_c = 6{,}000\,psi$
      - Compression $= 0.45\,f'_c = 0.45(6{,}000\,psi) = 2{,}700\,psi$
      - Tension $= 6\sqrt{f'_c} = 6\sqrt{6000\,psi} = 465\,psi$
  - Average pre-compression limits = 125 psi (min)
    = 300 psi (max)
  - Target Load Balances: 60%-80% of selfweight for slabs. Use 75%
    - $\omega_{pre} = 0.75\,slab$
      $\omega_{pre} = 0.75(100\,psf) = 75\,psf$
- Tendon profile
  - $a_A = 4.0"$
  - $a_B = \frac{(4.0"+7.0")}{2} - 1.75" = 3.75"$
- Prestress Force Required to Balance 70% of selfweight

- $w_b = 0.70(100\,psf)(52.5') = 3675\,plf = 3.68klf$

- Force needed in tendons to counteract the load in bay A-B.
  - $P = \frac{w_b l^2}{8a_A} = \frac{3.68klf\,(30')^2}{8(3.75''/12)} = 1323k$

- Check Precompression
  - $\#tendons = \frac{(1323k)}{26.6k/tendon} = 49$ tendons
  - Actual force for banded tendons: $P_{actual} = (49tendons)(26.6k) = 1303k$
  - Actual precompression stress: $\frac{P_{actual}}{A} = \frac{1303k}{630in^2 \times 8''} = 259\,psi$
    - 125 psi < 259 psi <300 psi
  - Check Interior Span Force
    - $P = \frac{(3.68klf)(30')^2}{8(6'')} = 827k < 1303k$ Less force is required in the center bay.
    - Check balance load for interior
      - $w_b = \frac{(1303k)(8)(6''/12)}{(30')^2} = 5.7klf$
      - $\frac{w_b}{w_{DL}} = \frac{5.7klf}{5.25klf} = 100\%$
  - **Effective prestress force, P_{eff} = 1303 k**

For further analysis, this layout was entered into RAM Conce*pt* and checked further.

B.2 Columns

Typical Columns Along Column Line 1

k	2	trib. W	30'
A_t	790 sf	f'c	6 ksi
span l_{ab}	52.5'	beam	800 plf
span l_{bc}	36'		

	w_{LL}	A_t (ft^2)	A_i (ft^2) = A_t x k	Reduction = $0.25+^{15}/_{\sqrt{Ai}}$	LL (k)	w_{DL} (psf)	DL (k)	Pu (k)	w_{uTL} (psf)	FEM_{ab}
R	60	790	1,580	0.63	30	65	72	**134 k**	3.24	**447'k**
15	80	1,580	3,160	0.52	65	115	224	**373 k**	7.98	**1100'k**
14	80	2,370	4,740	0.47	89	115	336	**545 k**	7.98	**1100'k**
13	80	3,160	6,320	0.44	111	115	447	**714 k**	7.98	**1100'k**
12	80	3,950	7,900	0.42	132	115	559	**883 k**	7.98	**1100'k**
11	80	4,740	9,480	0.40	153	115	671	**1050 k**	7.98	**1100'k**
10	80	5,530	11,060	0.40	177	115	783	**1223 k**	7.98	**1100'k**
9	80	6,320	12,640	0.40	202	115	895	**1397 k**	7.98	**1100'k**
8	80	7,110	14,220	0.40	228	115	1007	**1572 k**	7.98	**1100'k**
7	80	7,900	15,800	0.40	253	115	1119	**1747 k**	7.98	**1100'k**
6	80	8,690	17,380	0.40	278	115	1230	**1921 k**	7.98	**1100'k**
5	80	9,480	18,960	0.40	303	115	1342	**2096 k**	7.98	**1100'k**
4	80	10,270	20,540	0.40	329	115	1454	**2271 k**	7.98	**1100'k**
3	80	11,060	22,120	0.40	354	115	1566	**2445 k**	7.98	**1100'k**
2	80	11,850	23,700	0.40	379	115	1678	**2620 k**	7.98	**1100'k**

	b	h	γ	Rn	Kn	ρ	A_s		
R	20 in	20 in	0.80	**0.1717**	**0.0862**	0.031	12.4	(8)	#11
15	20 in	26 in	0.85	**0.2503**	**0.1839**	0.042	21.84	(14)	#11
14	20 in	26 in	0.85	**0.2503**	**0.2685**	0.048	24.96	(16)	#11
13	20 in	26 in	0.85	**0.2503**	**0.3522**	0.048	24.96	(16)	#11
12	20 in	26 in	0.85	**0.2503**	**0.4353**	0.048	24.96	(16)	#11
11	20 in	26 in	0.85	**0.2503**	**0.5180**	0.048	24.96	(16)	#11
10	20 in	26 in	0.85	**0.2503**	**0.6029**	0.048	24.96	(16)	#11
9	20 in	30 in	0.87	**0.1880**	**0.5972**	0.047	28.2	(18)	#11
8	20 in	30 in	0.87	**0.1880**	**0.6718**	0.047	28.2	(18)	#11
7	20 in	30 in	0.87	**0.1880**	**0.7464**	0.047	28.2	(18)	#11
6	20 in	30 in	0.87	**0.1880**	**0.8211**	0.047	28.2	(18)	#11
5	20 in	30 in	0.87	**0.1880**	**0.8957**	0.075	45	(20)	#14
4	20 in	30 in	0.87	**0.1880**	**0.9704**	0.075	45	(20)	#14
3	20 in	30 in	0.87	**0.1880**	**1.0450**	0.075	45	(20)	#14
2	20 in	30 in	0.87	**0.1880**	**1.1197**	0.075	45	(20)	#14

Typical Columns Along Column Line 3

k	2	trib. W	30'
A_t	540 sf	f'c	6 ksi
span l_{ab}	52.5'	beam	800 plf
span l_{bc}	36'		

	w_{LL}	A_t (ft^2)	A_i (ft^2) = A_t x k	Reduction= 0.25+15/$\sqrt{A_i}$	LL (k)	w_{DL} (psf)	DL (k)	Pu (k)	w_{uTL} (psf)	w_{uDL} (psf)	FEM_{bc}
R	60	540	1,080	0.71	23	65	50	**96 k**	3.24	2.34	152'k
15	80	1,080	2,160	0.57	49	115	153	**263 k**	7.98	4.14	268'k
14	80	1,620	3,240	0.51	67	115	230	**382 k**	7.98	4.14	268'k
13	80	2,160	4,320	0.48	83	115	306	**499 k**	7.98	4.14	268'k
12	80	2,700	5,400	0.45	98	115	383	**616 k**	7.98	4.14	268'k
11	80	3,240	6,480	0.44	113	115	459	**732 k**	7.98	4.14	268'k
10	80	3,780	7,560	0.42	128	115	536	**847 k**	7.98	4.14	268'k
9	80	4,320	8,640	0.41	142	115	612	**962 k**	7.98	4.14	268'k
8	80	4,860	9,720	0.40	156	115	689	**1076 k**	7.98	4.14	268'k
7	80	5,400	10,800	0.40	173	115	765	**1194 k**	7.98	4.14	268'k
6	80	5,940	11,880	0.40	190	115	842	**1314 k**	7.98	4.14	268'k
5	80	6,480	12,960	0.40	207	115	918	**1433 k**	7.98	4.14	268'k
4	80	7,020	14,040	0.40	225	115	995	**1553 k**	7.98	4.14	268'k
3	80	7,560	15,120	0.40	242	115	1071	**1672 k**	7.98	4.14	268'k
2	80	8,100	16,200	0.40	259	115	1148	**1792 k**	7.98	4.14	268'k

	b	h	γ	Rn	Kn	ρ	As		
R	18 in	18 in	0.78	**0.080**	**0.076**	0.022	7.128	(9)	#8
15	18 in	24 in	0.83	**0.080**	**0.156**	0.022	9.504	(12)	#8
14	18 in	24 in	0.83	**0.080**	**0.227**	0.08	34.56	(10)	#8
13	18 in	24 in	0.83	**0.080**	**0.296**	0.08	34.56	(10)	#8
12	18 in	24 in	0.83	**0.080**	**0.366**	0.08	34.56	(10)	#8
11	18 in	24 in	0.83	**0.080**	**0.434**	0.08	34.56	(10)	#8
10	18 in	24 in	0.83	**0.080**	**0.503**	0.08	34.56	(10)	#8
9	18 in	24 in	0.83	**0.080**	**0.571**	0.03	12.96	(16)	#8
8	18 in	28 in	0.86	**0.058**	**0.548**	0.03	15.12	(16)	#8
7	18 in	28 in	0.86	**0.058**	**0.608**	0.03	15.12	(16)	#8
6	18 in	28 in	0.86	**0.058**	**0.668**	0.03	15.12	(16)	#8
5	18 in	28 in	0.86	**0.058**	**0.729**	0.05	25.2	(16)	#11
4	18 in	28 in	0.86	**0.058**	**0.790**	0.05	25.2	(16)	#11
3	18 in	28 in	0.86	**0.058**	**0.851**	0.05	25.2	(16)	#11
2	18 in	28 in	0.86	**0.058**	**0.912**	0.05	25.2	(16)	#11

Column Schedule

	C-1	C-2	C-3	C-4	C-5	C-6	C-7	C-8
R	22x 22 (16)- #9 2228k	18x 18 (18)- #4 1212k	24x 24 (18)- #6 2218k	24x 24 (16)- #9 2533k	22x 22 (20)- #8 2221k	22x 26 (16)- #8 2389k	22x 26 (16)- #6 2171k	
15	22x 26 (16)- #6 2171k	18x 24 (18)- #5 1648k	32x 32 (18)- #7 3816k	22x 26 (16)- #9 2520k	22x 26 (20)- #7 2364k	22x 26 (16)- #9 2520k	22x 26 (16)- #6 2171k	
14	22x 26 (16)- #6 2171k	18x 24 (18)- #5 1648k	32x 32 (18)- #7 3816k	22x 26 (16)- #6 2171k	22x 26 (20)- #5 #N/A	22x 26 (16)- #6 2171k	22x 26 (16)- #6 2171k	
13	22x 26 (16)- #6 2171k	18x 24 (18)- #5 1648k	32x 32 (18)- #7 3816k	22x 26 (16)- #6 2171k	22x 26 (20)- #5 #N/A	22x 26 (16)- #6 2171k	22x 26 (16)- #6 2171k	
12	22x 26 (16)- #6 2170.740k	18x 24 (18)- #5 1647.594k	32x 32 (18)- #7 3815.760k	22x 26 (16)- #6 2170.740k	22x 26 (20)- #5 #N/A	22x 26 (16)- #6 2170.740k	22x 26 (16)- #6 2170.740k	
11	22x 26 (16)- #6 2171k	18x 24 (18)- #5 1648k	32x 32 (18)- #7 3816k	22x 26 (16)- #6 2171k	22x 26 (20)- #5 #N/A	22x 26 (16)- #6 2171k	22x 26 (16)- #6 2171k	
10	22x 32 (16)- #6 2608k	18x 28 (18)- #5 1886k	32x 32 (18)- #7 3816k	22x 32 (16)- #6 2608k	22x 32 (20)- #6 2677k	22x 30 (16)- #6 2462k	22x 30 (16)- #6 2462k	
9	22x 32 (16)- #6 2608k	18x 28 (18)- #5 1886k	32x 32 (18)- #7 3816k	22x 32 (16)- #6 2608k	22x 32 (20)- #6 2677k	22x 30 (16)- #6 2462k	22x 30 (16)- #6 2462k	
8	22x 32 (16)- #6 2608k	18x 28 (18)- #5 1886k	32x 32 (18)- #7 3816k	22x 32 (16)- #6 2608k	22x 32 (20)- #6 2677k	22x 30 (16)- #6 2462k	22x 30 (16)- #6 2462k	
7	22x 32 (16)- #6 2608k	18x 28 (18)- #5 1886k	32x 32 (18)- #7 3816k	22x 32 (16)- #6 2608k	22x 32 (20)- #6 2677k	22x 30 (16)- #6 2462k	22x 30 (16)- #6 2462k	
6	22x 32 (16)- #6 2608k	18x 28 (18)- #5 1886k	32x 32 (18)- #7 3816k	22x 32 (16)- #6 2608k	22x 32 (20)- #6 2677k	22x 30 (16)- #6 2462k	22x 30 (16)- #6 2462k	
5	22x 32 (16)- #6 2608k	18x 28 (18)- #5 1886k	34x 34 (18)- #8 4387k	22x 32 (16)- #6 2608k	22x 32 (20)- #6 2677k	22x 30 (16)- #6 2462k	22x 30 (16)- #6 2462k	12x 12 (8)- #4 539k
4	22x 32 (16)- #6 2608k	18x 28 (18)- #5 1886k	34x 34 (18)- #9 4534k	22x 32 (16)- #8 2827k	22x 32 (20)- #8 2950k	22x 30 (16)- #8 2681k	22x 30 (16)- #6 2462k	12x 12 (8)- #4 539k
3	22x 32 (16)- #6 2608k	18x 28 (18)- #5 1886k	34x 34 (18)- #11 4927k	22x 32 (16)- #10 3126k	22x 32 (20)- #10 3324k	22x 30 (16)- #10 2980k	22x 30 (16)- #6 2462k	12x 12 (8)- #4 539k
2	22x 32 (16)- #6 2608k	18x 28 (18)- #6 1980k	34x 34 (18)- #14 5412k	22x 32 (16)- #11 3307k	22x 32 (20)- #11 3551k	22x 30 (16)- #11 3161k	22x 30 (16)- #6 2462k	12x 12 (8)- #4 539k

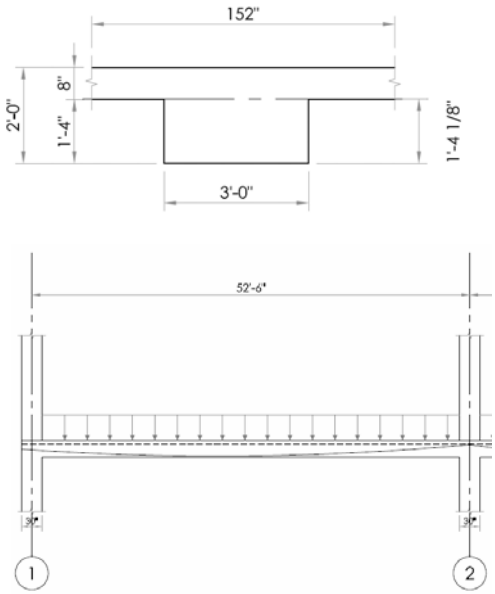
B.3 Beams

Note: All beams analyzed in a similar manner to the following two procedures.

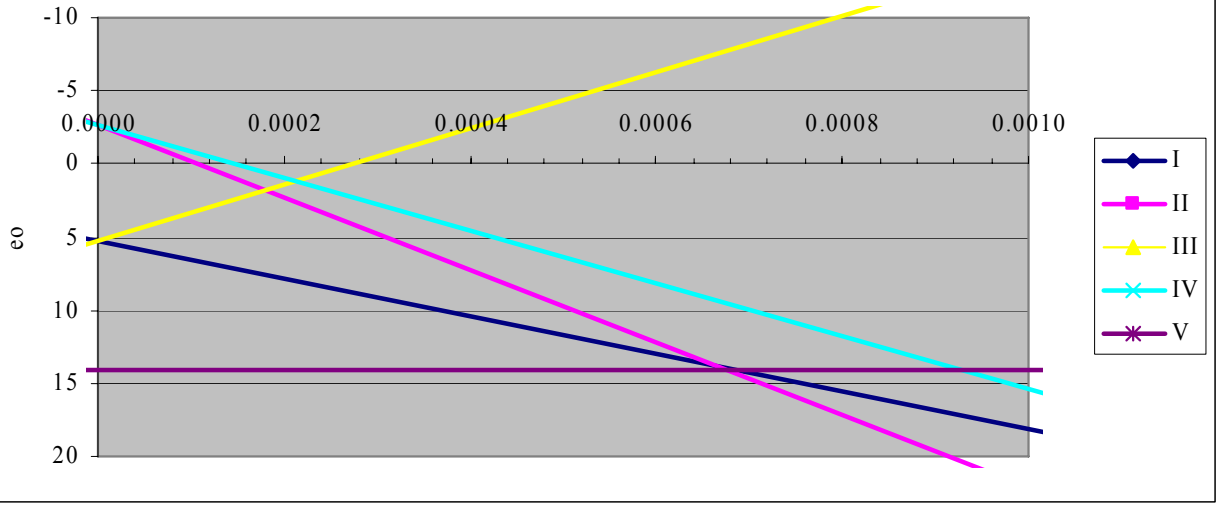
Detailed Calculation of 52' Post-tensioned beams

Stresses		Losses	
f'_c	6000 psi	σ_{ci}	3 ksi
f'_{ci}	5000 psi	σ_{cs}	4 ksi
f_{pu}	270 ksi	σ_{ti}	0 ksi
f_{pi}	181 ksi	σ_{ts}	-1 ksi
f_{py}	243 ksi	η	0.85
Input Information			
L span	53'	A_{ps}	0 sq in
dc,min	2 in	h	24 in
Section Properties			
A (in^2)	**I (in^4)**	**y_b (in)**	**yt (in)**
1792	75057	16.1429	7.8571
z_b (in)	**z_t (in)**	**k_b (in)**	**k_t (in)**
4650	9553	5.33	-2.59
$M_{mid\text{-}span}$ (in-k)			
ω_g (plf)	**ω_{LL} (plf)**	**M_{min}**	**M_{max}**
3600	2,400	10,825	18,041

Selection of Force	
IV	V
F_i	1078 k
Selection of Steel	
0.8fpu	216 ksi
0.7fpu	189 ksi
As	5.96 sq in
$\#_{strands}$	39
F_i	1080 k
$e_{o,u}$	14 in
$e_{o,l}$	14 in
$e_{o,mid}$	14 in
$e_{o,supp}$	5 in



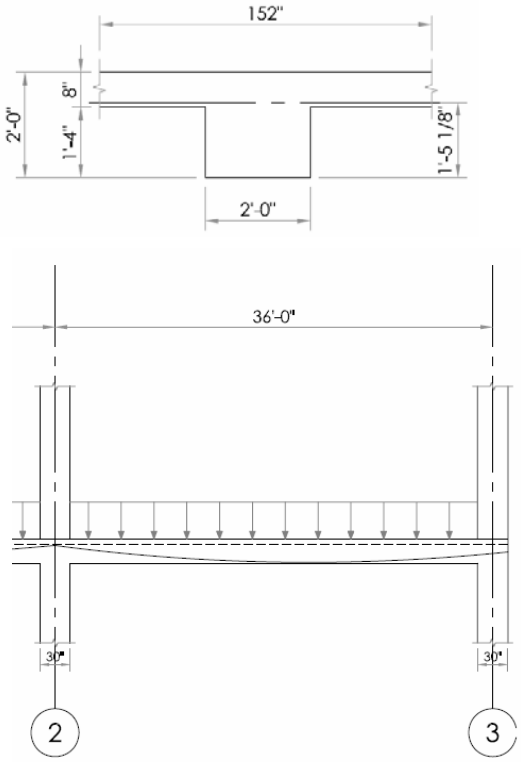
1/Fi					
e_o	***I***	***II***	***III***	***IV***	**V**
-30	-0.0027	-0.0011	0.0018	-0.0015	14.1429
30	0.0019	0.0013	-0.0013	0.0018	14.1429



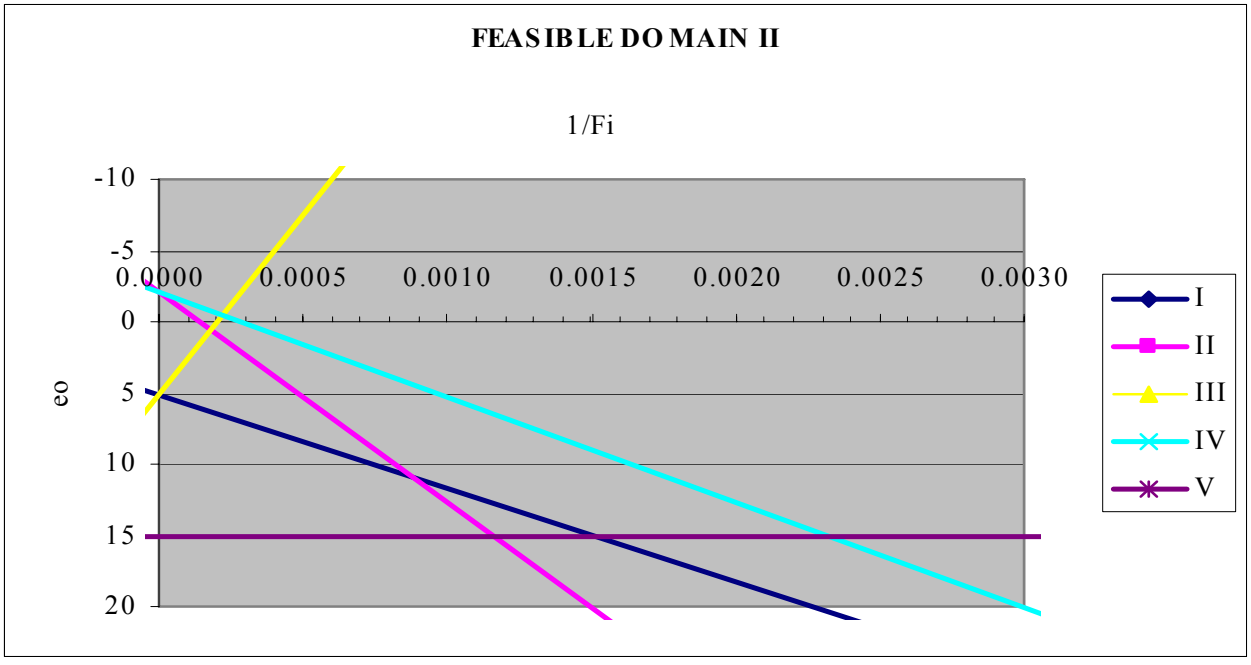
Detailed Calculation of 36' Interior Post-tensioned Beam

Stresses		Losses	
f'_c	6000 psi	σ_{ci}	3 ksi
f'_{ci}	5000 psi	σ_{cs}	4 ksi
f_{pu}	270 ksi	σ_{ti}	0 ksi
f_{pi}	181 ksi	σ_{ts}	-1 ksi
f_{py}	243 ksi	η	0.85
Input Information			
L_{span}	36'	A_{ps}	0.15 sq in
$d_{c,min}$	2 in	h	24 in
Section Properties			
A (in^2)	**I (in^4)**	**y_b (in)**	**yt (in)**
1600	56702	17.12	6.88
z_b (in)	**z_t (in)**	**k_b (in)**	**k_t (in)**
3312	8242	5.15	-2.07
$M_{mid\text{-}span}$ (in-k)			
ω_g (plf)	**ω_{LL} (plf)**	**M_{min}**	**M_{max}**
3400	2,400	4,807	8,200

Selection of Force	
IV	V
F_i	430 k
Selection of Steel	
0.8fpu	216 ksi
0.7fpu	189 ksi
As	2.37 sq in
$\#_{strands}$	16
F_i	443 k
$e_{o,u}$	15 in
$e_{o,l}$	15 in
$e_{o,mid}$	15 in
$e_{o,supp}$	5 in



1/Fi					
e_o	***I***	***II***	***III***	***IV***	**V**
-30	-0.0054	-0.0019	0.0014	-0.0038	15.12
30	0.0038	0.0022	-0.0010	0.0043	15.12



B.4 Shearwalls

The shearwalls are designed using 4000 psi concrete and use the forces for wind in the north-south direction for the north-south walls and use the forces for seismic activity in the east-west direction. The hand calculations below show preliminary designs and the formulas used in the following spreadsheets.

$V_u \le \phi V_n$

$V_n = V_c + V_s$

- $V_c = 2\sqrt{f'_c}hd = 2\sqrt{4000\,psi}(12")\left(0.8\times 36'\times 12\,{}^{in}/_{ft}\right) = 525k$
- $V_s = \dfrac{A_v f_y d}{s}$
  - Horizontal Reinforcing

    $\rho_{h,\min} = 0.0025$

    $A_{h,\min} = 0.0025(13.5'\times 12")(36'\times 12") = 175in^2$

    $s_{\max} = \min\begin{cases} \frac{l_w}{5} = 86.4" \\ 3h = 36" \\ 18" \end{cases} = 18"$

    Try #6 @ 14": $A_h = 183in^2, \rho = 0.0026$
  - Vertical Reinforcing

    $\rho_{v,\min} = 0.0025$

    $\rho_v = 0.0025 + 0.5\left(2.5 - \dfrac{211'}{36'}\right)(0.0026 - 0.0025) = 0.0023 \therefore 0.0025$

    $s_{\max} = \min\begin{cases} \frac{l_w}{3} = 144" \\ 3h = 36" \\ 18" \end{cases} = 18"$

    Try #6 @ 14": $A_v = 183in^2, \rho = 0.0026$

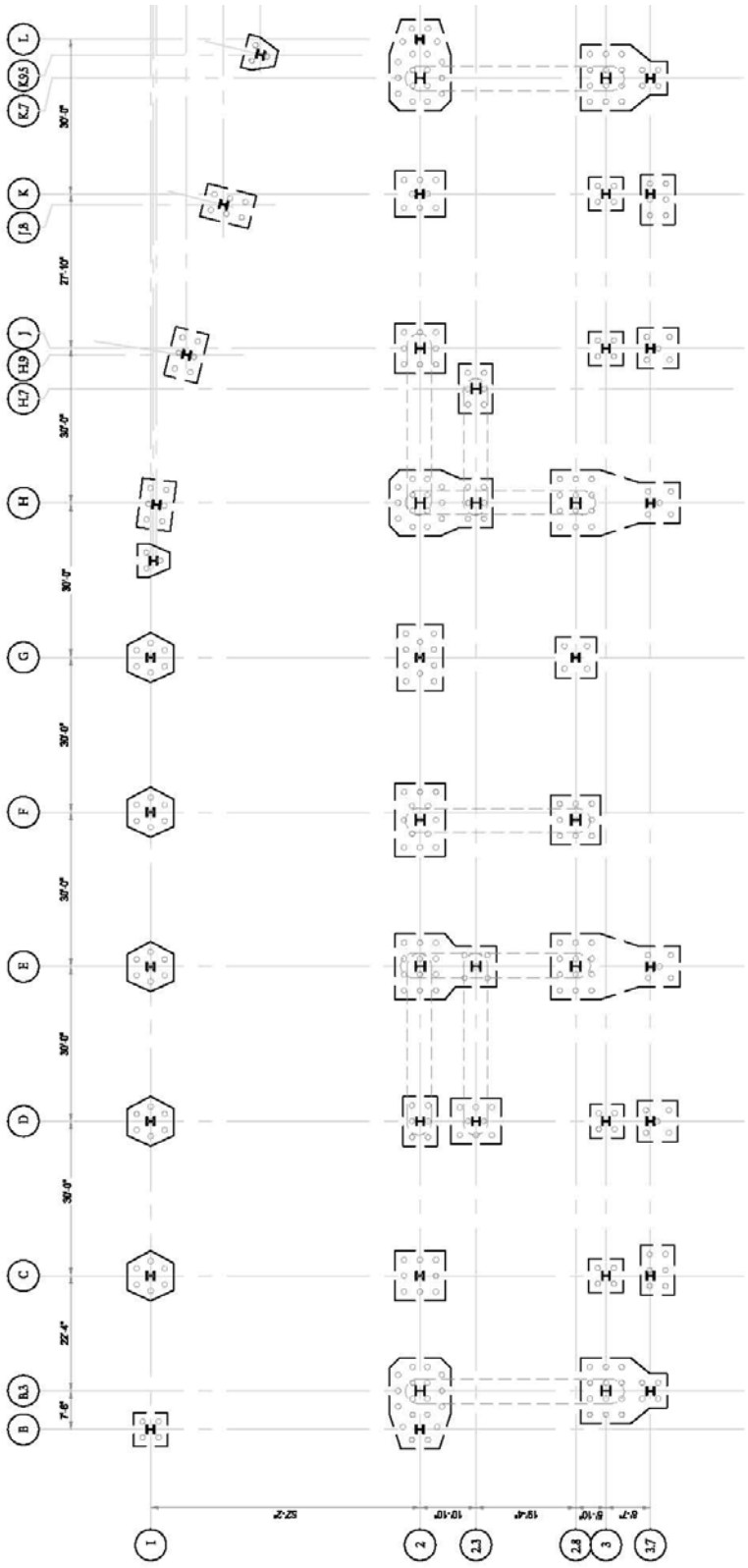
  $V_s = \dfrac{A_v f_y d}{s} = \dfrac{183in^2(60ksi)(0.8\times 36'\times 12")}{14"} = 271k$

$V_n = 525k + 271k = 796k$

$\phi V_n = 0.75(796k) = 597k$

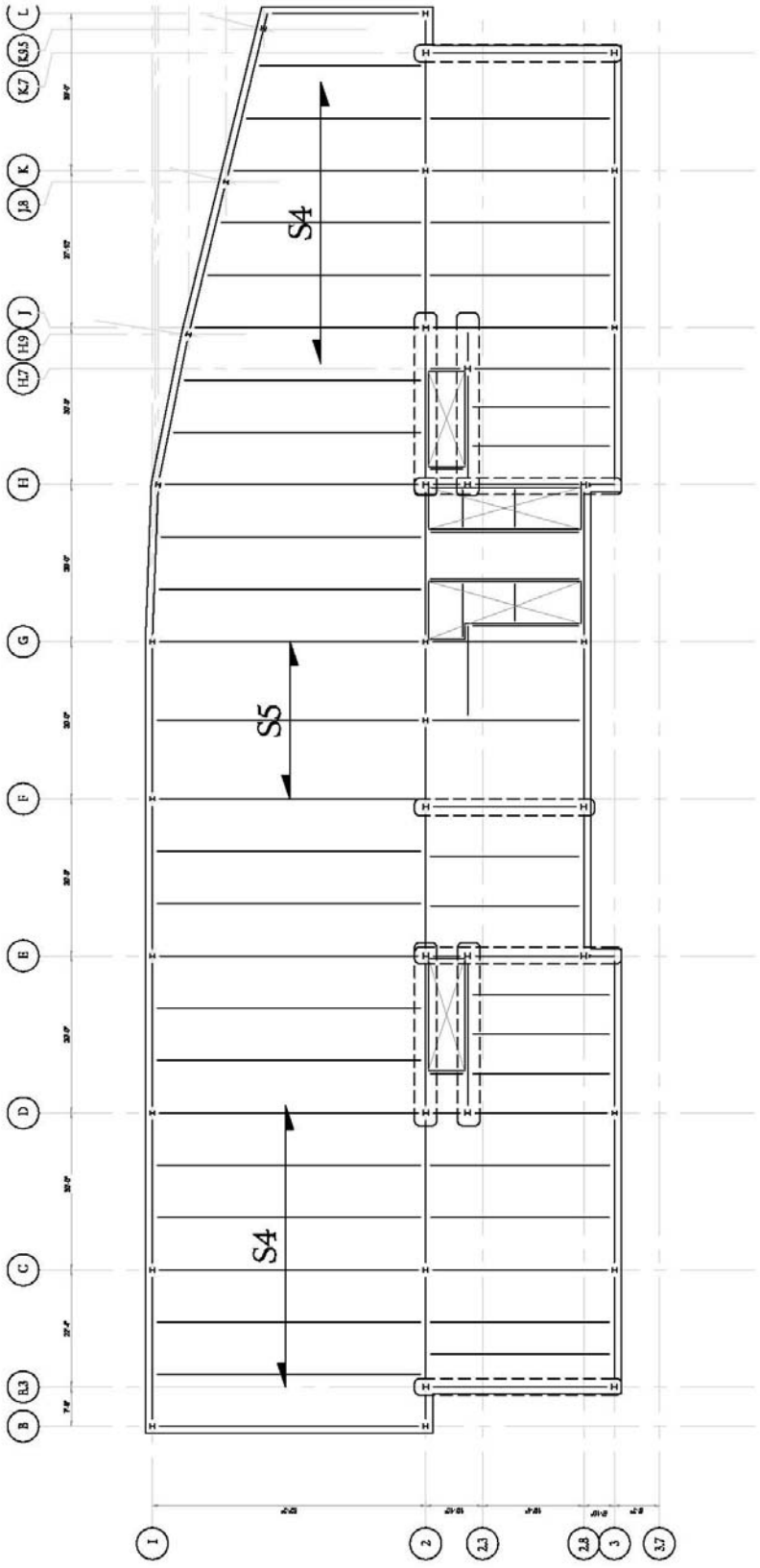
APPENDIX C: PLANS

C.I Composite Steel-Foundation



COMPOSITE STEEL FOUNDATION PLAN

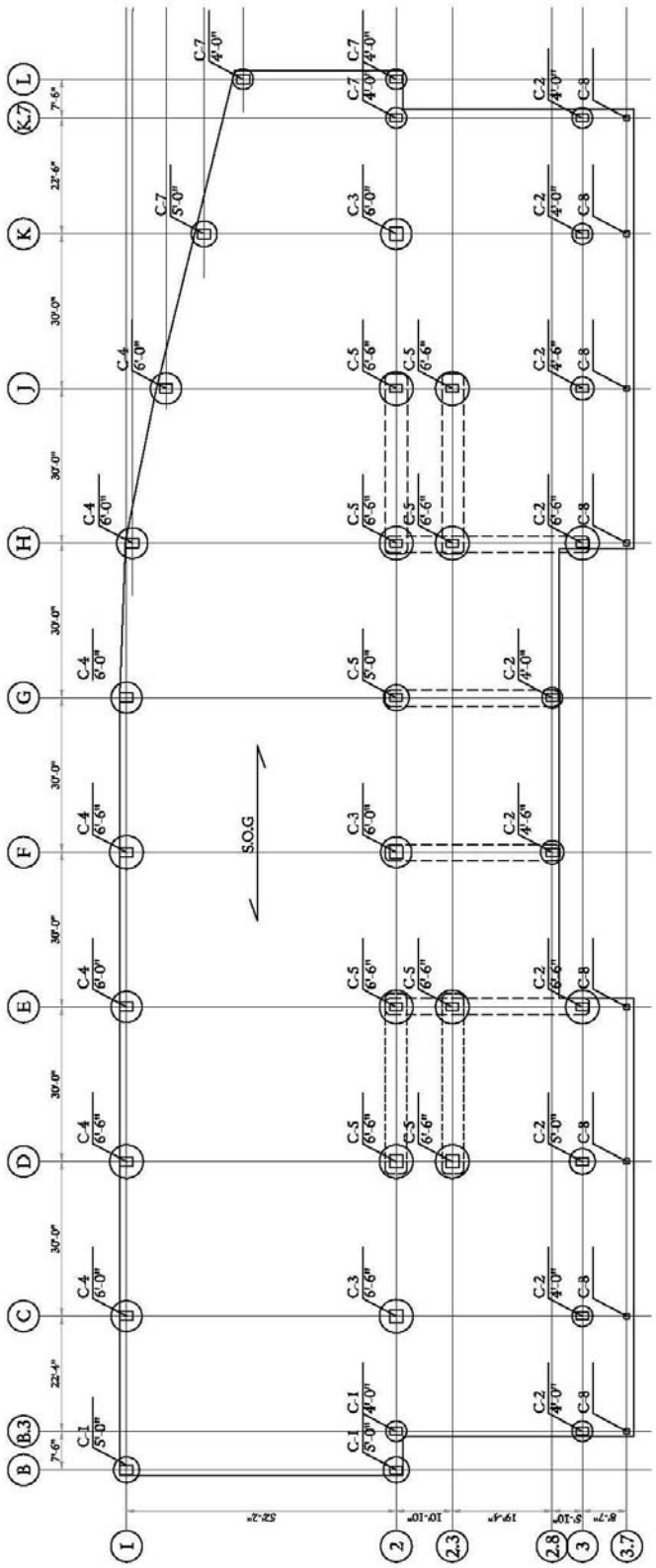
C.2 Composite Steel-Typical Floor



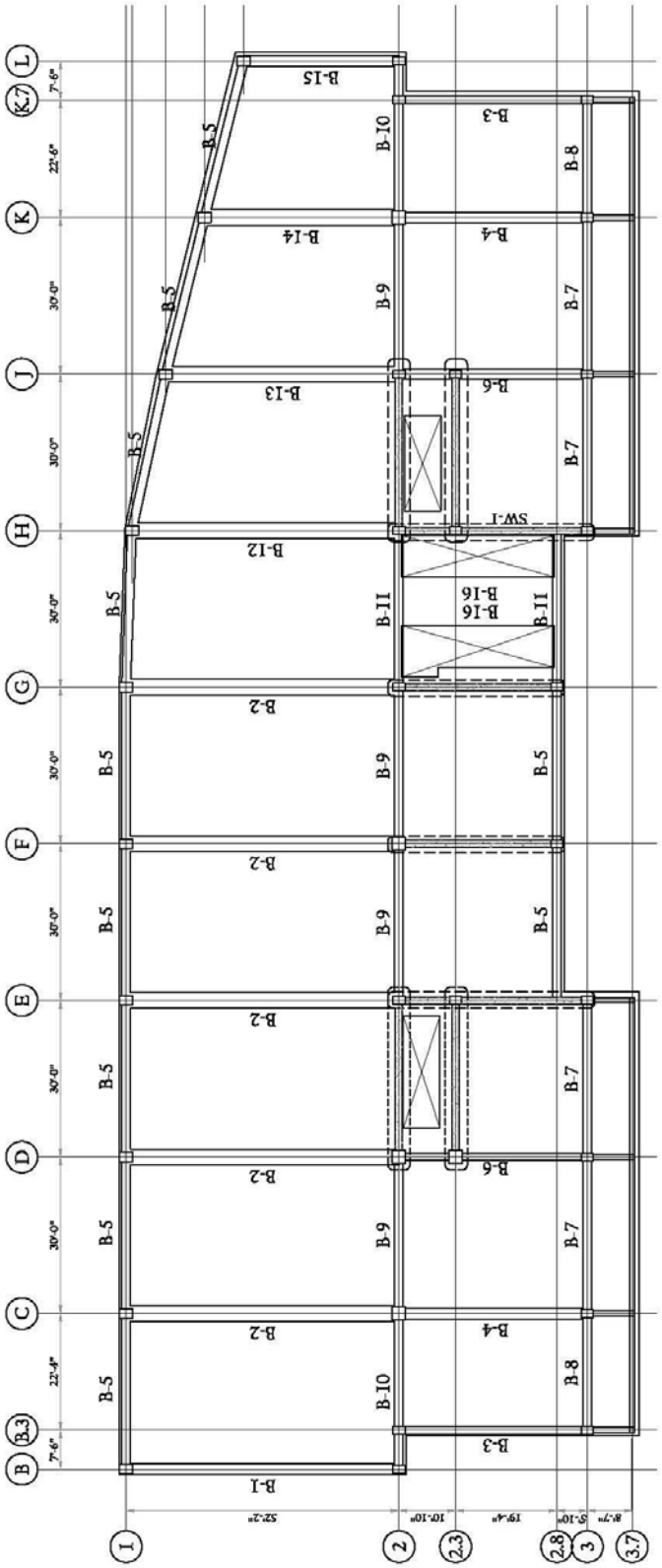
TYPICAL FLOOR FRAMING PLAN

1. DECK OVERHANG IS 16"
2. -S4- REFERS TO 3-1/4" NWT. CONC. ON 3" 20 GAGE COMPOSITE LOK-FLOOR DECK, UNSHORED.
3. -S5- REFERS TO 3-1/4" NWT. CONC. ON 3" 16 GAGE COMPOSITELOK-FLOOR DECK, SHORED.

C.3 Post-tensioned Concrete-Foundation

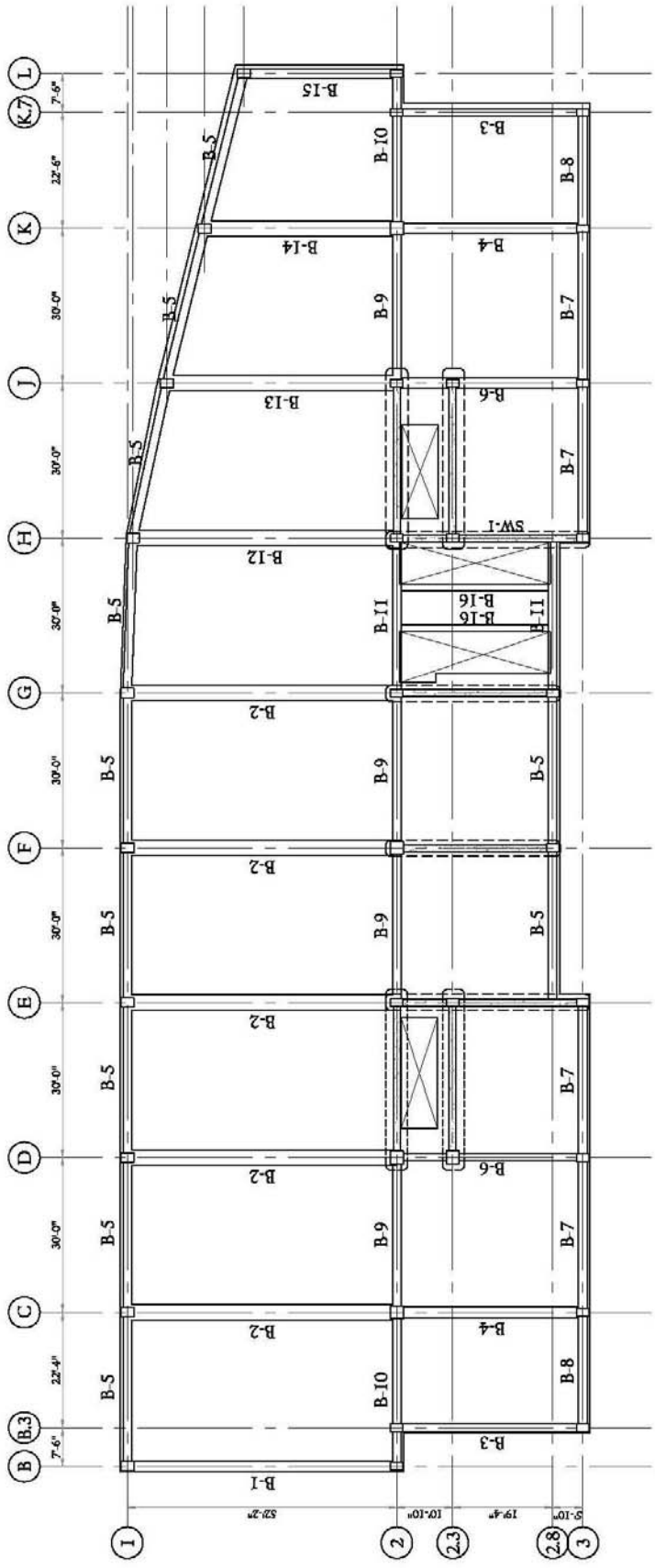


C.4 Post-tensioned Concrete-Floor Framing



FLOORS 2-5 FRAMING PLAN

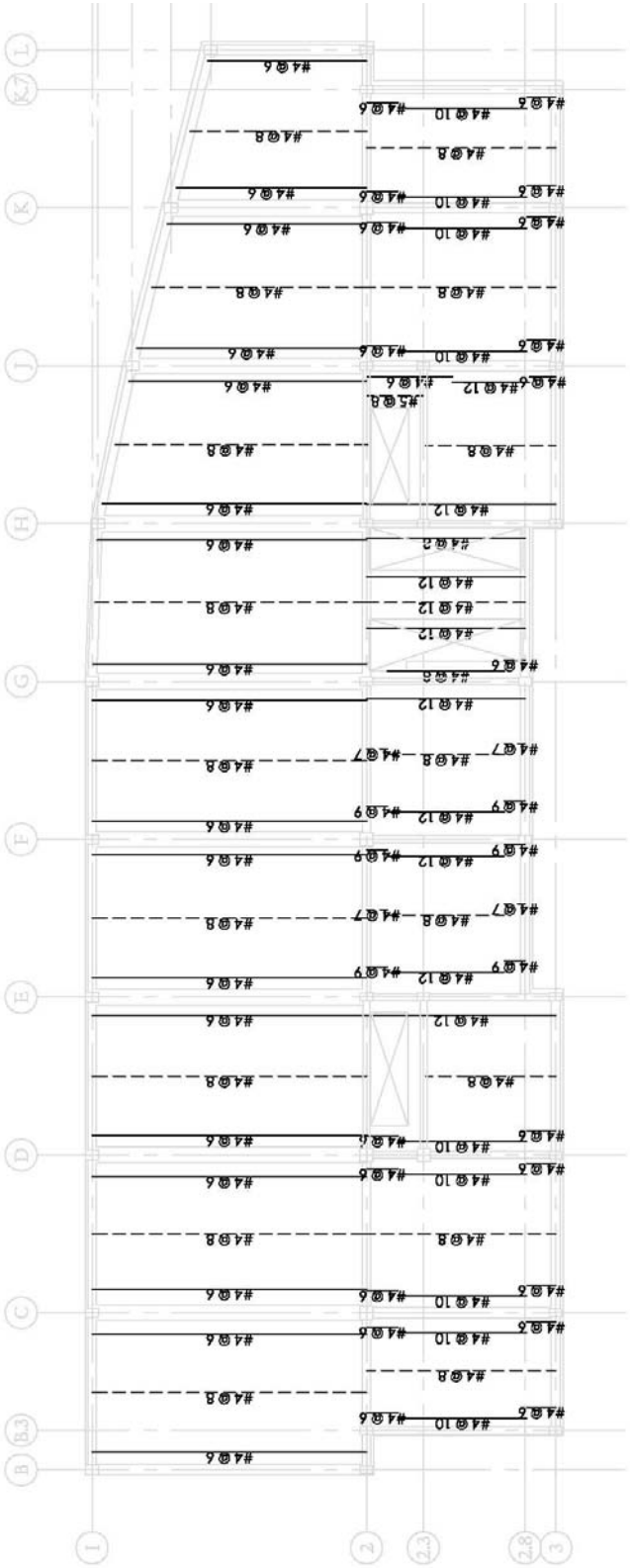
1. INDICATES 8" THK. POST-TENSIONED CONCRETE SLAB. SEE POST-TENSIONED SLAB PLAN.
2. REFER TO BEAM SCHEDULE FOR BEAM SIZES AND REINFORCEMENT.



TYPICAL FRAMING PLAN

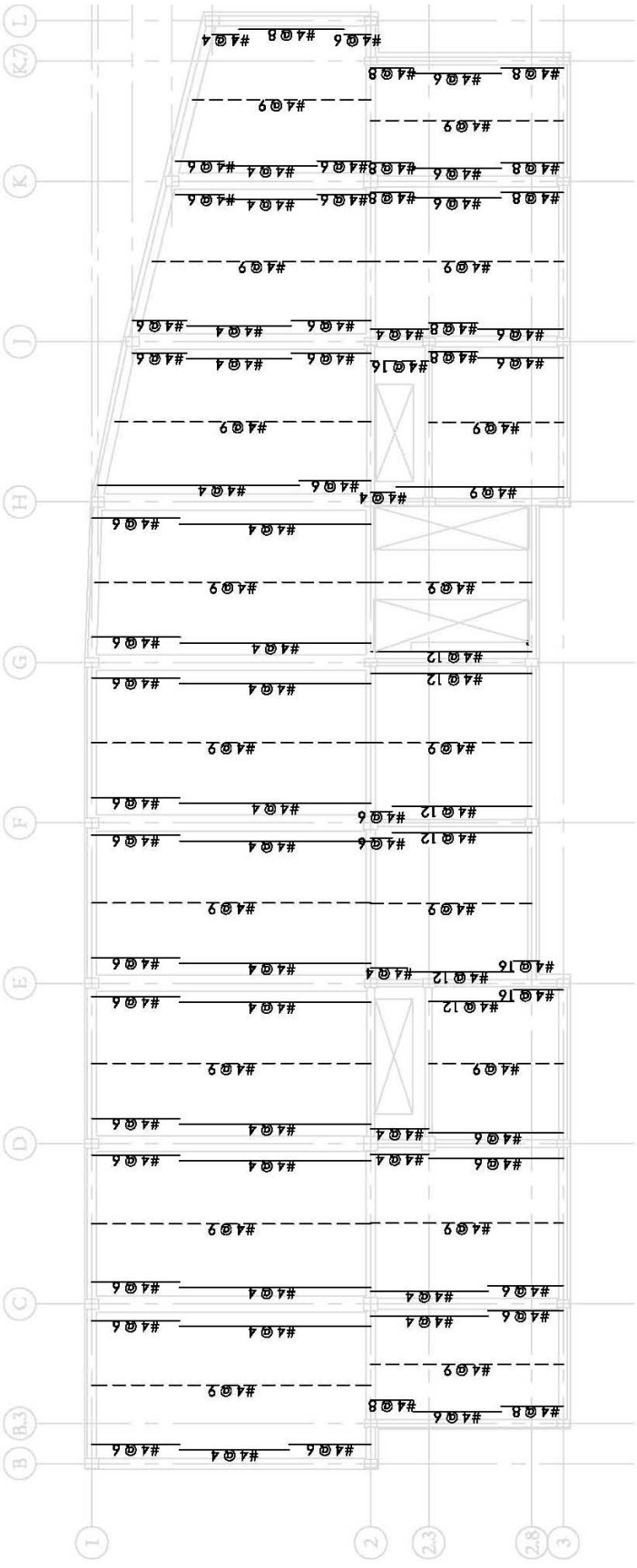
1. INDICATES 8" THK. POST-TENSIONED CONCRETE SLAB. SEE SLAB TENDON PLAN.
2. REFER TO BEAM SCHEDULE FOR BEAM SIZES AND REINFORCEMENT.

C.5 Post-tensioned Concrete-Reinforcement



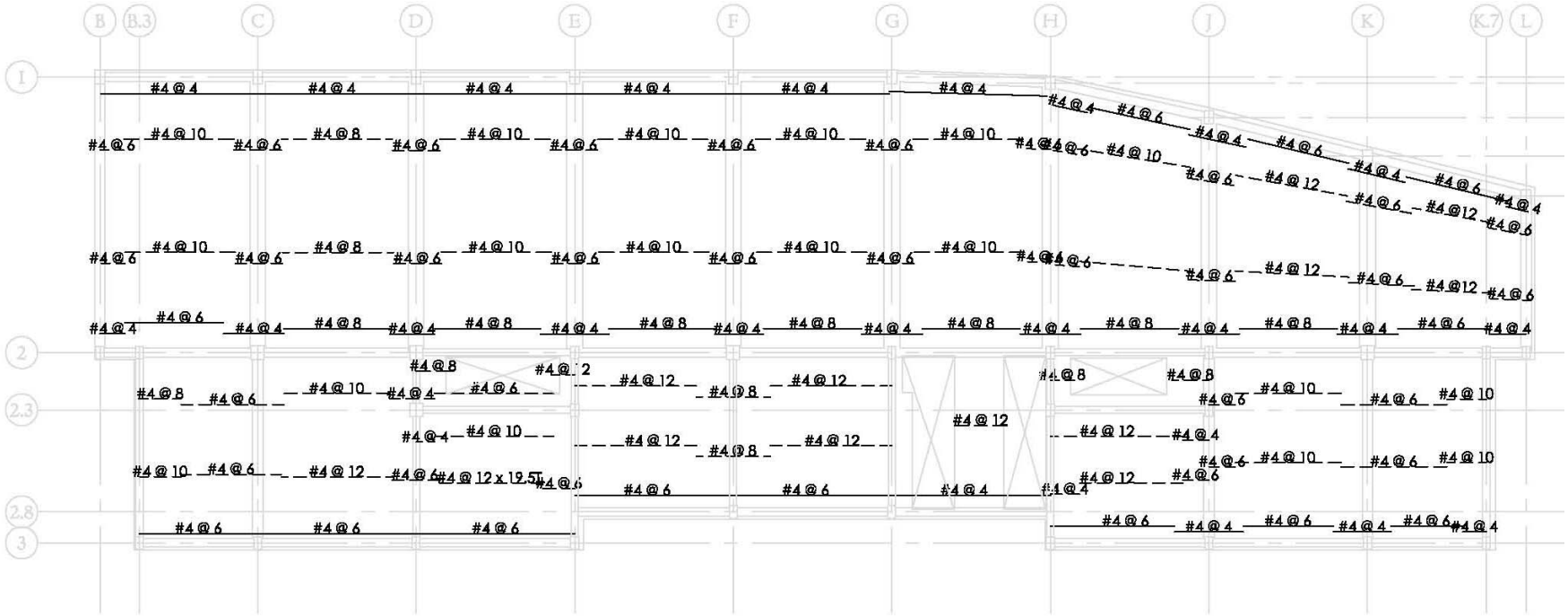
LONGITUDE TOP REINFORCING PLAN

1. —— INDICATES COLUMN STRIP REINFORCING.
2. - - - - INDICATES MIDDLE STRIP REINFORCING.



LONGITUDE BOTTOM REINFORCING PLAN

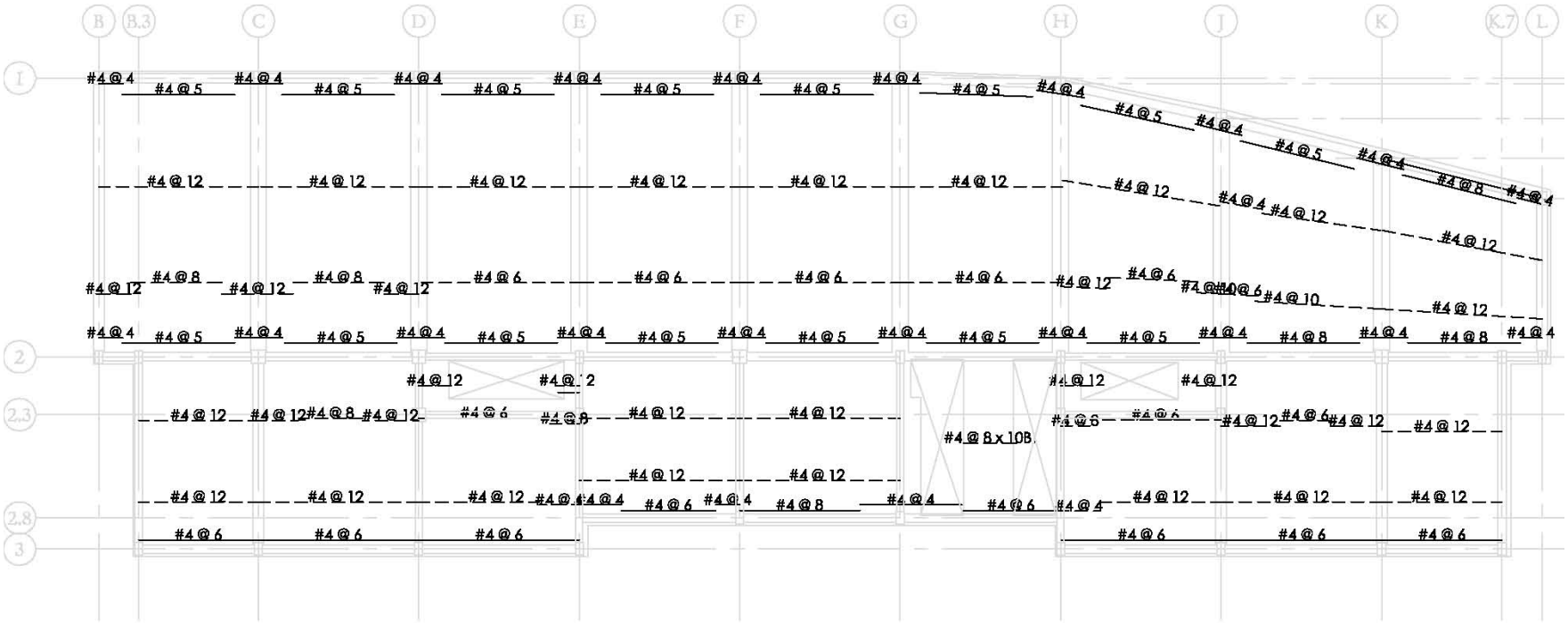
1. ——— INDICATES COLUMN STRIP REINFORCING.
2. – – – – INDICATES MIDDLE STRIP REINFORCING.



LATITUDE TOP REINFORCING PLAN

1. ——— INDICATES COLUMN STRIP REINFORCING.
2. – – – – INDICATES MIDDLE STRIP REINFORCING.

Elizabeth Hostutler - Structural Option
Dr. Hanagan - Spring 2006



LATITUDE BOTTOM REINFORCING PLAN

1. ——— INDICATES COLUMN STRIP REINFORCING.
2. – – – – INDICATES MIDDLE STRIP REINFORCING.

APPENDIX D: BREADTH STUDIES

D.I Mechanical Studies

ASHRAE Standard 62-Ventilation for Indoor Air Quality

Office	A_z (ft^2)	R_p	P_z	R_a	A_z (ft^2)	V_{bz} (cfm)	V_{oz} (cfm)	V_{pz} (cfm)	Z_p (cfm)	Vou (cfm)	# diffusers	cfm/ duct
1	2911	5	30	0.06	2911	325	325	3782	0.0859	325	6	630
2	3738	5	38	0.06	3738	415	415	4857	0.0855	415	9	540
3	3513	5	36	0.06	3513	391	391	4564	0.0857	391	6	761
4	2137	5	22	0.06	2137	239	239	2776	0.0861	239	4	694
5	2600	5	26	0.06	2600	286	286	3378	0.0847	286	5	676
6	2592	5	26	0.06	2592	286	286	3368	0.0849	286	5	674
Σ	**17491**				**17491**		**1942**			**1942**		

D.2 Construction Studies

D.2.1 Material Takeoffs

Post-tensioned Concrete					
Beams and Slabs: Takeoffs from RAM Concept		**Beam Formwork**			
Volume	687 CY	***Type***	***#***	***A***	***Contact Area***
Perimeter	719'	*B-1*	1.5	228 SF	341 SFCA
Floor Area	24000 SF	*B-2*	7.5	298 SF	2231 SFCA
Slab thickness	8 in	*B-3*	2	150 SF	300 SFCA
Prestressing	26350 lb	*B-4*	4	168 SF	672 SFCA
Reinforcing	46.18 tons	*B-5*	25	140 SF	3500 SFCA
Slab Formwork	21910 sf			**Total**	**7045 SFCA**
Slab Edge Forms	479 SFCA	**Shearwalls**			
Columns		*#*	*length*	*height*	*Area*
Volume/column	2 CY	6	30'	14'	2430 SF
# columns/floor	36	2	36'	14'	972 SF
Volume/floor	**72**			**Total**	**3402 SF**

Composite Steel			
Structural Steel: Takeoffs from RAM Beam			
Steel	107 tons	*Slab Thickness*	4 in
# shear studs	27352	*Frames*	50 tons
Fireproofing			
Beam	***#***	***A***	***Totals***
W24x55	28	295	8260
W24x55	20	202	4040
W24x76	27	185	4995
Column			
W14x120	36	97.4	3506.4

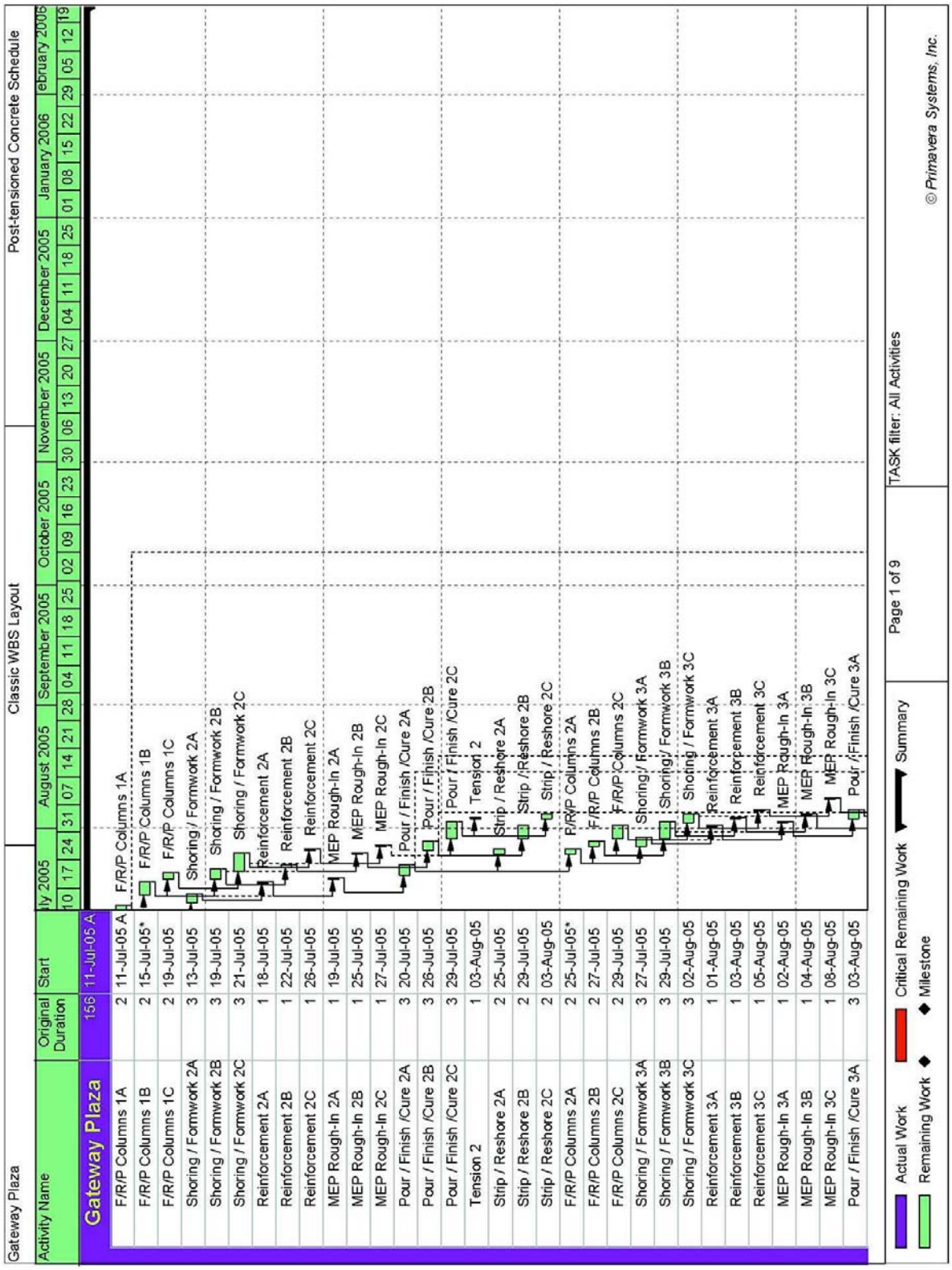
Caissons						
		Amount	**Material**	**Labor**	**Equipment**	**Cost**
A1020-310	4'-0" dia. x 100'	20 Ea	4358	70459		$1,496,329
	5'-0" dia. x 100'	6 Ea	8064	144990		$918,324
	6'-0" dia. x 100'	10 Ea	11730	172277		$1,840,069
					TOTAL	**$4,254,722**
Concrete Filled, Drilled Piers						
A1020-130	End Bearing Steel Piles					**Cost**
2380	4 pile cluster	5	5625	3325		$44,750
2460	6 pile cluster	8	8425	5025		$107,600
2480	7 pile cluster	7	9825	5850		$109,725
2500	8 pile cluster	5	12600	7525		$100,625
2560	12 pile cluster	9	15400	9200		$221,400
03310-240	Pile caps, incl. forms and reinf.	612	108	49	0.31	$96,309
					TOTAL	**$680,409**

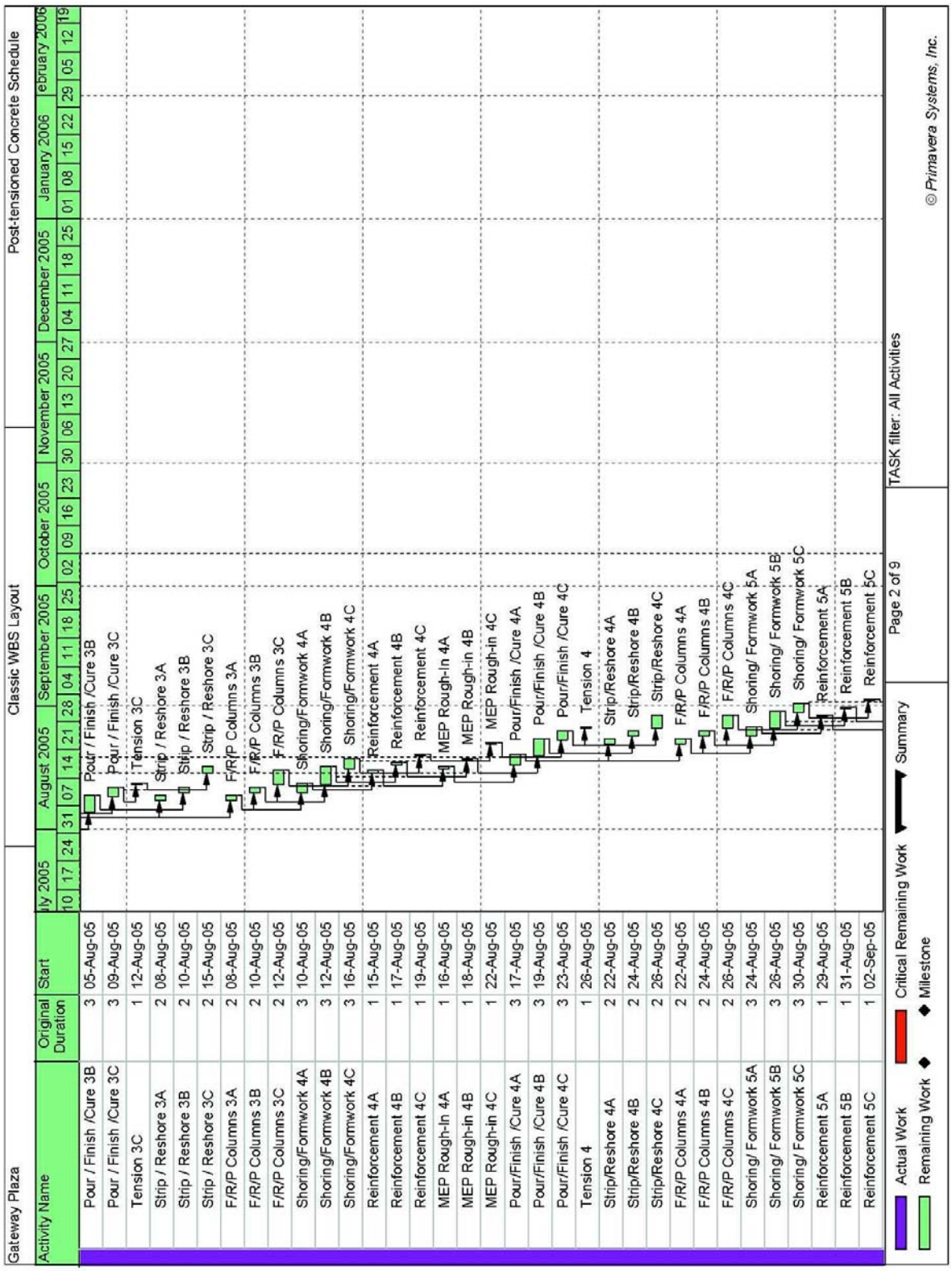
D.2.2 Estimates

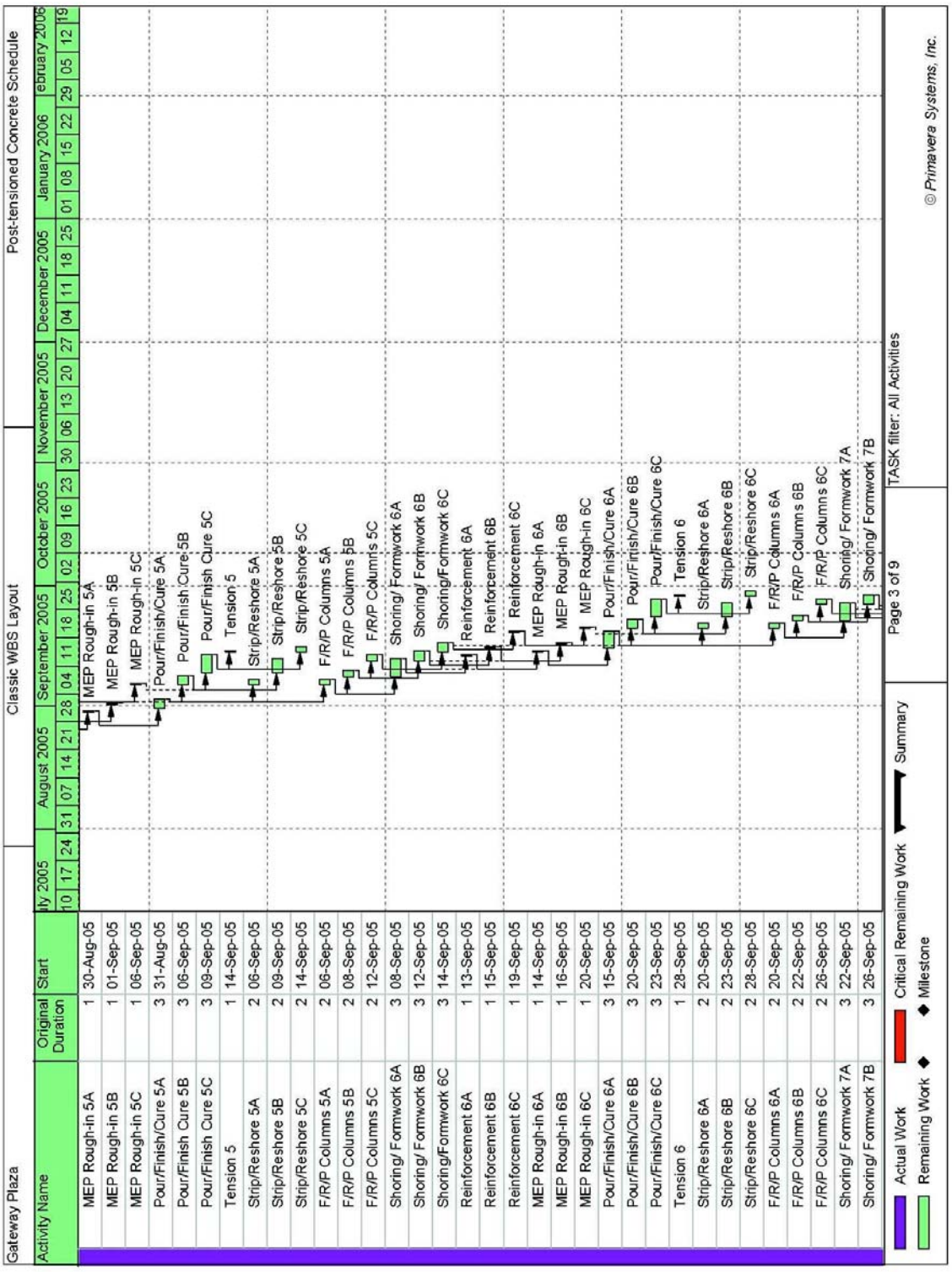
Estimate of Post-tensioned Concrete Design for One Typical Floor						
Slabs System		**Amount**	**Material**	**Labor**	**Equipment**	**Cost**
03110-405	Beam formwork	7044 SFCA	0.91	4.05		$63,466
03110-420	slab edge forms	479 SFCA	0.48	4.6		$2,432
	slab formwork	21910 sf	1.3	2.86		$216,471
03210-600	Slab Reinforcing	46.18 tons	800	380		$72,041
032230-600	Ungrouted Post-tensioned strand	26350 lb	0.47	0.87	0.02	$58,761
03300-220	6000 psi Concrete	687 CY	109			$74,883
03310-700	Placing	687 CY	11.5	4.7		$11,129
	Total					**$499,183**
Columns						
03310-240	24"x24" average reinforcing including 4 use forms, concrete, placement, reinforcing	72 CY	370	400	41	$58,392
	Total					**$58,392**
Shearwalls						
B2010-101	12" thick, plain finish, 4000 psi wall including 4 use forms, reinforcing, concrete, placement	3402 sf	6.6	15.35	21.95	$97,127
	Total					**$97,127**
					Total	**$654,702**
					Cost/sf	**$28**

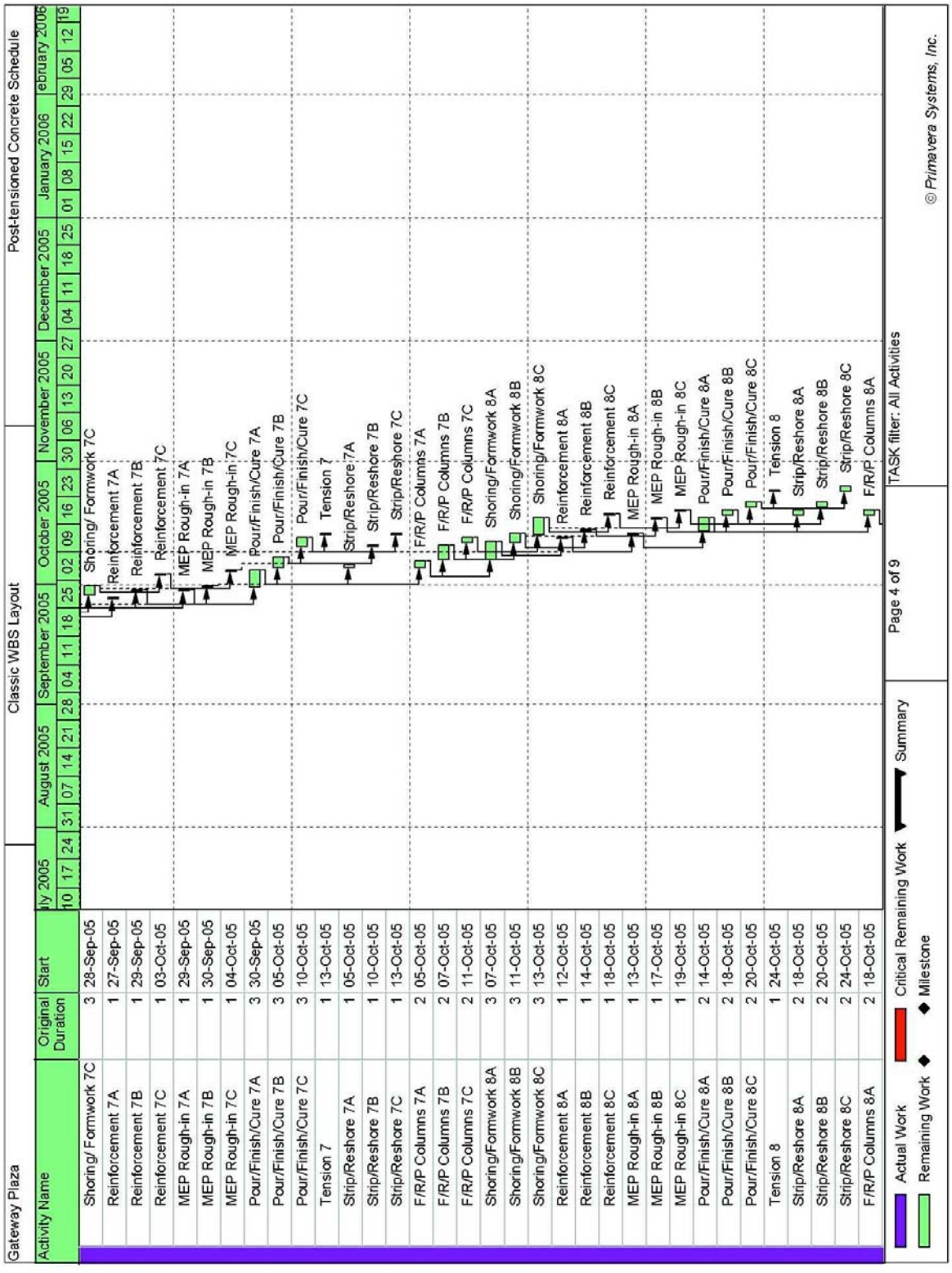
Estimate of Composite Steel Design for One Typical Floor						
Slabs System		**Amount**	**Material**	**Labor**	**Equipment**	**Total Cost**
05310-300	20 ga. 3-1/4" Metal Deck	23403 SF	1.88	0.34	0.02	$60,380
03210-200	6x6 W1.4xW1.4	234 CSF	19.35	17.35		$12,649
03300-220	6000 psi concrete	253 CY	81			$20,478
03310-700	Placing concrete	253 CY		13.1	5.35	$4,664
05120-260	Curb Edging	718 LF	14	4.95	0.33	$17,397
	Total					**$98,171**
Structural Steel						
05120-680	Offices over 15-stories	107 TON	1900	345	109	$251,878
05090-840	3/4" dia Shear Studs	27352	0.49	0.67	0.28	$57,713
	Total					**$309,591**
Frames						
05120-680	Columns, Beams, and Braces	50 TON	1900	345	109	$117,700
Fireproofing						
07800-600	Decking	22000 SF	0.62	0.54	0.09	$51,260
	Beams	17295 SF	0.41	0.45	0.07	$31,650
	Columns	3506 SF	0.47	0.62	0.1	$8,521
	Total					**$91,430**
					TOTAL	**$616,892**
					Cost/sf	**$26**

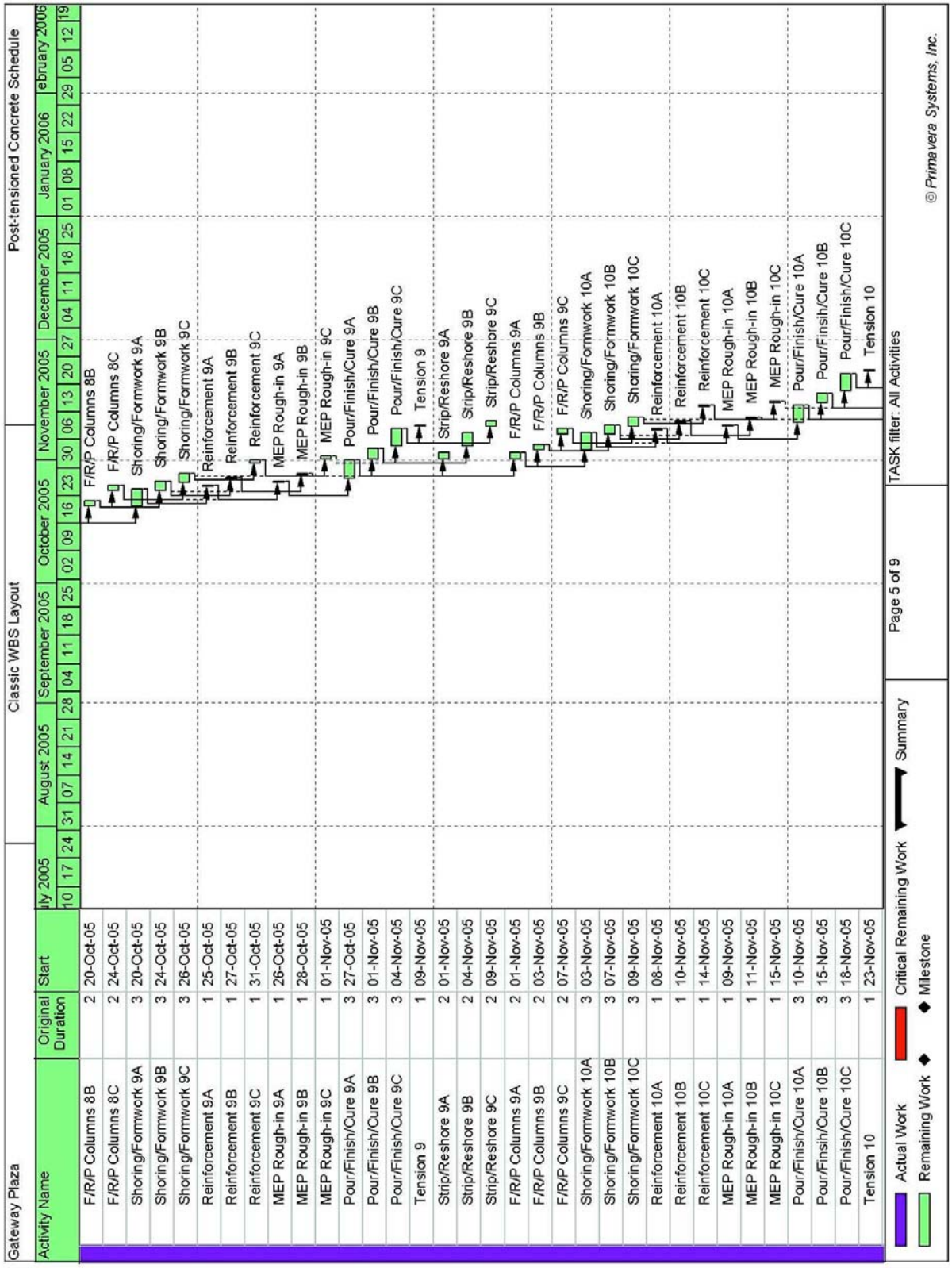
D.2.3 Schedule

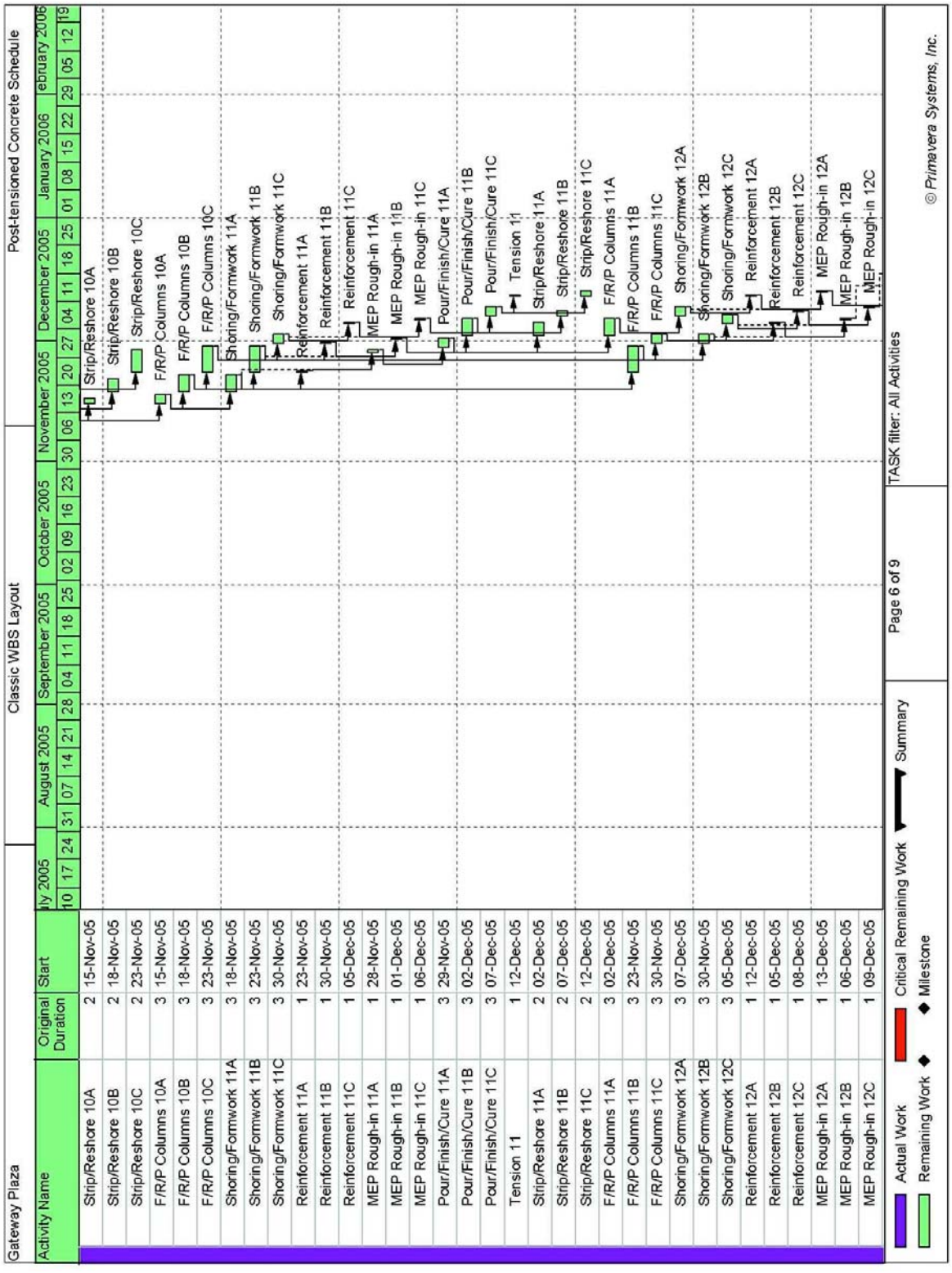


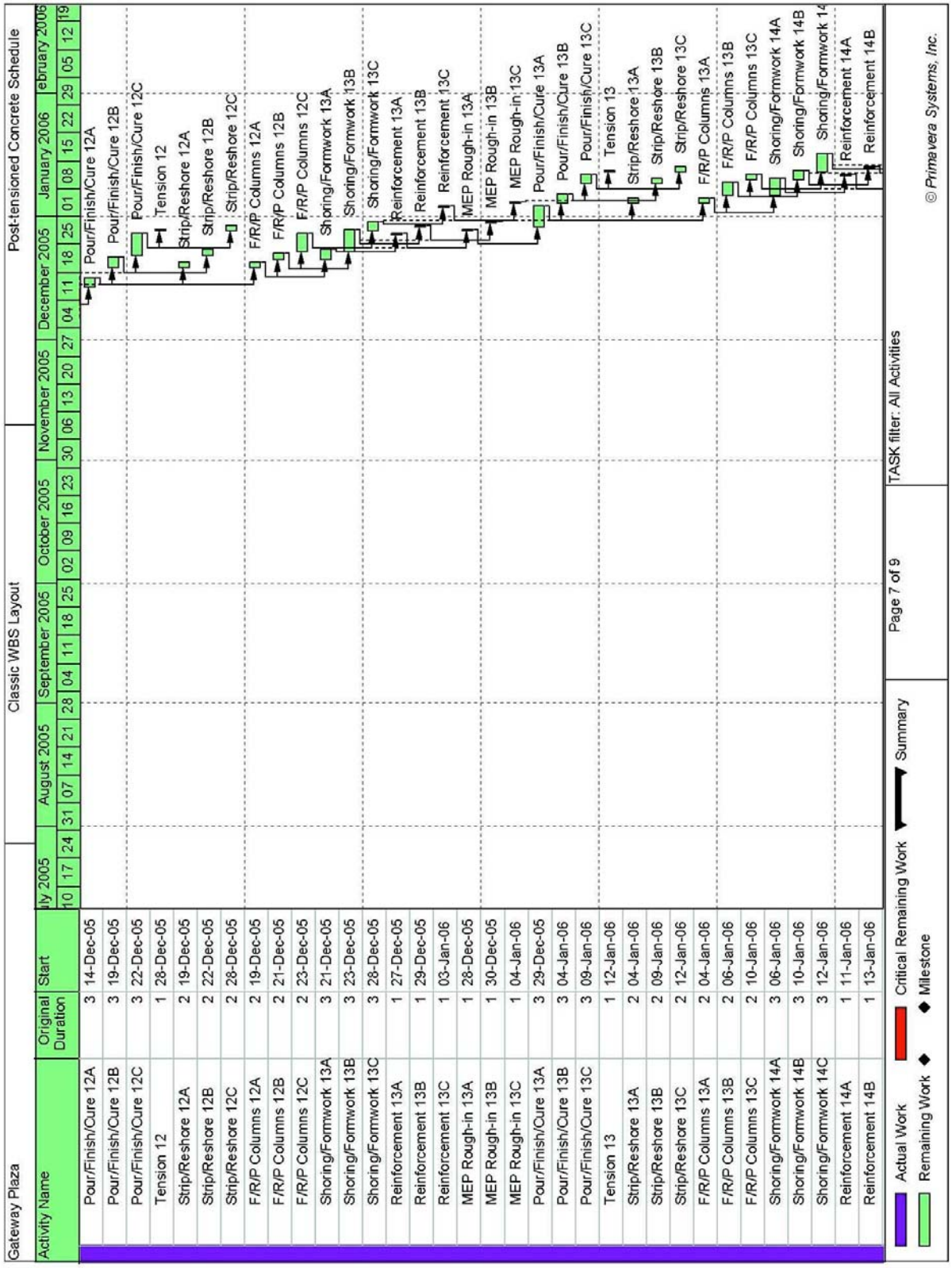

Gateway Plaza
Classic WBS Layout
Post-tensioned Concrete Schedule
Activity Name
Original Duration
Start
July 2005
August 2005
September 2005
October 2005
November 2005
December 2005
January 2006
February 2006
Pour / Finish /Cure 3B 3 05-Aug-05
Pour / Finish /Cure 3C 3 09-Aug-05
Tension 3C 1 12-Aug-05
Strip / Reshore 3A 2 08-Aug-05
Strip / Reshore 3B 2 10-Aug-05
Strip / Reshore 3C 2 15-Aug-05
F/R/P Columns 3A 2 08-Aug-05
F/R/P Columns 3B 2 10-Aug-05
F/R/P Columns 3C 2 12-Aug-05
Shoring/Formwork 4A 3 10-Aug-05
Shoring/Formwork 4B 3 12-Aug-05
Shoring/Formwork 4C 3 16-Aug-05
Reinforcement 4A 1 15-Aug-05
Reinforcement 4B 1 17-Aug-05
Reinforcement 4C 1 19-Aug-05
MEP Rough-In 4A 1 16-Aug-05
MEP Rough-in 4B 1 18-Aug-05
MEP Rough-in 4C 1 22-Aug-05
Pour/Finish /Cure 4A 3 17-Aug-05
Pour/Finish /Cure 4B 3 19-Aug-05
Pour/Finish /Cure 4C 3 23-Aug-05
Tension 4 1 26-Aug-05
Strip/Reshore 4A 2 22-Aug-05
Strip/Reshore 4B 2 24-Aug-05
Strip/Reshore 4C 2 26-Aug-05
F/R/P Columns 4A 2 22-Aug-05
F/R/P Columns 4B 2 24-Aug-05
F/R/P Columns 4C 2 26-Aug-05
Shoring/ Formwork 5A 3 24-Aug-05
Shoring/ Formwork 5B 3 26-Aug-05
Shoring/ Formwork 5C 3 30-Aug-05
Reinforcement 5A 1 29-Aug-05
Reinforcement 5B 1 31-Aug-05
Reinforcement 5C 1 02-Sep-05
Actual Work
Remaining Work
Critical Remaining Work
Summary
Milestone
Page 2 of 9
TASK filter: All Activities
© Primavera Systems, Inc.

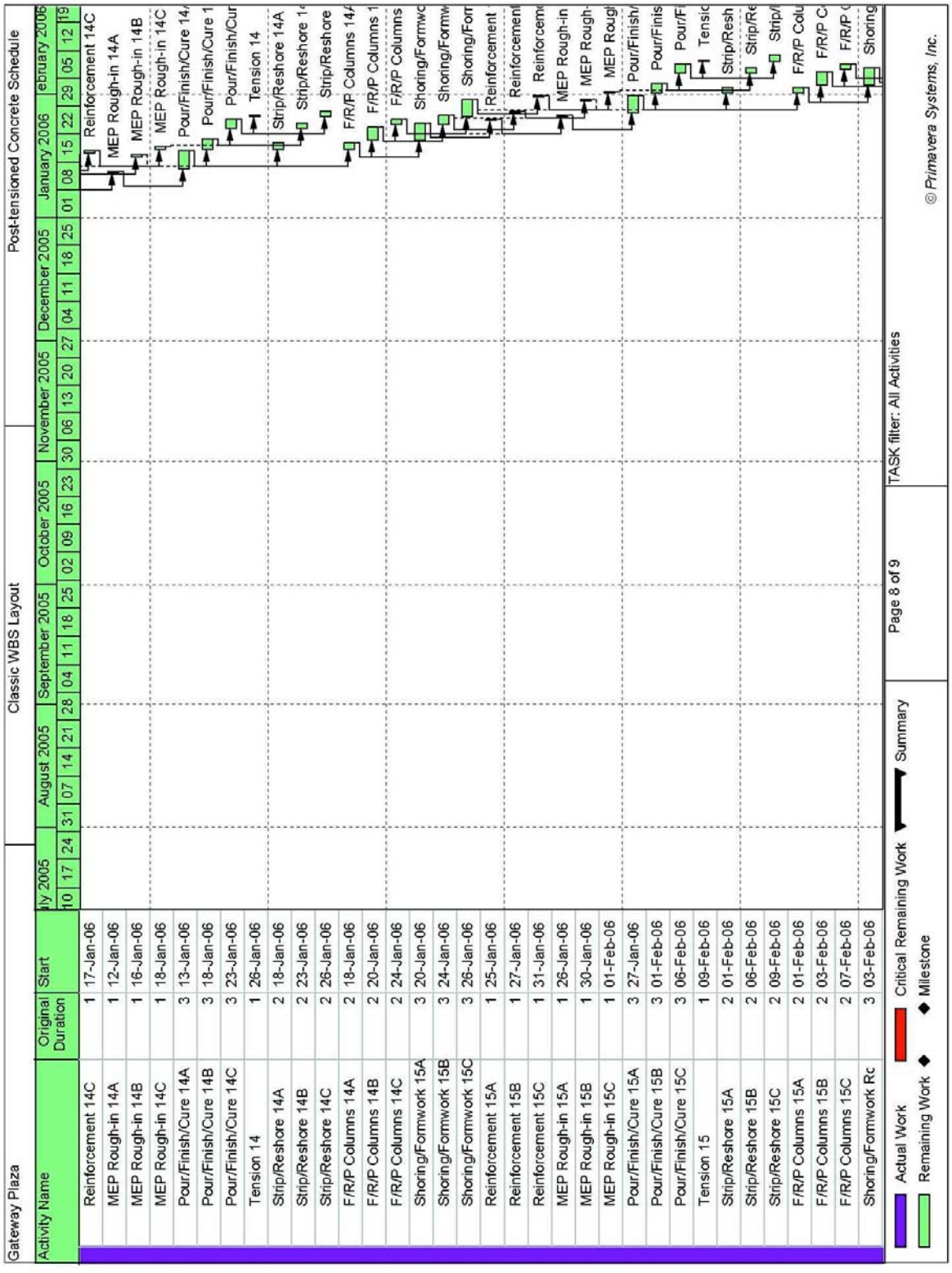

Gateway Plaza
Classic WBS Layout
Post-tensioned Concrete Schedule
Activity Name
Original Duration
Start
July 2005
August 2005
September 2005
October 2005
November 2005
December 2005
January 2006
February 2006
MEP Rough-in 5A
MEP Rough-in 5B
MEP Rough-in 5C
Pour/Finish/Cure 5A
Pour/Finish Cure 5B
Pour/Finish Cure 5C
Tension 5
Strip/Reshore 5A
Strip/Reshore 5B
Strip/Reshore 5C
F/R/P Columns 5A
F/R/P Columns 5B
F/R/P Columns 5C
Shoring/ Formwork 6A
Shoring/ Formwork 6B
Shoring/Formwork 6C
Reinforcement 6A
Reinforcement 6B
Reinforcement 6C
MEP Rough-in 6A
MEP Rough-in 6B
MEP Rough-in 6C
Pour/Finish/Cure 6A
Pour/Finish/Cure 6B
Pour/Finish/Cure 6C
Tension 6
Strip/Reshore 6A
Strip/Reshore 6B
Strip/Reshore 6C
F/R/P Columns 6A
F/R/P Columns 6B
F/R/P Columns 6C
Shoring/ Formwork 7A
Shoring/ Formwork 7B
Actual Work
Remaining Work
Critical Remaining Work
Milestone
Summary
Page 3 of 9
TASK filter: All Activities
© Primavera Systems, Inc.


Gateway Plaza
Classic WBS Layout
Post-tensioned Concrete Schedule
Activity Name
Original Duration
Start
Shoring/ Formwork 7C
Reinforcement 7A
Reinforcement 7B
Reinforcement 7C
MEP Rough-in 7A
MEP Rough-in 7B
MEP Rough-in 7C
Pour/Finish/Cure 7A
Pour/Finish/Cure 7B
Pour/Finish/Cure 7C
Tension 7
Strip/Reshore 7A
Strip/Reshore 7B
Strip/Reshore 7C
F/R/P Columns 7A
F/R/P Columns 7B
F/R/P Columns 7C
Shoring/Formwork 8A
Shoring/Formwork 8B
Shoring/Formwork 8C
Reinforcement 8A
Reinforcement 8B
Reinforcement 8C
MEP Rough-in 8A
MEP Rough-in 8B
MEP Rough-in 8C
Pour/Finish/Cure 8A
Pour/Finish/Cure 8B
Pour/Finish/Cure 8C
Tension 8
Strip/Reshore 8A
Strip/Reshore 8B
Strip/Reshore 8C
F/R/P Columns 8A
July 2005
August 2005
September 2005
October 2005
November 2005
December 2005
January 2006
February 2006
Actual Work
Remaining Work
Critical Remaining Work
Milestone
Summary
Page 4 of 9
TASK filter: All Activities
© Primavera Systems, Inc.


Gateway Plaza
Classic WBS Layout
Post-tensioned Concrete Schedule
Activity Name
Original Duration
Start
F/R/P Columns 8B 2 20-Oct-05
F/R/P Columns 8C 2 24-Oct-05
Shoring/Formwork 9A 3 20-Oct-05
Shoring/Formwork 9B 3 24-Oct-05
Shoring/Formwork 9C 3 26-Oct-05
Reinforcement 9A 1 25-Oct-05
Reinforcement 9B 1 27-Oct-05
Reinforcement 9C 1 31-Oct-05
MEP Rough-in 9A 1 26-Oct-05
MEP Rough-in 9B 1 28-Oct-05
MEP Rough-in 9C 1 01-Nov-05
Pour/Finish/Cure 9A 3 27-Oct-05
Pour/Finish/Cure 9B 3 01-Nov-05
Pour/Finish/Cure 9C 3 04-Nov-05
Tension 9 1 09-Nov-05
Strip/Reshore 9A 2 01-Nov-05
Strip/Reshore 9B 2 04-Nov-05
Strip/Reshore 9C 2 09-Nov-05
F/R/P Columns 9A 2 01-Nov-05
F/R/P Columns 9B 2 03-Nov-05
F/R/P Columns 9C 2 07-Nov-05
Shoring/Formwork 10A 3 03-Nov-05
Shoring/Formwork 10B 3 07-Nov-05
Shoring/Formwork 10C 3 09-Nov-05
Reinforcement 10A 1 08-Nov-05
Reinforcement 10B 1 10-Nov-05
Reinforcement 10C 1 14-Nov-05
MEP Rough-in 10A 1 09-Nov-05
MEP Rough-in 10B 1 11-Nov-05
MEP Rough-in 10C 1 15-Nov-05
Pour/Finish/Cure 10A 3 10-Nov-05
Pour/Finsih/Cure 10B 3 15-Nov-05
Pour/Finish/Cure 10C 3 18-Nov-05
Tension 10 1 23-Nov-05
July 2005
August 2005
September 2005
October 2005
November 2005
December 2005
January 2006
February 2006
Actual Work
Remaining Work
Critical Remaining Work
Milestone
Summary
Page 5 of 9
TASK filter: All Activities
© Primavera Systems, Inc.


Gateway Plaza
Classic WBS Layout
Post-tensioned Concrete Schedule
Activity Name
Original Duration
Start
July 2005
August 2005
September 2005
October 2005
November 2005
December 2005
January 2006
February 2006
Strip/Reshore 10A
Strip/Reshore 10B
Strip/Reshore 10C
F/R/P Columns 10A
F/R/P Columns 10B
F/R/P Columns 10C
Shoring/Formwork 11A
Shoring/Formwork 11B
Shoring/Formwork 11C
Reinforcement 11A
Reinforcement 11B
Reinforcement 11C
MEP Rough-in 11A
MEP Rough-in 11B
MEP Rough-in 11C
Pour/Finish/Cure 11A
Pour/Finish/Cure 11B
Pour/Finish/Cure 11C
Tension 11
Strip/Reshore 11A
Strip/Reshore 11B
Strip/Reshore 11C
F/R/P Columns 11A
F/R/P Columns 11B
F/R/P Columns 11C
Shoring/Formwork 12A
Shoring/Formwork 12B
Shoring/Formwork 12C
Reinforcement 12A
Reinforcement 12B
Reinforcement 12C
MEP Rough-in 12A
MEP Rough-in 12B
MEP Rough-in 12C
Actual Work
Remaining Work
Critical Remaining Work
Milestone
Summary
Page 6 of 9
TASK filter: All Activities
© Primavera Systems, Inc.


Gateway Plaza
Classic WBS Layout
Post-tensioned Concrete Schedule
Activity Name
Original Duration
Start
Pour/Finish/Cure 12A 3 14-Dec-05
Pour/Finish/Cure 12B 3 19-Dec-05
Pour/Finish/Cure 12C 3 22-Dec-05
Tension 12 1 28-Dec-05
Strip/Reshore 12A 2 19-Dec-05
Strip/Reshore 12B 2 22-Dec-05
Strip/Reshore 12C 2 28-Dec-05
F/R/P Columns 12A 2 19-Dec-05
F/R/P Columns 12B 2 21-Dec-05
F/R/P Columns 12C 2 23-Dec-05
Shoring/Formwork 13A 3 21-Dec-05
Shoring/Formwork 13B 3 23-Dec-05
Shoring/Formwork 13C 3 28-Dec-05
Reinforcement 13A 1 27-Dec-05
Reinforcement 13B 1 29-Dec-05
Reinforcement 13C 1 03-Jan-06
MEP Rough-in 13A 1 28-Dec-05
MEP Rough-in 13B 1 30-Dec-05
MEP Rough-in 13C 1 04-Jan-06
Pour/Finish/Cure 13A 3 29-Dec-05
Pour/Finish/Cure 13B 3 04-Jan-06
Pour/Finish/Cure 13C 3 09-Jan-06
Tension 13 1 12-Jan-06
Strip/Reshore 13A 2 04-Jan-06
Strip/Reshore 13B 2 09-Jan-06
Strip/Reshore 13C 2 12-Jan-06
F/R/P Columns 13A 2 04-Jan-06
F/R/P Columns 13B 2 06-Jan-06
F/R/P Columns 13C 2 10-Jan-06
Shoring/Formwork 14A 3 06-Jan-06
Shoring/Formwork 14B 3 10-Jan-06
Shoring/Formwork 14C 3 12-Jan-06
Reinforcement 14A 1 11-Jan-06
Reinforcement 14B 1 13-Jan-06
July 2005
August 2005
September 2005
October 2005
November 2005
December 2005
January 2006
February 2006
Actual Work
Remaining Work
Critical Remaining Work
Milestone
Summary
Page 7 of 9
TASK filter: All Activities
© Primavera Systems, Inc.


Gateway Plaza
Classic WBS Layout
Post-tensioned Concrete Schedule
Activity Name
Original Duration
Start
July 2005
August 2005
September 2005
October 2005
November 2005
December 2005
January 2006
February 2006
Reinforcement 14C 1 17-Jan-06
MEP Rough-in 14A 1 12-Jan-06
MEP Rough-in 14B 1 16-Jan-06
MEP Rough-in 14C 1 18-Jan-06
Pour/Finish/Cure 14A 3 13-Jan-06
Pour/Finish/Cure 14B 3 18-Jan-06
Pour/Finish/Cure 14C 3 23-Jan-06
Tension 14 1 26-Jan-06
Strip/Reshore 14A 2 18-Jan-06
Strip/Reshore 14B 2 23-Jan-06
Strip/Reshore 14C 2 26-Jan-06
F/R/P Columns 14A 2 18-Jan-06
F/R/P Columns 14B 2 20-Jan-06
F/R/P Columns 14C 2 24-Jan-06
Shoring/Formwork 15A 3 20-Jan-06
Shoring/Formwork 15B 3 24-Jan-06
Shoring/Formwork 15C 3 26-Jan-06
Reinforcement 15A 1 25-Jan-06
Reinforcement 15B 1 27-Jan-06
Reinforcement 15C 1 31-Jan-06
MEP Rough-in 15A 1 26-Jan-06
MEP Rough-in 15B 1 30-Jan-06
MEP Rough-in 15C 1 01-Feb-06
Pour/Finish/Cure 15A 3 27-Jan-06
Pour/Finish/Cure 15B 3 01-Feb-06
Pour/Finish/Cure 15C 3 06-Feb-06
Tension 15 1 09-Feb-06
Strip/Reshore 15A 2 01-Feb-06
Strip/Reshore 15B 2 06-Feb-06
Strip/Reshore 15C 2 09-Feb-06
F/R/P Columns 15A 2 01-Feb-06
F/R/P Columns 15B 2 03-Feb-06
F/R/P Columns 15C 2 07-Feb-06
Shoring/Formwork Rc 3 03-Feb-06
Actual Work
Remaining Work
Critical Remaining Work
Milestone
Summary
Page 8 of 9
TASK filter: All Activities
© Primavera Systems, Inc.

Gateway Plaza
Classic WBS Layout
Post-tensioned Concrete Schedule
Activity Name
Original Duration
Start
July 2005
August 2005
September 2005
October 2005
November 2005
December 2005
January 2006
February 2006
Shoring/Formwork Rc 3 07-Feb-06
Shoring/Formwork Rc 3 09-Feb-06
Reinforcement Roof A 1 08-Feb-06
Reinforcement Roof B 1 10-Feb-06
Reinforcement Roof C 1 14-Feb-06
MEP Rough-in Roof A 1 09-Feb-06
MEP Rough-in Roof B 1 13-Feb-06
MEP Rough-in Roof C 1 15-Feb-06
Pour/Finish/Cure Roo 3 10-Feb-06
Pour/Finish/Cure Roo 3 14-Feb-06
Pour/Finish/Cure Roo 3 16-Feb-06
Strip/Reshare Roof A 2 15-Feb-06
Strip/Reshare Roof B 2 17-Feb-06
Strip/Reshare Roof C 2 21-Feb-06
Tension Roof 1 21-Feb-06
Actual Work
Remaining Work
Critical Remaining Work
Milestone
Summary
Page 9 of 9
TASK filter: All Activities
© Primavera Systems, Inc.

500 Delaware Ave.