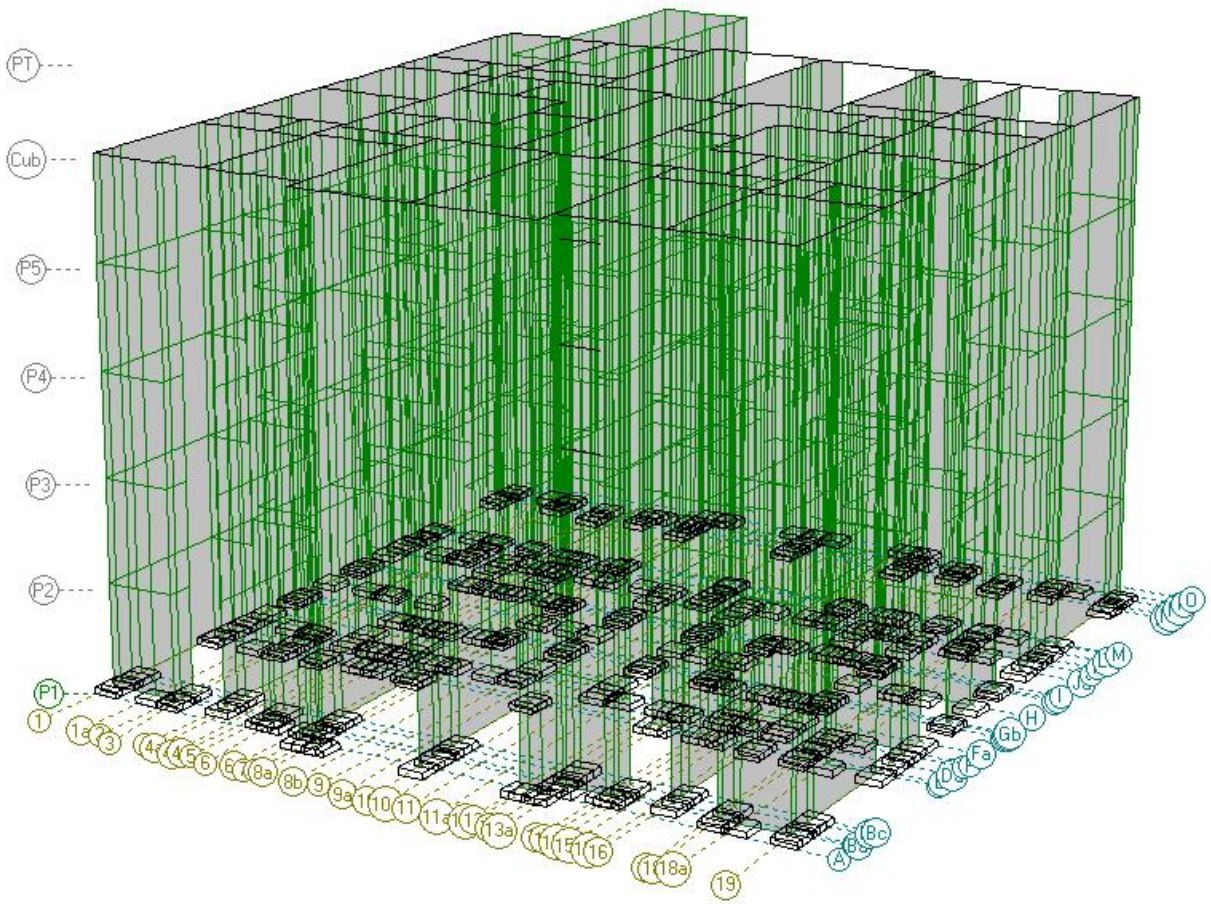
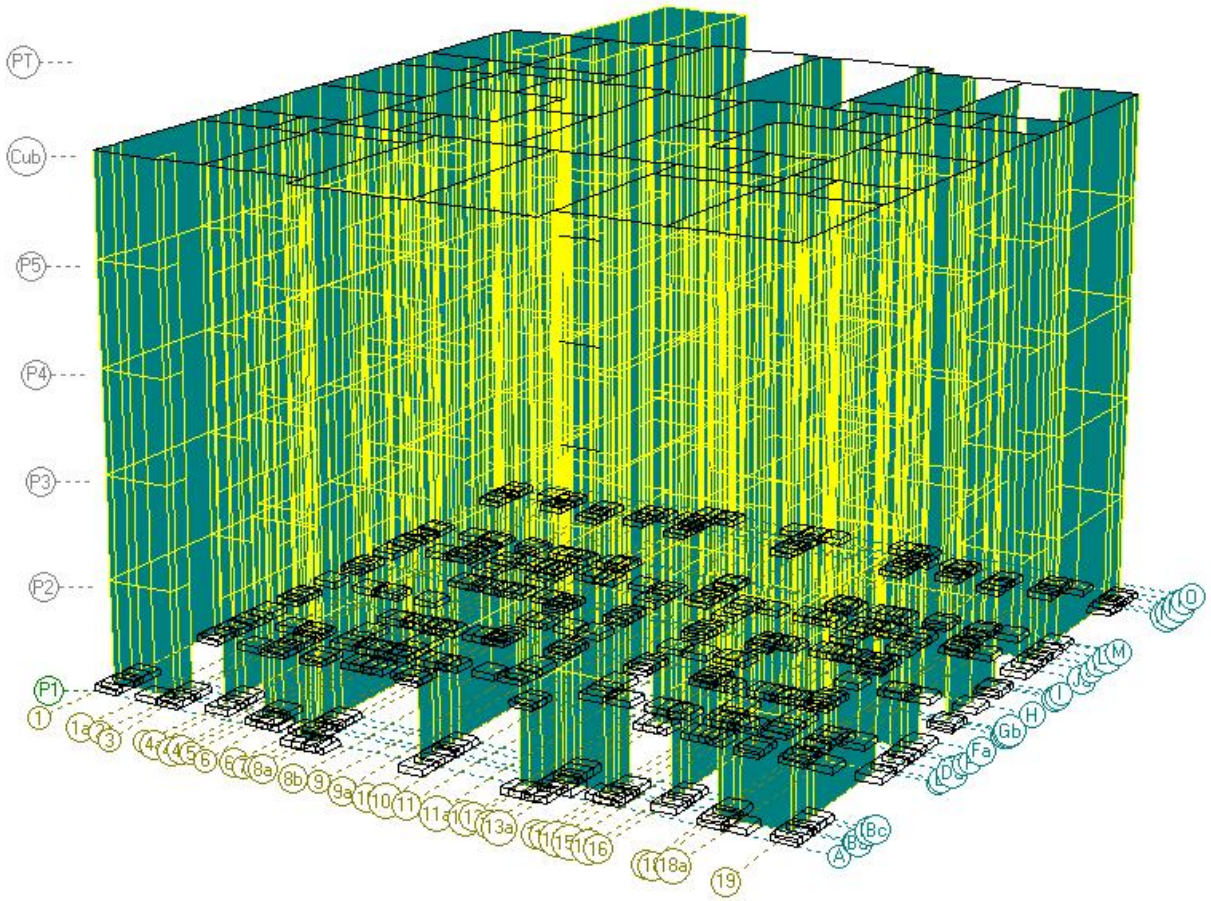
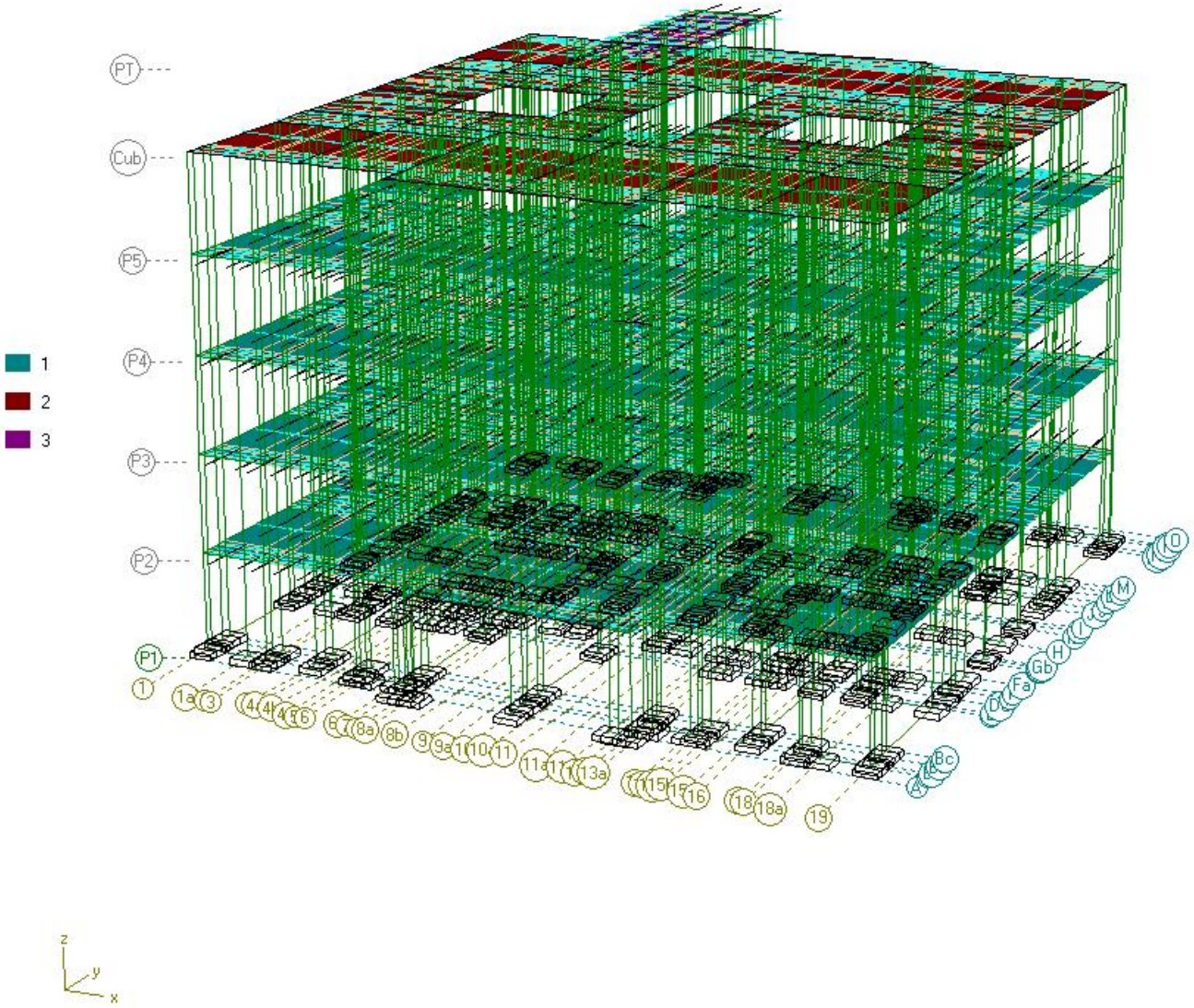
INTERVENCION ESTRUCTURA



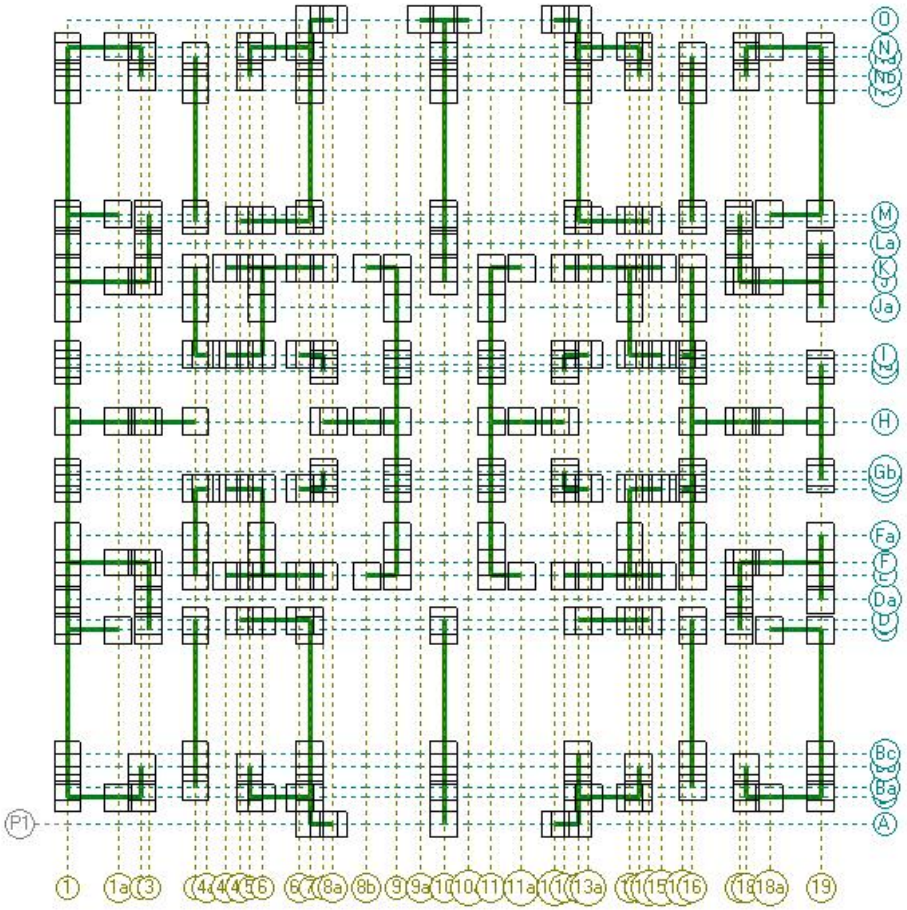
INTERVENCION ESTRUCTURA - MUROS



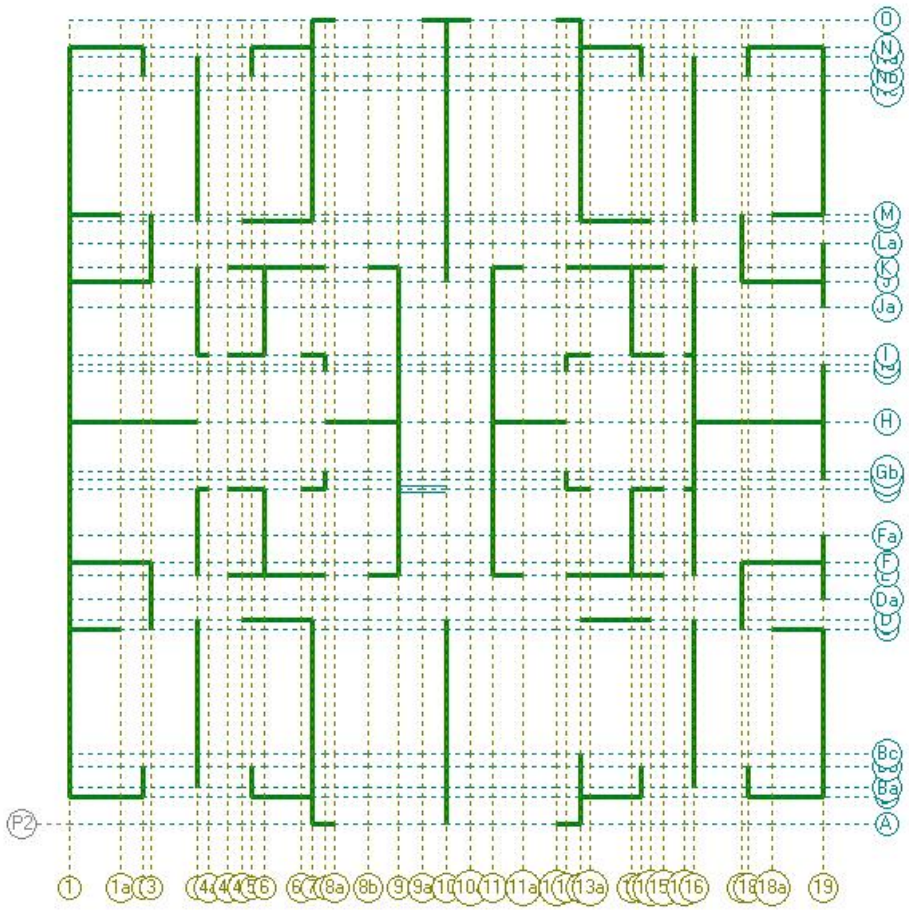
INTERVENCION ESTRUCTURA - TIPOS DE CARGAS



INTERVENCION ESTRUCTURA - CIMENTACION



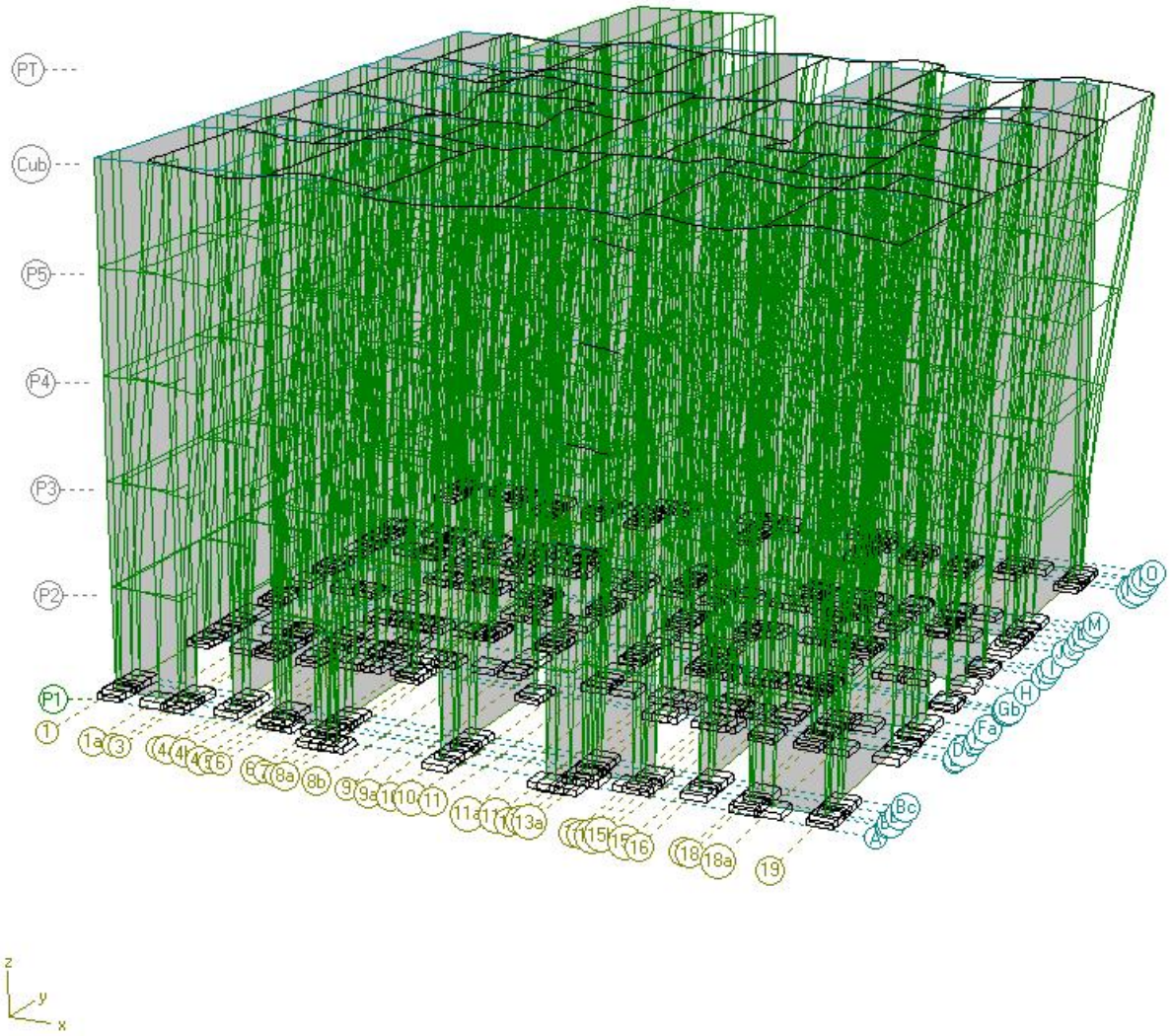
INTERVENCION ESTRUCTURA - 1 PISO MUROS



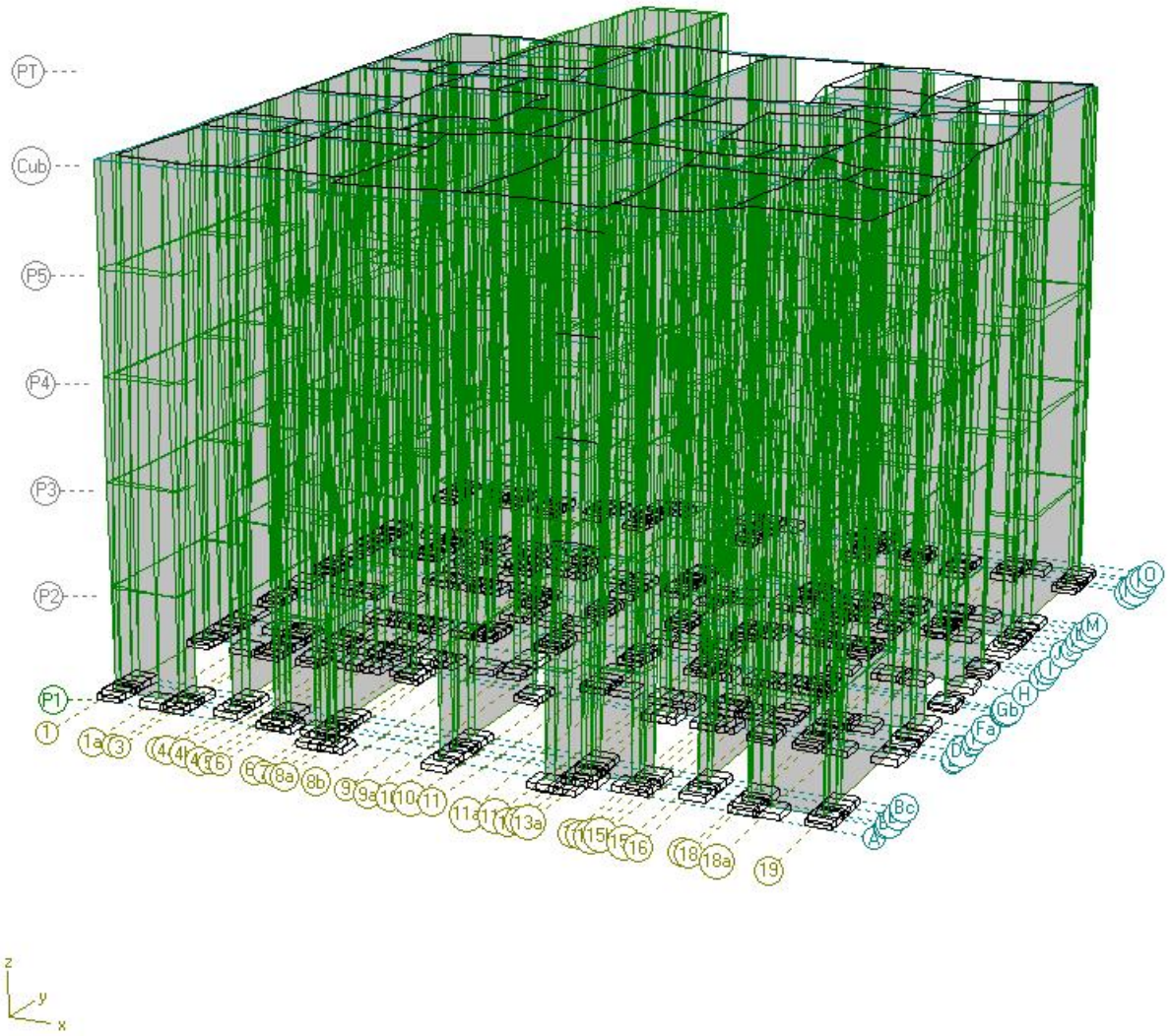
1

y
z
x

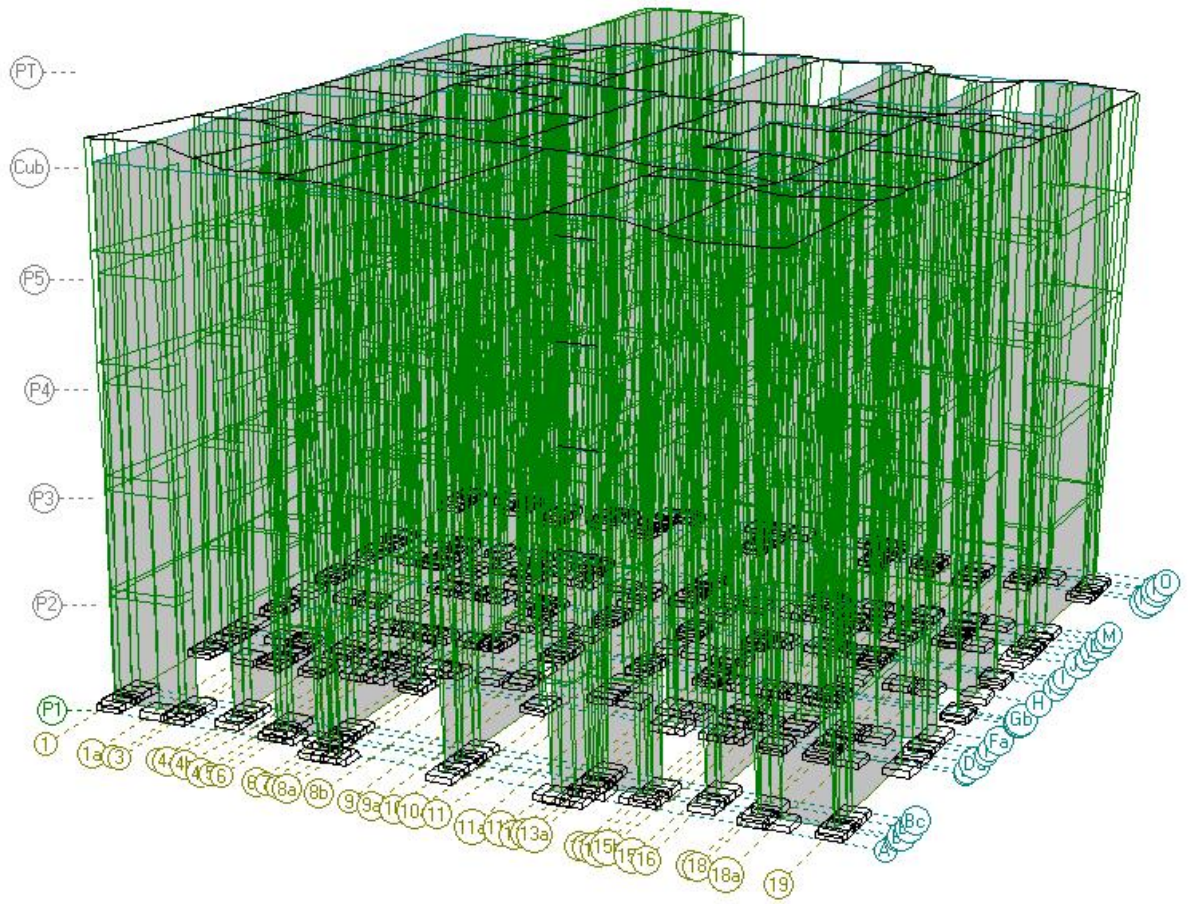
INTERVENCION ESTRUCTURA - MODO 1



INTERVENCION ESTRUCTURA - MODO 2

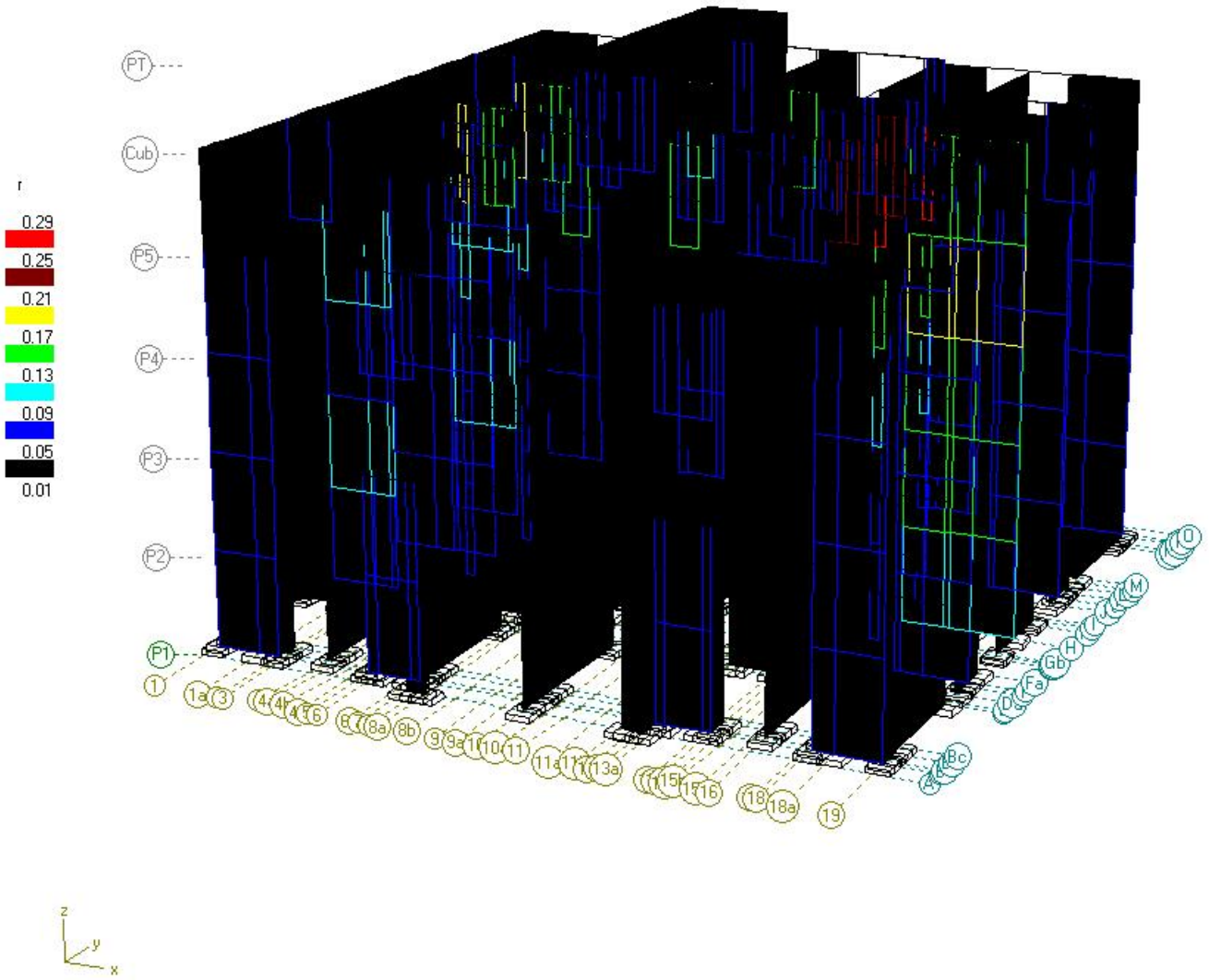


INTERVENCION ESTRUCTURA - MODO 3



ENVELOPE

INTERVENCION ESTRUCTURA - REDUNDANCIA X

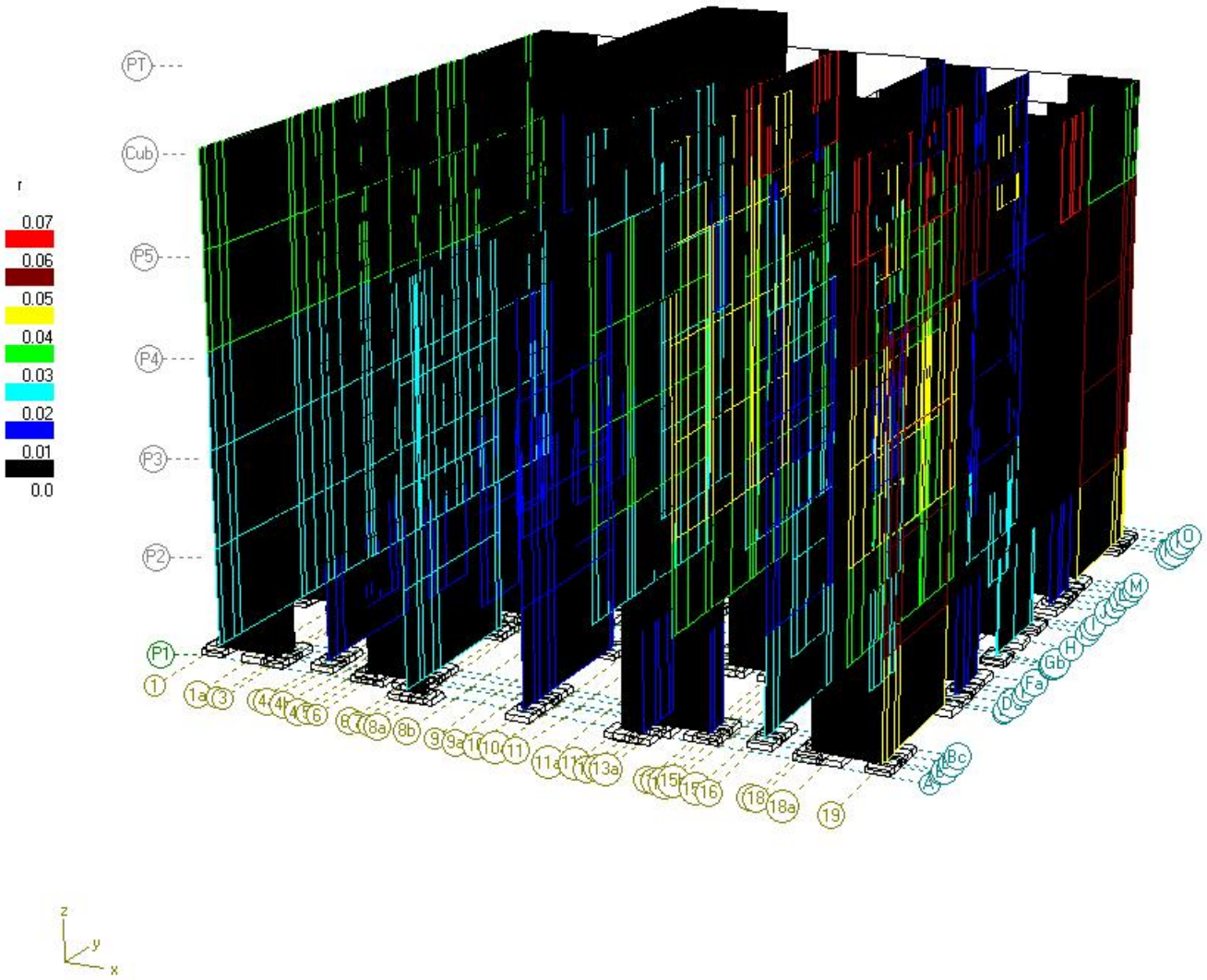


r: Story-Strenght Reduction upon removal of critical element
Ør: Reduction factor for lack of redundancy

r max = 0.29
Ør: 1.00

ENVELOPE

INTERVENCION ESTRUCTURA - REDUNDANCIA Y

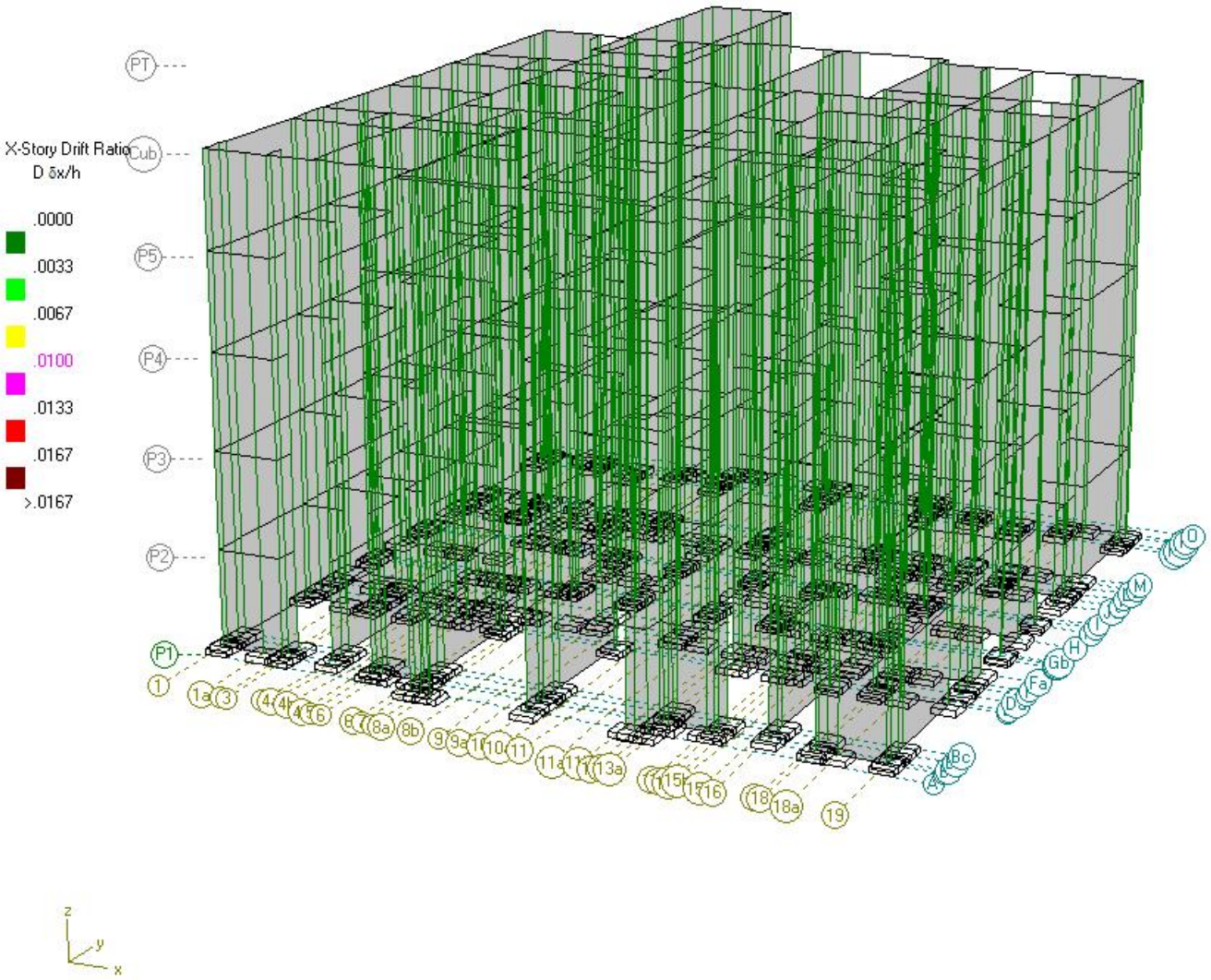


r: Story-Strenght Reduction upon removal of critical element
Ør: Reduction factor for lack of redundancy

r max = 0.07
Ør: 1.00

Drift at center of mass :
D (δcm/h) max = 0.0024
(δmax/δcm) max = 1.115

INTERVENCION ESTRUCTURA - DERIVAS X

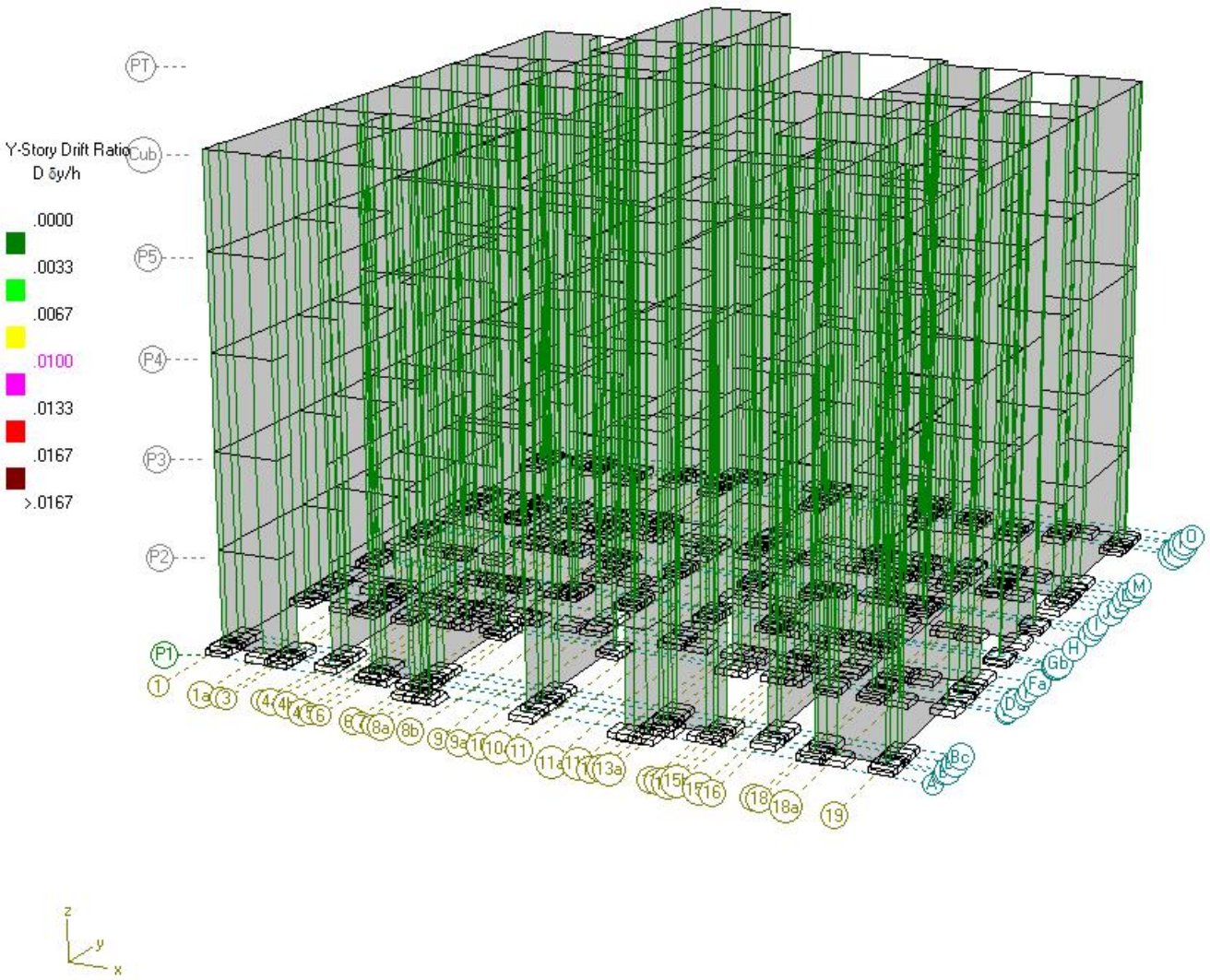


D = .50 Limit Drift Ratio = .0100

D (δ/h) max = 0.0026

Drift at center of mass :
D (δcm/h] max = 0.0004
(δmax/δcm] max = 1.982

INTERVENCION ESTRUCTURA - DERIVAS Y



D = .50 Limit Drift Ratio = .0100

D (δ/h] max = 0.0008

GENERAL INPUT DATA

```
Structure type: Three-Dimensional Frame/Wall Structure
Number of Floor Grids  . . . . = 1
Building total length  . . . . = 16.84 m
Building total width . . . . . = 18.01 m
```

STORY INFORMATION

```
Number of Stories  . . . . = 6
Total Frame Height . . . . = 14 m
```

Floor	Story Height	Grid No
P1	2.40	1
P2	2.40	1
P3	2.40	1
P4	2.40	1
P5	2.40	1
Cub	2.00	1
PT	-	1

* Story Height in (m)

STRUCTURAL GRID INFORMATION

GRID No 1

Grid Point	X	Y
A-1	0.00	0.00
B-1	0.00	0.60
Ba-1	0.00	0.82
Bb-1	0.00	1.27
Bc-1	0.00	1.57
C-1	0.00	4.35
D-1	0.00	4.56
Da-1	0.00	5.03
E-1	0.00	5.56
F-1	0.00	5.86
Fa-1	0.00	6.46
G-1	0.00	7.51
Ga-1	0.00	7.73
Gb-1	0.00	7.88
H-1	0.00	9.01
Ib-1	0.00	10.14
Ia-1	0.00	10.29
I-1	0.00	10.51
Ja-1	0.00	11.56
J-1	0.00	12.16
K-1	0.00	12.46
La-1	0.00	12.99
L-1	0.00	13.51
M-1	0.00	13.66
Nc-1	0.00	16.44
Nb-1	0.00	16.74
Na-1	0.00	17.19
N-1	0.00	17.41
O-1	0.00	18.01
A-1a	1.13	0.00
B-1a	1.13	0.60
Ba-1a	1.13	0.82
Bb-1a	1.13	1.27
Bc-1a	1.13	1.57
C-1a	1.13	4.35
D-1a	1.13	4.56
Da-1a	1.13	5.03
E-1a	1.13	5.56
F-1a	1.13	5.86
Fa-1a	1.13	6.46
G-1a	1.13	7.51
Ga-1a	1.13	7.73
Gb-1a	1.13	7.88

MATERIALS

Number of materials = 2

REINFORCED CONCRETE

Mat	Name	f'c (MPa)	fy (MPa)	fys1 (MPa)	fys2 (MPa)	E (MPa)	G (MPa)	w (N/m3)
1	RConcrete1	21	420	420	420	18837	7532	24000.0
2	Mamp	8	420	420	420	6195	2478	15300.0

MEMBER DATA

Total number of members..... = 451
Number of columns..... = 0
Number of beams ..... = 451
Number of braces ..... = 0

BEAM SECTIONS

Number of prismatic sections = 1

Sec	Name	Shape	b (mm)	h (mm)	tw (mm)	tf (mm)	P1 (mm)	P2 (mm)	A (mm2)	I2 (mm4)	I3 (mm4)	J (mm4)
1	V15x20	Rectang	150	200	-	-	-	-	30000	1.00E+08	5.63E+07	1.19E+08

BEAMS

Beam	Floor	L (m)	Lu (m)	a (m)	c (m)	Sec -	Mat -	System -
G(9-9a)	P2	0.52	0.52	0.00	0.00	1	1	G&L
G(9a-10)	P2	0.53	0.53	0.00	0.00	1	1	G&L
G(9-9a)	P3	0.52	0.52	0.00	0.00	1	1	G&L
G(9a-10)	P3	0.53	0.53	0.00	0.00	1	1	G&L
G(9-9a)	P4	0.52	0.52	0.00	0.00	1	1	G&L
G(9a-10)	P4	0.53	0.53	0.00	0.00	1	1	G&L
G(9-9a)	P5	0.52	0.52	0.00	0.00	1	1	G&L
G(9a-10)	P5	0.53	0.53	0.00	0.00	1	1	G&L
A(7-8)	Cub	0.30	0.30	0.00	0.00	1	1	G&L
A(8-8a)	Cub	0.22	0.22	0.00	0.00	1	1	G&L
A(8a-8b)	Cub	0.75	0.75	0.00	0.00	1	1	G&L
A(8b-9)	Cub	0.68	0.68	0.00	0.00	1	1	G&L
A(9-9a)	Cub	0.52	0.52	0.00	0.00	1	1	G&L
A(9a-10)	Cub	0.53	0.53	0.00	0.00	1	1	G&L
A(10-10a)	Cub	0.53	0.53	0.00	0.00	1	1	G&L
A(10a-11)	Cub	0.52	0.52	0.00	0.00	1	1	G&L
A(11-11a)	Cub	0.68	0.68	0.00	0.00	1	1	G&L
A(11a-11b)	Cub	0.75	0.75	0.00	0.00	1	1	G&L
A(11b-12)	Cub	0.22	0.22	0.00	0.00	1	1	G&L
A(12-13)	Cub	0.30	0.30	0.00	0.00	1	1	G&L
B(1-1a)	Cub	1.13	1.13	0.00	0.00	1	1	G&L
B(1a-2)	Cub	0.53	0.53	0.00	0.00	1	1	G&L
B(2-3)	Cub	0.15	0.15	0.00	0.00	1	1	G&L

Beam	Floor	L	Lu	a	c	Sec	Mat	System
B(3-4)	Cub	1.05	0.98	0.00	0.08	1	1	G&L
B(4-4a)	Cub	0.23	0.16	0.08	0.00	1	1	G&L
B(4a-4b)	Cub	0.45	0.45	0.00	0.00	1	1	G&L
B(4b-4c)	Cub	0.30	0.30	0.00	0.00	1	1	G&L
B(4c-5)	Cub	0.23	0.23	0.00	0.00	1	1	G&L
B(5-6)	Cub	0.28	0.28	0.00	0.00	1	1	G&L
B(6-6a)	Cub	0.84	0.84	0.00	0.00	1	1	G&L
B(6a-7)	Cub	0.23	0.23	0.00	0.00	1	1	G&L
B(13-13a)	Cub	0.23	0.23	0.00	0.00	1	1	G&L
B(13a-14)	Cub	0.92	0.92	0.00	0.00	1	1	G&L
B(14-15)	Cub	0.20	0.20	0.00	0.00	1	1	G&L
B(15-15a)	Cub	0.23	0.23	0.00	0.00	1	1	G&L
B(15a-15b)	Cub	0.30	0.30	0.00	0.00	1	1	G&L
B(15b-15c)	Cub	0.45	0.45	0.00	0.00	1	1	G&L
B(15c-16)	Cub	0.23	0.15	0.00	0.08	1	1	G&L
B(16-17)	Cub	1.05	0.98	0.08	0.00	1	1	G&L
B(17-18)	Cub	0.15	0.15	0.00	0.00	1	1	G&L
B(18-18a)	Cub	0.53	0.53	0.00	0.00	1	1	G&L
B(18a-19)	Cub	1.13	1.13	0.00	0.00	1	1	G&L
C(1-1a)	Cub	1.13	1.13	0.00	0.00	1	1	G&L
C(1a-2)	Cub	0.53	0.53	0.00	0.00	1	1	G&L
C(2-3)	Cub	0.15	0.15	0.00	0.00	1	1	G&L
C(3-4)	Cub	1.05	1.05	0.00	0.00	1	1	G&L
C(16-17)	Cub	1.05	1.05	0.00	0.00	1	1	G&L
C(17-18)	Cub	0.15	0.15	0.00	0.00	1	1	G&L
C(18-18a)	Cub	0.53	0.53	0.00	0.00	1	1	G&L
C(18a-19)	Cub	1.13	1.13	0.00	0.00	1	1	G&L
D(4-4a)	Cub	0.23	0.23	0.00	0.00	1	1	G&L
D(4a-4b)	Cub	0.45	0.45	0.00	0.00	1	1	G&L
D(4b-4c)	Cub	0.30	0.30	0.00	0.00	1	1	G&L
D(4c-5)	Cub	0.23	0.23	0.00	0.00	1	1	G&L
D(5-6)	Cub	0.28	0.28	0.00	0.00	1	1	G&L
D(6-6a)	Cub	0.84	0.84	0.00	0.00	1	1	G&L
D(6a-7)	Cub	0.23	0.23	0.00	0.00	1	1	G&L
D(13-13a)	Cub	0.23	0.23	0.00	0.00	1	1	G&L
D(13a-14)	Cub	0.92	0.92	0.00	0.00	1	1	G&L
D(14-15)	Cub	0.20	0.20	0.00	0.00	1	1	G&L
D(15-15a)	Cub	0.23	0.23	0.00	0.00	1	1	G&L
D(15a-15b)	Cub	0.30	0.30	0.00	0.00	1	1	G&L
D(15b-15c)	Cub	0.45	0.45	0.00	0.00	1	1	G&L
D(15c-16)	Cub	0.23	0.23	0.00	0.00	1	1	G&L
E(4-4a)	Cub	0.23	0.23	0.00	0.00	1	1	G&L
E(4a-4b)	Cub	0.45	0.45	0.00	0.00	1	1	G&L
E(4b-4c)	Cub	0.30	0.30	0.00	0.00	1	1	G&L
E(4c-5)	Cub	0.23	0.23	0.00	0.00	1	1	G&L
E(5-6)	Cub	0.28	0.28	0.00	0.00	1	1	G&L
E(6-6a)	Cub	0.84	0.84	0.00	0.00	1	1	G&L
E(6a-7)	Cub	0.23	0.23	0.00	0.00	1	1	G&L
E(7-8)	Cub	0.30	0.30	0.00	0.00	1	1	G&L
E(8-8a)	Cub	0.22	0.22	0.00	0.00	1	1	G&L
E(8a-8b)	Cub	0.75	0.75	0.00	0.00	1	1	G&L
E(8b-9)	Cub	0.68	0.68	0.00	0.00	1	1	G&L
E(9-9a)	Cub	0.52	0.52	0.00	0.00	1	1	G&L
E(9a-10)	Cub	0.53	0.46	0.00	0.08	1	1	G&L
E(10-10a)	Cub	0.53	0.45	0.08	0.00	1	1	G&L
E(10a-11)	Cub	0.52	0.52	0.00	0.00	1	1	G&L
E(11-11a)	Cub	0.68	0.68	0.00	0.00	1	1	G&L
E(11a-11b)	Cub	0.75	0.75	0.00	0.00	1	1	G&L
E(11b-12)	Cub	0.22	0.22	0.00	0.00	1	1	G&L
E(12-13)	Cub	0.30	0.30	0.00	0.00	1	1	G&L
E(13-13a)	Cub	0.23	0.23	0.00	0.00	1	1	G&L
E(13a-14)	Cub	0.92	0.92	0.00	0.00	1	1	G&L
E(14-15)	Cub	0.20	0.20	0.00	0.00	1	1	G&L
E(15-15a)	Cub	0.23	0.23	0.00	0.00	1	1	G&L
E(15a-15b)	Cub	0.30	0.30	0.00	0.00	1	1	G&L
E(15b-15c)	Cub	0.45	0.45	0.00	0.00	1	1	G&L
E(15c-16)	Cub	0.23	0.23	0.00	0.00	1	1	G&L
F(1-1a)	Cub	1.13	1.13	0.00	0.00	1	1	G&L

WALL DATA

Total number of wall panels..... = 1625

WALL PANELS

Wall	Story	B (m)	H (m)	t (mm)	Material -	System -
A(7-8)	P1	0.30	2.40	83.7	2	G&L
A(8-8a)	P1	0.22	2.40	83.7	2	G&L
A(11b-12)	P1	0.22	2.40	83.7	2	G&L
A(12-13)	P1	0.30	2.40	83.7	2	G&L
B(1-1a)	P1	1.13	2.40	80.6	2	G&L
B(1a-2)	P1	0.53	2.40	80.6	2	G&L
B(5-6)	P1	0.28	2.40	83.7	2	G&L
B(6-6a)	P1	0.84	2.40	83.7	2	G&L
B(6a-7)	P1	0.23	2.40	83.7	2	G&L
B(13-13a)	P1	0.23	2.40	83.7	2	G&L
B(13a-14)	P1	0.92	2.40	83.7	2	G&L
B(14-15)	P1	0.20	2.40	83.7	2	G&L
B(18-18a)	P1	0.53	2.40	80.6	2	G&L
B(18a-19)	P1	1.13	2.40	80.6	2	G&L
C(1-1a)	P1	1.13	2.40	83.7	2	G&L
C(18a-19)	P1	1.13	2.40	83.7	2	G&L
D(4c-5)	P1	0.23	2.40	82.0	2	G&L
D(5-6)	P1	0.28	2.40	82.0	2	G&L
D(6-6a)	P1	0.84	2.40	82.0	2	G&L
D(6a-7)	P1	0.23	2.40	82.0	2	G&L
D(13-13a)	P1	0.23	2.40	82.0	2	G&L
D(13a-14)	P1	0.92	2.40	82.0	2	G&L
D(14-15)	P1	0.20	2.40	82.0	2	G&L
D(15-15a)	P1	0.23	2.40	82.0	2	G&L
E(4b-4c)	P1	0.30	2.40	82.5	2	G&L
E(4c-5)	P1	0.23	2.40	82.5	2	G&L
E(5-6)	P1	0.28	2.40	82.5	2	G&L
E(6-6a)	P1	0.84	2.40	82.5	2	G&L
E(6a-7)	P1	0.23	2.40	82.5	2	G&L
E(7-8)	P1	0.30	2.40	82.5	2	G&L
E(8b-9)	P1	0.68	2.40	87.5	2	G&L
E(11-11a)	P1	0.68	2.40	87.5	2	G&L
E(12-13)	P1	0.30	2.40	82.5	2	G&L
E(13-13a)	P1	0.23	2.40	82.5	2	G&L
E(13a-14)	P1	0.92	2.40	82.5	2	G&L
E(14-15)	P1	0.20	2.40	82.5	2	G&L
E(15-15a)	P1	0.23	2.40	82.5	2	G&L
E(15a-15b)	P1	0.30	2.40	82.5	2	G&L
F(1-1a)	P1	1.13	2.40	79.4	2	G&L
F(1a-2)	P1	0.53	2.40	79.4	2	G&L
F(2-3)	P1	0.15	2.40	79.4	2	G&L
F(17-18)	P1	0.15	2.40	79.4	2	G&L
F(18-18a)	P1	0.53	2.40	79.4	2	G&L
F(18a-19)	P1	1.13	2.40	79.4	2	G&L
G(4-4a)	P1	0.23	2.40	102.7	2	G&L
G(4b-4c)	P1	0.30	2.40	83.7	2	G&L
G(4c-5)	P1	0.23	2.40	83.7	2	G&L
G(5-6)	P1	0.28	2.40	83.7	2	G&L
G(6a-7)	P1	0.23	2.40	83.7	2	G&L
G(7-8)	P1	0.30	2.40	83.7	2	G&L
G(12-13)	P1	0.30	2.40	83.7	2	G&L
G(13-13a)	P1	0.23	2.40	83.7	2	G&L
G(14-15)	P1	0.20	2.40	83.7	2	G&L
G(15-15a)	P1	0.23	2.40	83.7	2	G&L
G(15a-15b)	P1	0.30	2.40	83.7	2	G&L
G(15c-16)	P1	0.23	2.40	102.7	2	G&L
H(1-1a)	P1	1.13	2.40	78.1	2	G&L
H(1a-2)	P1	0.53	2.40	78.1	2	G&L
H(2-3)	P1	0.15	2.40	78.1	2	G&L
H(3-4)	P1	1.05	2.40	78.1	2	G&L
H(8-8a)	P1	0.22	2.40	80.6	2	G&L
H(8a-8b)	P1	0.75	2.40	80.6	2	G&L
H(8b-9)	P1	0.68	2.40	80.6	2	G&L

Wall	Story	B	H	t	Material	System
9(Ib-Ia)	Cub	0.15	2.00	80.0	2	G&L
9(Ia-I)	Cub	0.22	2.00	80.0	2	G&L
9(I-Ja)	Cub	1.05	2.00	80.0	2	G&L
9(Ja-J)	Cub	0.60	2.00	80.0	2	G&L
11(E-F)	Cub	0.30	2.00	80.0	2	G&L
11(F-Fa)	Cub	0.60	2.00	80.0	2	G&L
11(Fa-G)	Cub	1.05	2.00	80.0	2	G&L
11(G-Ga)	Cub	0.22	2.00	80.0	2	G&L
11(Ga-Gb)	Cub	0.15	2.00	80.0	2	G&L
11(Gb-H)	Cub	1.13	2.00	80.0	2	G&L
11(H-Ib)	Cub	1.13	2.00	80.0	2	G&L
11(Ib-Ia)	Cub	0.15	2.00	80.0	2	G&L
11(Ia-I)	Cub	0.22	2.00	80.0	2	G&L
11(I-Ja)	Cub	1.05	2.00	80.0	2	G&L
11(Ja-J)	Cub	0.60	2.00	80.0	2	G&L

GROUND SUPPORT DATA

Total number of ground supports = 348

K = Spring constant(KN/mm)

Characteristics for All Degrees of Freedom
Value = K Dash = free C = constrained

Support	Floor	Type	Ux	Uy	Uz	TetX	TetY	TetZ
B-1	P1	Fixed	C	C	C	C	C	C
Ba-1	P1	Fixed	C	C	C	C	C	C
Bb-1	P1	Fixed	C	C	C	C	C	C
Bc-1	P1	Fixed	C	C	C	C	C	C
C-1	P1	Fixed	C	C	C	C	C	C
D-1	P1	Fixed	C	C	C	C	C	C
Da-1	P1	Fixed	C	C	C	C	C	C
E-1	P1	Fixed	C	C	C	C	C	C
F-1	P1	Fixed	C	C	C	C	C	C
Fa-1	P1	Fixed	C	C	C	C	C	C
G-1	P1	Fixed	C	C	C	C	C	C
Ga-1	P1	Fixed	C	C	C	C	C	C
Gb-1	P1	Fixed	C	C	C	C	C	C
H-1	P1	Fixed	C	C	C	C	C	C
Ib-1	P1	Fixed	C	C	C	C	C	C
Ia-1	P1	Fixed	C	C	C	C	C	C
I-1	P1	Fixed	C	C	C	C	C	C
Ja-1	P1	Fixed	C	C	C	C	C	C
J-1	P1	Fixed	C	C	C	C	C	C
K-1	P1	Fixed	C	C	C	C	C	C
La-1	P1	Fixed	C	C	C	C	C	C
L-1	P1	Fixed	C	C	C	C	C	C
M-1	P1	Fixed	C	C	C	C	C	C
Nc-1	P1	Fixed	C	C	C	C	C	C
Nb-1	P1	Fixed	C	C	C	C	C	C
Na-1	P1	Fixed	C	C	C	C	C	C
N-1	P1	Fixed	C	C	C	C	C	C
B-1a	P1	Fixed	C	C	C	C	C	C
C-1a	P1	Fixed	C	C	C	C	C	C
F-1a	P1	Fixed	C	C	C	C	C	C
H-1a	P1	Fixed	C	C	C	C	C	C
J-1a	P1	Fixed	C	C	C	C	C	C
M-1a	P1	Fixed	C	C	C	C	C	C
N-1a	P1	Fixed	C	C	C	C	C	C
B-2	P1	Fixed	C	C	C	C	C	C
Ba-2	P1	Fixed	C	C	C	C	C	C
Bb-2	P1	Fixed	C	C	C	C	C	C
F-2	P1	Fixed	C	C	C	C	C	C
H-2	P1	Fixed	C	C	C	C	C	C
J-2	P1	Fixed	C	C	C	C	C	C
Nb-2	P1	Fixed	C	C	C	C	C	C
Na-2	P1	Fixed	C	C	C	C	C	C
N-2	P1	Fixed	C	C	C	C	C	C
C-3	P1	Fixed	C	C	C	C	C	C

Support	Floor	Type	Ux	Uy	Uz	TetX	TetY	TetZ
Nc-19	P1	Fixed	C	C	C	C	C	C
Nb-19	P1	Fixed	C	C	C	C	C	C
Na-19	P1	Fixed	C	C	C	C	C	C
N-19	P1	Fixed	C	C	C	C	C	C

SUMMARY OF TOTAL FLOOR LOADS

LOAD CASE 1 : SELFW (D0)

	Force (KN)			Moment (KN-m)		
Floor	Px	Py	Pz	Mx	My	Mz
PT	0.00	0.00	42.60	0.0	0.0	0.0
Cub	0.00	0.00	673.51	0.0	0.0	0.0
P5	0.00	0.00	498.59	0.0	0.0	0.0
P4	0.00	0.00	498.59	0.0	0.0	0.0
P3	0.00	0.00	498.59	0.0	0.0	0.0
P2	0.00	0.00	498.59	0.0	0.0	0.0
P1	0.00	0.00	0.00	0.0	0.0	0.0
Total	0.00	0.00	2710.47	0.0	0.0	0.0

LOAD CASE 2 : DEAD (DL)

	Force (KN)			Moment (KN-m)		
Floor	Px	Py	Pz	Mx	My	Mz
PT	0.00	0.00	43.94	0.0	0.0	0.0
Cub	0.00	0.00	764.67	0.0	0.0	0.0
P5	0.00	0.00	796.27	0.0	0.0	0.0
P4	0.00	0.00	796.27	0.0	0.0	0.0
P3	0.00	0.00	796.27	0.0	0.0	0.0
P2	0.00	0.00	796.27	0.0	0.0	0.0
P1	0.00	0.00	0.00	0.0	0.0	0.0
Total	0.00	0.00	3993.70	0.0	0.0	0.0

LOAD CASE 3 : DEAD 1 (DL1)

	Force (KN)			Moment (KN-m)		
Floor	Px	Py	Pz	Mx	My	Mz
PT	0.00	0.00	43.94	0.0	0.0	0.0
Cub	0.00	0.00	764.67	0.0	0.0	0.0
P5	0.00	0.00	796.27	0.0	0.0	0.0
P4	0.00	0.00	796.27	0.0	0.0	0.0
P3	0.00	0.00	796.27	0.0	0.0	0.0
P2	0.00	0.00	796.27	0.0	0.0	0.0
P1	0.00	0.00	0.00	0.0	0.0	0.0
Total	0.00	0.00	3993.70	0.0	0.0	0.0

LOAD CASE 4 : LIVE (LL)

	Force (KN)			Moment (KN-m)		
Floor	Px	Py	Pz	Mx	My	Mz
PT	0.00	0.00	38.25	0.0	0.0	0.0
Cub	0.00	0.00	90.74	0.0	0.0	0.0
P5	0.00	0.00	485.92	0.0	0.0	0.0
P4	0.00	0.00	485.92	0.0	0.0	0.0
P3	0.00	0.00	485.92	0.0	0.0	0.0
P2	0.00	0.00	485.92	0.0	0.0	0.0
P1	0.00	0.00	0.00	0.0	0.0	0.0
Total	0.00	0.00	2072.66	0.0	0.0	0.0

LOAD CASE 5 : LIVE 1 (LL1)

	Force (KN)			Moment (KN-m)		
Floor	Px	Py	Pz	Mx	My	Mz
PT	0.00	0.00	38.25	0.0	0.0	0.0
Cub	0.00	0.00	90.74	0.0	0.0	0.0
P5	0.00	0.00	485.92	0.0	0.0	0.0
P4	0.00	0.00	485.92	0.0	0.0	0.0
P3	0.00	0.00	485.92	0.0	0.0	0.0
P2	0.00	0.00	485.92	0.0	0.0	0.0
P1	0.00	0.00	0.00	0.0	0.0	0.0
Total	0.00	0.00	2072.66	0.0	0.0	0.0

LOAD CASE 6 : EQUAKE X (EQX) - TYPE : SPECTRAL

	Force (KN)			Acc. Tors. Mom. (KN-m)		
Floor	Px	Py	Pz	Mx	My	Mz
PT	151.75	0.00	0.00	0.0	0.0	50.4
Cub	2596.59	0.00	0.00	0.0	0.0	2349.4
P5	1766.11	0.00	0.00	0.0	0.0	1593.0
P4	1194.57	0.00	0.00	0.0	0.0	1077.8
P3	739.18	0.00	0.00	0.0	0.0	666.5
P2	292.34	0.00	0.00	0.0	0.0	264.5
P1	0.00	0.00	0.00	0.0	0.0	0.0
Total	6740.54	0.00	0.00	0.0	0.0	6001.5

LOAD CASE 7 : EQUAKE Y (EQY) - TYPE : SPECTRAL

	Force (KN)			Acc. Tors. Mom. (KN-m)		
Floor	Px	Py	Pz	Mx	My	Mz
PT	0.00	176.56	0.00	0.0	0.0	20.0
Cub	0.00	2439.09	0.00	0.0	0.0	2059.2
P5	0.00	1780.13	0.00	0.0	0.0	1497.1
P4	0.00	1253.23	0.00	0.0	0.0	1054.2
P3	0.00	770.34	0.00	0.0	0.0	647.3
P2	0.00	321.19	0.00	0.0	0.0	269.9
P1	0.00	0.00	0.00	0.0	0.0	0.0
Total	0.00	6740.55	0.00	0.0	0.0	5547.6

LOAD CASE 8 : WIND X (WLX)

	Force (KN)			Moment (KN-m)		
Floor	Px	Py	Pz	Mx	My	Mz
PT	2.28	0.00	0.00	0.0	0.0	0.8
Cub	13.34	0.00	0.00	0.0	0.0	12.6
P5	14.01	0.00	0.00	0.0	0.0	13.2
P4	13.35	0.00	0.00	0.0	0.0	12.6
P3	12.52	0.00	0.00	0.0	0.0	11.8
P2	12.43	0.00	0.00	0.0	0.0	11.7
P1	6.21	0.00	0.00	0.0	0.0	0.0
Total	74.15	0.00	0.00	0.0	0.0	62.8

LOAD CASE 9 : WIND Y (WLY)

	Force (KN)			Moment (KN-m)		
Floor	Px	Py	Pz	Mx	My	Mz
PT	0.00	0.72	0.00	0.0	0.0	0.1
Cub	0.00	12.35	0.00	0.0	0.0	10.9
P5	0.00	12.96	0.00	0.0	0.0	11.5
P4	0.00	12.35	0.00	0.0	0.0	10.9
P3	0.00	11.57	0.00	0.0	0.0	10.2
P2	0.00	11.48	0.00	0.0	0.0	10.2
P1	0.00	5.74	0.00	0.0	0.0	0.0
Total	0.00	67.18	0.00	0.0	0.0	53.8

WIND LOADS NSR-10

Wind pressure

p = q G Cp rigid buildings
= q Gf Cp flexible buildings
qz = 0.0473 Kz Kzt Kd V² I (N/m²); V in Km/h

W I N D L O A D I N G P A R A M E T E R S

Basic wind speed (Km/h), V ..... = 100

V: 3-second gust speed at 10 m, with annual probability of 0.002

Importance factor, I ..... = 1.0

OCCUPANCY CATEGORY		IMPORTANCE FACTOR (1)	(2)
I	Normal occupancy buildings	0.87	0.77
II	Especial occupancy buildings	1.00	1.00
III	Public assistance facilities	1.15	1.15
IV	Essential facilities	1.15	1.15

(1): Non-hurricane prone regions with V=140-160 km/h
(2): Hurricane prone regions with V >160 Km/h

Exposure category ..... = B

ROUGHNESS	DESCRIPTION
B	Urban and suburban areas, wooded areas, obstructions >30ft
C	Open terrain with scattered obstructions less than 30 ft
D	Flat, unobstructed areas, wind over large bodies of water

Directionality factor, Kd ..... = 0.85

Topographic factor, Kzt ..... = 1.0

Kzt = (1 + K1 K2 K3)²

Wall pressure coefficients, Cp

Windward wall ..... = 0.8
Leeward wall (Wind X) ..... = -0.5
Leeward wall (Wind Y) ..... = -0.486
Side walls ..... = -0.7
Roof ..... = 0.0

G U S T E F F E C T S F A C T O R S

Basic wind velocity, (Km/h) = 100
Exposure category ..... = B
Exposed height, (m) ..... = 14

	X-direction	Y-direction	
Computed natural frequency, f (Hz) =	2.004	4.444	
Height / Length ratio, H/L ..... =	.831	.777	
Structure clasification ..... =	RIGID	RIGID	
Background response index, Q ..... =	.843	.845	(Eq. B.6.5-4)
Resonant response factor, R1 *.... =	.071	.026	(Eq. B.6.5-8)
Gh: Rigid - Simplified analysis .. =	.85	.85	(Sec B.6.5.8.1)
Gh: Rigid - Complete analysis .... =	.826	.827	(Eq. B.6.5-2)
Gf: Flexible -Analytical(2% dampng)=	1.054	1.086	(Eq. B.6.5-2)
Gf: Flexible -Analytical(1% dampng)=	1.055	1.087	(Eq. B.6.5-2)

Gust effects factor, G ..... = .826 .827

* 1% damping ratio. For damping ratio ß, R = R1 * (0.01/ß)^½

V E L O C I T Y P R E S S U R E

Floor -	Height z, m	Pressure qz, N/m2
PT	14.00	322.02
Cub	12.00	308.15
P5	9.60	289.11
P4	7.19	266.30
P3	4.80	237.17
P2	2.40	233.89
P1	0.0	233.89

A C C I D E N T A L T O R S I O N F O R W I N D L O A D S

	X-direction	Y-direction
Accidental eccentricity as a percentage of building dimension, (%)=	15	15

WY is Envelope of:
Case 1: Pwy + Ply
Case 2: 0.75 (Pwy + Ply) + Mt
Mt=0.75(Pwy+Ply)Bx ex

WX is Envelope of:
Case 1: Pwx + Plx
Case 2: 0.75 (Pwx + Plx) + Mt
Mt=0.75(Pwx+Plx)By ey

NOTE: Load cases 3 and 4 are handled through load combinations

---

A C C I D E N T A L E C C E N T R I C I T Y W I N D L O A D S

	X-DIRECTION (WY)	Y-DIRECTION (WX)
Level -	ex (m)	ey (m)
PT	0.32	0.99
Cub	2.53	2.70
P5	2.53	2.70
P4	2.53	2.70
P3	2.53	2.70
P2	2.53	2.70

WY is Envelope of:
Case 1: Pwy + Ply
Case 2: 0.75 (Pwy + Ply) + Mt
Mt=0.75(Pwy+Ply)Bx ex

WX is Envelope of:
Case 1: Pwx + Plx
Case 2: 0.75 (Pwx + Plx) + Mt
Mt=0.75(Pwx+Plx)By ey

NOTE: Load cases 3 and 4 are handled through load combinations

---

Wind nodal forces:

Pw = ∑ pz Ai Pl = ∑ ph Ai
Ps = ∑ ph Ai Pr = ∑ ph Ai
Ai = Nodal tributary area

W I N D F O R C E S: X - D I R E C T I O N

Floor No	Height z, m	Windward Pw, KN	Leeward Pl, KN	Side Ps, KN	Roof Pr, KN
PT	14.00	1.39	0.88	0.39	0.0
Cub	12.00	8.06	5.26	6.90	0.0
P5	9.60	8.26	5.75	7.53	0.0
P4	7.19	7.61	5.75	7.53	0.0
P3	4.80	6.77	5.75	7.53	0.0
P2	2.40	6.67	5.75	7.53	0.0
P1	0.0	3.33	2.86	3.76	0.0

Base shear, V:∑(Pw+Pl) .. = 74.15 KN
Building Weight, W ..... = 10699.25 KN (V/W = 0.007)
Overturning moment
  From horizontal forces . = 512.54 KN-m
  From roof forces ..... = 0.0 KN-m
  Total moment, Mo ..... = 512.54 KN-m
Stabilizing moment, Ms.... = 89883.92 KN-m (Mo/Ms = 0.006)

Wind nodal forces:

Pw = ∑ pz Ai Pl = ∑ ph Ai
Ps = ∑ ph Ai Pr = ∑ ph Ai
Ai = Nodal tributary area

W I N D F O R C E S: Y - D I R E C T I O N

Floor No	Height z, m	Windward Pw, KN	Leeward Pl, KN	Side Ps, KN	Roof Pr, KN
PT	14.00	0.45	0.27	1.23	0.0
Cub	12.00	7.55	4.80	7.38	0.0
P5	9.60	7.73	5.23	8.06	0.0
P4	7.19	7.11	5.23	8.06	0.0
P3	4.80	6.34	5.23	8.06	0.0
P2	2.40	6.25	5.23	8.06	0.0
P1	0.0	3.13	2.61	4.03	0.0

Base shear, V:∑(Pw+Pl) .. = 67.18 KN
Building Weight, W ..... = 10699.25 KN (V/W = 0.006)
Overturning moment
  From horizontal forces . = 454.72 KN-m
  From roof forces ..... = 0.0 KN-m
  Total moment, Mo ..... = 454.72 KN-m
Stabilizing moment, Ms.... = 96788.25 KN-m (Mo/Ms = 0.005)

S E I S M I C D E S I G N C O D E : COL NSR-10

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============================================================
 S E I S M I C   B A S E   L E V E L :  P1
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S E I S M I C F O R C E R E S I S T I N G S Y S T E M

System X-Direction: A: Bearing Wall
System Y-Direction: A: Bearing Wall

Energy dissip capacity: 2: Moderate-DMO

RESPONSE SPECTRUM EARTHQUAKE FORCES COL NSR-10

Elastic Modal Base Shear
Vm = Sam Wm'
Sam = Spectral modal acceleration
Wm' = Effective modal weight

A N A L Y S I S P A R A M E T E R S

Number of modes to be included ... = 12

	X-direction	Y-direction
Energy dissipation coefficient, Ro =	2.5	2.5

S P E C T R A L M O D A L A C C E L E R A T I O N

Sam = 2.5 Aa Fa I [0.4+0.6T/To] For Tm <= To
Sam = 2.5 Aa Fa I For To < Tm <= Tc
Sam = 1.2 Av Fv I/Tm For Tc < Tm < Tl
Sam = 1.2 Av Fv Tl I/Tm² For Tm > Tl

Eff. peak acceleration & veloc., Aa = .2 Av = .20

Region:	10	9	8	7	6	5	4	3	2	1
Aa or Av	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05

LOCATION	Aa	Av	Menace
Barranquilla, Cartagena, San Andres, Valledupar	0.10	0.10	Low
Bogota, Medellin	0.15	0.20	Interm
Armenia, Bucaramanga, Cali, Manizalez, Pereira	0.25	0.25	High
Cucuta, Villavicencio	0.35	0.30	High
Quibdo	0.35	0.35	High

Importance coefficient, I ..... = 1.0

GROUP	COEFFICIENT
IV - Essential facilities	1.50
III- Public assistance facilities	1.25
II - Especial occupancy buildings	1.10
I - Normal occupancy buildings	1.00

Site profile type, S ..... = D

TYPE	SOIL PROFILE TYPE	Shear Wave Velocity
A	Hard Rock	> 1500 m/s
B	Rock	1500 - 760 m/s
C	Very Dense Soil & Soft Rock	760 - 360 m/s
D	Stiff Soil Profile	360 - 180 m/s
E	Soft Soil Profile	< 180 m/s
F	Soils requiring site-specific evaluations	

S P E C T R A L M O D A L A C C E L E R A T I O N

```
  Sam = 2.5 Aa Fa I [0.4+0.6T/To]  For Tm <= To
  Sam = 2.5 Aa Fa I                For To < Tm <= Tc
  Sam = 1.2 Av Fv I/Tm             For Tc < Tm < Tl
  Sam = 1.2 Av Fv Tl I/Tm²         For Tm > Tl
DESIGN SPECTRAL RESPONSE ACCELERATION PARAMETERS

                                   Short Periods   Long Period
                                   -------------  ----------------
Effect. peak acceleration & velc., Aa = 0.20      Av = 0.20
Site coefficients (Tables below),  Fa = 1.40      Fv = 2.00

Design response parameters,     Aa Fa =   0.28  Av Fv=   0.40

Long-period transition period, Tl sec =   4.80  (2.4 Fv)
```

Site Coefficient Fa

Site Class	Aa<=0.1	Aa=0.2	Aa=0.3	Aa=0.4	Ss>=0.5
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	a	a	a	a	a

Site Coefficient Fv

Site Class	Av<=0.1	Av=0.2	Av=0.3	Av=0.4	Av>=0.5
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	a	a	a	a	a

a: Site-specific geotechnical investigation required

Reduction in R for Irregularity and Lack of Redundancy:

PLAN IRREGULARITIES			ELEVATION IRREGULARITIES	
Type	Description	Øp	Type	Description	Øa
1aP	Torsional	0.9	1aA	Flexible	0.9
1bP	Torsional Extrme	0.8	1bA	Flexible Extrme	0.8
2P	Reentrant corners	0.9	2A	Mass	0.9
3P	Diaph. discontin.	0.9	3A	Geometrical	0.9
4P	Plane shifting	0.8	4A	Plane shifting	0.8
5P	Unparallel grid	0.9	5aA	Weak Story	0.9
			5bA	Weak Story Extr	0.8

NOTE: EngSolutions RCB assumes irregular building.
For regular buildings make (Øp . Øa)= 1.0

	X - D I R E C T I O N	Y - D I R E C T I O N
Reduct. factor, (Øp.Øa) =	.9	.9
Redundancy factor, Ør =	1	1

R = (Øp Øa) Ør Ro

S T A T I C E Q U I V A L E N T B A S E S H E A R

Building Weight, W, (KN) = 10699.28

Peak Acceleration Coeffi., Aa Fa = .28
Peak Velocity Coefficient, Av Fv = .4
Importance factor, I . . . . . = 1
Site class, S . . . . . = D
Coeff. for upper limit period, Cu = 1.27

		X-direction	Y-direction
Computed Period	=	0.499	0.225
Ta = Ct (H)^x	=	0.049 H ¾	0.049 H ¾
	=	0.355	0.355
Tmax = Cu Ta	=	0.450	0.450
Fundamental Period	=	0.450	0.225
Energ-Disspst coeff, R	=	2.25	2.25
1.2 Av Fv I / T	=	1.066	2.133
2.5 Aa Fa	=	.7	.7
Sa	=	.7	.7
Base Shear, Vo	=	7489.5	7489.5
Static Shear, .9Vo (KN)	=	6740.55	6740.55

For regular buildings use Vo = 0.8 * V

S P E C T R A L A C C E L E R A T I O N

MODE No	PERIOD (sec)	Sa (g)
1	.499	.7
2	.225	.7
3	.119	.63
4	.108	.598
5	.062	.462
6	.058	.451
7	.048	.421
8	.035	.383
9	.03	.368
10	.03	.368
11	.024	.351
12	.022	.345

M O D A L B A S E S H E A R

MODE No	X - D I R E C T I O N Sax (g)	W'x (KN)	Vx (KN)	Y - D I R E C T I O N Say (g)	W'y (KN)	Vy (KN)
1	.7	7799.2	5459.4	.7	0	0
2	.7	1.3	.9	.7	7163.2	5014.2
3	.63	.1	0	.63	564.5	355.6
4	.598	1963.2	1174	.598	0	0
5	.462	18.3	8.4	.462	0	0
6	.451	1.2	.5	.451	1692.2	763.2
7	.421	579.6	244	.421	0	0
8	.383	0	0	.383	37.3	14.3
9	.368	237.4	87.4	.368	0	0
10	.368	16.6	6.1	.368	425.8	156.7
11	.351	0	0	.351	51.9	18.2
12	.345	82.5	28.5	.345	0	0
ELASTIC Ve (combined):		5594.8				5099.3
STATIC(IREG) 0.9Sa(T1)W		6740.5				6740.5
Design Base Shear:			6740.5			6740.5

Total Building Weight, W = 10699.28 KN
Participating Mass, $\sum W'/W$ = 100% in X, 93% in Y
$W'xm=\{\sum Wj\ \phi xjm\}^2/\sum Wj\ \phi xjm^2$ $W'ym=\{\sum Wj\ \phi yjm\}^2/\sum Wj\ \phi yjm^2$
Combination of Modal Response: CQC V = (Sum Sum Vi Pij Vj)½

A C C I D E N T A L T O R S I O N

	X-direction	Y-direction
Accidental eccentricity as a percentage of building dimension, (%)=	5	5

A C C I D E N T A L E C C E N T R I C I T Y:

Level	X - D I R E C T I O N (EQY) $\delta\varepsilon xo$ (m)	Ax -	$\delta\varepsilon x$ (m)	Y - D I R E C T I O N (EQX) $\delta\varepsilon yo$ (m)	Ax -	$\delta\varepsilon y$ (m)
PT	0.11	1.00	0.11	0.33	1.00	0.33
Cub	0.84	1.00	0.84	0.90	1.00	0.90
P5	0.84	1.00	0.84	0.90	1.00	0.90
P4	0.84	1.00	0.84	0.90	1.00	0.90
P3	0.84	1.00	0.84	0.90	1.00	0.90
P2	0.84	1.00	0.84	0.90	1.00	0.90

Ax: Amplification factor for accidental eccentricity

EQY: Envelope (1) $Ex = \varepsilon x$
(2) $Ex = \varepsilon x + \delta\varepsilon x$
(3) $Ex = \varepsilon x - \delta\varepsilon x$

EQX: Envelope (1) $Ey = \varepsilon y$
(2) $Ey = \varepsilon y + \delta\varepsilon y$
(3) $Ey = \varepsilon y - \delta\varepsilon y$

D E S I G N E C C E N T R I C I T Y : E = ε + $\delta\varepsilon$

Level	X - D I R E C T I O N (EQY)				Y - D I R E C T I O N (EQX)			
	Center Mass CMx	Inherent Eccent. εx^*	Accident Eccent. $\delta\varepsilon x$	Design Eccent. E^x	Center Mass CMy	Inherent Eccent. εy^*	Accident Eccent. $\delta\varepsilon y$	Design Eccent. E^y
PT	8.42	-0.01	0.11	-0.122	8.86	0.14	0.33	0.4747
Cub	8.39	2.57	0.84	3.4141	9.05	-0.08	0.90	-0.988
P5	8.40	2.56	0.84	3.4040	9.05	-0.07	0.90	-0.977
P4	8.40	2.42	0.84	3.2626	9.05	-0.07	0.90	-0.977
P3	8.40	2.23	0.84	3.0707	9.05	-0.07	0.90	-0.977
P2	8.40	1.76	0.84	2.6060	9.05	-0.07	0.90	-0.977

Note: * Inherent eccentricity: εx = CMx - CRx and εy = CMy - CRy
All values are in meters

D E S I G N E C C E N T R I C I T Y : E = ε - $\delta\varepsilon$

Level	X - D I R E C T I O N (EQY)				Y - D I R E C T I O N (EQX)			
	Center Mass CMx	Inherent Eccent. εx^*	Accident Eccent. $\delta\varepsilon x$	Design Eccent. E^x	Center Mass CMy	Inherent Eccent. εy^*	Accident Eccent. $\delta\varepsilon y$	Design Eccent. E^y
PT	8.42	-0.01	0.11	0.1010	8.86	0.14	0.33	-0.199
Cub	8.39	2.57	0.84	1.7373	9.05	-0.08	0.90	0.8282
P5	8.40	2.56	0.84	1.7272	9.05	-0.07	0.90	0.8383
P4	8.40	2.42	0.84	1.5858	9.05	-0.07	0.90	0.8383
P3	8.40	2.23	0.84	1.3939	9.05	-0.07	0.90	0.8383
P2	8.40	1.76	0.84	0.9292	9.05	-0.07	0.90	0.8383

Note: * Inherent eccentricity: εx = CMx - CRx and εy = CMy - CRy
All values are in meters

Modal nodal force:

$$Fim = Vm \ \phi im / \Sigma Wj \ \phi jm$$
$$Vm = (Sam/Rw) W'm$$
$$W'm = \{\Sigma Wj \ \phi jm\}^2 / \Sigma Wj \ \phi jm^2$$

C O M B I N E D M O D A L F O R C E

X - DIRECTION

Floor k -	Weight W (KN)	Force F (KN)	Shear V (KN)	Torsion T=F(E-ε) (KN-m)
PT	130.4	151.7	151.7	50.43
Cub	2203	2597	2748	2349
P5	2091	1766	4514	1593
P4	2091	1195	5709	1078
P3	2091	739.1	6448	666.4
P2	2091	292.3	6741	264.4

C O M B I N E D M O D A L F O R C E

Y - DIRECTION

Floor k -	Weight W (KN)	Force F (KN)	Shear V (KN)	Torsion T=F(E-ε) (KN-m)
PT	130.4	176.5	176.5	19.96
Cub	2203	2439	2616	2059
P5	2091	1780	4396	1497
P4	2091	1253	5649	1054
P3	2091	770.3	6419	647.2
P2	2091	321.1	6741	269.8

LINEAR ANALYSIS - SUMMARY MAXIMUM STORY DRIFT RATIO, a/h

	Drift-Ratio at CENTER OF MASS			MAXIMUM Corner Story-Drift-Ratio		
Story	DriftX	DriftY	DriftR	DriftX	DriftY	DriftR
Cub	0.0007	0.0005	0.0007	0.0007	0.0005	0.0007
P5	0.0033	0.0005	0.0033	0.0034	0.0011	0.0034
P4	0.0038	0.0007	0.0038	0.0039	0.0013	0.0039
P3	0.0036	0.0007	0.0036	0.0037	0.0013	0.0037
P2	0.0029	0.0006	0.0029	0.0030	0.0011	0.0030
P1	0.0013	0.0003	0.0013	0.0014	0.0006	0.0014
Maxima	0.0038	0.0007	0.0038	0.0039	0.0013	0.0039

DriftX = $(\Delta x/h)max$
DriftY = $(\Delta y/h)max$
DriftR = $([(\Delta x/h)^2 + (\Delta y/h)^2]^{1/2})max$

PLAN TORSIONAL IRREGULARITY CHECK - NSR-10

	EARTHQUAKE - X				EARTHQUAKE - Y			
Level	Δ/h max	Δ/h avg	max/avg Δ/h	Irregular	Δ/h max	Δ/h avg	max/avg Δ/h	Irregular
PT	0.0007	0.0007	1.0202	NO	0.0005	0.0005	1.0000	NO
Cub	0.0034	0.0033	1.0318	NO	0.0011	0.0005	1.9705	EXT
P5	0.0039	0.0038	1.0319	NO	0.0013	0.0007	1.9723	EXT
P4	0.0037	0.0036	1.0344	NO	0.0013	0.0007	1.9472	EXT
P3	0.0030	0.0029	1.0376	NO	0.0011	0.0006	1.9100	EXT
P2	0.0014	0.0013	1.0491	NO	0.0006	0.0003	1.7930	EXT

Torsional irregularity is considered to exist if Δ/h max > 1.2 Δ/h ave
EXTreme torsional irregularity is considered to exist if Δ/h max > 1.4 Δ/h ave

TORSIONAL IREGULARITIES (1aP) EXIST !!!
EXTREME TORSIONAL IREGULARITIES (1bP) EXIST !!!

Notes:
The determination of torsional irregularities (plan structural irregularity type 1) and computation of amplification factors for accidental torsion Ax, is conducted according to FEMA's NEHRP Recommended Provitions for Seismic Regulations for New Buildings and other Structures, Provisions and Commentary ed. 1994, 1997, 2000, 2003, 2009, which is applicable to the following building codes derived from the above documents: (USA) IBC-03/06, ASCE 7-05/10, CBC-01/07, UBC-97, (COLOMBIA) NSR-10/98, and (PANAMA) REP-2004.

AMPLIFICATION FACTORS ACCIDENTAL TORSION, Ax

	EARTHQUAKE - X				EARTHQUAKE - Y			
Level	δmax	δavg	δmax/δavg	Ax	δmax	δavg	δmax/δavg	Ax
PT	69.17	68.16	1.01	1.00	17.77	15.13	1.17	1.00
Cub	73.29	70.81	1.04	1.00	25.36	13.13	1.93	2.59
P5	57.15	55.16	1.04	1.00	20.25	10.53	1.92	2.57
P4	38.52	37.11	1.04	1.00	14.09	7.41	1.90	2.51
P3	20.87	20.04	1.04	1.00	7.97	4.27	1.87	2.42
P2	6.57	6.26	1.05	1.00	2.78	1.55	1.79	2.23

Displacement units: mm
Ax = $[\delta max / 1.2\ \delta ave]^2 < 3.0$

DRIFT-BASED FLEXIBLE-STORY CHECK - NSR-10

	EARTHQUAKE - X				EARTHQUAKE - Y			
Story	Δcm*	Δcm/h	Δn/Δn+1	Irregular	Δcm*	Δcm/h	Δn/Δn+1	Irregular
Cub	1.3209	0.0007	-	-	1.0003	0.0005	-	-
P5	7.8226	0.0033	5.9224	?	1.2964	0.0005	1.2960	NO
P4	9.0257	0.0038	1.1538	NO	1.5605	0.0007	1.2037	NO
P3	8.5346	0.0036	0.9456	NO	1.5722	0.0007	1.0075	NO
P2	6.8904	0.0029	0.8073	NO	1.3591	0.0006	0.8645	NO
P1	3.1294	0.0013	0.4542	NO	0.7747	0.0003	0.5700	NO

* Δcm: Story drift at center of mass (mm)
n/n+1 Δ/h: (Δcm/h)n/(Δcm/h)n+1: Ratio between drift ratio at CM of a stotry and that of story above

Vertical irregularities type 1a, 1b, 2 and 3 do not apply if drift ratio of each story is less than 1.3 that of next story above (i.e. n/n+1 Δ/h < 1.3). Story drift ratio of top two stories are not considered

Stiffness-based flexible story check is not required!
It can be considered that vertical irregularities type 1aA, 1bA, 2A and 3A DO NOT EXIST !

Use: Øa = 1

DESIGN-SHEAR BASED STORY STIFFNESS

	X - DIRECTION			Y - DIRECTION		
Story	Shear X	Δcm X	Kx	Shear Y	Δcm Y	Ky
Cub	151.7	1.3208	114.9	176.6	1.0003	176.5
P5	2748.3	7.8226	351.3	2615.7	1.2964	2017.6
P4	4514.4	9.0257	500.2	4395.8	1.5605	2816.9
P3	5709.0	8.5346	668.9	5649.0	1.5722	3593.1
P2	6448.2	6.8904	935.8	6419.4	1.3591	4723.3
P1	6740.5	3.1294	2154.0	6740.5	0.7747	8701.2

Shear: Design Shear, in KN
Δcm: Drift at center of mass, in mm
K: Story stiffness, in KN/mm

STIFFNESS-BASED FLEXIBLE-STORY CHECK - NSR-10

	EARTHQUAKE - X				EARTHQUAKE - Y			
Story	Kn	Kn/Kn+1	Kn/Kavg3	Irregular	Kn	Kn/Kn+1	Kn/Kavg3	Irregular
Cub	114.9	-	-	-	176.5	-	-	-
P5	351.3	3.058	-	NO	2017.6	11.431	-	NO
P4	500.2	1.424	-	NO	2816.9	1.396	-	NO
P3	668.9	1.337	2.077	NO	3593.1	1.276	2.151	NO
P2	935.8	1.399	1.846	NO	4723.3	1.315	1.681	NO
P1	2154.0	2.302	3.070	NO	8701.2	1.842	2.345	NO

Kn: Stiffness of story n, in KN/mm
Kn/Kn+1: Ratio between stiffness of story n and that of store above n
Kn/Kavg3: Ratio between stiffness of story n and average stiffness of three stories above n

Stiffness-soft story irregularity is considered to exist if Kn/Kn+1 < 0.7 or Kn/Kavg3 < 0.8
Stiffness-EXTreme soft story irregularity is considered to exist if Kn/Kn+1 < 0.7 or Kn/Kavg3 < 0.8

Stiffness-flexible story irregularity types 1aA and 1bA do NOT exist.

Notes:
The determination stiffness-soft story irregularity (vertical structural irregularity types 1a and 1b) is conducted based on story-stiffness computed for the design seismic shear distribution, according to FEMA's NEHRP Recommended Provitions for Seismic Regulations for New Buildings and other Structures, Provisions and Commentary ed. 1994, 1997, 2000, 2003, 2009, which is applicable to the following building codes derived from the above documents: (USA) IBC-03/06, ASCE 7-05/10, CBC-01/07, UBC-97, (COLOMBIA) NSR-10/98, PANAMA) REP-2004, (DOM) R-001.

WEIGHT (MASS) IRREGULARITY CHECK

Level	Wn	Wn/Wn+1	Wn/Wn-1	Irregular
PT	130.5	-	0.059	-
Cub	2203.1	-	1.053	-
P5	2091.4	0.949	1.000	NO
P4	2091.4	1.000	1.000	NO
P3	2091.4	1.000	1.000	NO
P2	2091.4	1.000	-	NO

Wn: Effective weight of story n, in KN
Wn/Wn+1: Ratio between weight of story n and weight of store above n
Wn/Wn-1: Ratio between weight of story n and weight of story below n

Weight (mass) irregularity is considered to exist if effective weight of any story is more than 1.5 times the effective weight of an anjacent story. That is, if Wn/Wn+1 > 1.5 or Wn/Wn-1 > 1.5.
A roof that is lighter than the floor below is not considered.

Weight (mass) irregularity (2A) does NOT exist.

SEISMIC PARAMETERS - NSR-10

Effective peak acceleration, Aa	0.20
Effective peak velocity coeff, Av	0.20
Importance coefficient, I	1.00
Site profile type, S	D
Amplification coefficient, Fa	1.40
Amplification coefficient, Fv	2.00
Long-period transition period, Tl (sec)	4.80
Amplified peak acceleration Aa Fa	0.28
Amplified peak veloc. coefficent Av Fv	0.40
Effective Building Weight	10699.3 KN

	X - DIRECTION	Y - DIRECTION
Seismic Force-resisting system	A: Wall	A: Wall
Fundamental period, T	0.499	0.225
Energy Dissipation Coefficient, Ro	2.50	2.50
Reduced Energy Dissipation Coefficient, R	2.25	2.25
Design base shear, V	6740.5	6740.5

REDUNDANCY ANALYSIS

STORY-STRENGTH REDUCTION DUE TO REMOVAL OF CRITICAL ELEMENT

	EARTHQUAKE - X				EARTHQUAKE - Y			
Story	Vi	Vi/Vb	Crit.Element	Ve/Vi	Vi	Vi/Vb	Crit.Element	Ve/Vi
Cub	67.4	0.02	-	-	78.5	0.03	-	-
P5	1221.5	0.41	Wll:G(15c-16)	0.28	1162.5	0.39	Wll:10(J-O)	0.07
P4	2006.4	0.67	Wll:H(16-19)	0.19	1953.7	0.65	Wll:19(M-N)	0.05
P3	2537.3	0.85	Wll:H(16-19)	0.16	2510.7	0.84	Wll:19(B-C)	0.05
P2	2865.9	0.96	Wll:H(16-19)	0.15	2853.0	0.95	Wll:19(B-C)	0.05
P1	2995.8	1.00	Wll:H(16-19)	0.09	2995.8	1.00	Wll:19(B-C)	0.04
MAXIMA				0.28				0.07

NOTE: Shear values are divided by R

Removal of any critial element on any story supporting more than 35% Vb (Base Shear) would not reduce the story strength by more than 33%. Thus SEISMIC FORCE-RESISTING SYSTEM SEEMS REDUNDANT!!
It should be investigated if removal of critical element would induce Extreme Torsional Irregularity (1bP)

Proposed Reduction Factor for Lack of Redundancy: Ørx = 1 Øry = 1

Wall	Story	System	LdComb	Axial	Shear	Moment	Axial	Shear	Moment
			16	76.0	2.1	-2.5	76.0	2.1	1.8
			17	55.8	1.7	-1.6	55.8	1.7	2.0
			18	57.9	1.6	-1.3	57.9	1.6	1.8
			19	57.3	1.7	0.2	57.3	1.7	3.6
			20	56.4	1.6	-3.1	56.4	1.6	0.1
			21	69.2	11.9	20.8	69.5	11.9	48.9
			22	117.7	-6.8	-25.3	117.3	-6.8	-43.1
			23	49.7	6.9	-51.3	49.8	6.9	-32.1
			24	137.1	-1.7	46.8	137.0	-1.7	37.9
			25	115.6	13.1	114.0	116.1	13.1	139.6
			26	71.2	-7.9	-118.5	70.7	-7.9	-133.8
			27	136.0	9.0	121.7	136.4	9.0	136.3
			28	50.8	-3.8	-126.3	50.5	-3.8	-130.5
			29	32.6	11.0	21.6	33.0	11.0	47.9
			30	81.1	-7.7	-24.5	80.7	-7.7	-44.1
			31	13.1	5.9	-50.5	13.3	5.9	-33.2
			32	100.6	-2.6	47.6	100.4	-2.6	36.9
			33	79.1	12.2	114.8	79.5	12.2	138.5
			34	34.6	-8.9	-117.7	34.1	-8.9	-134.8
			35	99.5	8.1	122.6	99.8	8.1	135.2
			36	14.2	-4.8	-125.4	13.9	-4.8	-131.5

Linear Analysis- Support Reactions

Support		Load	Force (KN)			Moment (KN-m)		
Axis	Floor	LdComb	Fx	Fy	Fz	Mx	My	Mz
B-1	P1	1	-13.54	-5.21	39.27	2.10	-23.86	-0.04
		2	-16.37	-6.40	49.09	2.52	-29.38	-0.05
		3	-13.99	-5.44	41.37	2.16	-24.92	-0.04
		4	-13.99	-5.44	41.37	2.16	-24.92	-0.04
		5	-12.44	-5.32	40.04	2.13	-22.97	0.00
		6	-13.75	-4.83	36.91	1.92	-23.52	-0.08
		7	-13.28	-5.01	39.92	2.02	-23.66	-0.04
		8	-12.90	-5.13	37.04	2.02	-22.82	-0.04
		9	-12.75	-5.21	40.73	2.10	-23.35	-0.01
		10	-13.44	-4.93	36.23	1.95	-23.13	-0.07
		11	-11.28	-4.59	34.44	1.85	-20.31	-0.01
		12	-11.93	-4.35	32.87	1.75	-20.59	-0.06
		13	-11.70	-4.44	34.38	1.80	-20.66	-0.03
		14	-11.51	-4.50	32.94	1.80	-20.24	-0.03
		15	-11.43	-4.54	34.78	1.84	-20.50	-0.02
		16	-11.78	-4.40	32.53	1.76	-20.39	-0.05
		17	-8.05	-3.60	26.81	1.45	-15.06	0.02
		18	-9.36	-3.11	23.68	1.24	-15.61	-0.07
		19	-8.89	-3.29	26.68	1.35	-15.76	-0.02
		20	-8.51	-3.41	23.80	1.35	-14.91	-0.03
		21	6.10	-26.22	134.35	8.30	-13.09	2.37
		22	-32.29	16.08	-57.40	-4.26	-33.39	-2.44
		23	13.13	-24.27	94.32	8.07	-1.64	2.22
		24	-39.32	14.12	-17.36	-4.02	-44.84	-2.30
		25	-17.99	-14.38	127.96	4.26	-37.56	0.90
		26	-8.19	4.23	-51.00	-0.22	-8.92	-0.98
		27	-31.62	-2.27	82.45	0.57	-47.08	-0.50
		28	5.43	-7.87	-5.49	3.48	0.60	0.42
		29	10.49	-24.50	121.12	7.63	-5.19	2.38
		30	-27.90	17.80	-70.63	-4.93	-25.49	-2.43
		31	17.52	-22.55	81.08	7.40	6.26	2.23
		32	-34.93	15.85	-30.60	-4.70	-36.93	-2.29
		33	-13.60	-12.65	114.72	3.59	-29.65	0.91
		34	-3.80	5.95	-64.24	-0.89	-1.02	-0.97
		35	-27.23	-0.55	69.21	-0.11	-39.18	-0.48
		36	9.82	-6.15	-18.72	2.81	8.51	0.43
Ba-1	P1	1	-0.46	-3.37	19.84	2.92	-0.19	-0.06
		2	-0.59	-4.07	24.78	3.48	-0.24	-0.08
		3	-0.49	-3.48	20.90	2.99	-0.20	-0.06
		4	-0.49	-3.48	20.90	2.99	-0.20	-0.06
		5	-0.05	-3.51	21.14	2.89	-0.03	-0.01
		6	-0.86	-3.00	17.74	2.73	-0.35	-0.11

Axis	Floor	LdComb	Fx	Fy	Fz	Mx	My	Mz
		7	-0.39	-3.09	20.03	2.84	-0.19	-0.06
		8	-0.51	-3.42	18.85	2.78	-0.18	-0.06
		9	-0.10	-3.33	21.16	2.89	-0.07	-0.02
		10	-0.80	-3.19	17.72	2.72	-0.30	-0.10
		11	-0.19	-3.02	17.86	2.55	-0.08	-0.03
		12	-0.60	-2.76	16.16	2.46	-0.24	-0.08
		13	-0.36	-2.80	17.31	2.52	-0.16	-0.05
		14	-0.42	-2.97	16.71	2.49	-0.16	-0.05
		15	-0.22	-2.92	17.87	2.55	-0.10	-0.03
		16	-0.57	-2.85	16.15	2.46	-0.22	-0.07
		17	0.11	-2.42	14.46	1.96	0.04	0.01
		18	-0.70	-1.91	11.06	1.80	-0.28	-0.09
		19	-0.23	-2.00	13.35	1.91	-0.13	-0.04
		20	-0.35	-2.33	12.17	1.85	-0.11	-0.04
		21	19.38	-15.38	116.87	8.17	8.66	2.80
		22	-20.29	8.87	-77.99	-2.55	-9.03	-2.92
		23	17.97	-17.45	98.46	7.20	8.00	2.61
		24	-18.87	10.94	-59.58	-1.58	-8.37	-2.73
		25	7.65	-3.75	76.59	5.89	3.47	1.08
		26	-8.56	-2.76	-37.71	-0.27	-3.84	-1.20
		27	-3.83	4.15	23.65	2.96	-1.64	-0.57
		28	2.92	-10.66	15.23	2.65	1.27	0.46
		29	19.54	-14.29	110.19	7.24	8.72	2.82
		30	-20.13	9.96	-84.67	-3.48	-8.97	-2.90
		31	18.12	-16.36	91.78	6.27	8.06	2.63
		32	-18.71	12.03	-66.27	-2.51	-8.30	-2.71
		33	7.81	-2.66	69.90	4.96	3.54	1.11
		34	-8.40	-1.67	-44.39	-1.20	-3.78	-1.18
		35	-3.67	5.24	16.97	2.03	-1.57	-0.55
		36	3.08	-9.57	8.55	1.72	1.33	0.48
Bb-1	P1	1	-0.02	-2.00	22.01	-0.46	-0.01	-0.01
		2	-0.02	-2.60	27.45	-0.50	-0.01	-0.01
		3	-0.02	-2.16	23.16	-0.45	-0.01	-0.01
		4	-0.02	-2.16	23.16	-0.45	-0.01	-0.01
		5	0.08	-2.26	22.86	-0.44	0.02	0.01
		6	-0.12	-1.72	20.24	-0.42	-0.03	-0.02
		7	0.07	-1.81	22.12	-0.45	-0.01	-0.01
		8	-0.10	-2.17	20.98	-0.41	-0.01	-0.01
		9	0.12	-2.06	22.96	-0.45	0.01	0.00
		10	-0.15	-1.92	20.14	-0.40	-0.02	-0.02
		11	0.04	-1.85	19.52	-0.40	0.01	0.00
		12	-0.06	-1.58	18.21	-0.39	-0.02	-0.01
		13	0.03	-1.62	19.15	-0.41	-0.01	-0.01
		14	-0.06	-1.80	18.58	-0.39	-0.01	-0.01
		15	0.05	-1.75	19.57	-0.41	0.00	0.00
		16	-0.08	-1.68	18.16	-0.38	-0.01	-0.01
		17	0.09	-1.56	15.46	-0.31	0.02	0.01
		18	-0.11	-1.01	12.84	-0.29	-0.03	-0.02
		19	0.07	-1.10	14.72	-0.32	0.00	-0.01
		20	-0.09	-1.47	13.58	-0.28	0.00	0.00
		21	1.67	-14.23	104.64	-1.42	1.02	0.70
		22	-1.70	10.25	-61.55	0.56	-1.03	-0.71
		23	1.49	-17.58	81.67	-0.76	0.91	0.67
		24	-1.52	13.60	-38.57	-0.10	-0.92	-0.68
		25	0.77	-0.57	81.32	-1.73	0.47	0.25
		26	-0.80	-3.41	-38.22	0.87	-0.48	-0.27
		27	-0.19	7.78	38.35	-1.33	-0.11	-0.17
		28	0.16	-11.75	4.74	0.47	0.10	0.15
		29	1.68	-13.52	97.24	-1.29	1.02	0.70
		30	-1.70	10.95	-68.95	0.70	-1.03	-0.71
		31	1.49	-16.88	74.27	-0.63	0.91	0.67
		32	-1.52	14.31	-45.97	0.03	-0.92	-0.68
		33	0.77	0.13	73.92	-1.60	0.47	0.25
		34	-0.79	-2.70	-45.62	1.00	-0.48	-0.26
		35	-0.19	8.48	30.95	-1.20	-0.11	-0.16
		36	0.17	-11.05	-2.66	0.61	0.10	0.15
Bc-1	P1	1	-0.01	-6.28	90.01	78.84	-0.01	0.00
		2	-0.02	-7.83	112.43	98.56	-0.01	0.00
		3	-0.01	-6.61	94.79	83.07	-0.01	0.00
		4	-0.01	-6.61	94.79	83.07	-0.01	0.00
		5	0.28	-6.53	93.14	80.73	0.02	0.00
		6	-0.31	-5.77	83.21	73.79	-0.03	0.00
		7	0.33	-5.14	89.67	78.27	-0.01	0.00

LOAD COMBINATIONS

No	Load combination
1	1.4D0 + 1.4DL + 1.4DL1
2	1.2D0 + 1.2DL + 1.2DL1 + 1.6LL + 1.6LL1
3	1.2D0 + 1.2DL + 1.2DL1 + 1.6LL
4	1.2D0 + 1.2DL + 1.2DL1 + 1.6LL1
5	1.2D0 + 1.2DL + 1.2DL1 + .5LL + .5LL1 + WLX
6	1.2D0 + 1.2DL + 1.2DL1 + .5LL + .5LL1 - WLX
7	1.2D0 + 1.2DL + 1.2DL1 + .5LL + .5LL1 + WLY
8	1.2D0 + 1.2DL + 1.2DL1 + .5LL + .5LL1 - WLY
9	1.2D0 + 1.2DL + 1.2DL1 + .5LL + .5LL1 + .75WLX + .75WLY
10	1.2D0 + 1.2DL + 1.2DL1 + .5LL + .5LL1 - .75WLX - .75WLY
11	1.2D0 + 1.2DL + 1.2DL1 + .5WLX
12	1.2D0 + 1.2DL + 1.2DL1 - .5WLX
13	1.2D0 + 1.2DL + 1.2DL1 + .5WLY
14	1.2D0 + 1.2DL + 1.2DL1 - .5WLY
15	1.2D0 + 1.2DL + 1.2DL1 + .375WLX + .375WLY
16	1.2D0 + 1.2DL + 1.2DL1 - .375WLX - .375WLY
17	.9D0 + .9DL + .9DL1 + WLX
18	.9D0 + .9DL + .9DL1 - WLX
19	.9D0 + .9DL + .9DL1 + WLY
20	.9D0 + .9DL + .9DL1 - WLY
21	1.2D0 + 1.2DL + 1.2DL1 + .5LL + .5LL1 + EQX + .3EQY
22	1.2D0 + 1.2DL + 1.2DL1 + .5LL + .5LL1 - EQX - .3EQY
23	1.2D0 + 1.2DL + 1.2DL1 + .5LL + .5LL1 + EQX - .3EQY
24	1.2D0 + 1.2DL + 1.2DL1 + .5LL + .5LL1 - EQX + .3EQY
25	1.2D0 + 1.2DL + 1.2DL1 + .5LL + .5LL1 + .3EQX + EQY
26	1.2D0 + 1.2DL + 1.2DL1 + .5LL + .5LL1 - .3EQX - EQY
27	1.2D0 + 1.2DL + 1.2DL1 + .5LL + .5LL1 - .3EQX + EQY
28	1.2D0 + 1.2DL + 1.2DL1 + .5LL + .5LL1 + .3EQX - EQY
29	.9D0 + .9DL + .9DL1 + EQX + .3EQY
30	.9D0 + .9DL + .9DL1 - EQX - .3EQY
31	.9D0 + .9DL + .9DL1 + EQX - .3EQY
32	.9D0 + .9DL + .9DL1 - EQX + .3EQY
33	.9D0 + .9DL + .9DL1 + .3EQX + EQY
34	.9D0 + .9DL + .9DL1 - .3EQX - EQY
35	.9D0 + .9DL + .9DL1 - .3EQX + EQY
36	.9D0 + .9DL + .9DL1 + .3EQX - EQY