

Company: Company
Project: IE HECTOR MANUEL VIDES BALLESTEROS (MÓDULO 7)
File: C:\IE REGIDOR\MOD7.rcb

Engineer: Name
10:00:28 a. m. 27/06/2025

SEISMIC DESIGN CODE: COLNSR-10

SEISMIC BASE LEVEL: 1

SEISMIC FORCE RESISTING SYSTEM

System X-Direction: C: Moment Res.Frame
System Y-Direction: C: Moment Res.Frame

Energy dissip capacity: 2: Moderate-DMO

RESPONSE SPECTRUM EARTHQUAKE FORCES COLNSR-10

Elastic Modal Base Shear

$V_m = S_{am} W_m'$
 S_{am} = Spectral modal acceleration
 W_m' = Effective modal weight

ANALYSIS PARAMETERS

Number of modes to be included ... = 3

	X-direction	Y-direction
Energy dissipation coefficient, R_o =	5	5

SPECTRAL MODAL ACCELERATION

$S_{am} = 2.5 A_a F_a I [0.4 + 0.6 T / T_o]$ For $T_m \leq T_o$
 $S_{am} = 2.5 A_a F_a I$ For $T_o < T_m \leq T_c$
 $S_{am} = 1.2 A_v F_v I / T_m$ For $T_c < T_m < T_l$
 $S_{am} = 1.2 A_v F_v T_l I / T_m^2$ For $T_m > T_l$

Eff. peak acceleration & veloc., $A_a = .15$ $A_v = .15$

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

LOCATION	A_a	A_v	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 = 1.25

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	

Company: Company

Project: IE HECTOR MANUEL VIDES BALLESTEROS (MÓDULO 7)

Engineer: Name

10:00:28 a. m. 27/06/2025

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

$S_{am} = 2.5 A_a F_a I [0.4 + 0.6 T / T_o]$ For $T_m \leq T_o$
 $S_{am} = 2.5 A_a F_a I$ For $T_o < T_m \leq T_c$
 $S_{am} = 1.2 A_v F_v I / T_m$ For $T_c < T_m < T_l$
 $S_{am} = 1.2 A_v F_v T_l I / T_m^2$ For $T_m > T_l$

DESIGN SPECTRAL RESPONSE ACCELERATION PARAMETERS

Effect. peak acceleration & velc., $A_a = 0.15$ $A_v = 0.15$
 Site coefficients (Tables below), $F_a = 1.50$ $F_v = 2.20$
 Design response parameters, $A_a F_a = 0.23$ $A_v F_v = 0.33$
 Long-period transition period, T_l sec = 5.28 (2.4 F_v)

Site Coefficient F_a

Site Class	$A_a \leq 0.1$	$A_a = 0.2$	$A_a = 0.3$	$A_a = 0.4$	$S_s \geq 0.5$
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 F_v

Site Class	$A_v \leq 0.1$	$A_v = 0.2$	$A_v = 0.3$	$A_v = 0.4$	$A_v \geq 0.5$
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	ϕ_p	Type	Description	ϕ_a
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 $(\phi_p \cdot \phi_a) = 1.0$

X - D I R E C T I O N Y - D I R E C T I O N

 Reduct. factor, $(\phi_p \cdot \phi_a) = 1$ 1
 Redundancy factor, $\phi_r = .75$.75
 R = $(\phi_p \cdot \phi_a) \cdot \phi_r$ Ro

Company: Company

Project: IE HECTOR MANUEL VIDES BALLESTEROS (MÓDULO 7)

Engineer: Name

10:00:28 a. m. 27/06/2025

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, (ton) = 35.92

Peak Acceleration Coeffi., Aa Fa = .23
 Peak Velocity Coefficient, Av Fv = .33
 Importance factor, I = 1.25
 Site class, S = D
 Coeff. for upper limit period, Cu = 1.354

	X-direction	Y-direction
	-----	-----
Computed Period	= 0.292	0.302
Ta = Ct (H)^x	= 0.047 H^0.9	0.047 H^0.9
	= 0.136	0.136
Tmax = Cu Ta	= 0.184	0.184
Fundamental Period	= 0.184	0.184
Energ-Disspst coeff, R	= 3.75	3.75
1.2 Av Fv I / T	= 2.693	2.693
2.5 Aa Fa I	= .719	.719
Sa	= .719	.719
Base Shear, Vo	= 25.82	25.82
Static Shear, .8Vo (ton)	= 20.66	20.66

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	.302	.719
2	.292	.719
3	.151	.719

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			Y - D I R E C T I O N		
	Sax (g)	W'x (ton)	Vx (ton)	Say (g)	W'y (ton)	Vy (ton)
-----	-----	-----	-----	-----	-----	-----
1	.719	0	0	.719	34	24.45
2	.719	35.92	25.82	.719	0	0
3	.719	0	0	.719	.8	.58
-----	-----	-----	-----	-----	-----	-----
ELASTIC Ve (combined):			25.82			24.45
STATIC 0.8 Sa(T1)W:			20.66			20.66
Design Base Shear:			25.82			24.45

Total Building Weight, W = 35.92 ton
 Participating Mass, $\Sigma W'/W = 100\%$ in X, 97% in Y
 $W'_{xm} = \{\Sigma W_j \phi_{xjm}\}^2 / \Sigma W_j \phi_{xjm}^2$ $W'_{ym} = \{\Sigma W_j \phi_{yjm}\}^2 / \Sigma W_j \phi_{yjm}^2$
 Combination of Modal Response: SRSS $V = (\text{Sum } V_i^2)^{1/2}$

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

Engineer: Name
10:00:28 a.m. 27/06/2025

Note: * Inherent eccentricity: $\epsilon_x = CM_x - CR_x$ and $\epsilon_y = CM_y - CR_y$
All values are in meters

Company: Company

Project: IE HECTOR MANUEL VIDES BALLESTEROS (MÓDULO 7)

Engineer: Name

10:00:28 a. m. 27/06/2025

Modal nodal force:

$$F_{im} = V_m \quad W_{im} \quad \phi_{im} / \sum W_j \quad \phi_{jm}$$

$$V_m = S_{am} W'_m$$

$$W'_m = \{ \sum W_j \quad \phi_{jm} \}^2 / \sum W_j \quad \phi_{jm}^2$$

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

Floor k -	Weight W (ton)	X - DIRECTION		Torsion T=F(E-ε) (ton-m)
		Force F (ton)	Shear V (ton)	
2	35.91	25.81	25.81	8.52

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

Floor k -	Weight W (ton)	Y - DIRECTION		Torsion T=F(E-ε) (ton-m)
		Force F (ton)	Shear V (ton)	
2	35.91	24.45	24.45	8.40

ACCELERATIONS ON NON-STRUCTURAL ELEMENTS- NSR-10

F L O O R A C C E L E R A T I O N S			
Level	hx	hx/heq	ax
2	3.25	1.33	0.958

Seismic base level = 1
 Height above seismic base, hn = 3.25 m
 Equivalent height, heq = 0.75 hn = 2.44 m
 Ground acceleration, As = Aa Fa I = 0.288
 Spectral acceleration, Sa = 0.719

ax = Sa hx/heq for hx > heq
 ax = As + (Sa -As) hx/heq for hx < heq

Force on structural non-seismic element : Fp = ax Wp / Ro
 Force on nonstructural element : Fp = ax ap Wp / Rp
 > 0.5 Aa I Wp

ap : component amplification factor