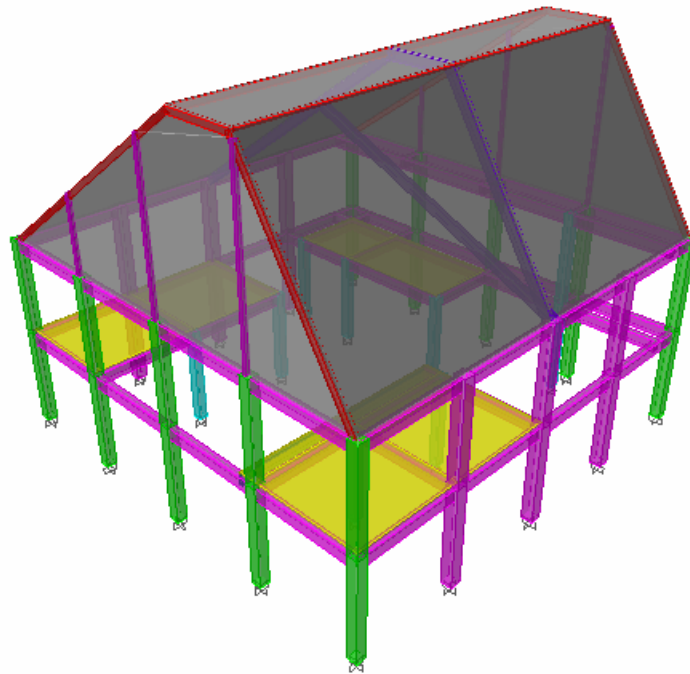


**PROYECTO: CENTRO DE ATENCIÓN
ESPECIALIZADA (CAE) – EL REDENTOR,
BLOQUE B1. TRANSV. 30 # 57-50 SUR/
DIAG. 58 SUR # 28-19, BOGOTÁ
(CUNDINAMARCA)**

dye14-2059



**MEMORIAS DE ANÁLISIS
Y DISEÑO ESTRUCTURAL**

Bogotá D.C. SEPTIEMBRE DE 2014

1. DESCRIPCIÓN DEL PROYECTO

1.1. INTRODUCCIÓN

El presente documento contiene las memorias de análisis y diseño estructural correspondiente al proyecto **CENTRO DE ATENCIÓN ESPECIALIZADA (CAE) – EL REDENTOR, BLOQUE B1**, ubicado en la **TRANSV. 30 # 57-50 SUR/ DIAG. 58 SUR # 28-19, BOGOTÁ (CUNDINAMARCA)**.

1.2. DESCRIPCIÓN ARQUITECTÓNICA

El proyecto se encuentra ubicado en un lote de 21330m² de área aproximadamente, en el cual se contempla la construcción de diferentes bloques que funcionarán como un Centro de Atención Especializada (CAE).

1.3. PARÁMETROS UTILIZADOS PARA EL REFORZAMIENTO ESTRUCTURAL

El proyecto se soluciona mediante el diseño de una estructura aporticada; se manejan luces que varían entre 4.30 m y 4.50 m en los dos sentidos de la estructura. La cubierta liviana se apoya sobre correas metálicas tipo ACESCO y éstas a su vez sobre una estructura metálica en tubería estructural situada en las vigas de cubierta del nivel N:+8.90 m, tal como se indica en los planos estructurales.

Para el análisis se empleó el programa de computador **ETABS v.9.7.4**, el cual tiene en cuenta los efectos de segundo orden. Las consideraciones sísmicas empleadas en el análisis estructural del proyecto son las siguientes:

- ✓ Método de análisis: **Análisis Modal**
- ✓ Zona de amenaza sísmica: **Intermedia**
- ✓ Zona de microzonificación sísmica: **Aluvial-100**
- ✓ Capacidad de disipación de energía: **Moderada**
- ✓ Coeficiente de disipación de energía: **$R_o = 5.00$**

El coeficiente de disipación de energía se afecta por las irregularidades presentes en la geometría de cada estructura, las cuales se describen a continuación:

- ✓ Uniones soldadas: $\phi_a = 0.90$
- ✓ Redundancia de la estructura: NO CUMPLE $\phi_r = 0.75$

El valor final del coeficiente R es igual a **3.38**

Las cargas horizontales fueron distribuidas entre los diferentes pórticos en proporción a su rigidez y teniendo en cuenta los efectos de torsión.

El dimensionamiento dado a todos los elementos que intervienen en las estructuras satisfacen los requerimientos de sollicitación ocasionados por las derivas presentes. La carga vivas de diseño fue de **0.50 KN/m²** en cubierta liviana.

Para la cimentación se siguieron las recomendaciones descritas en el respectivo estudio de suelos, que recomienda apoyar la estructura a -1.20 m del nivel actual del terreno mediante zapatas aisladas según lo indicado en los planos estructurales. La capacidad portante de seguridad admisible del suelo es **0.22 MPa** y el tipo de suelo es **F**.

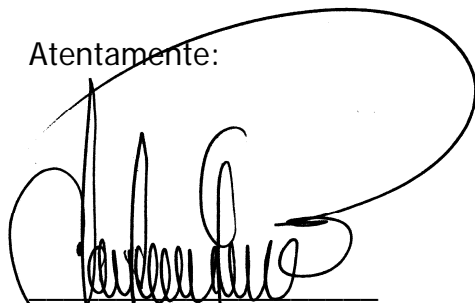
El diseño de todas las estructuras se realizó basado en la Norma Colombiana de Diseño y Construcción Sismo Resistente Ley 400 de 1997 (Modificada Ley 1229 de 2008) y Decreto 926 de Marzo de 2010, en el Decreto 523 de 2010 (Microzonificación Sísmica de Bogotá) y en el Reglamento para Concreto Estructural ACI 318S-08.

1.4. MATERIALES

Los materiales utilizados son:

Concreto	21.1 MPa para cimentación, vigas, columnas y placas.
Concreto	14 MPa (para concreto de limpieza).
Acero	para refuerzo $f_y = 420$ MPa en todos los diámetros.
Acero	HSLAS GRADO 50 en perfiles metálicos tipo PHR.
Acero	A500 en vigas y columnas metálicas.

Atentamente:



JAIR USECHE MACÍAS
ING. ESTRUCTURAL
T.P. 25202-56174 CND

MEMORIAL DE RESPONSABILIDAD

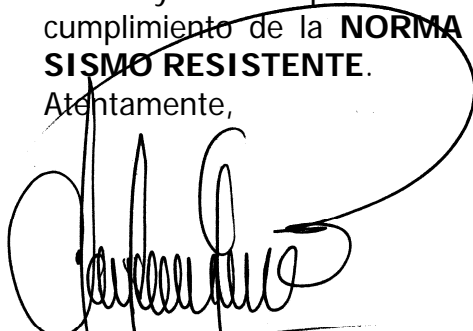
Bogotá D.C. Septiembre de 2014

Señores
CURADURÍA URBANA
La Ciudad

Yo, **JAIR USECHE MACÍAS**, ingeniero civil con Matrícula Profesional N° **25202-56174** de **CUNDINAMARCA**, debidamente registrado en el consejo profesional de Ingeniería y Arquitectura de Cundinamarca, presento los Cálculos y Diseños Estructurales elaborados de acuerdo a los requerimientos de la **NORMA COLOMBIANA DE DISEÑO Y CONSTRUCCIÓN SISMO RESISTENTE LEY 400 DE 1997 (MODIFICADA LEY 1229 DE 2008) Y DECRETO 926 DE MARZO DE 2010**, para el proyecto **CENTRO DE ATENCIÓN ESPECIALIZADA (CAE) – EL REDENTOR, BLOQUE B1**. ubicado en la **TRANSV. 30 # 57-50 SUR/ DIAG. 58 SUR # 28-19, BOGOTÁ (CUNDINAMARCA)**, declaro que asumo la responsabilidad por los perjuicios que causa de ellos puedan deducirse, exonerando a esta **CURADURIA URBANA** de cualquier responsabilidad.

Acepto y reconozco que la revisión efectuada por esta **CURADURÍA URBANA** no constituye una aprobación al Diseño Estructural, sino una verificación del cumplimiento de la **NORMA COLOMBIANA DE DISEÑO Y CONSTRUCCIÓN SISMO RESISTENTE**.

Atentamente,



JAIR USECHE MACÍAS
ING. ESTRUCTURAL
T.P. 25202-56174 CND

REPUBLICA DE COLOMBIA
Consejo Profesional Nacional de Ingeniería
y Arquitectura



MATRÍCULA No. 2528256174CND
INGENIERO CIVIL
DE FECHA 27/07/95
APELLIDOS
USECHE MACÍAS
NOMBRES
JAIR
C.C. 19.428.425
UNIV. NACIONAL - BOGOTÁ

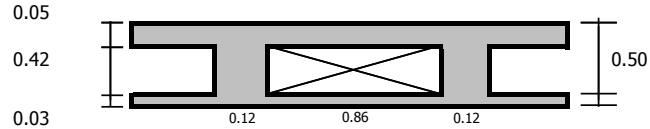
Antonio Villalaz
Presidente del Consejo

2. AVALÚO DE CARGAS

AVALÚO DE CARGAS

**PROYECTO: CENTRO DE ATENCIÓN ESPECIALIZADA - EL REDENTOR,
BLOQUE B1, BOGOTÁ (CUNDINAMARCA)**
AVALÚO DE CARGAS

1. PLACA ALIGERADA CUBIERTAS



ALTURA DE PLACA	50 cm		
TORTA SUPERIOR	5 cm		
TORTA INFERIOR	3 cm		
Tortas	0.08x24		1.92 kN/m ²
Viguetas	0.12x0.42x24/0.86		1.41 kN/m ²
Casetón			0.35 kN/m ²
Acabados	20x0.05		1.10 kN/m ²
		CM	4.78 kN/m ²
		CV	1.80 kN/m ²
		CR	6.58 kN/m ²

$$CU = 1.2 \times 0 + 1.6 \times 0 = 8.61 \text{ kN/m}^2$$

$$e = CM/24 = 0.20 \text{ m}$$

2. CUBIERTA LIVIANA

Eterboard			0.15 kN/m ²
Estructura Metálica			0.10 kN/m ²
Iluminación			0.05 kN/m ²
		CM	0.30 kN/m ²
		CV	0.50 kN/m ²
		CR	0.80 kN/m ²

$$CU = 1.2 \times 0.3 + 1.6 \times 0.5 = 1.16 \text{ kN/m}^2$$

Espesor de placa equivalente:

$$e = CM/24 = 0.013 \text{ m}$$

Pendiente de Cubierta α (°) = **21.0** → Equivale a 38.4%

Según la tabla B.4.2.1-2 - En cubiertas inclinadas con más de 15° de pendiente en estructura metálica o de madera la carga viva asumida puede ser 0.35 kN/m².

Según B.4.8.3.2 - Para cubiertas con inclinación mayor a 15% el valor de la carga viva para granizo puede reducirse a 0.50 kN/m².

**PROYECTO: CENTRO DE ATENCIÓN ESPECIALIZADA - EL REDENTOR, BLOQUE B1, BOGOTÁ
(CUNDINAMARCA)
AVALÚO DE CARGAS DE VIENTO
MÉTODO ANALÍTICO**

B.6.5.1 - Un edificio cuyas cargas de viento de diseño sean determinadas de acuerdo con esta sección deberá cumplir las siguientes condiciones:

- (a) El edificio o estructura es de forma regular, como se define en la sección B.6.2. de NSR-10
- (b) El edificio o estructura no tiene características de respuesta que den lugar a cargas transversales de viento, generación de vórtices, inestabilidad debida a golpeo o aleteo y que por su ubicación, tampoco deben merecer consideración especial los efectos de canalización o sacudimiento por la estela producida por las obstrucciones a barlovento.

B.6.5.3 - PROCEDIMIENTO DE DISEÑO

(a) Determinar Velocidad básica del viento V y factor de dirección Kd:

Zona de amenaza eólica (figura B.6.4-1):

Ciudad: Bogotá
Región: 2
Velocidad del viento: 28 m/s

Región	Velocidad del viento			
	Combinaciones de carga de			
	B.2.3		B.2.4	
	m/s	km/h	m/s	km/h
1	17	60	22	75
2	22	80	28	100
3	28	100	35	125
4	33	120	42	150
5	36	130	46	165

Factor de direccionalidad del viento k_d :

Tipo de estructura: Edificios
 $K_d = 0.85$

Factor de importancia I :

Categoría: III
I = 1.15

Coefficientes de exposición:

Rugosidad del terreno: C Terreno abierto con pocas obstrucciones y con alturas inferiores a 9.0 m. Esta categoría incluye campos planos abiertos, praderas y todas las superficies acuáticas en zonas propensas a huracanes.

Categoría de exposición: C La categoría de exposición C aplicará para todos los casos donde no apliquen las categorías B y D.

h edificación = 17.05 m
 $K_h = 1.117$
 $K_{zt} = 1.00$

Factor de ráfaga:

$T_{adoptado} = 0.66$ seg
Frecuencia f = 1.52 Hz Estructura rígida
G = 0.85

Coefficiente de presión interna GCpi y coeficiente de presión externa Cp

GCpi = 0.18 para edificios cerrados
Cp = 0.01
1.41

Presión por viento a la altura media de la cubierta q_h :

$$q_h = 0.613 k_h k_{zt} k_d V^2 I \text{ N/m}^2$$

$$q_h = 524.74 \text{ N/m}^2$$

$$0.52 \text{ kN/m}^2$$

Por lo tanto la carga de viento a emplear es: 0.52 kN/m²

$L_{fachada} = 19.63$ m
 $h_{fachada} = 8.10$ m
 $A_{fachada} = 159.00$ m²
 $F_{viento} = 8.34$ ton
 $F_{sismo} = 73.13$ ton **Prevalece la fuerza sísmica**

3. ANÁLISIS SÍSMICO

ANÁLISIS SÍSMICO ***COMPROBACIÓN DE DERIVAS***

**PROYECTO: CENTRO DE ATENCIÓN ESPECIALIZADA - EL REDENTOR,
 BLOQUE B1, BOGOTÁ (CUNDINAMARCA)
 ANÁLISIS SÍSMICO (ESPECTRO DE DISEÑO - CURVA DE DISEÑO)
 MICROZONIFICACIÓN SÍSMICA DE BOGOTÁ D.C.**

ZONA DE AMENAZA SÍSMICA
INTERMEDIA

ZONA DE MICROZONIFICACIÓN
ALUVIAL-100

EFFECTOS LOCALES

Perfil de Suelo	F
Coefficiente Av	0.20

COEFICIENTE DE IMPORTANCIA

Grupo de Uso	III
Coefficiente de importancia I	1.25

VARIACIÓN COEFICIENTE DE CAPACIDAD DE DISIPACIÓN DE ENERGÍA

R_0 : Coeficiente de capacidad de disipación de energía básico.

R : Coeficiente de capacidad de disipación de energía, para ser empleado en el diseño.

ϕ_a : Coeficiente de reducción de R causado por irregularidades en altura de la edificación.

ϕ_p : Coeficiente de reducción de R causado por irregularidades en planta de la edificación.

ϕ_r : Coeficiente de reducción de R causado por ausencia de redundancia en el sistema estructural de resistencia sísmica.

R_0	5.00
ϕ_p	1.00
ϕ_a	1.00
ϕ_r	0.75
ϕ	0.90
R	3.38

TIPO	DESCRIPCIÓN	VALOR
3P		ϕ_p : 1.00
3A		ϕ_a : 1.00
	REDUNDANCIA	ϕ_r : 0.75
	UNIONES SOLDADAS	ϕ : 0.90

Para edificaciones clasificadas como irregulares el valor de **R_o** debe multiplicarse por ϕ_a , ϕ_p y por ϕ_r para obtener **R = $\phi_a \times \phi_p \times \phi_r \times R_o$**

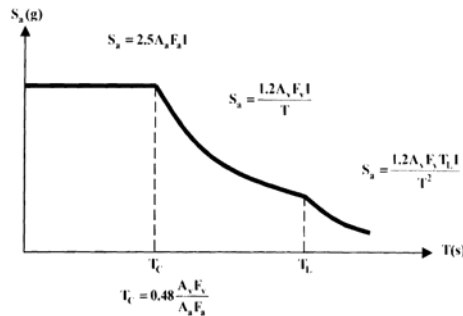
ESPECTRO DE DISEÑO

- Fa: Coeficiente de ampliación que afecta la aceleración en la zona de periodos cortos.
- Fv: Coeficiente de ampliación que afecta la aceleración en la zona de periodos intermedios.
- Sa: Aceleración espectral (g).
- Aa: Aceleración horizontal pico efectiva de diseño. Aa=0.15g.
- Ao: Aceleración horizontal pico efectiva del terreno en superficie (g).
- Av: Aceleración que representa la velocidad horizontal pico efectiva de diseño. Av=0.20g.
- T: Periodo de vibración del sistema elástico, en segundos.
- Tc: Periodo corto, en segundos.
- Tl: Periodo largo, en segundos.

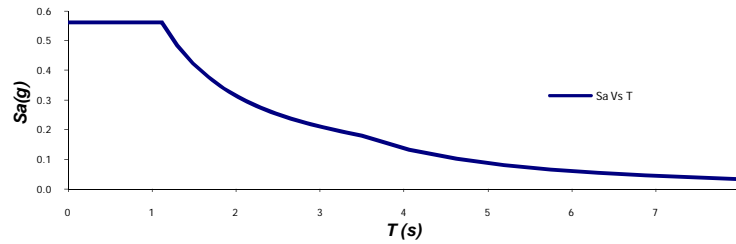
ALUVIAL-100		
T _c :	1.12	Seg
T _l :	3.50	Seg
Ao:	0.18	g
Aa:	0.15	g
Fa:	1.20	
Fv:	2.10	

T	Sa	Sa/R _{adoptado}
(Seg)	(%g)	(%g)
0.00	0.563	0.167
0.16	0.563	0.167
0.32	0.563	0.167
0.48	0.563	0.167
0.64	0.563	0.167
0.80	0.563	0.167
0.96	0.563	0.167
1.12	0.563	0.167
1.30	0.483	0.143
1.49	0.424	0.126
1.67	0.377	0.112
1.85	0.340	0.101
2.04	0.310	0.092
2.22	0.284	0.084
2.40	0.262	0.078
2.58	0.244	0.072
2.77	0.228	0.067
2.95	0.214	0.063
3.13	0.201	0.060
3.32	0.190	0.056
3.50	0.180	0.053
4.06	0.134	0.040
4.63	0.103	0.031
5.19	0.082	0.024
5.75	0.067	0.020
6.31	0.055	0.016
6.88	0.047	0.014
7.44	0.040	0.012
8.00	0.034	0.010

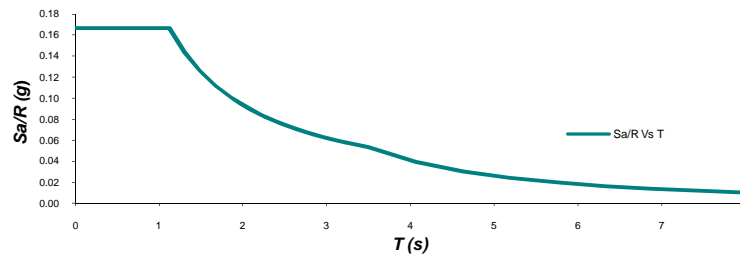
Curva de diseño para un coeficiente de amortiguamiento de 5% del crítico



Espectro Elástico de Diseño



Espectro Elástico de Diseño/ R_{adop}



Sistema de resistencia Sísmica: Pórticos resistentes a momentos con Capacidad Moderada de Disipación de Energía (DMO).

Nota: El sistema de pórtico es un sistema estructural compuesto por un pórtico espacial, resistente a momentos, esencialmente completo, sin diagonales, que resiste todas las cargas verticales y las fuerzas horizontales.

MODELO MATEMÁTICO

Modelo Tridimensional con Diafragma Rígido: En este modelo los entrepisos se consideran diafragmas infinitamente rígidos en su propio plano. La masa de cada diafragma se considera concentrada en su centro de masa. Los efectos torsionales accidentales son incluidos haciendo ajustes en la localización de los centros de masa de los diafragmas. Los efectos direccionales son tomados en cuenta a través de las componentes de los desplazamientos de los grados de libertad horizontales ortogonales del diafragma.

**PROYECTO: CENTRO DE ATENCIÓN ESPECIALIZADA - EL REDENTOR,
BLOQUE B1 , BOGOTÁ (CUNDINAMARCA)
ANÁLISIS SÍSMICO (ESPECTRO DE DISEÑO - CURVA DE UMBRAL DE DAÑO)
MICROZONIFICACIÓN SÍSMICA DE BOGOTÁ D.C.**

ZONA DE AMENAZA SÍSMICA
<i>INTERMEDIA</i>

ZONA DE MICROZONIFICACIÓN
<i>ALUVIAL-100</i>

EFFECTOS LOCALES

Perfil de Suelo	F
Coefficiente Ad	0.06

COEFICIENTE DE IMPORTANCIA

Grupo de Uso	III
Coefficiente de importancia I	1.25

ESPECTRO DE UMBRAL DE DAÑO

Fa: Coeficiente de ampliación que afecta la aceleración en la zona de periodos cortos.

Fv: Coeficiente de ampliación que afecta la aceleración en la zona de periodos intermedios.

Sad: Aceleración espectral de umbral de daño (g).

Ad: Aceleración horizontal pico efectiva de umbral de daño. Ad=0.06g.

Aod: Aceleración horizontal pico efectiva del terreno para umbral de daño en superficie (g).

T: Periodo de vibración del sistema elástico, en segundos.

T_{0d}: Periodo inicial de umbral de daño, en segundos.

T_{cd}: Periodo corto de umbral de daño, en segundos.

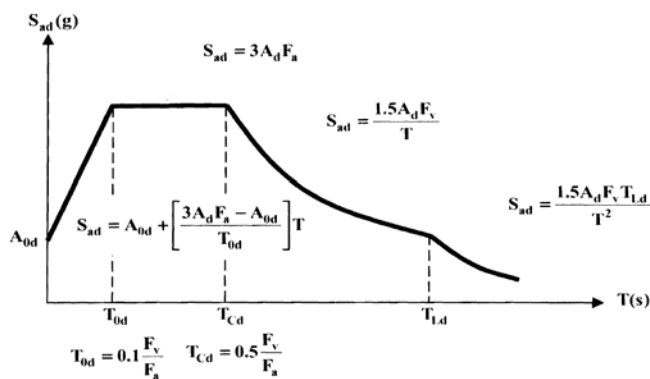
T_{ld}: Periodo largo de umbral de daño, en segundos.

ALUVIAL-100

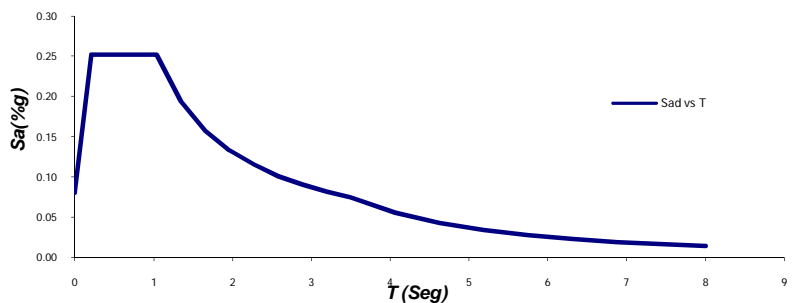
T_{cd} :	1.04	Seg
T_{ld} :	3.50	Seg
T_{od} :	0.21	Seg
Aod:	0.08	g
Fa:	1.40	
Fv:	2.90	

T (Seg)	Sad (%g)
0.00	0.080
0.21	0.252
0.28	0.252
0.35	0.252
0.42	0.252
0.49	0.252
0.56	0.252
0.63	0.252
0.69	0.252
0.76	0.252
0.83	0.252
0.90	0.252
0.97	0.252
1.04	0.252
1.35	0.194
1.66	0.158
1.96	0.133
2.27	0.115
2.58	0.101
2.89	0.090
3.19	0.082
3.50	0.075
4.06	0.055
4.63	0.043
5.19	0.034
5.75	0.028
6.31	0.023
6.88	0.019
7.44	0.017
8.00	0.014

Curva de umbral de daño para un coeficiente de amortiguamiento de 2% del crítico.



Espectro De Umbral De Daño



Sistema de resistencia Sísmica: Pórticos resistentes a momentos con Capacidad Moderada de Disipación de Energía (DMO).

Nota: El sistema de pórtico es un sistema estructural compuesto por un pórtico espacial, resistente a momentos, esencialmente completo, sin diagonales, que resiste todas las cargas verticales y las fuerzas horizontales.

MODELO MATEMÁTICO

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PROYECTO: CENTRO DE ATENCIÓN ESPECIALIZADA - EL REDENTOR, BLOQUE B1 BOGOTÁ (CUNDINAMARCA)
 CALCULO DEL CORTANTE BASAL DE LA ESTRUCTURA (ESPECTRO DE DISEÑO)
 MICROZONIFICACIÓN SÍSMICA DE BOGOTÁ D.C.

CALCULO DEL CORTANTE BASAL DE LA ESTRUCTURA

H_{edificio}	=	17.05	m	
Tipo de Perfil:		F		
Aa	=	0.15		
Av	=	0.20		
Fa	=	1.20		
Fv	=	2.10		
T_c	=	1.12	Seg	
C_t	=	0.047		
α	=	0.90		
T_a	=	0.60	Seg	
C_u	=	1.25		
$C_u T_a$	=	0.75	Seg	
$T_{\text{modelación estructural}}$	=	0.66	Seg	
ΔT	=	9.37	%	Ok!
T_{adoptado}	=	0.66	Seg	
S_a	=	0.563		S_a obtenido del espectro de diseño
g	=	9.81	m/s ²	
M	=	155.59	Ton	Masa obtenida del modelo
V_s	=	859.31	kN	
90% V_s	=	773.38	kN	Cortante basal para comparación de acuerdo a A.5.4.5 NSR-10

MODELO INICIAL
 Response Spectrum Base Reactions

PORCENTAJE PARA REVISIÓN DE CORTANTE BASAL DE ACUERDO A A.5.4.5 NSR-10: 90.0 %

	F1	F2	Total	Factor		g corregido
$V_{s(x)}$	403.85	0.75	403.85	1.915	18.786	Se aplica en SISMO X
$V_{s(y)}$	0.75	441.46	441.46	1.752	17.186	Se aplica en SISMO Y

MODELO CORREGIDO
 Response Spectrum Base Reactions

	F1	F2	Total	90% V_s
$V_{s(x)}$	773.37	1.43	773.37	773.4
$V_{s(y)}$	1.31	773.39	773.39	773.4

PROYECTO: CENTRO DE ATENCIÓN ESPECIALIZADA - EL REDENTOR, BLOQUE B1 BOGOTÁ (CUNDINAMARCA)
 CALCULO DEL CORTANTE BASAL DE LA ESTRUCTURA (ESPECTRO DE UMBRAL DE DAÑO)
 MICROZONIFICACIÓN SÍSMICA DE BOGOTÁ D.C.

CALCULO DEL CORTANTE BASAL DE LA ESTRUCTURA

H _{edificio} =	17.05	m	
Tipo de Perfil:	F		
Ad =	0.06		
Fv =	2.10		
C _t =	0.047		
α =	0.90		
T _a =	0.60	Seg	
C _u =	1.25		
C _u T _a =	0.75	Seg	
T _{modelación estructural} =	0.66	Seg	
ΔT =	9.37	%	Ok!
T _{adoptado} =	0.66	Seg	
S _a =	0.252		S _a obtenido del espectro de diseño
g =	9.81	m/s ²	
M =	155.59	Ton	Masa obtenida del modelo
V _s =	384.63	kN	
100% V _s =	384.63	kN	Cortante basal para comparación de acuerdo a A.5.4.5 NSR-10

MODELO INICIAL

Response Spectrum Base Reactions

PORCENTAJE PARA REVISIÓN DE CORTANTE BASAL DE ACUERDO A A.5.4.5 NSR-10: 100.0 %

	F1	F2	Total	Factor		g corregido
V _{s(x)} =	179.18	0.33	179.18	2.147	21.058	Se aplica en SISMO X
V _{s(y)} =	0.33	196.66	196.66	1.956	19.186	Se aplica en SISMO Y

MODELO CORREGIDO

Response Spectrum Base Reactions

	F1	F2	Total	100% V _s
V _{s(x)} =	384.63	0.71	384.63	384.6
V _{s(y)} =	0.64	384.62	384.62	384.6

PROYECTO: CENTRO DE ATENCIÓN ESPECIALIZADA - EL REDENTOR, BLOQUE B1, BOGOTÁ (CUNDINAMARCA) CÁLCULO DE DERIVAS MÁXIMAS

ALTURA DE N+8.90	4.45	m		Deriva Máxima	1.00	%
ALTURA DE N+4.45	4.50	m		Permitida		
ALTURA DE BASE	0.00	m				

Nivel	Punto	COMBINACIÓN DE CARGA	DESPLAZAMIENTOS FUERZA SÍSMICA		Deriva Δ m	Deriva Δ %	Observación
			Desplazamiento X	Desplazamiento Y			
N+8.90	1	COMDER1 MAX	0.01210	0.00469	0.00663	0.15	OK
N+8.90	1	COMDER1 MIN	-0.01210	-0.00469	0.00663	0.15	OK
N+8.90	1	COMDER2 MAX	0.00381	0.01414	0.00739	0.17	OK
N+8.90	1	COMDER2 MIN	-0.00381	-0.01414	0.00739	0.17	OK
N+4.45	1	COMDER1 MAX	0.00592	0.00231	0.00635	0.14	OK
N+4.45	1	COMDER1 MIN	-0.00592	-0.00231	0.00635	0.14	OK
N+4.45	1	COMDER2 MAX	0.00190	0.00700	0.00726	0.16	OK
N+4.45	1	COMDER2 MIN	-0.00190	-0.00700	0.00726	0.16	OK
BASE	1	COMDER1 MAX	0.00000	0.00000	--	--	--
BASE	1	COMDER1 MIN	0.00000	0.00000	--	--	--
BASE	1	COMDER2 MAX	0.00000	0.00000	--	--	--
BASE	1	COMDER2 MIN	0.00000	0.00000	--	--	--
N+8.90	2	COMDER1 MAX	0.01210	0.00462	0.00661	0.15	OK
N+8.90	2	COMDER1 MIN	-0.01210	-0.00462	0.00661	0.15	OK
N+8.90	2	COMDER2 MAX	0.00388	0.01387	0.00728	0.16	OK
N+8.90	2	COMDER2 MIN	-0.00388	-0.01387	0.00728	0.16	OK
N+4.45	2	COMDER1 MAX	0.00592	0.00231	0.00635	0.14	OK
N+4.45	2	COMDER1 MIN	-0.00592	-0.00231	0.00635	0.14	OK
N+4.45	2	COMDER2 MAX	0.00190	0.00687	0.00713	0.16	OK
N+4.45	2	COMDER2 MIN	-0.00190	-0.00687	0.00713	0.16	OK
BASE	2	COMDER1 MAX	0.00000	0.00000	--	--	--
BASE	2	COMDER1 MIN	0.00000	0.00000	--	--	--
BASE	2	COMDER2 MAX	0.00000	0.00000	--	--	--
BASE	2	COMDER2 MIN	0.00000	0.00000	--	--	--
N+8.90	3	COMDER1 MAX	0.01312	0.00476	0.00729	0.16	OK
N+8.90	3	COMDER1 MIN	-0.01312	-0.00476	0.00729	0.16	OK
N+8.90	3	COMDER2 MAX	0.00408	0.01414	0.00744	0.17	OK
N+8.90	3	COMDER2 MIN	-0.00408	-0.01414	0.00744	0.17	OK
N+4.45	3	COMDER1 MAX	0.00626	0.00231	0.00667	0.15	OK
N+4.45	3	COMDER1 MIN	-0.00626	-0.00231	0.00667	0.15	OK
N+4.45	3	COMDER2 MAX	0.00197	0.00700	0.00728	0.16	OK
N+4.45	3	COMDER2 MIN	-0.00197	-0.00700	0.00728	0.16	OK
BASE	3	COMDER1 MAX	0.00000	0.00000	--	--	--
BASE	3	COMDER1 MIN	0.00000	0.00000	--	--	--
BASE	3	COMDER2 MAX	0.00000	0.00000	--	--	--
BASE	3	COMDER2 MIN	0.00000	0.00000	--	--	--
N+8.90	4	COMDER1 MAX	0.04515	0.00476	0.02961	0.67	OK
N+8.90	4	COMDER1 MIN	-0.04515	-0.00476	0.02961	0.67	OK
N+8.90	4	COMDER2 MAX	0.01938	0.01408	0.01425	0.32	OK
N+8.90	4	COMDER2 MIN	-0.01938	-0.01408	0.01425	0.32	OK
N+4.45	4	COMDER1 MAX	0.01564	0.00231	0.01581	0.35	OK
N+4.45	4	COMDER1 MIN	-0.01564	-0.00231	0.01581	0.35	OK
N+4.45	4	COMDER2 MAX	0.00700	0.00700	0.00991	0.22	OK
N+4.45	4	COMDER2 MIN	-0.00700	-0.00700	0.00991	0.22	OK
BASE	4	COMDER1 MAX	0.00000	0.00000	--	--	--
BASE	4	COMDER1 MIN	0.00000	0.00000	--	--	--
BASE	4	COMDER2 MAX	0.00000	0.00000	--	--	--
BASE	4	COMDER2 MIN	0.00000	0.00000	--	--	--
N+8.90	5	COMDER1 MAX	0.06378	0.00469	0.04141	0.93	OK
N+8.90	5	COMDER1 MIN	-0.06378	-0.00469	0.04141	0.93	OK
N+8.90	5	COMDER2 MAX	0.02679	0.01408	0.01866	0.42	OK
N+8.90	5	COMDER2 MIN	-0.02679	-0.01408	0.01866	0.42	OK
N+4.45	5	COMDER1 MAX	0.02244	0.00231	0.02256	0.50	OK
N+4.45	5	COMDER1 MIN	-0.02244	-0.00231	0.02256	0.50	OK
N+4.45	5	COMDER2 MAX	0.00952	0.00700	0.01182	0.26	OK
N+4.45	5	COMDER2 MIN	-0.00952	-0.00700	0.01182	0.26	OK
BASE	5	COMDER1 MAX	0.00000	0.00000	--	--	--
BASE	5	COMDER1 MIN	0.00000	0.00000	--	--	--
BASE	5	COMDER2 MAX	0.00000	0.00000	--	--	--
BASE	5	COMDER2 MIN	0.00000	0.00000	--	--	--
N+8.90	6	COMDER1 MAX	0.04332	0.00469	0.02812	0.63	OK
N+8.90	6	COMDER1 MIN	-0.04332	-0.00469	0.02812	0.63	OK
N+8.90	6	COMDER2 MAX	0.02353	0.01408	0.01649	0.37	OK
N+8.90	6	COMDER2 MIN	-0.02353	-0.01408	0.01649	0.37	OK
N+4.45	6	COMDER1 MAX	0.01530	0.00231	0.01547	0.34	OK
N+4.45	6	COMDER1 MIN	-0.01530	-0.00231	0.01547	0.34	OK

PROYECTO: CENTRO DE ATENCIÓN ESPECIALIZADA - EL REDENTOR, BLOQUE B1, BOGOTÁ (CUNDINAMARCA) CÁLCULO DE DERIVAS MÁXIMAS

ALTURA DE N+8.90	4.45	m		Deriva Máxima	1.00	%
ALTURA DE N+4.45	4.50	m		Permitida		
ALTURA DE BASE	0.00	m				

Nivel	Punto	COMBINACIÓN DE CARGA	DESPLAZAMIENTOS FUERZA SÍSMICA		Deriva Δ m	Deriva Δ %	Observación
			Desplazamiento X	Desplazamiento Y			
N+4.45	6	COMDER2 MAX	0.00864	0.00700	0.01112	0.25	OK
N+4.45	6	COMDER2 MIN	-0.00864	-0.00700	0.01112	0.25	OK
BASE	6	COMDER1 MAX	0.00000	0.00000	--	--	--
BASE	6	COMDER1 MIN	0.00000	0.00000	--	--	--
BASE	6	COMDER2 MAX	0.00000	0.00000	--	--	--
BASE	6	COMDER2 MIN	0.00000	0.00000	--	--	--
N+8.90	7	COMDER1 MAX	0.04393	0.00462	0.02852	0.64	OK
N+8.90	7	COMDER1 MIN	-0.04393	-0.00462	0.02852	0.64	OK
N+8.90	7	COMDER2 MAX	0.02394	0.01387	0.01670	0.38	OK
N+8.90	7	COMDER2 MIN	-0.02394	-0.01387	0.01670	0.38	OK
N+4.45	7	COMDER1 MAX	0.01550	0.00231	0.01568	0.35	OK
N+4.45	7	COMDER1 MIN	-0.01550	-0.00231	0.01568	0.35	OK
N+4.45	7	COMDER2 MAX	0.00877	0.00687	0.01114	0.25	OK
N+4.45	7	COMDER2 MIN	-0.00877	-0.00687	0.01114	0.25	OK
BASE	7	COMDER1 MAX	0.00000	0.00000	--	--	--
BASE	7	COMDER1 MIN	0.00000	0.00000	--	--	--
BASE	7	COMDER2 MAX	0.00000	0.00000	--	--	--
BASE	7	COMDER2 MIN	0.00000	0.00000	--	--	--
N+8.90	8	COMDER1 MAX	0.06460	0.00462	0.04195	0.94	OK
N+8.90	8	COMDER1 MIN	-0.06460	-0.00462	0.04195	0.94	OK
N+8.90	8	COMDER2 MAX	0.02700	0.01387	0.01876	0.42	OK
N+8.90	8	COMDER2 MIN	-0.02700	-0.01387	0.01876	0.42	OK
N+4.45	8	COMDER1 MAX	0.02271	0.00231	0.02283	0.51	OK
N+4.45	8	COMDER1 MIN	-0.02271	-0.00231	0.02283	0.51	OK
N+4.45	8	COMDER2 MAX	0.00959	0.00687	0.01179	0.26	OK
N+4.45	8	COMDER2 MIN	-0.00959	-0.00687	0.01179	0.26	OK
BASE	8	COMDER1 MAX	0.00000	0.00000	--	--	--
BASE	8	COMDER1 MIN	0.00000	0.00000	--	--	--
BASE	8	COMDER2 MAX	0.00000	0.00000	--	--	--
BASE	8	COMDER2 MIN	0.00000	0.00000	--	--	--
N+8.90	9	COMDER1 MAX	0.04583	0.00462	0.03008	0.68	OK
N+8.90	9	COMDER1 MIN	-0.04583	-0.00462	0.03008	0.68	OK
N+8.90	9	COMDER2 MAX	0.01979	0.01387	0.01446	0.32	OK
N+8.90	9	COMDER2 MIN	-0.01979	-0.01387	0.01446	0.32	OK
N+4.45	9	COMDER1 MAX	0.01584	0.00231	0.01601	0.36	OK
N+4.45	9	COMDER1 MIN	-0.01584	-0.00231	0.01601	0.36	OK
N+4.45	9	COMDER2 MAX	0.00714	0.00687	0.00991	0.22	OK
N+4.45	9	COMDER2 MIN	-0.00714	-0.00687	0.00991	0.22	OK
BASE	9	COMDER1 MAX	0.00000	0.00000	--	--	--
BASE	9	COMDER1 MIN	0.00000	0.00000	--	--	--
BASE	9	COMDER2 MAX	0.00000	0.00000	--	--	--
BASE	9	COMDER2 MIN	0.00000	0.00000	--	--	--
N+8.90	10	COMDER1 MAX	0.01312	0.00469	0.00733	0.16	OK
N+8.90	10	COMDER1 MIN	-0.01312	-0.00469	0.00733	0.16	OK
N+8.90	10	COMDER2 MAX	0.00415	0.01387	0.00733	0.16	OK
N+8.90	10	COMDER2 MIN	-0.00415	-0.01387	0.00733	0.16	OK
N+4.45	10	COMDER1 MAX	0.00619	0.00231	0.00661	0.15	OK
N+4.45	10	COMDER1 MIN	-0.00619	-0.00231	0.00661	0.15	OK
N+4.45	10	COMDER2 MAX	0.00197	0.00687	0.00715	0.16	OK
N+4.45	10	COMDER2 MIN	-0.00197	-0.00687	0.00715	0.16	OK
BASE	10	COMDER1 MAX	0.00000	0.00000	--	--	--
BASE	10	COMDER1 MIN	0.00000	0.00000	--	--	--
BASE	10	COMDER2 MAX	0.00000	0.00000	--	--	--
BASE	10	COMDER2 MIN	0.00000	0.00000	--	--	--
N+8.90	11	COMDER1 MAX	0.01204	0.02074	0.01460	0.33	OK
N+8.90	11	COMDER1 MIN	-0.01204	-0.02074	0.01460	0.33	OK
N+8.90	11	COMDER2 MAX	0.00381	0.04522	0.02957	0.66	OK
N+8.90	11	COMDER2 MIN	-0.00381	-0.04522	0.02957	0.66	OK
N+4.45	11	COMDER1 MAX	0.00592	0.00748	0.00954	0.21	OK
N+4.45	11	COMDER1 MIN	-0.00592	-0.00748	0.00954	0.21	OK
N+4.45	11	COMDER2 MAX	0.00190	0.01571	0.01582	0.35	OK
N+4.45	11	COMDER2 MIN	-0.00190	-0.01571	0.01582	0.35	OK
BASE	11	COMDER1 MAX	0.00000	0.00000	--	--	--
BASE	11	COMDER1 MIN	0.00000	0.00000	--	--	--
BASE	11	COMDER2 MAX	0.00000	0.00000	--	--	--
BASE	11	COMDER2 MIN	0.00000	0.00000	--	--	--

PROYECTO: CENTRO DE ATENCIÓN ESPECIALIZADA - EL REDENTOR, BLOQUE B1, BOGOTÁ (CUNDINAMARCA) CÁLCULO DE DERIVAS MÁXIMAS

ALTURA DE N+8.90	4.45	m		Deriva Máxima	1.00	%
ALTURA DE N+4.45	4.50	m		Permitida		
ALTURA DE BASE	0.00	m				

Nivel	Punto	COMBINACIÓN DE CARGA	DESPLAZAMIENTOS FUERZA SÍSMICA		Deriva Δ m	Deriva Δ %	Observación
			Desplazamiento X	Desplazamiento Y			
N+8.90	12	COMDER1 MAX	0.01204	0.02067	0.01467	0.33	OK
N+8.90	12	COMDER1 MIN	-0.01204	-0.02067	0.01467	0.33	OK
N+8.90	12	COMDER2 MAX	0.00381	0.06861	0.04424	0.99	OK
N+8.90	12	COMDER2 MIN	-0.00381	-0.06861	0.04424	0.99	OK
N+4.45	12	COMDER1 MAX	0.00592	0.00734	0.00943	0.21	OK
N+4.45	12	COMDER1 MIN	-0.00592	-0.00734	0.00943	0.21	OK
N+4.45	12	COMDER2 MAX	0.00190	0.02441	0.02449	0.54	OK
N+4.45	12	COMDER2 MIN	-0.00190	-0.02441	0.02449	0.54	OK
BASE	12	COMDER1 MAX	0.00000	0.00000	--	--	--
BASE	12	COMDER1 MIN	0.00000	0.00000	--	--	--
BASE	12	COMDER2 MAX	0.00000	0.00000	--	--	--
BASE	12	COMDER2 MIN	0.00000	0.00000	--	--	--
N+8.90	13	COMDER1 MAX	0.01204	0.02108	0.01479	0.33	OK
N+8.90	13	COMDER1 MIN	-0.01204	-0.02108	0.01479	0.33	OK
N+8.90	13	COMDER2 MAX	0.00381	0.04576	0.02991	0.67	OK
N+8.90	13	COMDER2 MIN	-0.00381	-0.04576	0.02991	0.67	OK
N+4.45	13	COMDER1 MAX	0.00592	0.00762	0.00964	0.21	OK
N+4.45	13	COMDER1 MIN	-0.00592	-0.00762	0.00964	0.21	OK
N+4.45	13	COMDER2 MAX	0.00190	0.01591	0.01603	0.36	OK
N+4.45	13	COMDER2 MIN	-0.00190	-0.01591	0.01603	0.36	OK
BASE	13	COMDER1 MAX	0.00000	0.00000	--	--	--
BASE	13	COMDER1 MIN	0.00000	0.00000	--	--	--
BASE	13	COMDER2 MAX	0.00000	0.00000	--	--	--
BASE	13	COMDER2 MIN	0.00000	0.00000	--	--	--
N+8.90	14	COMDER1 MAX	0.01306	0.01680	0.01266	0.28	OK
N+8.90	14	COMDER1 MIN	-0.01306	-0.01680	0.01266	0.28	OK
N+8.90	14	COMDER2 MAX	0.00408	0.03278	0.02152	0.48	OK
N+8.90	14	COMDER2 MIN	-0.00408	-0.03278	0.02152	0.48	OK
N+4.45	14	COMDER1 MAX	0.00626	0.00612	0.00875	0.19	OK
N+4.45	14	COMDER1 MIN	-0.00626	-0.00612	0.00875	0.19	OK
N+4.45	14	COMDER2 MAX	0.00197	0.01136	0.01153	0.26	OK
N+4.45	14	COMDER2 MIN	-0.00197	-0.01136	0.01153	0.26	OK
BASE	14	COMDER1 MAX	0.00000	0.00000	--	--	--
BASE	14	COMDER1 MIN	0.00000	0.00000	--	--	--
BASE	14	COMDER2 MAX	0.00000	0.00000	--	--	--
BASE	14	COMDER2 MIN	0.00000	0.00000	--	--	--
N+8.90	15	COMDER1 MAX	0.01312	0.01489	0.01189	0.27	OK
N+8.90	15	COMDER1 MIN	-0.01312	-0.01489	0.01189	0.27	OK
N+8.90	15	COMDER2 MAX	0.00408	0.04903	0.03196	0.72	OK
N+8.90	15	COMDER2 MIN	-0.00408	-0.04903	0.03196	0.72	OK
N+4.45	15	COMDER1 MAX	0.00619	0.00524	0.00811	0.18	OK
N+4.45	15	COMDER1 MIN	-0.00619	-0.00524	0.00811	0.18	OK
N+4.45	15	COMDER2 MAX	0.00197	0.01714	0.01725	0.38	OK
N+4.45	15	COMDER2 MIN	-0.00197	-0.01714	0.01725	0.38	OK
BASE	15	COMDER1 MAX	0.00000	0.00000	--	--	--
BASE	15	COMDER1 MIN	0.00000	0.00000	--	--	--
BASE	15	COMDER2 MAX	0.00000	0.00000	--	--	--
BASE	15	COMDER2 MIN	0.00000	0.00000	--	--	--
N+8.90	16	COMDER1 MAX	0.01306	0.01720	0.01295	0.29	OK
N+8.90	16	COMDER1 MIN	-0.01306	-0.01720	0.01295	0.29	OK
N+8.90	16	COMDER2 MAX	0.00408	0.03318	0.02179	0.49	OK
N+8.90	16	COMDER2 MIN	-0.00408	-0.03318	0.02179	0.49	OK
N+4.45	16	COMDER1 MAX	0.00626	0.00619	0.00880	0.20	OK
N+4.45	16	COMDER1 MIN	-0.00626	-0.00619	0.00880	0.20	OK
N+4.45	16	COMDER2 MAX	0.00197	0.01149	0.01166	0.26	OK
N+4.45	16	COMDER2 MIN	-0.00197	-0.01149	0.01166	0.26	OK
BASE	16	COMDER1 MAX	0.00000	0.00000	--	--	--
BASE	16	COMDER1 MIN	0.00000	0.00000	--	--	--
BASE	16	COMDER2 MAX	0.00000	0.00000	--	--	--
BASE	16	COMDER2 MIN	0.00000	0.00000	--	--	--

**PROYECTO: CENTRO DE ATENCIÓN ESPECIALIZADA - EL REDENTOR, BLOQUE B1,
 BOGOTÁ (CUNDINAMARCA)**
CÁLCULO DE DERIVAS MÁXIMAS (ESPECTRO DE UMBRAL DE DAÑO)

ALTURA DE N+8.90	4.45	m	Deriva Máxima	0.40	%
ALTURA DE N+4.45	4.50	m	Permitida		
ALTURA DE BASE	0.00	m			

Nivel	Punto	COMBINACIÓN DE CARGA	DESPLAZAMIENTOS FUERZA SÍSMICA		Deriva Δ m	Deriva Δ %	Observación
			Desplazamiento X	Desplazamiento Y			
N+8.90	1	COMDERUMX MAX	0.00472	0.00180	0.00255	0.06	OK
N+8.90	1	COMDERUMX MIN	-0.00472	-0.00180	0.00255	0.06	OK
N+8.90	1	COMDERUMY MAX	0.00148	0.00551	0.00291	0.07	OK
N+8.90	1	COMDERUMY MIN	-0.00148	-0.00551	0.00291	0.07	OK
N+4.45	1	COMDERUMX MAX	0.00233	0.00090	0.00250	0.06	OK
N+4.45	1	COMDERUMX MIN	-0.00233	-0.00090	0.00250	0.06	OK
N+4.45	1	COMDERUMY MAX	0.00074	0.00270	0.00280	0.06	OK
N+4.45	1	COMDERUMY MIN	-0.00074	-0.00270	0.00280	0.06	OK
BASE	1	COMDERUMX MAX	0.00000	0.00000	--	--	--
BASE	1	COMDERUMX MIN	0.00000	0.00000	--	--	--
BASE	1	COMDERUMY MAX	0.00000	0.00000	--	--	--
BASE	1	COMDERUMY MIN	0.00000	0.00000	--	--	--
N+8.90	2	COMDERUMX MAX	0.00472	0.00180	0.00255	0.06	OK
N+8.90	2	COMDERUMX MIN	-0.00472	-0.00180	0.00255	0.06	OK
N+8.90	2	COMDERUMY MAX	0.00148	0.00541	0.00285	0.06	OK
N+8.90	2	COMDERUMY MIN	-0.00148	-0.00541	0.00285	0.06	OK
N+4.45	2	COMDERUMX MAX	0.00233	0.00090	0.00250	0.06	OK
N+4.45	2	COMDERUMX MIN	-0.00233	-0.00090	0.00250	0.06	OK
N+4.45	2	COMDERUMY MAX	0.00074	0.00265	0.00275	0.06	OK
N+4.45	2	COMDERUMY MIN	-0.00074	-0.00265	0.00275	0.06	OK
BASE	2	COMDERUMX MAX	0.00000	0.00000	--	--	--
BASE	2	COMDERUMX MIN	0.00000	0.00000	--	--	--
BASE	2	COMDERUMY MAX	0.00000	0.00000	--	--	--
BASE	2	COMDERUMY MIN	0.00000	0.00000	--	--	--
N+8.90	3	COMDERUMX MAX	0.00509	0.00186	0.00282	0.06	OK
N+8.90	3	COMDERUMX MIN	-0.00509	-0.00186	0.00282	0.06	OK
N+8.90	3	COMDERUMY MAX	0.00159	0.00551	0.00293	0.07	OK
N+8.90	3	COMDERUMY MIN	-0.00159	-0.00551	0.00293	0.07	OK
N+4.45	3	COMDERUMX MAX	0.00244	0.00090	0.00260	0.06	OK
N+4.45	3	COMDERUMX MIN	-0.00244	-0.00090	0.00260	0.06	OK
N+4.45	3	COMDERUMY MAX	0.00074	0.00270	0.00280	0.06	OK
N+4.45	3	COMDERUMY MIN	-0.00074	-0.00270	0.00280	0.06	OK
BASE	3	COMDERUMX MAX	0.00000	0.00000	--	--	--
BASE	3	COMDERUMX MIN	0.00000	0.00000	--	--	--
BASE	3	COMDERUMY MAX	0.00000	0.00000	--	--	--
BASE	3	COMDERUMY MIN	0.00000	0.00000	--	--	--
N+8.90	4	COMDERUMX MAX	0.01749	0.00186	0.01149	0.26	OK
N+8.90	4	COMDERUMX MIN	-0.01749	-0.00186	0.01149	0.26	OK
N+8.90	4	COMDERUMY MAX	0.00753	0.00551	0.00558	0.13	OK
N+8.90	4	COMDERUMY MIN	-0.00753	-0.00551	0.00558	0.13	OK
N+4.45	4	COMDERUMX MAX	0.00604	0.00090	0.00611	0.14	OK
N+4.45	4	COMDERUMX MIN	-0.00604	-0.00090	0.00611	0.14	OK
N+4.45	4	COMDERUMY MAX	0.00270	0.00270	0.00382	0.08	OK
N+4.45	4	COMDERUMY MIN	-0.00270	-0.00270	0.00382	0.08	OK
BASE	4	COMDERUMX MAX	0.00000	0.00000	--	--	--
BASE	4	COMDERUMX MIN	0.00000	0.00000	--	--	--
BASE	4	COMDERUMY MAX	0.00000	0.00000	--	--	--
BASE	4	COMDERUMY MIN	0.00000	0.00000	--	--	--
N+8.90	5	COMDERUMX MAX	0.02475	0.00186	0.01609	0.36	OK
N+8.90	5	COMDERUMX MIN	-0.02475	-0.00186	0.01609	0.36	OK
N+8.90	5	COMDERUMY MAX	0.01039	0.00551	0.00724	0.16	OK
N+8.90	5	COMDERUMY MIN	-0.01039	-0.00551	0.00724	0.16	OK
N+4.45	5	COMDERUMX MAX	0.00869	0.00090	0.00874	0.19	OK
N+4.45	5	COMDERUMX MIN	-0.00869	-0.00090	0.00874	0.19	OK
N+4.45	5	COMDERUMY MAX	0.00371	0.00270	0.00459	0.10	OK
N+4.45	5	COMDERUMY MIN	-0.00371	-0.00270	0.00459	0.10	OK
BASE	5	COMDERUMX MAX	0.00000	0.00000	--	--	--
BASE	5	COMDERUMX MIN	0.00000	0.00000	--	--	--
BASE	5	COMDERUMY MAX	0.00000	0.00000	--	--	--
BASE	5	COMDERUMY MIN	0.00000	0.00000	--	--	--
N+8.90	6	COMDERUMX MAX	0.01685	0.00180	0.01096	0.25	OK
N+8.90	6	COMDERUMX MIN	-0.01685	-0.00180	0.01096	0.25	OK
N+8.90	6	COMDERUMY MAX	0.00917	0.00551	0.00647	0.15	OK
N+8.90	6	COMDERUMY MIN	-0.00917	-0.00551	0.00647	0.15	OK
N+4.45	6	COMDERUMX MAX	0.00594	0.00090	0.00600	0.13	OK
N+4.45	6	COMDERUMX MIN	-0.00594	-0.00090	0.00600	0.13	OK

**PROYECTO: CENTRO DE ATENCIÓN ESPECIALIZADA - EL REDENTOR, BLOQUE B1,
 BOGOTÁ (CUNDINAMARCA)**
CÁLCULO DE DERIVAS MÁXIMAS (ESPECTRO DE UMBRAL DE DAÑO)

					Deriva Máxima	0.40	%	
					Permitida			
ALTURA DE N+8.90	4.45	m						
ALTURA DE N+4.45	4.50	m						
ALTURA DE BASE	0.00	m						
N+4.45	6	COMDERUMY MAX	0.00334	0.00270	0.00430	0.10	OK	
N+4.45	6	COMDERUMY MIN	-0.00334	-0.00270	0.00430	0.10	OK	
BASE	6	COMDERUMX MAX	0.00000	0.00000	--	--	--	
BASE	6	COMDERUMX MIN	0.00000	0.00000	--	--	--	
BASE	6	COMDERUMY MAX	0.00000	0.00000	--	--	--	
BASE	6	COMDERUMY MIN	0.00000	0.00000	--	--	--	
N+8.90	7	COMDERUMX MAX	0.01707	0.00180	0.01106	0.25	OK	
N+8.90	7	COMDERUMX MIN	-0.01707	-0.00180	0.01106	0.25	OK	
N+8.90	7	COMDERUMY MAX	0.00928	0.00541	0.00647	0.15	OK	
N+8.90	7	COMDERUMY MIN	-0.00928	-0.00541	0.00647	0.15	OK	
N+4.45	7	COMDERUMX MAX	0.00604	0.00090	0.00611	0.14	OK	
N+4.45	7	COMDERUMX MIN	-0.00604	-0.00090	0.00611	0.14	OK	
N+4.45	7	COMDERUMY MAX	0.00339	0.00270	0.00434	0.10	OK	
N+4.45	7	COMDERUMY MIN	-0.00339	-0.00270	0.00434	0.10	OK	
BASE	7	COMDERUMX MAX	0.00000	0.00000	--	--	--	
BASE	7	COMDERUMX MIN	0.00000	0.00000	--	--	--	
BASE	7	COMDERUMY MAX	0.00000	0.00000	--	--	--	
BASE	7	COMDERUMY MIN	0.00000	0.00000	--	--	--	
N+8.90	8	COMDERUMX MAX	0.02507	0.00180	0.01624	0.37	OK	
N+8.90	8	COMDERUMX MIN	-0.02507	-0.00180	0.01624	0.37	OK	
N+8.90	8	COMDERUMY MAX	0.01049	0.00541	0.00730	0.16	OK	
N+8.90	8	COMDERUMY MIN	-0.01049	-0.00541	0.00730	0.16	OK	
N+4.45	8	COMDERUMX MAX	0.00885	0.00090	0.00890	0.20	OK	
N+4.45	8	COMDERUMX MIN	-0.00885	-0.00090	0.00890	0.20	OK	
N+4.45	8	COMDERUMY MAX	0.00371	0.00270	0.00459	0.10	OK	
N+4.45	8	COMDERUMY MIN	-0.00371	-0.00270	0.00459	0.10	OK	
BASE	8	COMDERUMX MAX	0.00000	0.00000	--	--	--	
BASE	8	COMDERUMX MIN	0.00000	0.00000	--	--	--	
BASE	8	COMDERUMY MAX	0.00000	0.00000	--	--	--	
BASE	8	COMDERUMY MIN	0.00000	0.00000	--	--	--	
N+8.90	9	COMDERUMX MAX	0.01776	0.00180	0.01164	0.26	OK	
N+8.90	9	COMDERUMX MIN	-0.01776	-0.00180	0.01164	0.26	OK	
N+8.90	9	COMDERUMY MAX	0.00769	0.00541	0.00562	0.13	OK	
N+8.90	9	COMDERUMY MIN	-0.00769	-0.00541	0.00562	0.13	OK	
N+4.45	9	COMDERUMX MAX	0.00615	0.00090	0.00621	0.14	OK	
N+4.45	9	COMDERUMX MIN	-0.00615	-0.00090	0.00621	0.14	OK	
N+4.45	9	COMDERUMY MAX	0.00276	0.00270	0.00386	0.09	OK	
N+4.45	9	COMDERUMY MIN	-0.00276	-0.00270	0.00386	0.09	OK	
BASE	9	COMDERUMX MAX	0.00000	0.00000	--	--	--	
BASE	9	COMDERUMX MIN	0.00000	0.00000	--	--	--	
BASE	9	COMDERUMY MAX	0.00000	0.00000	--	--	--	
BASE	9	COMDERUMY MIN	0.00000	0.00000	--	--	--	
N+8.90	10	COMDERUMX MAX	0.00509	0.00180	0.00280	0.06	OK	
N+8.90	10	COMDERUMX MIN	-0.00509	-0.00180	0.00280	0.06	OK	
N+8.90	10	COMDERUMY MAX	0.00159	0.00541	0.00288	0.06	OK	
N+8.90	10	COMDERUMY MIN	-0.00159	-0.00541	0.00288	0.06	OK	
N+4.45	10	COMDERUMX MAX	0.00244	0.00090	0.00260	0.06	OK	
N+4.45	10	COMDERUMX MIN	-0.00244	-0.00090	0.00260	0.06	OK	
N+4.45	10	COMDERUMY MAX	0.00074	0.00265	0.00275	0.06	OK	
N+4.45	10	COMDERUMY MIN	-0.00074	-0.00265	0.00275	0.06	OK	
BASE	10	COMDERUMX MAX	0.00000	0.00000	--	--	--	
BASE	10	COMDERUMX MIN	0.00000	0.00000	--	--	--	
BASE	10	COMDERUMY MAX	0.00000	0.00000	--	--	--	
BASE	10	COMDERUMY MIN	0.00000	0.00000	--	--	--	
N+8.90	11	COMDERUMX MAX	0.00472	0.00811	0.00572	0.13	OK	
N+8.90	11	COMDERUMX MIN	-0.00472	-0.00811	0.00572	0.13	OK	
N+8.90	11	COMDERUMY MAX	0.00148	0.01760	0.01147	0.26	OK	
N+8.90	11	COMDERUMY MIN	-0.00148	-0.01760	0.01147	0.26	OK	
N+4.45	11	COMDERUMX MAX	0.00233	0.00292	0.00373	0.08	OK	
N+4.45	11	COMDERUMX MIN	-0.00233	-0.00292	0.00373	0.08	OK	
N+4.45	11	COMDERUMY MAX	0.00074	0.00615	0.00619	0.14	OK	
N+4.45	11	COMDERUMY MIN	-0.00074	-0.00615	0.00619	0.14	OK	
BASE	11	COMDERUMX MAX	0.00000	0.00000	--	--	--	
BASE	11	COMDERUMX MIN	0.00000	0.00000	--	--	--	
BASE	11	COMDERUMY MAX	0.00000	0.00000	--	--	--	
BASE	11	COMDERUMY MIN	0.00000	0.00000	--	--	--	
N+8.90	12	COMDERUMX MAX	0.00472	0.00806	0.00572	0.13	OK	
N+8.90	12	COMDERUMX MIN	-0.00472	-0.00806	0.00572	0.13	OK	
N+8.90	12	COMDERUMY MAX	0.00148	0.02671	0.01724	0.39	OK	

**PROYECTO: CENTRO DE ATENCIÓN ESPECIALIZADA - EL REDENTOR, BLOQUE B1,
 BOGOTÁ (CUNDINAMARCA)**
CÁLCULO DE DERIVAS MÁXIMAS (ESPECTRO DE UMBRAL DE DAÑO)

ALTURA DE N+8.90	4.45	m			Deriva Máxima Permitida	0.40	%	
ALTURA DE N+4.45	4.50	m						
ALTURA DE BASE	0.00	m						
N+8.90	12	COMDERUMY MIN	-0.00148	-0.02671	0.01724	0.39	OK	
N+4.45	12	COMDERUMX MAX	0.00233	0.00286	0.00369	0.08	OK	
N+4.45	12	COMDERUMX MIN	-0.00233	-0.00286	0.00369	0.08	OK	
N+4.45	12	COMDERUMY MAX	0.00074	0.00949	0.00952	0.21	OK	
N+4.45	12	COMDERUMY MIN	-0.00074	-0.00949	0.00952	0.21	OK	
BASE	12	COMDERUMX MAX	0.00000	0.00000	--	--	--	
BASE	12	COMDERUMX MIN	0.00000	0.00000	--	--	--	
BASE	12	COMDERUMY MAX	0.00000	0.00000	--	--	--	
BASE	12	COMDERUMY MIN	0.00000	0.00000	--	--	--	
N+8.90	13	COMDERUMX MAX	0.00472	0.00822	0.00576	0.13	OK	
N+8.90	13	COMDERUMX MIN	-0.00472	-0.00822	0.00576	0.13	OK	
N+8.90	13	COMDERUMY MAX	0.00148	0.01781	0.01163	0.26	OK	
N+8.90	13	COMDERUMY MIN	-0.00148	-0.01781	0.01163	0.26	OK	
N+4.45	13	COMDERUMX MAX	0.00233	0.00297	0.00377	0.08	OK	
N+4.45	13	COMDERUMX MIN	-0.00233	-0.00297	0.00377	0.08	OK	
N+4.45	13	COMDERUMY MAX	0.00074	0.00620	0.00625	0.14	OK	
N+4.45	13	COMDERUMY MIN	-0.00074	-0.00620	0.00625	0.14	OK	
BASE	13	COMDERUMX MAX	0.00000	0.00000	--	--	--	
BASE	13	COMDERUMX MIN	0.00000	0.00000	--	--	--	
BASE	13	COMDERUMY MAX	0.00000	0.00000	--	--	--	
BASE	13	COMDERUMY MIN	0.00000	0.00000	--	--	--	
N+8.90	14	COMDERUMX MAX	0.00509	0.00657	0.00496	0.11	OK	
N+8.90	14	COMDERUMX MIN	-0.00509	-0.00657	0.00496	0.11	OK	
N+8.90	14	COMDERUMY MAX	0.00159	0.01277	0.00842	0.19	OK	
N+8.90	14	COMDERUMY MIN	-0.00159	-0.01277	0.00842	0.19	OK	
N+4.45	14	COMDERUMX MAX	0.00244	0.00239	0.00341	0.08	OK	
N+4.45	14	COMDERUMX MIN	-0.00244	-0.00239	0.00341	0.08	OK	
N+4.45	14	COMDERUMY MAX	0.00074	0.00440	0.00446	0.10	OK	
N+4.45	14	COMDERUMY MIN	-0.00074	-0.00440	0.00446	0.10	OK	
BASE	14	COMDERUMX MAX	0.00000	0.00000	--	--	--	
BASE	14	COMDERUMX MIN	0.00000	0.00000	--	--	--	
BASE	14	COMDERUMY MAX	0.00000	0.00000	--	--	--	
BASE	14	COMDERUMY MIN	0.00000	0.00000	--	--	--	
N+8.90	15	COMDERUMX MAX	0.00509	0.00578	0.00460	0.10	OK	
N+8.90	15	COMDERUMX MIN	-0.00509	-0.00578	0.00460	0.10	OK	
N+8.90	15	COMDERUMY MAX	0.00159	0.01913	0.01248	0.28	OK	
N+8.90	15	COMDERUMY MIN	-0.00159	-0.01913	0.01248	0.28	OK	
N+4.45	15	COMDERUMX MAX	0.00244	0.00201	0.00316	0.07	OK	
N+4.45	15	COMDERUMX MIN	-0.00244	-0.00201	0.00316	0.07	OK	
N+4.45	15	COMDERUMY MAX	0.00074	0.00668	0.00672	0.15	OK	
N+4.45	15	COMDERUMY MIN	-0.00074	-0.00668	0.00672	0.15	OK	
BASE	15	COMDERUMX MAX	0.00000	0.00000	--	--	--	
BASE	15	COMDERUMX MIN	0.00000	0.00000	--	--	--	
BASE	15	COMDERUMY MAX	0.00000	0.00000	--	--	--	
BASE	15	COMDERUMY MIN	0.00000	0.00000	--	--	--	
N+8.90	16	COMDERUMX MAX	0.00509	0.00668	0.00500	0.11	OK	
N+8.90	16	COMDERUMX MIN	-0.00509	-0.00668	0.00500	0.11	OK	
N+8.90	16	COMDERUMY MAX	0.00159	0.01293	0.00852	0.19	OK	
N+8.90	16	COMDERUMY MIN	-0.00159	-0.01293	0.00852	0.19	OK	
N+4.45	16	COMDERUMX MAX	0.00244	0.00244	0.00345	0.08	OK	
N+4.45	16	COMDERUMX MIN	-0.00244	-0.00244	0.00345	0.08	OK	
N+4.45	16	COMDERUMY MAX	0.00074	0.00445	0.00451	0.10	OK	
N+4.45	16	COMDERUMY MIN	-0.00074	-0.00445	0.00451	0.10	OK	
BASE	16	COMDERUMX MAX	0.00000	0.00000	--	--	--	
BASE	16	COMDERUMX MIN	0.00000	0.00000	--	--	--	
BASE	16	COMDERUMY MAX	0.00000	0.00000	--	--	--	
BASE	16	COMDERUMY MIN	0.00000	0.00000	--	--	--	

4. DISEÑO DE CIMENTACIÓN

DISEÑO DE CIMENTACIÓN

CARGAS A CIMENTACIÓN

PROYECTO: CENTRO DE ATENCIÓN ESPECIALIZADA - EL REDENTOR, BLOQUE B1, BOGOTÁ (CUNDINAMARCA)

Story	Point	Load	FX	FY	FZ	MX	MY	MZ
BASE	1	CIMEN	0.9	-4.89	123.59	6.96	1.763	-1.765
BASE	2	CIMEN	-2.62	-3.94	111.49	6.887	-3.616	-0.182
BASE	3	CIMEN	6.44	0.52	129.66	-1.167	11.477	2.177
BASE	4	CIMEN	1.85	0.75	142.44	-1.502	-1.972	2.177
BASE	5	CIMEN	-2.31	-0.33	90.35	0.149	-9.034	-0.345
BASE	6	CIMEN	-3.44	4.06	138.32	-6.265	-10.043	-1.765
BASE	7	CIMEN	-8.64	0.86	177.95	-0.214	-13.073	-0.182
BASE	8	CIMEN	-7.1	-2.69	150.82	5.035	-11.369	-0.182
BASE	9	CIMEN	0.4	-0.69	80.43	2.02	2.169	0.033
BASE	10	CIMEN	0.54	-0.63	99.21	1.922	2.647	0.072
BASE	11	CIMEN	0.31	-18.71	187.5	35.394	1.122	-2.689
BASE	12	CIMEN	0.04	-10.55	202.83	31.731	0.728	-2.689
BASE	13	CIMEN	1.39	1.71	108.56	-1.769	2.43	-0.277
BASE	14	CIMEN	2.85	5.37	185.42	-18.669	7.173	3.318
BASE	15	CIMEN	-1	4.55	219.92	-27.783	1.504	3.318
BASE	16	CIMEN	3.24	1.88	94.34	-12.16	7.649	-7.271
BASE	31	CIMEN	-3.64	7.36	113.9	-7.703	-8.503	-1.102
BASE	32	CIMEN	-4.07	-1.18	61.16	8.386	-9.132	-1.102
BASE	33	CIMEN	-3.12	6.59	164.42	-14.187	-7.564	1.359
BASE	34	CIMEN	-9.07	10.21	71.96	-23.774	-16.387	1.359
BASE	35	CIMEN	0.44	0.07	104.52	0.456	1.645	0.113
BASE	36	CIMEN	9.07	1.7	83.21	-2.219	12.873	-0.114
BASE	37	CIMEN	12.03	-1.34	116.85	2.287	17.675	-0.114
BASE	38	CIMEN	5.51	-0.67	54.02	1.304	8.243	-0.114

DISEÑO VIGAS DE AMARRE

PROYECTO: CENTRO DE ATENCIÓN ESPECIALIZADA - EL REDENTOR, BLOQUE B1, BOGOTÁ (CUNDINAMARCA)

VIGA DE AMARRE TIPO

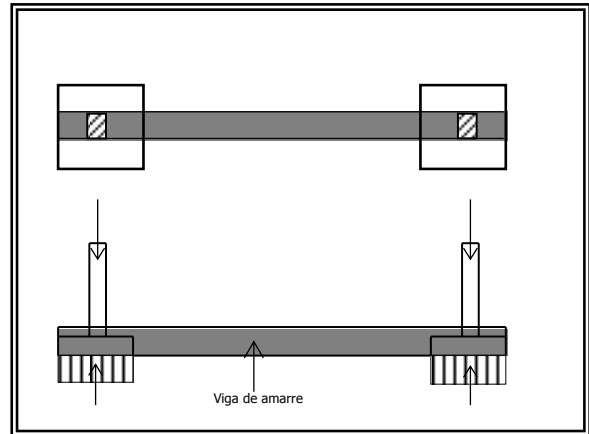
$$f_c = \boxed{21.1} \text{ MPa}$$
$$f_y = \boxed{420} \text{ MPa}$$

$$b = \boxed{0.25} \text{ m}$$
$$h = \boxed{0.30} \text{ m}$$

$$P_{\text{máx}} = 219.92 \text{ kN}$$

De acuerdo a el numeral A.3.6.4.2 de la NSR-10 tenemos:

$$A_a = 0.15$$
$$P_{\text{axial}} = 0.25 * A_a * P_{\text{máx}}$$
$$P_{\text{axial}} = 8.2 \text{ kN}$$



DISEÑO A TENSIÓN

$$A_s = 1.7 * 8.247 / (0.90 * 420)$$
$$A_s = \boxed{0.37} \text{ cm}^2$$

DISEÑO A COMPRESIÓN

$$P_{\text{com}} = 1.7 * 8.247$$
$$P_{\text{com}} = 14.0 \text{ kN}$$

Para esta carga la sección requiere cuantía mínima:

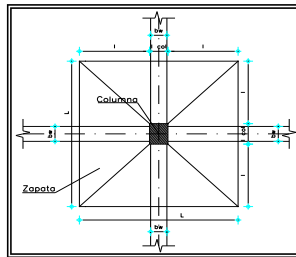
$$A_s = 0.00333 * 0.25 * 0.25$$
$$A_s = \boxed{2.08} \text{ cm}^2$$

Se suministra un refuerzo constituido por 3#4 arriba y abajo (como refuerzo mínimo).

DISEÑO DE ZAPATAS CONCENRICAS
PROYECTO: CENTRO DE ATENCIÓN ESPECIALIZADA - EL REDENTOR, BLOQUE B1, BOGOTÁ (CUNDINAMARCA)
ZAPATA TIPO 1 (11 Und)

Columna	b = 45 cm	f_c = 21.1 MPa	σ = 0.220 MPa
	t = 45 cm	f_y = 420 MPa	

PREDIMENSIONAMIENTO



L = 1.100 m	Cargas
l_{col} = 0.450 m	M_u = 0 kN*m
l = 0.325 m	P_u = 219.92 kN
	P_p (10%) = 22 kN
	Σ P = 242 kN

$$\text{Area necesaria} = \frac{\Sigma P}{\sigma} = \frac{241.91}{0.220} = 1.10 \text{ m}^2$$

$$e = 0.00 \text{ m}$$

$$L = 1.049 \text{ m} \quad \text{Aproximamos} = 1.10 \text{ m}$$

$$\text{Carga de diseño} = \frac{P_u}{A \text{ real}} = \frac{219.92}{1.210} = 0.182 \text{ MPa}$$

Esfuerzos

σ_{máx} = 0.200 MPa	OK
σ_{mín} = 0.200 MPa	OK

DISEÑO DE ZAPATA CONCENRICA

FLEXIÓN

	M borde de la columna =	10.56	kN*m
M_u =	1,7 * M borde de la columna =	17.95	kN*m

Con el criterio de calcular el refuerzo por metro lineal utilizamos una altura efectiva igual a:

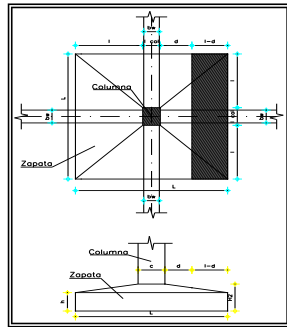
$$d = 0.23 \text{ m}$$

$$\text{Cuantía} = 0.002$$

$$\text{As} = 4.60 \text{ cm}^2/\text{m}$$

Armadura: 7#414c./0.18
en ambos sentidos

CORTANTE



a. En una dirección (d)

L = 1.10 m	H = 0.30 m
l = 0.33 m	h = 0.30 m
l - d = 0.10 m	H - h = 0.00 m

$$V(d) = 20.89 \text{ kN}$$

$$Vu(d) = 1.7 * V(d)$$

$$Vu(d) = 35.52 \text{ kN}$$

$$h' = 0.23 \text{ m}$$

$$\sigma_v = \frac{Vu}{L * h'} = 0.140 \text{ MPa}$$

$$\phi_{vc} = 0.57 \text{ MPa} \quad \text{OK}$$

b. En dos direcciones (d/2)

ZAPATA TIPO 1 (11 Und)

L = 1.100 m	H = 0.30 m
d/2 = 0.115 m	h = 0.30 m
l - d/2 = 0.210 m	H - h = 0.00 m

$$V(d/2) = 37.4 \text{ kN}$$

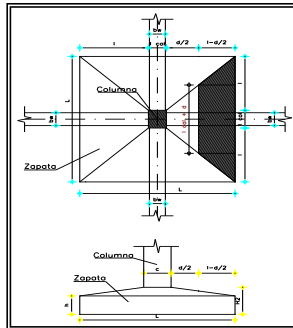
$$Vu(d/2) = 1.5 * V(d/2)$$

$$Vu(d/2) = 56.0 \text{ kN}$$

$$d_1 = 0.23 \text{ m}$$

$$\sigma_v = \frac{Vu}{b_o * d_1} = 0.358 \text{ MPa}$$

$$\phi_{vc} = 1.15 \text{ MPa} \quad \text{OK}$$



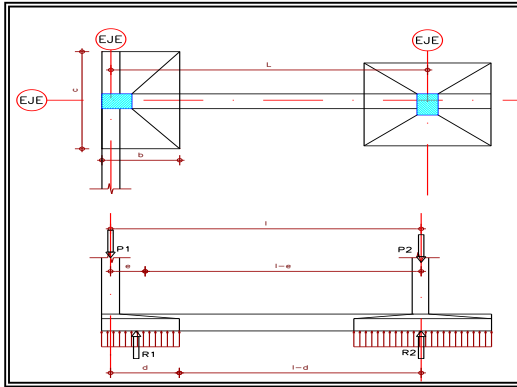
DISEÑO DE ZAPATA EXCÉNTRICA

PROYECTO: CENTRO DE ATENCIÓN ESPECIALIZADA - EL REDENTOR, BLOQUE B1, BOGOTÁ (CUNDINAMARCA)

ZAPATA TIPO 2 (9 Und).

Columna	$b_c = 45$ cm.	$f'_c = 21.1$ MPa	$\sigma = 0.220$ MPa
	$t = 45$ cm.	$f_y = 420$ MPa	

PREDIMENSIONAMIENTO



$c = 2.00$ m			
$b = 1.00$ m			
$l-e = 4.66$ m			
$d = 0.78$ m			
$e = 0.28$ m			
$L = 4.93$ m			

Cargas	
$P_u = 177.95$ kN	
$P_p (10\%) = 17.80$ kN	
$\Sigma P_1 = 195.75$ kN	

$$\text{Area necesaria} = \frac{\Sigma P_1}{\sigma} = \frac{195.75}{0.22} = 0.89 \text{ m}^2$$

$$c \gg 2b \quad 0.89 = c \times b \quad b = 0.50c$$

$c = 1.334$ m	Asumimos	$c = 2.00$ m
$b = 0.67$ m		$b = 1.00$ m

VALOR DE ΔR

$$\Delta R * (L-e) = P_1 * e = \Delta R * 4.66 = 53.83 \text{ kN-m}$$

$$c = (P_1 + \Delta R) / (\sigma * b) = 0.94 \text{ m} \quad \text{Entonces}$$

$$\sigma_{\text{neto}} = (P_u + \Delta R) / (b * c) = 0.095 \text{ MPa OK}$$

$$\Delta R = 11.56 \text{ kN}$$

$$c = 2.00 \text{ m}$$

$$\sigma_{\text{neto}} = 0.095 \text{ MPa}$$

DISEÑO DE VIGA DE CONTRAPESO :

Flexión

Donde el cortante es cero (0), el momento es máximo

$$M_d = \Delta R * (l-d) = 48.048 \text{ kN-m} \quad h = 0.30 \text{ m}$$

$$M_u = 1.5 * M_d = 72.07 \text{ kN-m} \quad b_v = 0.25 \text{ m}$$

$$d = 0.23 \text{ m}$$

$$\text{Cuantía} = 0.015971003$$

$$A_s = 9.18 \text{ cm}^2$$

$$\text{Armadura} = 2\#6, 1\#7 \text{ Arriba}$$

$$3\#4 \text{ Abajo}$$

Carga long. Bajo la zapata exterior = 189.51 kN/m

$$A_i = 42.64 \text{ kN}$$

$$A_d = 135.31 \text{ kN}$$

$$V(d) = -11.56 \text{ kN}$$

$$V \text{ borde de columna} = 92.67 \text{ kN}$$

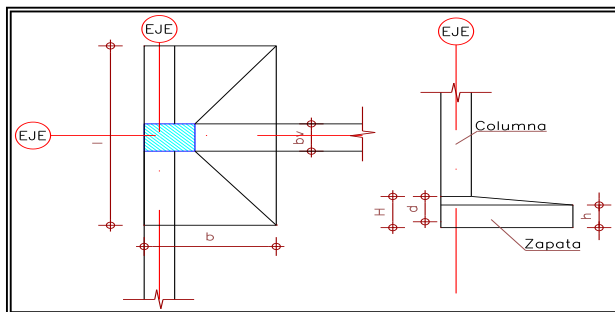
Estribos #3 c/0.06m en la zona de confinamiento.

DISEÑO DE ZAPATA EXCÉNTRICA

ZAPATA TIPO 2 (9 Und).

Flexión

Se considera como voladizos en el sentido más largo, soportados en la viga de contrapeso:



$$\sigma = 0.095 \text{ MPa}$$

$$M = (\sigma * b * (c-bv) / 2 * (c-bv) / 2) = 36.27 \text{ kN-m}$$

$$M_u = 1.7 * M = 61.67 \text{ kN-m}$$

$$H = 0.30 \text{ m}$$

$$d = 0.23 \text{ m}$$

$$b = 1.00 \text{ m}$$

$$h = 0.30 \text{ m}$$

$$\text{Cuantía} = 0.0029$$

$$A_s = 6.61 \text{ cm}^2$$

$$\text{Armadura} = 11\#413c./0.20 \text{ Transversales}$$

$$7\#423c./0.12 \text{ Longitudinales}$$

Chequeo por cortante

$$v_u = \frac{V_u}{b * d} \quad V_u \text{ borde viga} = \sigma_{\text{neto}} * b * (c-bv) / 2 = 82.91 \text{ kN}$$

$$V_u = 1.5 * V \text{ borde} = 124.37 \text{ kN} \quad v_u = 0.541 \text{ MPa}$$

$$\phi v_c = 0.574 \text{ MPa OK}$$

DISEÑO DE ZAPATA COMBINADA
PROYECTO: CENTRO DE ATENCIÓN ESPECIALIZADA - EL REDENTOR, BLOQUE B1, BOGOTÁ (CUNDINAMARCA)
ZAPATA TIPO 3 (1 Und).

Columna
b₁ = 45 cm.
t₁ = 45 cm.
b₂ = 40 cm.
t₂ = 40 cm.

Materiales
f_c = 21.1 MPa
f_y = 420 MPa

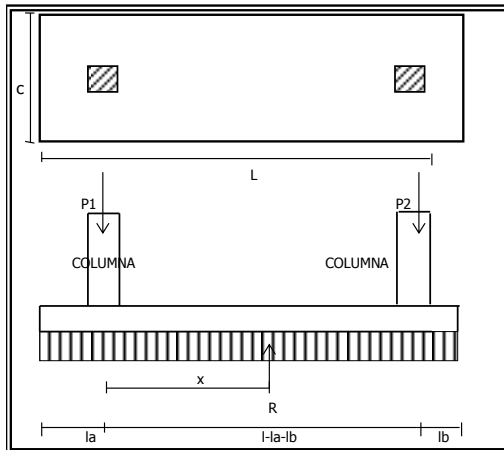
Esfuerzo Admisible
σ = 0.220 MPa

Predimensionamiento

c = 1.60 m.
l_a = 1.03 m.
l_b = 0.62 m.
l-l_a-l_b = 1.25 m.
l = 2.90 m.

Cargas

Pu₁ = 108.6 kN
Pu₂ = 54.0 kN
Pp (13%) = 21.14 kN
Σ P = 183.72 kN



$$\text{Area necesaria} = \frac{\Sigma P}{\sigma} = \frac{183.72}{0.220} = 0.84 \text{ m}^2.$$

Centro de gravedad: **X** = 0.42 m
l = 2.90 m
c = 0.29 m

Asumimos **l** = 2.90 m
c = 1.60 m

entonces el **σ_{neto}** = 0.035 MPa **OK**

DISEÑO VIGA DE ENLACE LONGITUDINAL Y ZAPATA

VIGA DE ENLACE LONGITUDINAL

Para el análisis de la viga de enlace longitudinal se tendrá en cuenta la longitud entre columnas, incluyendo la sollicitación que le imprime la zapata combinada.

Carga bajo el cimiento combinado:

σ_{neto} * c = 56.1 kN/m
L = 1.25 m

H = 0.30 m

d = 0.23 m

b_v = 0.25 m

Cortantes en los apoyos:

V₁ = 35.0 1.5xV_{1d} = 52.56 kN

V₂ = -35.0 1.5xV_{1d} = -52.56 kN

Separación de flejes

0.13 m En toda la luz

0.13 m En toda la luz

Nº Ramas y flejes

2 RAMAS SENCILLO #3

2 RAMAS SENCILLO #3

Nota: En las partes intermedias a las distancias enunciadas los flejes se separan de acuerdo a lo enunciado en los planos estructurales.

Momento longitudinal:

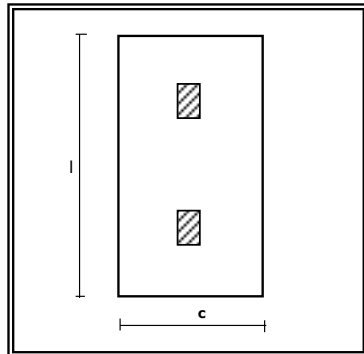
M_{1/2 L} = 10.9 1.5xM_{1/2L} = 16.42 kN.m

Cuantía
0.0033

As
1.92 cm²

Armadura
3#4

ZAPATA



M dir(x)			Datos	
$M = \sigma * l * (c/2 - bv/2)^2 / 2 =$	23.15	kN.m	$\sigma =$	0.035 MPa
$M_u = 1.5 * M$	Mu(x) =	34.72 kN.m	l =	2.90 m
	Cuantia (x) =	0.0020	c =	1.60 m
	As (x) =	13.34 cm ²	H =	0.30 m
	A var =	1.99 cm ²	d =	0.23 m
	s =	0.47 m	h =	0.30 m
	No. var =	7		
	Armadura (x):	15#519c./0.2	Tranversales	
M dir(y)				
$M = \sigma * C * (Máx(la:lb))^2 / 2 =$	30.01	kN.m		
$M_u = 1.5 * M$	Mu(y) =	45.01 kN.m		
	Cuantia (y) =	0.0020		
	As (y) =	7.36 cm ²		
	A var =	1.99 cm ²		
	s =	0.50 m		
	No. var =	4		
	Armadura (y):	9#532c./0.2	Longitudinales	

Chequeo por cortante:

$$v_u = \frac{V_u}{b * d}$$

$$V_u \text{ dir}(x) = \sigma_{\text{neto}} * l * (c - bv) / 2 = \boxed{68.59} \text{ kN}$$

$$V_u \text{ dir}(y) = \sigma_{\text{neto}} * c * [Máx(la, lb)] = \boxed{58.01} \text{ kN}$$

$$V_u = 1.50 * V_u \text{ dir}(x) = \boxed{102.88} \text{ kN}$$

$$V_u = 1.50 * V_u \text{ dir}(y) = \boxed{87.01} \text{ kN}$$

$$v_u \text{ dir}(x) = \boxed{0.154} \text{ MPa} \quad \text{OK}$$

$$v_u \text{ dir}(y) = \boxed{0.236} \text{ MPa} \quad \text{OK}$$

$$\phi v_c = \boxed{0.574} \text{ MPa}$$

Chequeo por transmisión de esfuerzos

$$\sigma_b = \frac{1.5 * Máx(P_1: P_2)}{b * t}$$

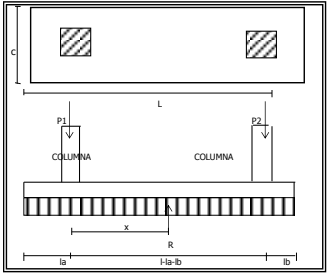
$$\sigma_b = 0.804 \text{ MPa}$$

$$\phi \sigma_c = 22.155 \text{ MPa} \quad \text{OK}$$

DISEÑO DE ZAPATA COMBINADA

PROYECTO: CENTRO DE ATENCIÓN ESPECIALIZADA - EL REDENTOR, BLOQUE B1, BOGOTÁ (CUNDINAMARCA)

ZAPATA TIPO 4 (1 Un.)

<p>Columna</p> <p>$b_1 = 40$ cm. $t_1 = 40$ cm. $b_2 = 45$ cm. $t_2 = 45$ cm.</p>	<p>Materiales</p> <p>$f_c = 21.1$ MPa $f_y = 420$ MPa</p>	<p>Esfuerzo Admisible</p> <p>$\sigma = 0.220$ MPa</p>
	<p>Predimensionamiento</p> <p>$c = 1.50$ m. $la = 0.42$ m. $lb = 0.25$ m. $l-la-lb = 1.33$ m. $l = 2.00$ m.</p>	<p>Cargas</p> <p>$Pu_1 = 104.5$ kN $Pu_2 = 80.4$ kN $Pp (13\%) = 24.04$ kN $\Sigma P = 208.99$ kN</p>
<p>Area necesaria = $\frac{\Sigma P}{\sigma} = \frac{208.99}{0.220} = 0.95$ m².</p> <p>Centro de gravedad: $X = 0.58$ m $l = 2.00$ m $c = 0.47$ m</p> <p>Asumimos $l = 2.00$ m $c = 1.50$ m entonces el $\sigma_{neto} = 0.062$ MPa OK</p>		

DISEÑO VIGA DE ENLACE LONGITUDINAL Y ZAPATA

VIGA DE ENLACE LONGITUDINAL

Para el análisis de la viga de enlace longitudinal se tendrá en cuenta la longitud entre columnas, incluyendo la sollicitación que le imprime la zapata combinada.

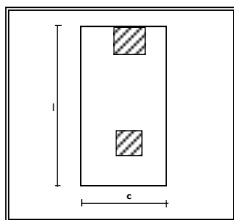
Carga bajo el cimiento combinado: $\sigma_{neto} * c = 92.5$ kN/m $H = 0.30$ m
 $L = 1.33$ m $d = 0.23$ m
 $bv = 0.25$ m

Cortantes en los apoyos: $V_1 = 61.5$ $1.5xV_{1d} = 92.24$ kN 0.06 m En toda la luz **Sencillos #3**
 $V_2 = -61.5$ $1.5xV_{1d} = -92.24$ kN 0.06 m En toda la luz **Sencillos #3**

Nota: En las partes intermedias a las distancias enunciadas los flejes se separan de acuerdo a lo enunciado en los planos estructurales.

Momento longitudinal: $M_{1/2L} = 20.4$ $1.5xM_{1/2L} = 30.67$ kN.m **Cuántia** 0.0059 **As** 3.41 cm² **Armadura** 3#4 Arriba, 3#4 Abajo

ZAPATA



M dir(x)		Datos	
$M = \sigma * l * (c/2 - bv/2)^2 / 2 = 24.08$ kN.m	$\sigma = 0.062$ MPa	$l = 2.00$ m	
$Mu = 1.5xM = 36.12$ kN.m	$c = 1.50$ m	$H = 0.30$ m	
Cuántia (x) = 0.0020	$d = 0.23$ m	$h = 0.30$ m	
As (x) = 9.20 cm ²			
A varilla = 1.29 cm ²			
s = 0.24 m			
No. varillas = 8			
Armadura (x): 10#418c./0.2	Tranversales		
M dir(y)		Datos	
$M = \sigma * c * (Máx(la;lb))^2 / 2 = 8.22$ kN.m	$\sigma = 0.062$ MPa	$l = 2.00$ m	
$Mu = 1.5xM = 12.33$ kN.m	$c = 1.50$ m	$H = 0.30$ m	
Cuántia (y) = 0.0020	$d = 0.23$ m	$h = 0.30$ m	
As (y) = 6.90 cm ²			
A var = 1.29 cm ²			
s = 0.28 m			
No. var = 6			
Armadura (y): 8#423c./0.2	Longitudinales		

Chequeo por cortante:

$$v_u = \frac{Vu}{b * d}$$

$Vu \text{ dir}(x) = \sigma_{neto} * l * (c - bv) / 2 = 77.06$ kN

$Vu \text{ dir}(y) = \sigma_{neto} * c * [Máx(la, lb)] = 38.99$ kN

$Vu = 1.50 * Vu \text{ dir}(x) = 115.59$ kN $v_u \text{ dir}(x) = 0.251$ MPa **OK**

$Vu = 1.50 * Vu \text{ dir}(y) = 58.48$ kN $v_u \text{ dir}(y) = 0.170$ MPa **OK**

$\phi v_c = 0.574$ MPa

Chequeo por transmisión de esfuerzos

$$\sigma_b = \frac{1.5xMáx(P_1; P_2)}{b * t}$$

$\sigma_b = 0.980$ MPa

$\phi \sigma_c = 22.155$ MPa **OK**

5. DISEÑO DE VIGAS Y COLUMNAS

DISEÑO DE VIGAS, VIGUETAS Y COLUMNAS

PROYECTO: CAE - EL REDENTOR, BLOQUE B1, BOGOTÁ (CUND.)

V-101B1/N+4.45

B=0.30 H=0.50 L=4.38			B=0.30 H=0.50 L=4.43			B=0.30 H=0.50 L=4.43		
Mu=-63.62	Mu=-59.70		Mu=-61.15	Mu=-56.72		Mu=-58.98	Mu=-62.34	
As=4.42	As=4.42		As=4.42	As=4.42		As=4.42	As=4.42	
Mu=12.72 As=4.42			Mu=12.23 As=4.42			Mu=12.47 As=4.42		
Vu=-32.91	Vu=-22.44	Vu=32.35	Vu=-32.01	Vu=-21.36	Vu=30.11	Vu=-30.75	Vu=21.33	Vu=31.98

B=0.30 H=0.50 L=4.45		
Mu=-65.57	Mu=-70.23	
As=4.42	As=4.42	
Mu=14.05 As=4.42		
Vu=-35.69	Vu=-25.04	Vu=51.32

V-102B1/N+4.45

B=0.30 H=0.50 L=4.70		
Mu=-56.71	Mu=-13.79	
As=4.42	As=4.42	
Mu=30.64 As=4.42		
Vu=-53.78	Vu=-13.31	Vu=28.50

V-103B1/N+4.45

B=0.30 H=0.50 L=4.70		
Mu=-81.95	Mu=-85.34	
As=5.09	As=5.31	
Mu=73.51 As=4.54		
Vu=-107.74	Vu=15.11	Vu=89.46

V-104B1/N+4.45

B=0.30 H=0.50 L=4.43			B=0.30 H=0.50 L=4.58		
Mu=-85.93	Mu=-57.71		Mu=-25.45	Mu=-45.71	
As=5.35	As=4.42		As=4.42	As=4.42	
Mu=28.58 As=4.42			Mu=12.96 As=4.42		
Vu=-33.88	Vu=30.17	Vu=40.64	Vu=-20.63	Vu=12.09	Vu=22.74

PROYECTO: CAE - EL REDENTOR, BLOQUE B1, BOGOTÁ (CUND.)

V-105B1/N+4.45

B=0.30 H=0.50 L=4.70		
Mu=-70.07 As=4.42	Mu=-67.26 As=4.42	
Mu=54.81 As=4.42		
Vu=-81.53	Vu=-17.71	Vu=69.17

V-106B1/N+4.45

B=0.15 H=0.50 L=4.58		B=0.15 H=0.50 L=4.78	
Mu=-28.16 As=2.21	Mu=-21.54 As=2.21	Mu=-13.76 As=2.21	Mu=-8.73 As=2.21
Mu=16.87 As=2.21		Mu=11.79 As=2.21	
Vu=-15.52	Vu=10.42	Vu=21.24	Vu=-15.31 Vu=-4.08 Vu=10.37

V-107B1/N+4.45

B=0.30 H=0.50 L=4.37		B=0.30 H=0.50 L=4.63	
Mu=-110.72 As=7.00	Mu=-104.74 As=6.60	Mu=-75.00 As=4.64	Mu=-63.61 As=4.42
Mu=51.86 As=4.42		Mu=40.30 As=4.42	
Vu=-79.06	Vu=34.21	Vu=94.73	Vu=-77.36 Vu=-15.84 Vu=66.55

V-108B1/N+4.45

B=0.30 H=0.50 L=0.90		
Mu=-63.95 As=4.42	Mu=-66.87 As=4.42	
Mu=16.19 As=4.42		
Vu=-111.04	Vu=-108.15	Vu=-105.25

V-109B1/N+4.45

B=0.30 H=0.50 L=4.38		B=0.30 H=0.50 L=4.43		B=0.30 H=0.50 L=4.43	
Mu=-82.65 As=5.13	Mu=-93.90 As=5.87	Mu=-97.17 As=6.09	Mu=-78.98 As=4.90	Mu=-60.62 As=4.42	Mu=-49.64 As=4.42
Mu=31.30 As=4.42		Mu=32.39 As=4.42		Mu=12.12 As=4.42	
Vu=-71.70	Vu=22.24	Vu=77.18	Vu=-77.36 Vu=-21.52 Vu=70.06	Vu=-30.88	Vu=-20.23 Vu=26.30

PROYECTO: CAE - EL REDENTOR, BLOQUE B1, BOGOTÁ (CUND.)

B=0.30 H=0.50 L=4.45		
Mu=-61.72 As=4.42	Mu=-55.44 As=4.42	
Mu=12.34 As=4.42		
Vu=-33.87	Vu=-23.22	Vu=35.23

V-110B1/N+4.45

B=0.30 H=0.50 L=4.40			B=0.30 H=0.50 L=4.48			B=0.30 H=0.50 L=4.48		
Mu=-62.09 As=4.42	Mu=-55.96 As=4.42		Mu=-54.25 As=4.42	Mu=-51.45 As=4.42		Mu=-49.03 As=4.42	Mu=-59.01 As=4.42	
Mu=12.42 As=4.42			Mu=10.85 As=4.42			Mu=11.80 As=4.42		
Vu=-31.10	Vu=20.98	Vu=31.40	Vu=-35.50	Vu=17.71	Vu=28.35	Vu=-25.48	Vu=19.22	Vu=29.87

B=0.30 H=0.50 L=4.40		
Mu=-87.77 As=5.47	Mu=-88.50 As=5.52	
Mu=33.81 As=4.42		
Vu=-77.00	Vu=-22.07	Vu=74.48

V-111B1/N+4.45

B=0.30 H=0.50 L=4.40			B=0.30 H=0.50 L=0.80		
Mu=-111.90 As=7.08	Mu=-59.25 As=4.42		Mu=-27.54 As=4.42	Mu=-0.06 As=4.42	
Mu=22.38 As=4.42			Mu=0.00 As=4.42		
Vu=-44.48	Vu=-34.01	Vu=35.52	Vu=-36.77	Vu=-35.04	Vu=-33.31

V-112B1/N+4.45

B=0.30 H=0.50 L=4.18		
Mu=-84.89 As=5.28	Mu=-169.71 As=11.16	
Mu=72.85 As=4.65		
Vu=-115.03	Vu=38.16	Vu=138.28

PROYECTO: CAE - EL REDENTOR, BLOQUE B1, BOGOTÁ (CUND.)

V-113B1/N+4.45

B=0.30 H=0.50 L=4.40			B=0.30 H=0.50 L=0.80		
Mu=-185.57	Mu=-69.39		Mu=-10.14	Mu=-0.42	
As=12.35	As=4.42		As=4.42	As=4.42	
Mu=37.11 As=4.42			Mu=0.00 As=4.42		
Vu=-69.17	Vu=-58.70	Vu=-48.22	Vu=-14.40	Vu=-12.38	Vu=-10.37

V-114B1/N+4.45

B=0.30 H=0.50 L=4.18		
Mu=-64.82	Mu=-188.65	
As=4.42	As=12.58	
Mu=47.48 As=4.42		
Vu=-74.02	Vu=51.88	Vu=107.55

V-115B1/N+4.45

B=0.30 H=0.50 L=5.38			B=0.30 H=0.50 L=2.83			B=0.30 H=0.50 L=0.80		
Mu=-28.40	Mu=-28.33		Mu=-26.49	Mu=-17.78		Mu=-26.51	Mu=-104.90	
As=4.42	As=4.42		As=4.42	As=4.42		As=4.42	As=6.61	
Mu=12.24 As=4.42			Mu=5.30 As=4.42			Mu=30.53 As=4.42		
Vu=-18.20	Vu=7.80	Vu=20.28	Vu=-19.29	Vu=-12.32	Vu=15.86	Vu=94.62	Vu=97.39	Vu=100.17

V-116B1/N+4.45

B=0.30 H=0.50 L=4.58			B=0.30 H=0.50 L=4.01			B=0.30 H=0.50 L=5.53		
Mu=-21.22	Mu=-41.53		Mu=-46.15	Mu=-9.90		Mu=-9.56	Mu=-9.78	
As=4.42	As=4.42		As=4.42	As=4.42		As=4.42	As=4.42	
Mu=8.31 As=4.42			Mu=9.23 As=4.42			Mu=12.26 As=4.42		
Vu=-17.10	Vu=11.78	Vu=22.26	Vu=-22.40	Vu=-12.86	Vu=12.19	Vu=-14.40	Vu=0.89	Vu=14.73

B=0.30 H=0.50 L=2.93			B=0.30 H=0.50 L=1.05		
Mu=-9.50	Mu=-8.67		Mu=-6.40	Mu=-19.70	
As=4.42	As=4.42		As=4.42	As=4.42	
Mu=10.25 As=4.42			Mu=12.16 As=4.42		
Vu=-14.47	Vu=-7.49	Vu=11.42	Vu=23.05	Vu=25.82	Vu=28.60

PROYECTO: CAE - EL REDENTOR, BLOQUE B1, BOGOTÁ (CUND.)

V-117B1/N+4.45

B=0.30 H=0.50 L=4.40			B=0.30 H=0.50 L=4.48			B=0.30 H=0.50 L=4.48		
Mu=-48.17 As=4.42	Mu=-50.68 As=4.42		Mu=-46.11 As=4.42	Mu=-62.26 As=4.42		Mu=-44.92 As=4.42	Mu=-47.86 As=4.42	
Mu=10.14 As=4.42			Mu=25.93 As=4.42			Mu=9.57 As=4.42		
Vu=-26.05	Vu=18.24	Vu=28.72	Vu=-26.30	Vu=-15.65	Vu=84.39	Vu=-24.23	Vu=14.78	Vu=25.43

B=0.30 H=0.50 L=4.40		
Mu=-67.56 As=4.42	Mu=-63.64 As=4.42	
Mu=14.31 As=4.42		
Vu=-109.14	Vu=-18.69	Vu=44.72

V-201B1/N+8.90

B=0.30 H=0.50 L=4.38			B=0.30 H=0.50 L=4.43			B=0.30 H=0.50 L=4.43		
Mu=-44.43 As=4.42	Mu=-38.78 As=4.42		Mu=-39.13 As=4.42	Mu=-35.99 As=4.42		Mu=-38.32 As=4.42	Mu=-36.77 As=4.42	
Mu=8.89 As=4.42			Mu=7.83 As=4.42			Mu=7.66 As=4.42		
Vu=-24.29	Vu=14.14	Vu=24.61	Vu=-23.58	Vu=-12.93	Vu=21.09	Vu=-21.82	Vu=11.84	Vu=22.49

B=0.30 H=0.50 L=4.45		
Mu=-50.77 As=4.42	Mu=-39.28 As=4.42	
Mu=17.80 As=4.42		
Vu=-32.13	Vu=-21.49	Vu=28.34

V-202B1/N+8.90

B=0.30 H=0.50 L=1.20		
Mu=-4.01 As=4.42	Mu=-38.55 As=4.42	
Mu=2.16 As=4.42		
Vu=24.83	Vu=27.72	Vu=30.89

PROYECTO: CAE - EL REDENTOR, BLOQUE B1, BOGOTÁ (CUND.)

V-203B1/N+8.90

B=0.30 H=0.50 L=1.20		
Mu=-3.63	Mu=-38.47	
As=4.42	As=4.42	
Mu=5.59		
As=4.42		
Vu=24.29	Vu=27.19	Vu=30.08

V-204B1/N+8.90

B=0.30 H=0.50 L=1.20		
Mu=-40.24	Mu=-40.52	
As=4.42	As=4.42	
Mu=10.35		
As=4.42		
Vu=-71.08	Vu=-68.19	Vu=-65.30

V-205B1/N+8.90

B=0.30 H=0.50 L=4.38			B=0.30 H=0.50 L=4.43			B=0.30 H=0.50 L=4.43		
Mu=-43.90	Mu=-35.28		Mu=-36.76	Mu=-46.55		Mu=-43.47	Mu=-39.88	
As=4.42	As=4.42		As=4.42	As=4.42		As=4.42	As=4.42	
Mu=9.16			Mu=11.35			Mu=11.78		
As=4.42			As=4.42			As=4.42		
Vu=-23.22	Vu=12.93	Vu=23.26	Vu=-24.14	Vu=-13.54	Vu=23.45	Vu=-22.49	Vu=14.85	Vu=25.50

B=0.30 H=0.50 L=4.45		
Mu=-38.63	Mu=-37.28	
As=4.42	As=4.42	
Mu=10.85		
As=4.42		
Vu=-24.92	Vu=-14.28	Vu=27.70

V-206B1/N+8.90

B=0.30 H=0.50 L=4.40			B=0.30 H=0.50 L=4.48			B=0.30 H=0.50 L=4.48		
Mu=-34.55	Mu=-33.82		Mu=-29.99	Mu=-30.68		Mu=-31.44	Mu=-26.20	
As=4.42	As=4.42		As=4.42	As=4.42		As=4.42	As=4.42	
Mu=11.99			Mu=6.14			Mu=6.29		
As=4.42			As=4.42			As=4.42		
Vu=-20.71	Vu=12.52	Vu=22.99	Vu=-19.18	Vu=8.56	Vu=19.21	Vu=-20.00	Vu=-9.35	Vu=18.13

PROYECTO: CAE - EL REDENTOR, BLOQUE B1, BOGOTÁ (CUND.)

B=0.30 H=0.50 L=4.40		
Mu=-35.97 As=4.42		Mu=-36.59 As=4.42
Mu=7.55 As=4.42		
Vu=-23.02	Vu=-12.54	Vu=20.78

V-207B1/N+8.90

B=0.30 H=0.50 L=4.58		B=0.30 H=0.50 L=4.58		B=0.30 H=0.50 L=4.63	
Mu=-17.50 As=4.42	Mu=-33.87 As=4.42	Mu=-40.85 As=4.42	Mu=-14.69 As=4.42	Mu=-13.11 As=4.42	Mu=-11.66 As=4.42
Mu=7.33 As=4.42		Mu=8.17 As=4.42		Mu=16.07 As=4.42	
Vu=-14.72	Vu=9.64	Vu=20.12	Vu=-21.80	Vu=-11.16	Vu=13.24
			Vu=-11.86	Vu=2.15	Vu=12.99

B=0.30 H=0.50 L=4.63		
Mu=-13.84 As=4.42		Mu=-22.85 As=4.42
Mu=11.52 As=4.42		
Vu=-13.96	Vu=5.35	Vu=15.83

V-208B1/N+8.90

B=0.30 H=0.50 L=4.40		B=0.30 H=0.50 L=4.48		B=0.30 H=0.50 L=4.48	
Mu=-27.63 As=4.42	Mu=-34.17 As=4.42	Mu=-30.38 As=4.42	Mu=-28.63 As=4.42	Mu=-26.89 As=4.42	Mu=-25.96 As=4.42
Mu=10.49 As=4.42		Mu=6.08 As=4.42		Mu=6.45 As=4.42	
Vu=-18.50	Vu=11.99	Vu=22.47	Vu=-18.97	Vu=-8.32	Vu=18.49
			Vu=-18.38	Vu=-7.73	Vu=18.17

B=0.30 H=0.50 L=4.40		
Mu=-33.53 As=4.42		Mu=-29.00 As=4.42
Mu=8.19 As=4.42		
Vu=-22.29	Vu=-11.81	Vu=18.45

PROYECTO: CAE - EL REDENTOR, BLOQUE B1, BOGOTÁ (CUND.)

Columnas A-1, A-5, F-1, D'-1, C'-1, B'-1, B'-5, C'-5, D'-5, F-5

Nivel	H Libre	Losa	B	H	M1	M2	P	V1	V2	Cuantia	m/mr	Rap	Ras
N+8.90	3.95	.50	.45	.45	-5.31	-33.68	-73.13	12.49	15.17	8/#6 (1.1%)	0.20	0	0
					4.27	34.47				8/#6 (1.1%)			
N+4.45	4.00	.50	.45	.45	-17.33	-56.12	-189.60	23.04	28.29	8/#6 (1.1%)	0.32	0	0
					29.45	68.11				8/#6 (1.1%)			

Columnas A-2, A-3, A-4, F-2, F-3, F-4

Nivel	H Libre	Losa	B	H	M1	M2	P	V1	V2	Cuantia	m/mr	Rap	Ras
N+8.90	3.95	.50	.50	.50	61.58	6.89	-50.59	24.36	23.64	16/#5 #4 (1.0%)	0.30	0	0
					20.12	95.77				16/#5 #4 (1.0%)			
N+4.45	4.00	.50	.50	.50	-65.64	-78.41	-241.50	36.66	46.13	16/#5 #4 (1.0%)	0.44	0	0
					95.38	97.73				16/#5 #4 (1.0%)			

Columnas B'-2, B'-3, D'-2, D'-3, C''-4, A''-4, A'-4

Nivel	H Libre	Losa	B	H	M1	M2	P	V1	V2	Cuantia	m/mr	Rap	Ras
N+4.45	4.00	.50	.40	.40	24.38	78.11	-104.86	30.48	31.53	8/#6 #5 (1.2%)	0.66	0	0
					66.77	32.07				8/#6 #5 (1.2%)			

Columna D'-4'

Nivel	H Libre	Losa	B	H	M1	M2	P	V1	V2	Cuantia	m/mr	Rap	Ras
N+8.90	3.95	.50	.40	.40	32.99	24.91	3.04	14.97	15.24	8/#6 #5 (1.2%)	0.37	0	0
					-33.64	-21.14				8/#6 #5 (1.2%)			
N+4.45	4.00	.50	.40	.40	33.20	13.66	66.03	17.20	13.21	8/#6 #5 (1.2%)	0.35	0	0
					40.64	18.90				8/#6 #5 (1.2%)			

PROYECTO: CAE - EL REDENTOR, BLOQUE B1, BOGOTÁ (CUND.)

VT-1 B1/

B=0.12 H=0.50 L=4.63			B=0.12 H=0.50 L=4.73		
Mu=-0.00		Mu=-27.33	Mu=-27.28		Mu=-0.00
As=1.10		As=1.63	As=1.63		As=1.10
	Mu=14.38			Mu=15.63	
	As=1.10			As=1.10	
Vu=16.71	Vu=-6.44	Vu=-29.59	Vu=29.97	Vu=6.32	Vu=-17.33

VT-2 B1/

B=0.12 H=0.50 L=5.00			B=0.12 H=0.50 L=2.93		
Mu=-0.00		Mu=-23.19	Mu=-24.24		Mu=-0.00
As=1.10		As=1.37	As=1.44		As=1.10
	Mu=21.14			Mu=0.00	
	As=1.33			As=1.10	
Vu=19.77	Vu=-5.23	Vu=-30.23	Vu=23.23	Vu=8.58	Vu=-6.07

VT-3 B1/

B=0.12 H=0.50 L=4.70			B=0.12 H=0.50 L=0.65		
Mu=-0.00		Mu=-24.58	Mu=-23.56		Mu=-2.22
As=1.10		As=1.46	As=1.40		As=1.10
	Mu=16.65			Mu=0.00	
	As=1.10			As=1.10	
Vu=17.71	Vu=-5.79	Vu=-29.29	Vu=36.08	Vu=32.83	Vu=29.58

6. DISEÑO DE ELEMENTOS METÁLICOS

DISEÑO DE ELEMENTOS METÁLICOS

DISEÑO DE ELEMENTOS METÁLICOS

AISC360-10

BLOQUE B1

STEEL CODE PREFERENCES

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Steel Design Code           : AISC360-10

Time History Type          : Step-by-Step
Frame Type                 : IMF
Seismic Design Category    : D
Importance Factor         : 1.
System Rho                 : 1.
System Sds                 : 0.5
System R                   : 8.
System Omega0             : 3.
System Cd                  : 5.5
Design Provision          : LRFD
Design Analysis Method     : Direct Analysis
Second Order Analysis Method : General 2nd Order
Stiffness Reduction Method : Tau-b Fixed
Phi(Bending)              : 0.9
Phi(Compression)          : 0.9
Phi(Tension-Yielding)     : 0.9
Phi(Tension-Fracture)    : 0.75
Phi(Shear)                : 0.9
Phi(Shear Rolled I)       : 1.
Phi(Shear-Torsion)        : 0.9
Ignore Seismic Code?      : No
Ignore Special Seismic Load? : No
Is Doubler Plate Plug Welded? : Yes
HSS Welding Type          : ERW
Reduce HSS Thickness?     : No
Consider Deflection?      : Yes
Deflection Check Type     : Both
DL Limit, L /              : 120
Super DL+LL Limit, L /   : 120
Live Load Limit, L /     : 360
Total Load Limit, L /    : 240
Total--Camber Limit, L/  : 240
DL Limit, abs             : 0.0254
Super DL+LL Limit, abs   : 0.0254
Live Load Limit, abs     : 0.0254
Total Load Limit, abs    : 0.0254
Total--Camber Limit, abs : 0.0254
Pattern Live Load Factor  : 0.75
Stress Ratio Limit        : 0.95
Maximum Auto Iteration    : 1
    
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C O L U M N S T E E L S T R E S S C H E C K O U T P U T (AISC360-10)

STORY LEVEL	COLUMN LINE	SECTION ID	/-----MOMENT INTERACTION CHECK-----//			----SHEAR22----		----SHEAR33----	
			COMBO	RATIO	= AXL + B33 + B22	COMBO	RATIO	COMBO	RATIO
N+17.00	C5-1	TEC1-150X150	COMDIS8(C)	0.653	= 0.567 + 0.077 + 0.009	COMDIS3	0.012	COMDIS4	0.001
N+17.00	C4-1	TEC1-150X150	COMDIS9(C)	0.922	= 0.788 + 0.088 + 0.046	COMDIS3	0.013	COMDIS11	0.002
			COMDIS10(T)	0.112	= 0.006 + 0.075 + 0.032				
N+17.00	C8-1	TEC1-150X150	COMDIS8(C)	0.654	= 0.567 + 0.078 + 0.009	COMDIS3	0.012	COMDIS4	0.001
N+17.00	C9-1	TEC1-150X150	COMDIS9(C)	0.924	= 0.789 + 0.090 + 0.046	COMDIS3	0.013	COMDIS11	0.002
			COMDIS10(T)	0.113	= 0.006 + 0.076 + 0.032				
N+17.00	C6-1	TEC1-150X150	COMDIS3(C)	0.209	= 0.023 + 0.182 + 0.003	COMDIS3	0.009	COMDIS8	0.000
N+17.00	C7-1	TEC1-150X150	COMDIS3(C)	0.209	= 0.023 + 0.183 + 0.003	COMDIS3	0.009	COMDIS8	0.000

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C O L U M N S P E C I A L S E I S M I C R E Q U I R E M E N T S (AISC360-10)

STORY LEVEL	COLUMN LINE	SECTION ID	SECTION CLASS	/--CONTN. PLATE--// COMBO	DOUBLER PLATE--// AREA COMBO	THICK	---B/C RATIOS---/ MAJOR MINOR
N+17.00	C5-1	TEC1-150X150	Compact				
N+17.00	C4-1	TEC1-150X150	Compact				
N+17.00	C8-1	TEC1-150X150	Compact				
N+17.00	C9-1	TEC1-150X150	Compact				
N+17.00	C6-1	TEC1-150X150	Compact				
N+17.00	C7-1	TEC1-150X150	Compact				

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B E A M S T E E L S T R E S S C H E C K O U T P U T (AISC360-10)

STORY LEVEL	BEAM BAY	SECTION ID	SECTION CLASS	COMBO	-----MOMENT INTERACTION CHECK----- RATIO = AXL + B33 + B22	-----SHEAR22----- COMBO RATIO	-----SHEAR33----- COMBO RATIO
N+17.00	B17	TER1-150X250	Compact	COMDIS9(C)	0.238 = 0.006 + 0.192 + 0.041	COMDIS9 0.035	COMDIS3 0.015
N+17.00	B18	TER2-200X400	Compact	COMDIS10(C)	0.151 = 0.002 + 0.149 + 0.000	COMDIS8 0.035	COMDIS3 0.007
N+17.00	B19	TER1-150X250	Compact	COMDIS9(C)	0.239 = 0.006 + 0.192 + 0.041	COMDIS9 0.035	COMDIS3 0.015
N+17.00	B20	TER1-150X250	Compact	COMDIS3(C) COMDIS11(T)	0.308 = 0.008 + 0.230 + 0.070 0.165 = 0.000 + 0.106 + 0.059	COMDIS9 0.023	COMDIS4 0.004
N+17.00	B21	TER1-150X250	Compact	COMDIS3(C) COMDIS11(T)	0.307 = 0.008 + 0.230 + 0.069 0.166 = 0.000 + 0.107 + 0.058	COMDIS9 0.023	COMDIS4 0.004
N+17.00	B22	TER1-150X250	Compact	COMDIS3(C) COMDIS10(T)	0.432 = 0.005 + 0.298 + 0.129 0.140 = 0.000 + 0.086 + 0.054	COMDIS9 0.023	COMDIS3 0.006
N+17.00	B23	TER1-150X250	Compact	COMDIS3(C) COMDIS10(T)	0.430 = 0.005 + 0.298 + 0.127 0.141 = 0.000 + 0.088 + 0.053	COMDIS9 0.024	COMDIS3 0.006

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B E A M S P E C I A L S E I S M I C R E Q U I R E M E N T S (AISC360-10)

STORY LEVEL	BEAM BAY	SECTION ID	SECTION CLASS	COMBO	-----CONNECTION SHEAR----- END-I COMBO END-J
N+17.00	B17	TER1-150X250	Non-Compact	COMDI	-16.61
N+17.00	B18	TER2-200X400	Compact		
N+17.00	B19	TER1-150X250	Non-Compact	COMDI	-16.62
N+17.00	B20	TER1-150X250	Non-Compact		
N+17.00	B21	TER1-150X250	Non-Compact	COMDI	14.83
N+17.00	B22	TER1-150X250	Non-Compact	COMDI	-18.35
N+17.00	B23	TER1-150X250	Non-Compact	COMDI	18.20

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B R A C E S T E E L S T R E S S C H E C K O U T P U T (AISC360-10)

STORY LEVEL	BRACE BAY	SECTION ID	SECTION CLASS	COMBO	-----MOMENT INTERACTION CHECK----- RATIO = AXL + B33 + B22	-----SHEAR22----- COMBO RATIO	-----SHEAR33----- COMBO RATIO
N+17.00	D4	TER2-200X400	Compact	COMDIS3(C)	0.446 = 0.031 + 0.130 + 0.285	COMDIS9 0.036	COMDIS3 0.021
N+17.00	D7	TER1-150X250	Compact	COMDIS9(C) COMDIS9(T)	0.470 = 0.077 + 0.341 + 0.053 0.327 = 0.004 + 0.249 + 0.074	COMDIS9 0.046	COMDIS3 0.012
N+17.00	D8	TER1-150X250	Compact	COMDIS3(C)	0.549 = 0.036 + 0.068 + 0.445	COMDIS11 0.013	COMDIS3 0.027
N+17.00	D9	TER1-150X250	Compact	COMDIS9(C) COMDIS8(T)	0.428 = 0.309 + 0.100 + 0.020 0.211 = 0.001 + 0.192 + 0.018	COMDIS8 0.040	COMDIS3 0.004
N+17.00	D10	TER1-150X250	Compact	COMDIS8(C) COMDIS10(T)	0.398 = 0.209 + 0.173 + 0.017 0.160 = 0.001 + 0.146 + 0.013	COMDIS8 0.041	COMDIS3 0.008
N+17.00	D11	TER1-150X250	Compact	COMDIS8(C)	0.457 = 0.242 + 0.145 + 0.071	COMDIS8 0.036	COMDIS3 0.022
N+17.00	D12	TER1-150X250	Compact	COMDIS9(C) COMDIS9(T)	0.472 = 0.077 + 0.341 + 0.054 0.328 = 0.004 + 0.249 + 0.075	COMDIS9 0.046	COMDIS3 0.012
N+17.00	D13	TER1-150X250	Compact	COMDIS3(C)	0.549 = 0.036 + 0.068 + 0.445	COMDIS11 0.013	COMDIS3 0.027
N+17.00	D14	TER1-150X250	Compact	COMDIS9(C) COMDIS8(T)	0.429 = 0.309 + 0.100 + 0.020 0.211 = 0.001 + 0.192 + 0.018	COMDIS8 0.040	COMDIS3 0.005
N+17.00	D15	TER1-150X250	Compact	COMDIS8(C)	0.399 = 0.209 + 0.173 + 0.017	COMDIS8 0.041	COMDIS3 0.008

N+17.00	D16	TER1-150X250	COMDIS10(T)	0.160	= 0.001 + 0.146 + 0.013	COMDIS8	0.036	COMDIS3	0.022
N+17.00	D25	TER2-200X400	COMDIS8(C)	0.459	= 0.242 + 0.145 + 0.072	COMDIS10	0.031	COMDIS3	0.013
N+17.00	D26	TER2-200X400	COMDIS11(C)	0.241	= 0.074 + 0.168 + 0.000	COMDIS8	0.018	COMDIS3	0.007
N+17.00	D27	TER2-200X400	COMDIS8(C)	0.393	= 0.048 + 0.345 + 0.000	COMDIS11(T)	0.015	COMDIS3	0.011
			COMDIS11(T)	0.015	= 0.006 + 0.010 + 0.000	COMDIS8	0.074	COMDIS3	0.011
			COMDIS8(C)	0.888	= 0.304 + 0.584 + 0.000				

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B R A C E S P E C I A L S E I S M I C R E Q U I R E M E N T S (AISC360-10)

STORY LEVEL	BRACE BAY	SECTION ID	SECTION CLASS	/-----CONNECTION FORCE-----/			
				COMBO	END-I	COMBO	END-J
N+17.00	D4	TER2-200X400	Compact	COMDI	-195.60	COMDI	-95.11
N+17.00	D7	TER1-150X250	Non-Compact	COMDI	-62.68	COMDI	-26.75
N+17.00	D8	TER1-150X250	Non-Compact	COMDI	-29.81	COMDI	-28.34
N+17.00	D9	TER1-150X250	Non-Compact	COMDI	-35.38	COMDI	-21.57
N+17.00	D10	TER1-150X250	Non-Compact	COMDI	-30.54	COMDI	-10.63
N+17.00	D11	TER1-150X250	Non-Compact	COMDI	-27.71	COMDI	-20.31
N+17.00	D12	TER1-150X250	Non-Compact	COMDI	-62.77	COMDI	-26.79
N+17.00	D13	TER1-150X250	Non-Compact	COMDI	-29.94	COMDI	-28.47
N+17.00	D14	TER1-150X250	Non-Compact	COMDI	-35.44	COMDI	-21.60
N+17.00	D15	TER1-150X250	Non-Compact	COMDI	-30.60	COMDI	-10.66
N+17.00	D16	TER1-150X250	Non-Compact	COMDI	-27.78	COMDI	-20.39
N+17.00	D25	TER2-200X400	Compact	COMDI	-109.91	COMDI	-76.42
N+17.00	D26	TER2-200X400	Compact	COMDI	-77.58	COMDI	-72.37
N+17.00	D27	TER2-200X400	Compact	COMDI	-173.07	COMDI	-106.08

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7. DISEÑO DE ELEMENTOS COMPLEMENTARIOS

DISEÑO DE ELEMENTOS COMPLEMENTARIOS

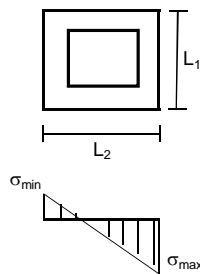
**PROYECTO: CENTRO DE ATENCIÓN ESPECIALIZADA - EL REDENTOR, BLOQUE B1, BOGOTÁ
 (CUNDINAMARCA)
 DISEÑO DE UNIONES DE ELEMENTOS METÁLICOS-CONCRETO**

CARGAS
 M= 5.87 kN.m
 P= 46.36 kN

DATOS DEL PERFIL
 H= 0.15 m.
 B= 0.15 m.

MATERIALES
 f'c= 21000 kN/m²
 fy= 253000 kN/m² platina
 fy= 253000 kN/m² pernos
 ex= 0.127 m

1. DIMENSIONAMIENTO EN PLANTA DE LA PLATINA



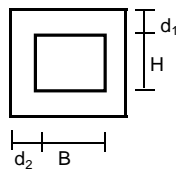
f'c >= Esfuerzo sobre la platina σ_h

$$\sigma_h = P / L^2 =$$

L₁(asumido)= 0.30 m.
 L₂(asumido)= 0.25 m.

σ_{min} = -378.08 kN/m OK. σ_{med} = 202.3456
 σ_{max} = 748.96 kN/m OK.

2. ESPESOR DE LA PLATINA

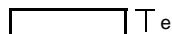


Datos del perfil:

H= 0.1500 m
 B= 0.1500 m
 d₁ = 0.075 m
 d₂ = 0.065 m

M₁= 1.59 kN.m V= 43.493 kN
 M₂= 0.39 kN.m V= 12.0536 kN

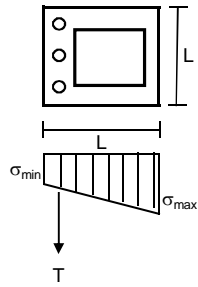
M_{diseño} = 1.59 kN.m



e_{requerido} = 0.61 cm
 e_{colocado} = 1.30 cm

Colocar una platina de 250x350x1/2" A36

3. DISEÑO DE PERNOS



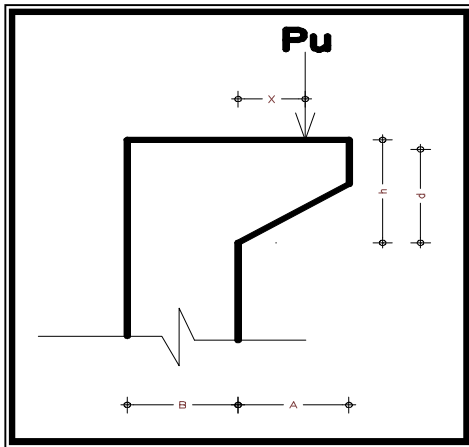
Calculando momentos respecto al ala derecha del perfil:

$$T = -9.41 \text{ kN}$$

$$\text{Area req.} = 0.661 \text{ cm}^2$$

Colocar 2 pernos diametro 1/2" en cada lado

DISEÑO DE MÉNSULA TIPO M1 PROYECTO: CENTRO DE ATENCIÓN ESPECIALIZADA - EL REDENTOR, BLOQUE B1, BOGOTÁ (CUNDINAMARCA)



Geometría de la ménsula

B =	0.50	m	fy =	420	MPa
A =	0.30	m	f'c =	21.1	MPa
Ancho:	0.50	m	h =	0.5	m
d =	0.45	m			
x =	0.15	m			

P_u : 168.90 kN

N_u : 33.78 kN

A_{vf} : 3.38 cm²

M_u : 27.02 kN-m

Cuantía: 0.0020

A_f 4.50 cm²

A_n 0.95 cm²

A_s 5.45 cm²

A_s escojido 5.45 cm²

A_h 2.25 cm²

A_h escojido 2.25 cm²

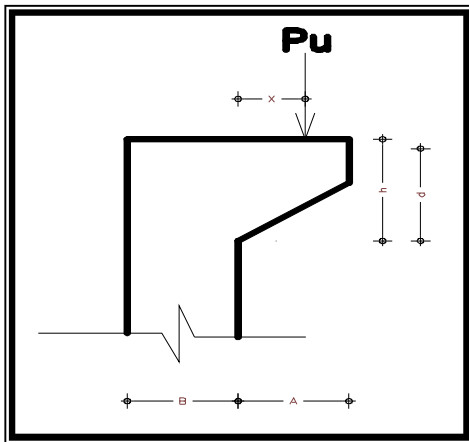
A_{smin} 4.52 cm²

> **A_s** 3.20 cm²
 3#5 Arriba

> **A_h** 1.13 cm²
 3 Flejes #3 c/.15 repartidos en 2/3 de la altura efectiva

DISEÑO DE MÉNSULA TIPO M2

PROYECTO: CENTRO DE ATENCIÓN ESPECIALIZADA - EL REDENTOR, BLOQUE B1,
 BOGOTÁ (CUNDINAMARCA)



Geometría de la ménsula

B =	0.50	m	fy =	420	MPa
A =	0.85	m	f'c =	21.1	MPa
Ancho:	0.50	m	h =	0.5	m
d =	0.45	m			
x =	0.80	m			

Pu : 136.30 kN
 Nu : 27.26 kN

Avf : 2.73 cm²

Mu : 110.40 kN-m

Cuantía: 0.0027

Af 6.03 cm²

An 0.76 cm²

As 6.79 cm²

As escojido 6.79 cm²

Ah 3.02 cm²

Ah escojido 3.02 cm²

$Asmin$ 4.52 cm²

> **As** 2.58 cm²
 4#5 Arriba

> **Ah** 0.91 cm²
 3 Flejes #3 c/.15 repartidos en 2/3 de la altura efectiva

Proyecto: _____ Fecha: _____

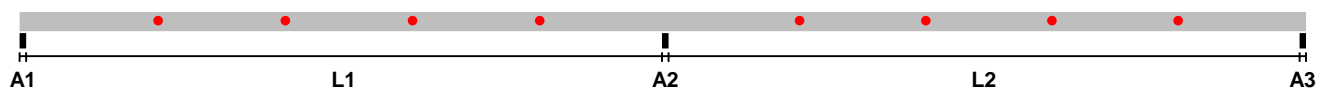
Ingeniero: _____ Firma: _____

Elementos calculados con el programa de diseño Arquimet 2.0 de ACESCO

REPORTE DE CORREAS

PHR C con atiesador 220 x 80 x 20 (3.00 mm)
con $F_y = 35.15 \text{ Kgf/mm}^2$ cada 1.32 m con arriostramiento cada L/5.

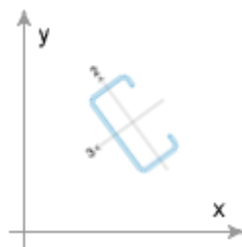
SECCION LONGITUDINAL



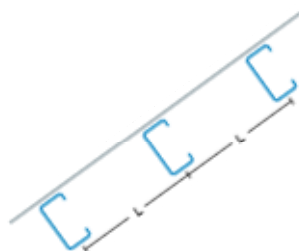
L1	9.75 m
L2	9.68 m
A1	0.10 m
A2	0.10 m
A3	0.10 m

CONFIGURACION	
TIPO DE CARGA	DISTRIBUIDA
Carga muerta	0.30 KN/m ²
Peso propio correa	0.09 KN/m
Carga viva	0.35 KN/m ²
Carga granizo	0.50 KN/m ²
Viento compresión (Perpendicular)	0.52 KN/m ²
Viento succión (Perpendicular)	0.52 KN/m ²
Pendiente sección transversal	36° = 72.6540%

SECCION TRANSVERSAL



$$L = 1.32 \text{ m}$$



Proyecto: _____ Fecha: _____

Ingeniero: _____ Firma: _____

Elementos calculados con el programa de diseño Arquimet 2.0 de ACESCO

REPORTES DE DISEÑO

REPORTE FLEXION				
	Apoyos		Interiores	
Ejes locales	3	2	3	2
Resistente (KN.m)	24.5450	5.0300	21.9499	4.9058
Calculado (KN.m)	20.0644	0.3099	20.0644	0.3948

REPORTE CORTANTE		
Ejes locales	2	3
Resistente (KN)	99.2653	73.0982
Calculado (KN)	10.1897	0.9379

REPORTE DEFLEXION		
Deflexiones máximas	Instantanea	Permanente
Admisible (m)	0.0365	0.0547
Calculado (m)	0.0109	0.0225

REPORTE ARRUGAMIENTO	
No. de Apoyo	0
Resistencia máxima (Kgf)	6.1730
Arrugamiento (Kgf)	20.1057

Memorias de Cálculo

PROGRAMA DE DISEÑO Y CALCULO ESTRUCTURAL ARQUIMET 2.0

Proyecto: _____ Fecha: _____

Ingeniero: _____ Firma: _____

Elementos calculados con el programa de diseño Arquimet 2.0 de ACESCO

COMBINACIONES DE CARGA

No	Muerta	Viva	Granizo	Viento compresión	Viento succión
1	1.4000	0.0000	0.0000	0.0000	0.0000
2	1.2000	0.5000	0.0000	0.0000	0.0000
3	1.2000	0.0000	0.5000	0.0000	0.0000
4	1.2000	1.6000	0.0000	0.5000	0.0000
5	1.2000	0.0000	1.6000	0.5000	0.0000
6	1.2000	1.6000	0.0000	0.0000	0.5000
7	1.2000	0.0000	1.6000	0.0000	0.5000
8	1.2000	0.5000	0.0000	0.0000	1.0000
9	1.2000	0.0000	0.5000	0.0000	1.0000
10	1.2000	0.5000	0.0000	1.0000	0.0000
11	1.2000	0.0000	0.5000	1.0000	0.0000
12	0.9000	0.0000	0.0000	0.0000	1.0000
13	0.9000	0.0000	0.0000	1.0000	0.0000

Memorias de Cálculo

PROGRAMA DE DISEÑO Y CALCULO ESTRUCTURAL ARQUIMET 2.0

Proyecto: _____ Fecha: _____

Ingeniero: _____ Firma: _____

REACCIONES - EJES GLOBALES (KN-m)

Elementos calculados con el programa de diseño Arquimet 2.0 de ACESCO

APOYO 1		
Combinacion	Rx	Ry
Muerta	0.0000	1.3145
Viva de Cub.	0.0000	1.2390
Granizo	0.0000	1.7700
Viento Comp.	-1.4884	2.0486
Viento Succion	1.4884	-2.0486
Comb. 1	-0.9512	1.8402
Comb. 2	-1.1355	2.1969
Comb. 3	-1.2728	2.4624
Comb. 4	-2.5842	4.5841
Comb. 5	-3.0233	5.4337
Comb. 6	-2.5842	4.5841
Comb. 7	-3.0233	5.4337
Comb. 8	-2.6239	4.2454
Comb. 9	-2.7611	4.5109
Comb. 10	-2.6239	4.2454
Comb. 11	-2.7611	4.5109
Comb. 12	-2.0998	3.2316
Comb. 13	-2.0998	3.2316

APOYO 2		
Combinacion	Rx	Ry
Muerta	0.0000	4.2514
Viva de Cub.	0.0000	4.0074
Granizo	0.0000	5.7249
Viento Comp.	-4.9299	6.7855
Viento Succion	4.9299	-6.7855
Comb. 1	-3.3483	5.9519
Comb. 2	-3.9972	7.1054
Comb. 3	-4.4803	7.9641
Comb. 4	-8.9420	14.9063
Comb. 5	-10.4879	17.6542
Comb. 6	-8.9420	14.9063
Comb. 7	-10.4879	17.6542
Comb. 8	-8.9271	13.8909
Comb. 9	-9.4102	14.7496
Comb. 10	-8.9271	13.8909
Comb. 11	-9.4102	14.7496
Comb. 12	-7.0824	10.6117
Comb. 13	-7.0824	10.6117

APOYO 3		
Combinacion	Rx	Ry
Muerta	0.0000	1.2985
Viva de Cub.	0.0000	1.2240
Granizo	0.0000	1.7485
Viento Comp.	-1.4695	2.0226
Viento Succion	1.4695	-2.0226
Comb. 1	-0.9379	1.8179
Comb. 2	-1.1196	2.1702
Comb. 3	-1.2550	2.4324
Comb. 4	-2.5490	4.5278
Comb. 5	-2.9820	5.3671
Comb. 6	-2.5490	4.5278
Comb. 7	-2.9820	5.3671
Comb. 8	-2.5892	4.1928
Comb. 9	-2.7245	4.4551
Comb. 10	-2.5892	4.1928
Comb. 11	-2.7245	4.4551
Comb. 12	-2.0724	3.1913
Comb. 13	-2.0724	3.1913

Memorias de Cálculo

PROGRAMA DE DISEÑO Y CALCULO ESTRUCTURAL ARQUIMET 2.0

Proyecto: _____ Fecha: _____

Ingeniero: _____ Firma: _____

FUERZAS INTERNAS - EJES LOCALES (KN-m)

Elementos calculados con el programa de diseño Arquimet 2.0 de ACESCO

APOYO 1				
Combinacion	R2	R3	M2	M3
Muerta	0.2230	1.4628	-9.5768E-09	1.3599E-06
Viva de Cub.	0.2102	1.3788	0.0000	2.4612E-06
Granizo	0.3002	1.9698	-9.5768E-09	-1.4748E-06
Viento Comp.	0.0000	2.5321	0.0000	1.0151E-06
Viento Succion	0.0000	2.5321	0.0000	1.0151E-06
Comb. 1	0.3121	2.0479	-1.3408E-08	1.9039E-06
Comb. 2	0.3726	2.4447	-1.1492E-08	2.8625E-06
Comb. 3	0.4177	2.7402	-1.6281E-08	8.9447E-07
Comb. 4	0.6038	5.2275	-1.1492E-08	6.0774E-06
Comb. 5	0.7479	6.1730	-2.6815E-08	-2.2027E-07
Comb. 6	0.6038	5.2275	-1.1492E-08	6.0774E-06
Comb. 7	0.7479	6.1730	-2.6815E-08	-2.2027E-07
Comb. 8	0.3726	4.9769	-1.1492E-08	3.8776E-06
Comb. 9	0.4177	5.2724	-1.6281E-08	1.9096E-06
Comb. 10	0.3726	4.9769	-1.1492E-08	3.8776E-06
Comb. 11	0.4177	5.2724	-1.6281E-08	1.9096E-06
Comb. 12	0.2007	3.8486	-8.6191E-09	2.2391E-06
Comb. 13	0.2007	3.8486	-8.6191E-09	2.2391E-06

APOYO 2				
Combinacion	R2	R3	M2	M3
Muerta	0.5640	4.8452	0.0924	-4.7545
Viva de Cub.	0.5317	4.5672	0.0871	-4.4817
Granizo	0.7595	6.5245	0.1244	-6.4024
Viento Comp.	0.0000	8.3873	0.0000	-8.2303
Viento Succion	0.0000	8.3873	0.0000	-8.2303
Comb. 1	0.7896	6.7833	0.1293	-6.6563
Comb. 2	0.9426	8.0978	0.1544	-7.9463
Comb. 3	1.0566	9.0765	0.1730	-8.9066
Comb. 4	1.5275	17.3154	0.2502	-16.9913
Comb. 5	1.8920	20.4472	0.3099	-20.0644
Comb. 6	1.5275	17.3154	0.2502	-16.9913
Comb. 7	1.8920	20.4472	0.3099	-20.0644
Comb. 8	0.9426	16.4852	0.1544	-16.1766
Comb. 9	1.0566	17.4639	0.1730	-17.1370
Comb. 10	0.9426	16.4852	0.1544	-16.1766
Comb. 11	1.0566	17.4639	0.1730	-17.1370
Comb. 12	0.5076	12.7480	0.0831	-12.5094
Comb. 13	0.5076	12.7480	0.0831	-12.5094

APOYO 3				
Combinacion	R2	R3	M2	M3
Muerta	0.2213	1.4443	0.0000	-4.5969E-07
Viva de Cub.	0.2086	1.3614	2.8730E-08	-2.9113E-06
Granizo	0.2979	1.9448	5.7461E-08	2.4517E-06
Viento Comp.	0.0000	2.5001	0.0000	-4.2904E-06
Viento Succion	0.0000	2.5001	0.0000	-4.2904E-06
Comb. 1	0.3098	2.0220	0.0000	-6.4356E-07
Comb. 2	0.3698	2.4138	1.4365E-08	-2.0073E-06
Comb. 3	0.4145	2.7055	2.8730E-08	6.7421E-07
Comb. 4	0.5992	5.1614	4.5969E-08	-7.3550E-06
Comb. 5	0.7422	6.0949	9.1937E-08	1.2258E-06
Comb. 6	0.5992	5.1614	4.5969E-08	-7.3550E-06
Comb. 7	0.7422	6.0949	9.1937E-08	1.2258E-06
Comb. 8	0.3698	4.9139	1.4365E-08	-6.2977E-06
Comb. 9	0.4145	5.2056	2.8730E-08	-3.6162E-06
Comb. 10	0.3698	4.9139	1.4365E-08	-6.2977E-06
Comb. 11	0.4145	5.2056	2.8730E-08	-3.6162E-06
Comb. 12	0.1991	3.7999	0.0000	-4.7041E-06
Comb. 13	0.1991	3.7999	0.0000	-4.7041E-06

Proyecto: _____ Fecha: _____

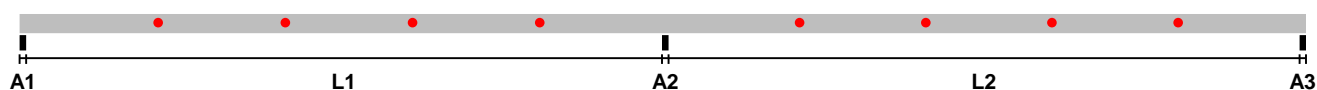
Ingeniero: _____ Firma: _____

Elementos calculados con el programa de diseño Arquimet 2.0 de ACESCO

REPORTE DE CORREAS

PHR C con atiesador 220 x 80 x 20 (2.50 mm)
con $F_y = 35.15 \text{ Kgf/mm}^2$ cada 1.44 m con arriostramiento cada L/5.

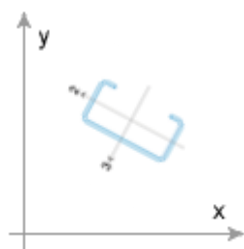
SECCION LONGITUDINAL



L1	9.75 m
L2	9.68 m
A1	0.10 m
A2	0.10 m
A3	0.10 m

CONFIGURACION	
TIPO DE CARGA	DISTRIBUIDA
Carga muerta	0.30 KN/m ²
Peso propio correa	0.08 KN/m
Carga viva	0.35 KN/m ²
Carga granizo	0.50 KN/m ²
Viento compresión (Perpendicular)	0.52 KN/m ²
Viento succión (Perpendicular)	0.52 KN/m ²
Pendiente sección transversal	62.4° = 191.2820%

SECCION TRANSVERSAL



$L = 1.44 \text{ m}$



Memorias de Cálculo

PROGRAMA DE DISEÑO Y CALCULO ESTRUCTURAL ARQUIMET 2.0

Proyecto: _____ Fecha: _____

Ingeniero: _____ Firma: _____

Elementos calculados con el programa de diseño Arquimet 2.0 de ACESCO

REPORTES DE DISEÑO

REPORTE FLEXION				
	Apoyos		Interiores	
Ejes locales	3	2	3	2
Resistente (KN.m)	20.0439	4.2921	17.2088	4.1011
Calculado (KN.m)	14.4338	0.5032	14.4338	0.6411

REPORTE CORTANTE		
Ejes locales	2	3
Resistente (KN)	68.9342	61.8977
Calculado (KN)	7.3302	1.5231

REPORTE DEFLEXION		
Deflexiones máximas	Instantanea	Permanente
Admisible (m)	0.0365	0.0547
Calculado (m)	0.0081	0.0163

REPORTE ARRUGAMIENTO	
No. de Apoyo	0
Resistencia máxima (Kgf)	4.4407
Arrugamiento (Kgf)	14.2243

Memorias de Cálculo

PROGRAMA DE DISEÑO Y CALCULO ESTRUCTURAL ARQUIMET 2.0

Proyecto: _____ Fecha: _____

Ingeniero: _____ Firma: _____

Elementos calculados con el programa de diseño Arquimet 2.0 de ACESCO

COMBINACIONES DE CARGA

No	Muerta	Viva	Granizo	Viento compresión	Viento succión
1	1.4000	0.0000	0.0000	0.0000	0.0000
2	1.2000	0.5000	0.0000	0.0000	0.0000
3	1.2000	0.0000	0.5000	0.0000	0.0000
4	1.2000	1.6000	0.0000	0.5000	0.0000
5	1.2000	0.0000	1.6000	0.5000	0.0000
6	1.2000	1.6000	0.0000	0.0000	0.5000
7	1.2000	0.0000	1.6000	0.0000	0.5000
8	1.2000	0.5000	0.0000	0.0000	1.0000
9	1.2000	0.0000	0.5000	0.0000	1.0000
10	1.2000	0.5000	0.0000	1.0000	0.0000
11	1.2000	0.0000	0.5000	1.0000	0.0000
12	0.9000	0.0000	0.0000	0.0000	1.0000
13	0.9000	0.0000	0.0000	1.0000	0.0000

Memorias de Cálculo

PROGRAMA DE DISEÑO Y CALCULO ESTRUCTURAL ARQUIMET 2.0

Proyecto: _____ Fecha: _____

Ingeniero: _____ Firma: _____

REACCIONES - EJES GLOBALES (KN-m)

Elementos calculados con el programa de diseño Arquimet 2.0 de ACESCO

APOYO 1		
Combinacion	Rx	Ry
Muerta	0.0000	0.7167
Viva de Cub.	0.0000	0.7081
Granizo	0.0000	1.0116
Viento Comp.	-2.4573	1.2846
Viento Succion	2.4573	-1.2846
Comb. 1	-0.8581	1.0034
Comb. 2	-1.0382	1.2141
Comb. 3	-1.1680	1.3658
Comb. 4	-2.9330	2.6353
Comb. 5	-3.3482	3.1209
Comb. 6	-2.9330	2.6353
Comb. 7	-3.3482	3.1209
Comb. 8	-3.4955	2.4988
Comb. 9	-3.6253	2.6505
Comb. 10	-3.4955	2.4988
Comb. 11	-3.6253	2.6505
Comb. 12	-3.0089	1.9297
Comb. 13	-3.0089	1.9297

APOYO 2		
Combinacion	Rx	Ry
Muerta	0.0000	2.1304
Viva de Cub.	0.0000	2.1048
Granizo	0.0000	3.0068
Viento Comp.	-8.1394	4.2552
Viento Succion	8.1394	-4.2552
Comb. 1	-3.0204	2.9826
Comb. 2	-3.6547	3.6089
Comb. 3	-4.1114	4.0599
Comb. 4	-10.0690	8.0518
Comb. 5	-11.5306	9.4951
Comb. 6	-10.0690	8.0518
Comb. 7	-11.5306	9.4951
Comb. 8	-11.7941	7.8641
Comb. 9	-12.2508	8.3151
Comb. 10	-11.7941	7.8641
Comb. 11	-12.2508	8.3151
Comb. 12	-10.0811	6.1726
Comb. 13	-10.0811	6.1726

APOYO 3		
Combinacion	Rx	Ry
Muerta	0.0000	0.7092
Viva de Cub.	0.0000	0.7007
Granizo	0.0000	1.0010
Viento Comp.	-2.4262	1.2684
Viento Succion	2.4262	-1.2684
Comb. 1	-0.8460	0.9929
Comb. 2	-1.0237	1.2014
Comb. 3	-1.1516	1.3515
Comb. 4	-2.8936	2.6063
Comb. 5	-3.3029	3.0868
Comb. 6	-2.8936	2.6063
Comb. 7	-3.3029	3.0868
Comb. 8	-3.4499	2.4698
Comb. 9	-3.5778	2.6199
Comb. 10	-3.4499	2.4698
Comb. 11	-3.5778	2.6199
Comb. 12	-2.9701	1.9067
Comb. 13	-2.9701	1.9067

Memorias de Cálculo

PROGRAMA DE DISEÑO Y CALCULO ESTRUCTURAL ARQUIMET 2.0

Proyecto: _____ Fecha: _____

Ingeniero: _____ Firma: _____

FUERZAS INTERNAS - EJES LOCALES (KN-m)

Elementos calculados con el programa de diseño Arquimet 2.0 de ACESCO

APOYO 1				
Combinacion	R2	R3	M2	M3
Muerta	0.3512	0.8752	0.0000	-3.2082E-07
Viva de Cub.	0.3470	0.8647	-9.5768E-09	9.1459E-07
Granizo	0.4957	1.2352	0.0000	-2.2122E-06
Viento Comp.	0.0000	2.7728	0.0000	1.5323E-06
Viento Succion	0.0000	2.7728	0.0000	1.5323E-06
Comb. 1	0.4917	1.2253	0.0000	-4.4915E-07
Comb. 2	0.5949	1.4826	-4.7884E-09	7.2305E-08
Comb. 3	0.6693	1.6679	0.0000	-1.4911E-06
Comb. 4	0.9766	3.8201	-1.5323E-08	1.8445E-06
Comb. 5	1.2145	4.4130	0.0000	-3.1584E-06
Comb. 6	0.9766	3.8201	-1.5323E-08	1.8445E-06
Comb. 7	1.2145	4.4130	0.0000	-3.1584E-06
Comb. 8	0.5949	4.2554	-4.7884E-09	1.6046E-06
Comb. 9	0.6693	4.4407	0.0000	4.1180E-08
Comb. 10	0.5949	4.2554	-4.7884E-09	1.6046E-06
Comb. 11	0.6693	4.4407	0.0000	4.1180E-08
Comb. 12	0.3161	3.5605	0.0000	1.2435E-06
Comb. 13	0.3161	3.5605	0.0000	1.2435E-06

APOYO 2				
Combinacion	R2	R3	M2	M3
Muerta	0.8885	2.8990	0.1455	-2.8447
Viva de Cub.	0.8778	2.8641	0.1438	-2.8105
Granizo	1.2540	4.0915	0.2054	-4.0149
Viento Comp.	0.0000	9.1846	0.0000	-9.0127
Viento Succion	0.0000	9.1846	0.0000	-9.0127
Comb. 1	1.2438	4.0585	0.2037	-3.9826
Comb. 2	1.5050	4.9108	0.2465	-4.8189
Comb. 3	1.6931	5.5245	0.2773	-5.4211
Comb. 4	2.4706	12.6536	0.4046	-12.4167
Comb. 5	3.0725	14.6175	0.5032	-14.3439
Comb. 6	2.4706	12.6536	0.4046	-12.4167
Comb. 7	3.0725	14.6175	0.5032	-14.3439
Comb. 8	1.5050	14.0954	0.2465	-13.8315
Comb. 9	1.6931	14.7091	0.2773	-14.4338
Comb. 10	1.5050	14.0954	0.2465	-13.8315
Comb. 11	1.6931	14.7091	0.2773	-14.4338
Comb. 12	0.7996	11.7937	0.1310	-11.5729
Comb. 13	0.7996	11.7937	0.1310	-11.5729

APOYO 3				
Combinacion	R2	R3	M2	M3
Muerta	0.3485	0.8641	-1.9154E-08	8.4276E-07
Viva de Cub.	0.3443	0.8537	-5.7461E-08	-6.1292E-07
Granizo	0.4919	1.2196	1.1492E-07	2.4517E-06
Viento Comp.	0.0000	2.7377	0.0000	3.6775E-06
Viento Succion	0.0000	2.7377	0.0000	3.6775E-06
Comb. 1	0.4879	1.2098	-2.6815E-08	1.1799E-06
Comb. 2	0.5904	1.4638	-5.1715E-08	7.0485E-07
Comb. 3	0.6642	1.6467	3.4477E-08	2.2371E-06
Comb. 4	0.9692	3.7718	-1.1492E-07	1.8694E-06
Comb. 5	1.2053	4.3572	1.6089E-07	6.7727E-06
Comb. 6	0.9692	3.7718	-1.1492E-07	1.8694E-06
Comb. 7	1.2053	4.3572	1.6089E-07	6.7727E-06
Comb. 8	0.5904	4.2015	-5.1715E-08	4.3823E-06
Comb. 9	0.6642	4.3845	3.4477E-08	5.9146E-06
Comb. 10	0.5904	4.2015	-5.1715E-08	4.3823E-06
Comb. 11	0.6642	4.3845	3.4477E-08	5.9146E-06
Comb. 12	0.3137	3.5155	-1.7238E-08	4.4360E-06
Comb. 13	0.3137	3.5155	-1.7238E-08	4.4360E-06

Proyecto: _____ Fecha: _____

Ingeniero: _____ Firma: _____

Elementos calculados con el programa de diseño Arquimet 2.0 de ACESCO

REPORTE DE CORREAS

PHR C con atiesador 220 x 80 x 20 (3.00 mm)
con $F_y = 35.15 \text{ Kgf/mm}^2$ cada 0.69 m con arriostramiento cada L/5.

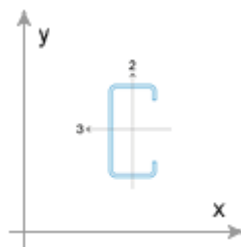
SECCION LONGITUDINAL



L1	9.75 m
A1	0.15 m
A2	0.15 m

CONFIGURACION	
TIPO DE CARGA	DISTRIBUIDA
Carga muerta	0.30 KN/m ²
Peso propio correa	0.09 KN/m
Carga viva	0.50 KN/m ²
Carga granizo	1.00 KN/m ²
Viento compresión (Perpendicular)	0.00 KN/m ²
Viento succión (Perpendicular)	0.00 KN/m ²
Pendiente sección transversal	0° = 0.0000%

SECCION TRANSVERSAL



$L = 0.69 \text{ m}$



Memorias de Cálculo

PROGRAMA DE DISEÑO Y CALCULO ESTRUCTURAL ARQUIMET 2.0

Proyecto: _____ Fecha: _____

Ingeniero: _____ Firma: _____

Elementos calculados con el programa de diseño Arquimet 2.0 de ACESCO

REPORTES DE DISEÑO

REPORTE FLEXION				
	Apoyos		Interiores	
Ejes locales	3	2	3	2
Resistente (KN.m)	24.5450	5.0300	21.8360	0.0000
Calculado (KN.m)	0.0000	0.0000	17.9472	0.0000

REPORTE CORTANTE		
Ejes locales	2	3
Resistente (KN)	99.2653	73.0982
Calculado (KN)	7.2377	0.0000

REPORTE DEFLEXION		
Deflexiones máximas	Instantanea	Permanente
Admisible (m)	0.0367	0.0000
Calculado (m)	0.0246	0.0000

REPORTE ARRUGAMIENTO	
No. de Apoyo	0
Resistencia máxima (Kgf)	7.2514
Arrugamiento (Kgf)	23.1285

Memorias de Cálculo

PROGRAMA DE DISEÑO Y CALCULO ESTRUCTURAL ARQUIMET 2.0

Proyecto: _____ Fecha: _____

Ingeniero: _____ Firma: _____

Elementos calculados con el programa de diseño Arquimet 2.0 de ACESCO

COMBINACIONES DE CARGA

No	Muerta	Viva	Granizo	Viento compresión	Viento succión
1	1.4000	0.0000	0.0000	0.0000	0.0000
2	1.2000	0.5000	0.0000	0.0000	0.0000
3	1.2000	0.0000	0.5000	0.0000	0.0000
4	1.2000	1.6000	0.0000	0.5000	0.0000
5	1.2000	0.0000	1.6000	0.5000	0.0000
6	1.2000	1.6000	0.0000	0.0000	0.5000
7	1.2000	0.0000	1.6000	0.0000	0.5000
8	1.2000	0.5000	0.0000	0.0000	1.0000
9	1.2000	0.0000	0.5000	0.0000	1.0000
10	1.2000	0.5000	0.0000	1.0000	0.0000
11	1.2000	0.0000	0.5000	1.0000	0.0000
12	0.9000	0.0000	0.0000	0.0000	1.0000
13	0.9000	0.0000	0.0000	1.0000	0.0000

Memorias de Cálculo

PROGRAMA DE DISEÑO Y CALCULO ESTRUCTURAL ARQUIMET 2.0

Proyecto: _____ Fecha: _____

Ingeniero: _____ Firma: _____

REACCIONES - EJES GLOBALES (KN-m)

Elementos calculados con el programa de diseño Arquimet 2.0 de ACESCO

APOYO 1		
Combinacion	Rx	Ry
Muerta	0.0000	1.4888
Viva de Cub.	0.0000	1.7078
Granizo	0.0000	3.4155
Viento Comp.	0.0000	0.0000
Viento Succion	0.0000	0.0000
Comb. 1	0.0000	2.0843
Comb. 2	0.0000	2.6405
Comb. 3	0.0000	3.4943
Comb. 4	0.0000	4.5190
Comb. 5	0.0000	7.2514
Comb. 6	0.0000	4.5190
Comb. 7	0.0000	7.2514
Comb. 8	0.0000	2.6405
Comb. 9	0.0000	3.4943
Comb. 10	0.0000	2.6405
Comb. 11	0.0000	3.4943
Comb. 12	0.0000	1.3399
Comb. 13	0.0000	1.3399

APOYO 2		
Combinacion	Rx	Ry
Muerta	0.0000	1.4888
Viva de Cub.	0.0000	1.7077
Granizo	0.0000	3.4155
Viento Comp.	0.0000	0.0000
Viento Succion	0.0000	0.0000
Comb. 1	0.0000	2.0843
Comb. 2	0.0000	2.6405
Comb. 3	0.0000	3.4943
Comb. 4	0.0000	4.5190
Comb. 5	0.0000	7.2514
Comb. 6	0.0000	4.5190
Comb. 7	0.0000	7.2514
Comb. 8	0.0000	2.6405
Comb. 9	0.0000	3.4943
Comb. 10	0.0000	2.6405
Comb. 11	0.0000	3.4943
Comb. 12	0.0000	1.3399
Comb. 13	0.0000	1.3399

Memorias de Cálculo

PROGRAMA DE DISEÑO Y CALCULO ESTRUCTURAL ARQUIMET 2.0

Proyecto: _____ Fecha: _____

Ingeniero: _____ Firma: _____

FUERZAS INTERNAS - EJES LOCALES (KN-m)

Elementos calculados con el programa de diseño Arquimet 2.0 de ACESCO

APOYO 1				
Combinacion	R2	R3	M2	M3
Muerta	0.0000	1.4888	0.0000	0.0000
Viva de Cub.	0.0000	1.7078	0.0000	0.0000
Granizo	0.0000	3.4155	0.0000	0.0000
Viento Comp.	0.0000	0.0000	0.0000	0.0000
Viento Succion	0.0000	0.0000	0.0000	0.0000
Comb. 1	0.0000	2.0843	0.0000	0.0000
Comb. 2	0.0000	2.6405	0.0000	0.0000
Comb. 3	0.0000	3.4943	0.0000	0.0000
Comb. 4	0.0000	4.5190	0.0000	0.0000
Comb. 5	0.0000	7.2514	0.0000	0.0000
Comb. 6	0.0000	4.5190	0.0000	0.0000
Comb. 7	0.0000	7.2514	0.0000	0.0000
Comb. 8	0.0000	2.6405	0.0000	0.0000
Comb. 9	0.0000	3.4943	0.0000	0.0000
Comb. 10	0.0000	2.6405	0.0000	0.0000
Comb. 11	0.0000	3.4943	0.0000	0.0000
Comb. 12	0.0000	1.3399	0.0000	0.0000
Comb. 13	0.0000	1.3399	0.0000	0.0000

APOYO 2				
Combinacion	R2	R3	M2	M3
Muerta	0.0000	1.4888	0.0000	0.0000
Viva de Cub.	0.0000	1.7077	0.0000	0.0000
Granizo	0.0000	3.4155	0.0000	0.0000
Viento Comp.	0.0000	0.0000	0.0000	0.0000
Viento Succion	0.0000	0.0000	0.0000	0.0000
Comb. 1	0.0000	2.0843	0.0000	0.0000
Comb. 2	0.0000	2.6405	0.0000	0.0000
Comb. 3	0.0000	3.4943	0.0000	0.0000
Comb. 4	0.0000	4.5190	0.0000	0.0000
Comb. 5	0.0000	7.2514	0.0000	0.0000
Comb. 6	0.0000	4.5190	0.0000	0.0000
Comb. 7	0.0000	7.2514	0.0000	0.0000
Comb. 8	0.0000	2.6405	0.0000	0.0000
Comb. 9	0.0000	3.4943	0.0000	0.0000
Comb. 10	0.0000	2.6405	0.0000	0.0000
Comb. 11	0.0000	3.4943	0.0000	0.0000
Comb. 12	0.0000	1.3399	0.0000	0.0000
Comb. 13	0.0000	1.3399	0.0000	0.0000

8. DISEÑO DE ELEMENTOS NO ESTRUCTURALES

DISEÑO DE ELEMENTOS NO ESTRUCTURALES

PROYECTO: CENTRO DE ATENCIÓN ESPECIALIZADA - EL REDENTOR, BLOQUE B1, BOGOTÁ (CUNDINAMARCA)
DISEÑO DE ELEMENTOS NO ESTRUCTURALES

Units: kN*m

STORY DATA

Story	Height	Elevation	SimilarTo
N+17.00	8.10	17.00	None
N+8.90	4.45	8.90	None
N+4.45	4.50	4.45	None
BASE	0.00	-0.05	None

CENTER MASS RIGIDITY

Story	Diaphragm	MassX	MassY	XCM	YCM	CumMassX	CumMassY
N+4.45	D1	66.0825	66.0825	9.81	9.78	66.0825	66.0825
XCCM		YCCM	XCR	YCR			
9.81		9.78	9.807	9.78			

STORY SHEARS

Story	Load	Loc	P	VX	VY	T	MX	MY
N+4.45	SISDISX	Top	0	237.68	0.69	2362.43	3.31	910.977
N+4.45	SISDISX	Bottom	0	237.68	0.69	2362.43	6.064	1892.208
N+4.45	SISDISY	Top	0	0.63	253.88	2498.161	1080.203	2.012
N+4.45	SISDISY	Bottom	0	0.63	253.88	2498.161	2178.991	4.778

$$F_p = \frac{a_x a_p}{R_p} gM_p \geq \frac{A_a I}{2} gM_p$$

$$a_x = \frac{C_{vx} V_x}{m_x g} \leq 2 S_a$$

$$C_{vx} = \frac{m_x h_x^k}{\sum_{i=1}^n (m_i h_i^k)}$$

$$V_s = S_a gM$$

g: 9.81 m/s²
Sa: 0.563 s

Grupo de uso: III
Grado de desempeño: SUPERIOR

Grupo de Uso	Grado de desempeño
IV	SUPERIOR
III	SUPERIOR
II	BUENO
I	BAJO

Grado de desempeño de los elementos no estructurales: SUPERIOR

ANÁLISIS DE CARGAS PARA MUROS

Espesor de muros: 0.15 m
 Espesor de pañete en una cara: 0 m
 Densidad de mampostería: 13 kN/m³
 Densidad mortero de pañete: 21 kN/m³
 Altura Fachada: 4.00 m
 Carga: 7.8 kN/m
 Descripción: mampostería reforzada, separada lateralmente de la estructura,
 apoyada arriba y abajo
 ap: 1.0
 Rp: 6

ANÁLISIS DE CARGAS PARA ANTEPECHOS

Espesor de muros: 0.15 m
 Espesor de pañete en una cara: 0 m
 Densidad de mampostería: 13 kN/m³
 Densidad mortero de pañete: 21 kN/m³
 Altura Antepecho: 1 m
 Carga: 1.95 kN/m
 Descripción: mampostería reforzada, separada lateralmente de la estructura,
 apoyada solo abajo
 ap: 2.5
 Rp: 6

Sección de vigas verticales: 0.15x0.25 m
 f'c = 21 MPa
 fy = 420 MPa

DISEÑO PARA MUROS

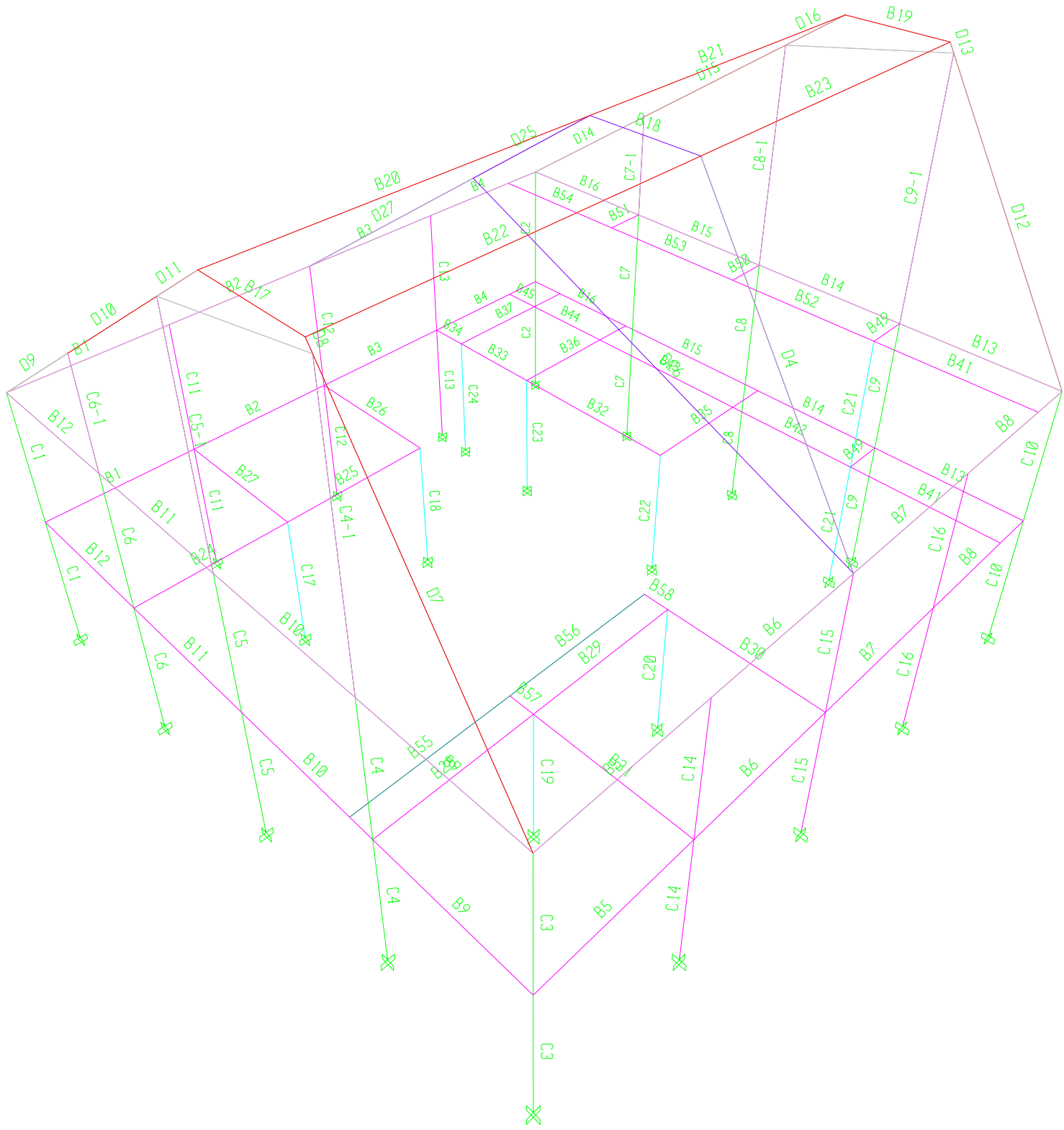
Story	Fx	Wx	ax	ap	Rp	Fp	M	V
N+4.45	253.88	66.08	1.126	1.0	6	1.464	2.928	2.928
	Sección Vigas V.			As. (cm²)		Separación column.		Fl. 1/4"
Story	b	d	ρ	neces.	ubicado	S max	S escogida	S estribos
N+4.45	0.15	0.21	0.00107	0.34	0.71	2.11	2.10	0.188

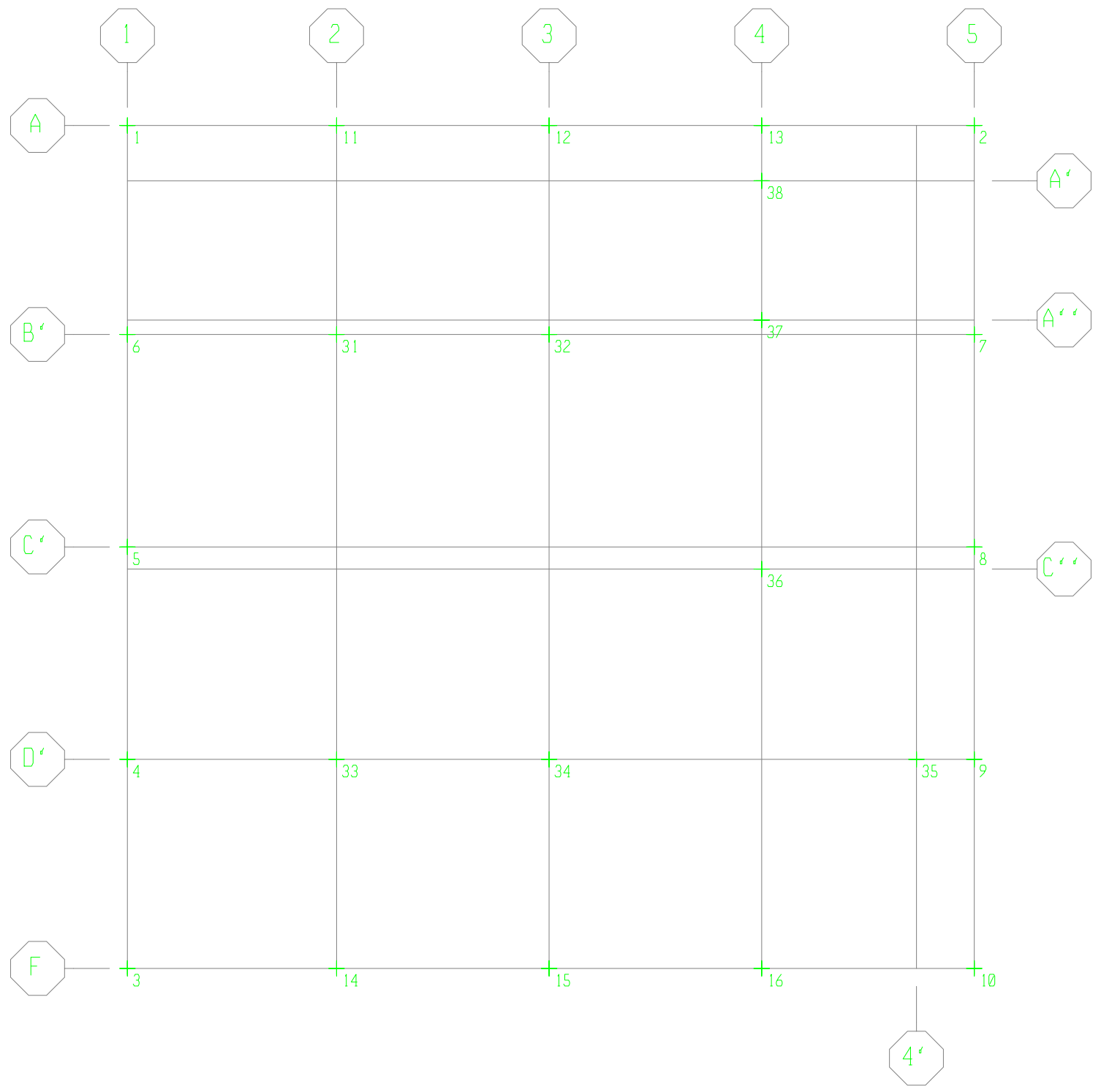
DISEÑO PARA ANTEPECHOS

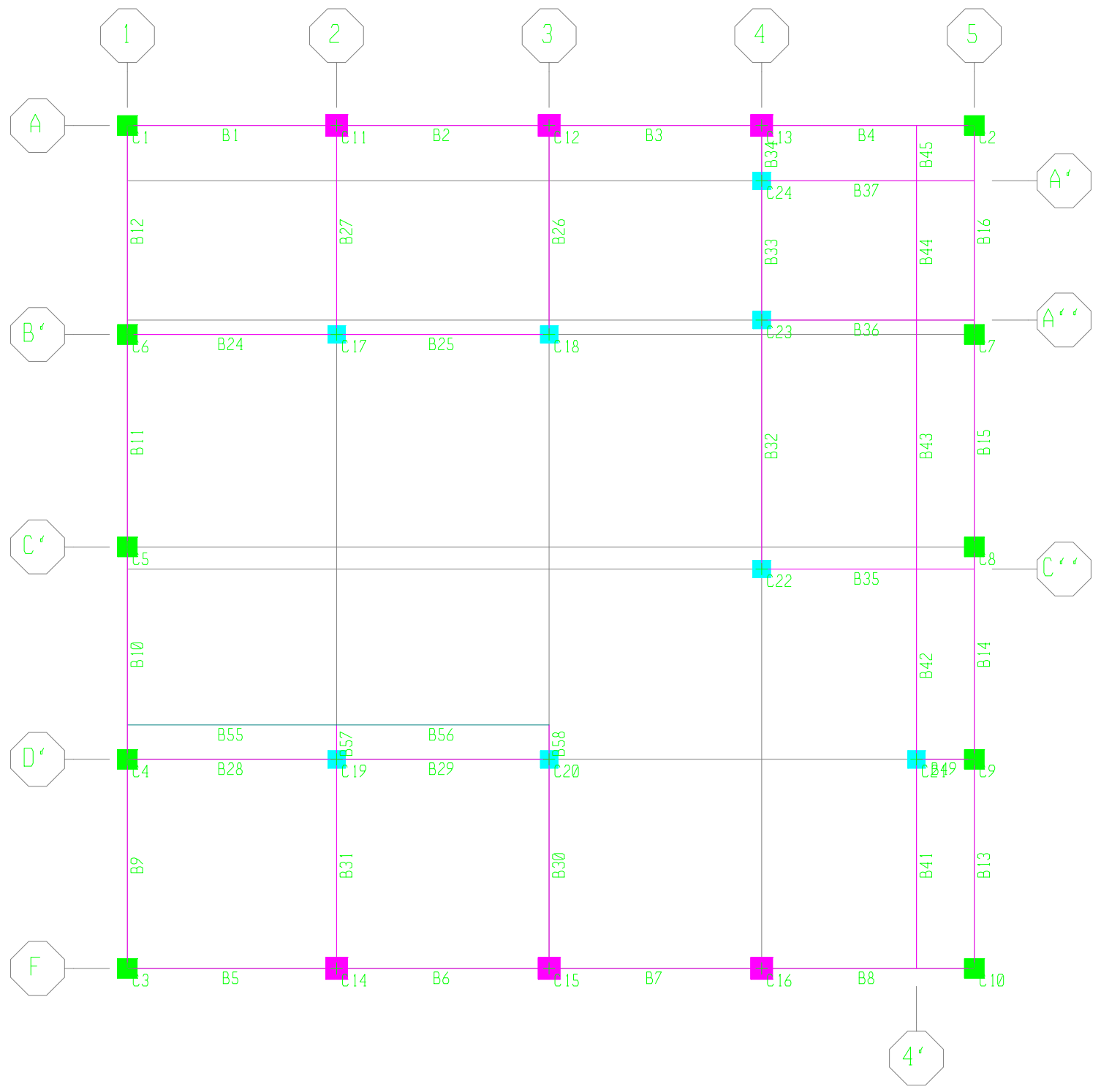
Story	Fx	Wx	ax	ap	Rp	Fp	M	V
N+4.45	253.88	66.08	1.126	2.5	6	3.660	7.319	7.319
	Sección columneta			As. (cm²)		Separación column.		Fl. 1/4"
Story	b	d	ρ	neces.	ubicado	S max	S escogida	S estribos
N+4.45	0.15	0.21	0.00272	0.86	1.29	1.50	1.50	0.188

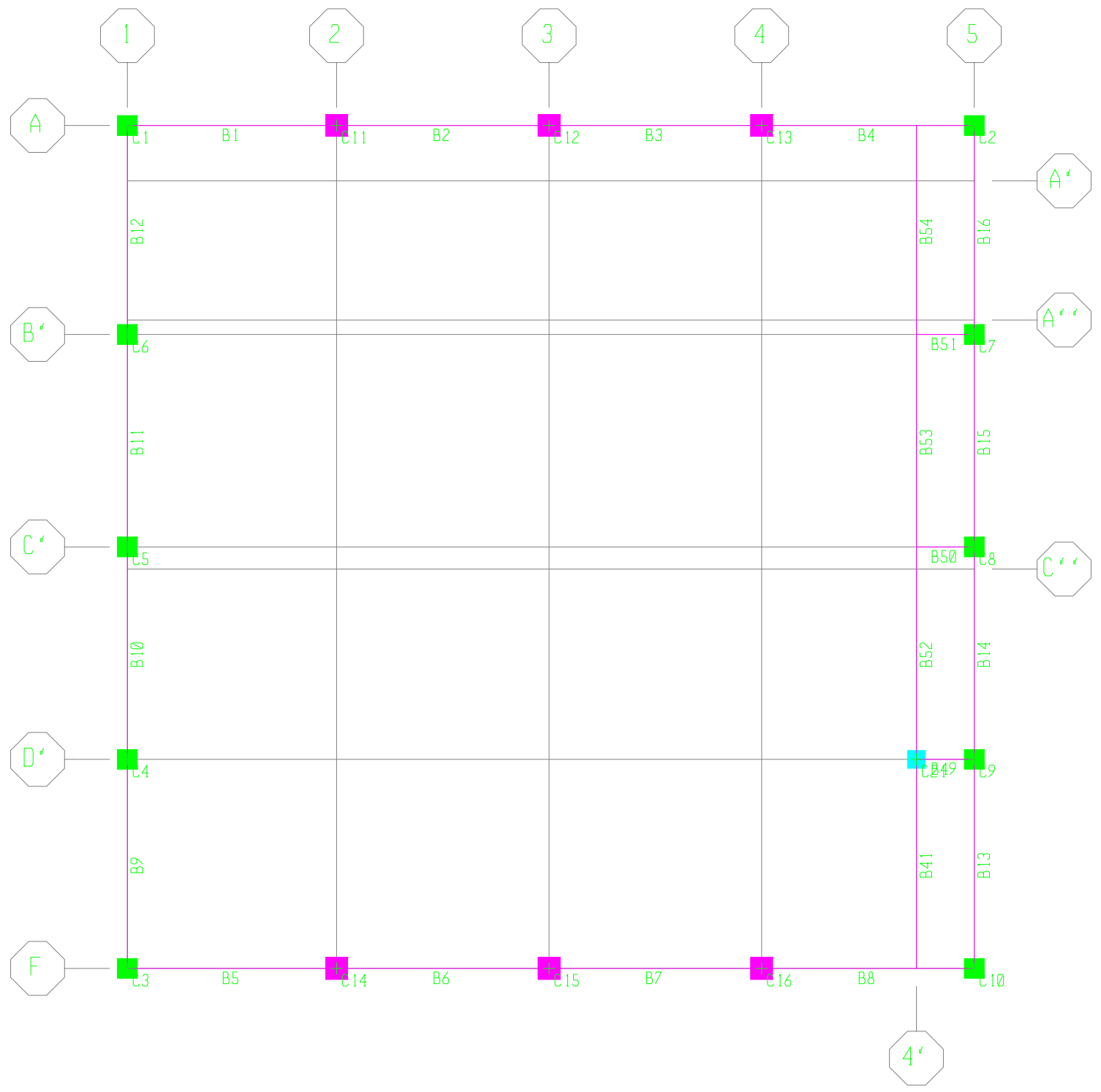
9. ANEXOS DE COMPUTADOR

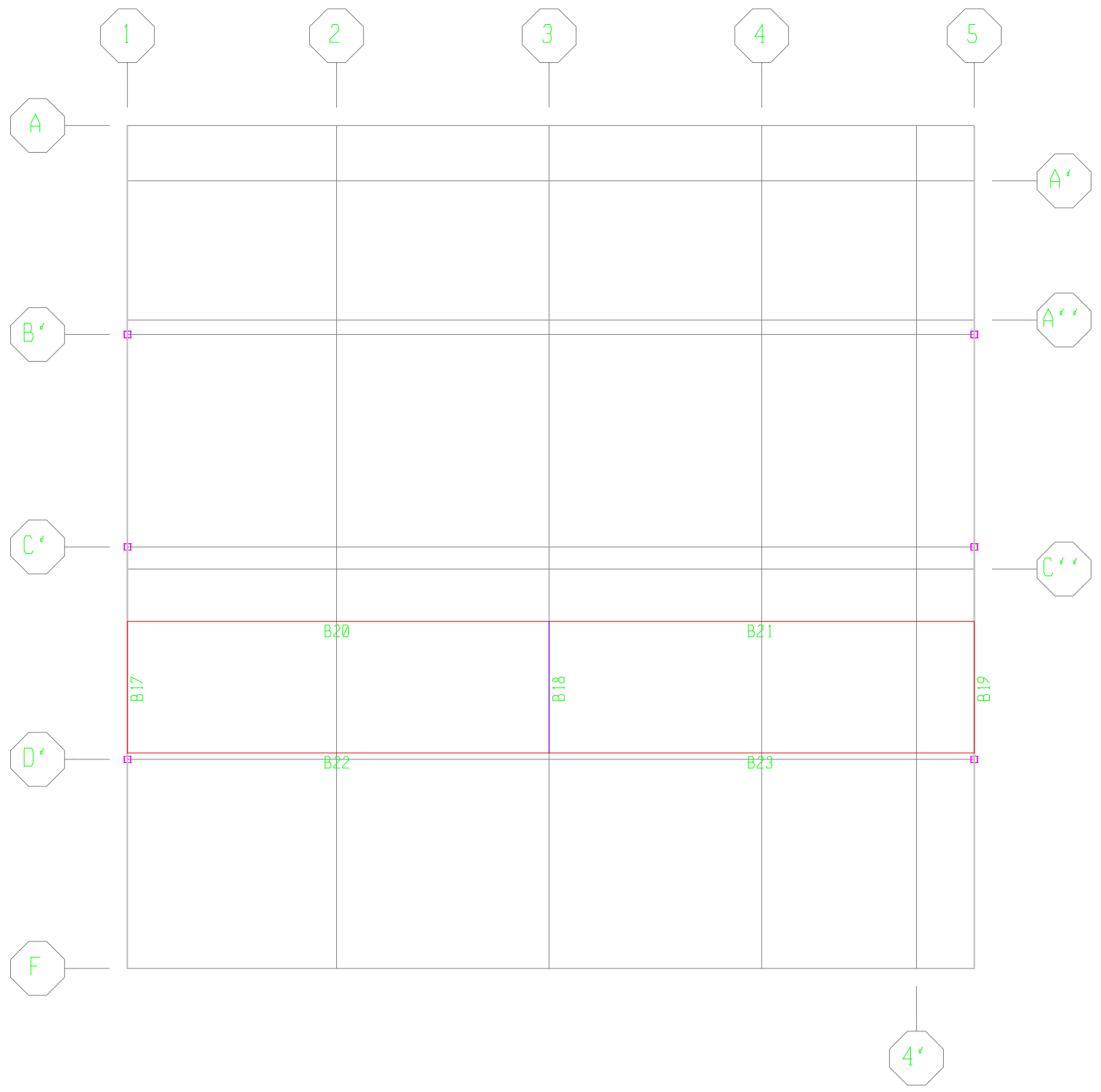
ANEXOS DE COMPUTADOR











ETABS v9.7.4 File:CAE - BLOQUE B1 Units:KN-m agosto 22, 2014 15:40 PAGE 1

S T O R Y D A T A

STORY	SIMILAR TO	HEIGHT	ELEVATION
N+17.00	None	8.100	17.000
N+8.90	None	4.450	8.900
N+4.45	None	4.500	4.450
BASE	None		-0.050

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

POINT	X	Y	DZ-BELOW
1	0.000	19.560	0.000
2	19.640	19.560	0.000
3	0.000	0.000	0.000
4	0.000	4.850	0.000
5	0.000	9.780	0.000
6	0.000	14.710	0.000
7	19.640	14.710	0.000
8	19.640	9.780	0.000
9	19.640	4.850	0.000
10	19.640	0.000	0.000
11	4.850	19.560	0.000
12	9.780	19.560	0.000
13	14.710	19.560	0.000
14	4.850	0.000	0.000
15	9.780	0.000	0.000
16	14.710	0.000	0.000
17	0.000	5.000	0.000
18	0.000	8.050	0.000
5-1	0.000	9.780	1.217
4-1	0.000	4.850	0.243
20	9.780	5.000	0.000
21	9.780	8.050	0.000
22	19.640	5.000	0.000
23	19.640	8.050	0.000
8-1	19.640	9.780	1.217
9-1	19.640	4.850	0.243
6-1	0.000	14.710	4.687
7-1	19.640	14.710	4.687
28	9.780	11.887	0.000
28-1	9.780	11.887	2.700

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C O L U M N C O N N E C T I V I T Y D A T A

COLUMN	I END PT	J END PT	I END STORY
C1	1	1	Below
C2	2	2	Below
C3	3	3	Below
C4	4	4	Below
C5	5	5	Below
C6	6	6	Below
C7	7	7	Below
C8	8	8	Below
C9	9	9	Below
C10	10	10	Below
C11	11	11	Below
C12	12	12	Below
C13	13	13	Below
C14	14	14	Below
C15	15	15	Below
C16	16	16	Below
C5-1	5	5-1	Below
C4-1	4	4-1	Below
C8-1	8	8-1	Below
C9-1	9	9-1	Below
C6-1	6	6-1	Below
C7-1	7	7-1	Below

ETABS v9.7.4 File:CAE - BLOQUE B1 Units:KN-m agosto 22, 2014 15:40 PAGE 4

BEAM CONNECTIVITY DATA

BEAM	I END PT	J END PT
B1	1	11
B2	11	12
B3	12	13
B4	13	2
B5	3	14
B6	14	15
B7	15	16
B8	16	10
B9	3	4
B10	4	5
B11	5	6
B12	6	1
B13	10	9
B14	9	8
B15	8	7
B16	7	2
B17	17	18
B18	20	21
B19	22	23
B20	18	21
B21	21	23
B22	17	20
B23	20	22

ETABS v9.7.4 File:CAE - BLOQUE B1 Units:KN-m agosto 22, 2014 15:40 PAGE 5

BRACE CONNECTIVITY DATA

BRACE	I END PT	J END PT	I END STORY
D4	15	20	Below
D7	3	4-1	Below
D8	4-1	17	Same
D9	1	6-1	Below
D10	6-1	5-1	Same
D11	5-1	18	Same
D12	10	9-1	Below
D13	9-1	22	Same
D14	2	7-1	Below
D15	7-1	8-1	Same
D16	8-1	23	Same
D25	28-1	21	Same
D26	15	28-1	Below
D27	12	28-1	Below

ETABS v9.7.4 File:CAE - BLOQUE B1 Units:KN-m agosto 22, 2014 15:40 PAGE 6

WALL CONNECTIVITY DATA

WALL	POINT 1	POINT 2	POINT 3	POINT 4	PT1 STORY	PT2 STORY	PT3 STORY	PT4 STORY
W1	1	6-1	6		Below	Same	Below	
W2	5	6	6-1	5-1	Below	Below	Same	Same
W3	5-1	18	17	4-1	Same	Same	Same	Same
W4	4	5	5-1	4-1	Below	Below	Same	Same
W5	3	4	4-1		Below	Below	Same	
W6	10	9-1	9		Below	Same	Below	
W7	8-1	9-1	22	23	Same	Same	Same	Same
W8	8	9	9-1	8-1	Below	Below	Same	Same
W9	7	8	8-1	7-1	Below	Below	Same	Same
W10	2	7	7-1		Below	Below	Same	

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FLOOR CONNECTIVITY DATA

FLOOR	POINT	POINT	POINT	POINT
F1	17	20	21	18
F2	20	22	23	21

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R A M P C O N N E C T I V I T Y D A T A

RAMP	POINT 1	POINT 2	POINT 3	POINT 4	PT1 STORY	PT2 STORY	PT3 STORY	PT4 STORY
R1	15	3	17	20	Below	Below	Same	Same
R2	10	15	20	22	Below	Below	Same	Same
R3	12	2	23	21	Below	Below	Same	Same
R4	1	12	21	18	Below	Below	Same	Same

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M A S S S O U R C E D A T A

MASS LATERAL LUMP MASS
 FROM MASS ONLY AT STORIES

Masses Yes Yes

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A S S E M B L E D P O I N T M A S S E S

STORY	POINT	UX	UY	UZ	RX	RY	RZ
N+17.00	17	1.174E+00	1.174E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+17.00	18	1.557E+00	1.557E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+17.00	20	2.741E+00	2.741E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+17.00	21	3.240E+00	3.240E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+17.00	22	1.183E+00	1.183E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+17.00	23	1.569E+00	1.569E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+17.00	28-1	1.112E+00	1.112E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+8.90	1	4.078E+00	4.078E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+8.90	2	4.101E+00	4.101E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+8.90	3	3.893E+00	3.893E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+8.90	4	4.192E+00	4.192E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+8.90	5	4.186E+00	4.186E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+8.90	6	3.640E+00	3.640E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+8.90	7	3.640E+00	3.640E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+8.90	8	4.186E+00	4.186E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+8.90	9	4.192E+00	4.192E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+8.90	10	3.913E+00	3.913E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+8.90	11	3.095E+00	3.095E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+8.90	12	5.651E+00	5.651E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+8.90	13	3.110E+00	3.110E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+8.90	14	3.095E+00	3.095E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+8.90	15	5.494E+00	5.494E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+8.90	16	3.110E+00	3.110E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+4.45	1	3.921E+00	3.921E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+4.45	2	3.935E+00	3.935E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+4.45	3	3.921E+00	3.921E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+4.45	4	3.935E+00	3.935E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+4.45	5	3.950E+00	3.950E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+4.45	6	3.935E+00	3.935E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+4.45	7	3.935E+00	3.935E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+4.45	8	3.950E+00	3.950E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+4.45	9	3.935E+00	3.935E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+4.45	10	3.935E+00	3.935E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+4.45	11	4.445E+00	4.445E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+4.45	12	4.460E+00	4.460E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+4.45	13	4.460E+00	4.460E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+4.45	14	4.445E+00	4.445E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+4.45	15	4.460E+00	4.460E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+4.45	16	4.460E+00	4.460E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BASE	1	1.094E+00	1.094E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BASE	2	1.094E+00	1.094E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BASE	3	1.094E+00	1.094E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BASE	4	1.094E+00	1.094E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BASE	5	1.094E+00	1.094E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BASE	6	1.094E+00	1.094E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BASE	7	1.094E+00	1.094E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BASE	8	1.094E+00	1.094E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BASE	9	1.094E+00	1.094E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BASE	10	1.094E+00	1.094E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BASE	11	1.350E+00	1.350E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BASE	12	1.350E+00	1.350E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BASE	13	1.350E+00	1.350E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BASE	14	1.350E+00	1.350E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BASE	15	1.350E+00	1.350E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BASE	16	1.350E+00	1.350E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

N+17.00	All	1.258E+01	1.258E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+8.90	All	6.357E+01	6.357E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00
N+4.45	All	6.608E+01	6.608E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BASE	All	1.904E+01	1.904E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Totals	All	1.613E+02	1.613E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00

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G R O U P M A S S D A T A

GROUP NAME	SELF MASS	SELF WEIGHT	TOTAL MASS-X	TOTAL MASS-Y	TOTAL MASS-Z
ALL	161.2681	1390.970	161.2681	161.2681	0.0000

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

ELEMENT TYPE	MATERIAL	TOTAL MASS tons	NUMBER PIECES	NUMBER STUDS
Column	A500	0.98	6	
Column	CONC21	77.21	32	
Beam	A500	1.64	7	0
Beam	CONC21	57.56	32	0
Brace	A500	4.45	14	

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M A T E R I A L L I S T B Y S E C T I O N

SECTION	ELEMENT TYPE	NUMBER PIECES	TOTAL LENGTH meters	TOTAL MASS tons	NUMBER STUDS
COL50X50	Column	12	53.700	32.86	
COL45X45	Column	20	89.500	44.35	
TER1-150X25	Beam	6	45.380	1.39	0
TER1-150X25	Brace	10	47.187	1.44	
TER2-200X40	Beam	1	3.050	0.25	0
TER2-200X40	Brace	4	36.649	3.01	
VIGA30X50	Beam	32	156.800	57.56	0
TEC1-150X15	Column	6	36.305	0.98	

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M A T E R I A L L I S T B Y S T O R Y

STORY	ELEMENT TYPE	MATERIAL	TOTAL WEIGHT tons	FLOOR AREA m2	UNIT WEIGHT kg/m2	NUMBER PIECES	NUMBER STUDS
N+17.00	Column	A500	0.98	59.902	16.4079	6	
N+17.00	Beam	A500	1.64	59.902	27.3224	7	0
N+17.00	Brace	A500	4.45	59.902	74.2730	14	
N+8.90	Column	CONC21	38.39	0.000	16		
N+8.90	Beam	CONC21	28.78	0.000	16	0	
N+4.45	Column	CONC21	38.82	0.000	16		
N+4.45	Beam	CONC21	28.78	0.000	16	0	
SUM	Column	A500	0.98	59.902	16.4079	6	
SUM	Column	CONC21	77.21	59.902	1288.9361	32	
SUM	Beam	A500	1.64	59.902	27.3224	7	0
SUM	Beam	CONC21	57.56	59.902	960.9185	32	0
SUM	Brace	A500	4.45	59.902	74.2730	14	
TOTAL	All	All	141.84	59.902	2367.8578	91	0

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M A T E R I A L P R O P E R T Y D A T A

MATERIAL NAME	MATERIAL TYPE	DESIGN TYPE	MATERIAL DIR/PLANE	MODULUS OF ELASTICITY	POISSON'S RATIO	THERMAL COEFF	SHEAR MODULUS
A36	Iso	Steel	All	199900000.00	0.3000	1.1700E-05	76884615.38
A500	Iso	Steel	All	199900000.00	0.3000	1.1700E-05	76884615.38

CONC21	Iso	Concrete	All	21538110.000	0.2000	9.9000E-06	8974212.500
MAT1	Iso	Concrete	All	0.001	0.2000	9.9000E-06	0.000

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

MATERIAL NAME	MASS PER UNIT VOL	WEIGHT PER UNIT VOL
A36	7.8271E+00	7.6820E+01
A500	7.8271E+00	7.6820E+01
CONC21	2.4000E+00	2.4000E+01
MAT1	2.4000E+00	0.0000E+00

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

MATERIAL NAME	STEEL FY	STEEL FU	STEEL COST (\$)
A36	252000.000	400000.000	5000.00
A500	352000.000	400000.000	5000.00

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

MATERIAL NAME	LIGHTWEIGHT CONCRETE	CONCRETE FC	REBAR FY	REBAR FYS	LIGHTWT REDUC FACT
CONC21	No	21000.000	420000.000	420000.000	N/A
MAT1	No	0.001	420000.000	420000.000	N/A

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

FRAME SECTION NAME	MATERIAL NAME	SECTION SHAPE NAME OR NAME IN SECTION DATABASE FILE	CONC COL	CONC BEAM
COL50X50	CONC21	Rectangular	Yes	
COL45X45	CONC21	Rectangular	Yes	
TER1-150X250	A500	Box/Tube		
TER2-200X400	A500	Box/Tube		
VIGA30X50	CONC21	Rectangular		Yes
TEC1-150X150	A500	Box/Tube		

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

FRAME SECTION NAME	SECTION DEPTH	FLANGE WIDTH TOP	FLANGE THICK TOP	WEB THICK	FLANGE WIDTH BOT	FLANGE THICK BOT
COL50X50	0.5000	0.5000	0.0000	0.0000	0.0000	0.0000
COL45X45	0.4500	0.4500	0.0000	0.0000	0.0000	0.0000
TER1-150X250	0.2500	0.1500	0.0050	0.0050	0.0000	0.0000
TER2-200X400	0.4000	0.2000	0.0090	0.0090	0.0000	0.0000
VIGA30X50	0.5000	0.3000	0.0000	0.0000	0.0000	0.0000
TEC1-150X150	0.1500	0.1500	0.0060	0.0060	0.0000	0.0000

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

FRAME SECTION NAME	SECTION AREA	TORSIONAL CONSTANT	MOMENTS OF INERTIA		SHEAR AREAS	
			I33	I22	A2	A3
COL50X50	0.2500	0.0088	0.0052	0.0052	0.2083	0.2083
COL45X45	0.2025	0.0058	0.0034	0.0034	0.1688	0.1688
TER1-150X250	0.0039	0.0000	0.0000	0.0000	0.0025	0.0015
TER2-200X400	0.0105	0.0002	0.0002	0.0001	0.0072	0.0036
VIGA30X50	0.1500	0.0028	0.0031	0.0011	0.1250	0.1250
TEC1-150X150	0.0035	0.0000	0.0000	0.0000	0.0018	0.0018

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

FRAME SECTION NAME	SECTION MODULI		PLASTIC MODULI		RADIUS OF GYRATION	
	S33	S22	Z33	Z22	R33	R22
COL50X50	0.0208	0.0208	0.0313	0.0313	0.1443	0.1443
COL45X45	0.0152	0.0152	0.0228	0.0228	0.1299	0.1299
TER1-150X250	0.0003	0.0002	0.0003	0.0002	0.0934	0.0629

TER2-200X400	0.0011	0.0007	0.0014	0.0008	0.1453	0.0845
VIGA30X50	0.0125	0.0075	0.0188	0.0113	0.1443	0.0866
TEC1-150X150	0.0002	0.0002	0.0002	0.0002	0.0588	0.0588

FRAME SECTION WEIGHTS AND MASSES

FRAME SECTION NAME	TOTAL WEIGHT	TOTAL MASS
COL50X50	322.2000	32.2200
COL45X45	434.9700	43.4970
TER1-150X250	27.7326	2.8257
TER2-200X400	31.9483	3.2552
VIGA30X50	564.4800	56.4480
TEC1-150X150	9.6386	0.9821

CONCRETE COLUMN DATA

FRAME SECTION NAME	REINF CONFIGURATION		REINF SIZE/TYPE	NUM BARS 3DIR/2DIR	NUM BARS CIRCULAR	BAR COVER
	LONGIT	LATERAL				
COL50X50	Rectangular Ties		#8/Design	5/5	N/A	0.0500
COL45X45	Rectangular Ties		#8/Design	4/4	N/A	0.0500

CONCRETE BEAM DATA

FRAME SECTION NAME	TOP COVER	BOT COVER	TOP LEFT AREA	TOP RIGHT AREA	BOT LEFT AREA	BOT RIGHT AREA
VIGA30X50	0.0500	0.0500	0.000	0.000	0.000	0.000

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SHELL SECTION PROPERTY DATA

SHELL SECTION	MATERIAL NAME	SHELL TYPE	LOAD DIST ONE WAY	MEMBRANE THICK	BENDING THICK	TOTAL WEIGHT	TOTAL MASS
CUB	MAT1	Membrane	Yes	0.0130	0.0130	0.0000	22.0402

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LINK PROPERTY DATA

LINK: NLPR1
 TYPE: Damper

MASS	WEIGHT	INERTIA 1	INERTIA 2	INERTIA 3	P-D M2I	P-D M2J	P-D M3I	P-D M3J
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
DOF	KE	CE	DJ	K	C	C EXP		
U1	0.0000	0.0000	N/A	---	---	---		

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STATIC LOAD CASES

STATIC CASE	CASE TYPE	AUTO LAT LOAD	SELF WT MULTIPLIER	NOTIONAL FACTOR	NOTIONAL DIRECTION
DEAD	DEAD	N/A	1.0000		
LIVE	LIVE	N/A	0.0000		
VIENTO	WIND	None	0.0000		
VIVACUB	SNOW	N/A	0.0000		

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RESPONSE SPECTRUM CASES

RESP SPEC CASE: SISDERX

BASIC RESPONSE SPECTRUM DATA

MODAL COMBO	DIRECTION COMBO	MODAL DAMPING	SPECTRUM ANGLE	TYPICAL ECCEN
SRSS	SRSS	0.0500	0.0000	0.0500

RESPONSE SPECTRUM FUNCTION ASSIGNMENT DATA

DIRECTION	FUNCTION	SCALE FACT
U1	DERIVAS	18.7860
U2	----	N/A
UZ	----	N/A

RESP SPEC CASE: SISDERY

BASIC RESPONSE SPECTRUM DATA

MODAL COMBO	DIRECTION COMBO	MODAL DAMPING	SPECTRUM ANGLE	TYPICAL ECCEN
SRSS	SRSS	0.0500	0.0000	0.0500

RESPONSE SPECTRUM FUNCTION ASSIGNMENT DATA

DIRECTION	FUNCTION	SCALE FACT
U1	----	N/A
U2	DERIVAS	17.1860
UZ	----	N/A

RESP SPEC CASE: SISDISX

BASIC RESPONSE SPECTRUM DATA

MODAL COMBO	DIRECTION COMBO	MODAL DAMPING	SPECTRUM ANGLE	TYPICAL ECCEN
SRSS	SRSS	0.0500	0.0000	0.0500

RESPONSE SPECTRUM FUNCTION ASSIGNMENT DATA

DIRECTION	FUNCTION	SCALE FACT
U1	DISENO	18.7860
U2	----	N/A
UZ	----	N/A

RESP SPEC CASE: SISDISY

BASIC RESPONSE SPECTRUM DATA

MODAL COMBO	DIRECTION COMBO	MODAL DAMPING	SPECTRUM ANGLE	TYPICAL ECCEN
SRSS	SRSS	0.0500	0.0000	0.0500

RESPONSE SPECTRUM FUNCTION ASSIGNMENT DATA

DIRECTION	FUNCTION	SCALE FACT
U1	----	N/A
U2	DISENO	17.1860
UZ	----	N/A

RESP SPEC CASE: SISUMBX

BASIC RESPONSE SPECTRUM DATA

MODAL COMBO	DIRECTION COMBO	MODAL DAMPING	SPECTRUM ANGLE	TYPICAL ECCEN
-------------	-----------------	---------------	----------------	---------------

SRSS SRSS 0.0200 0.0000 0.0500

RESPONSE SPECTRUM FUNCTION ASSIGNMENT DATA

DIRECTION	FUNCTION	SCALE FACT
U1	UMBRAL	21.0580
U2	----	N/A
UZ	----	N/A

RESP SPEC CASE: SISUMBY

BASIC RESPONSE SPECTRUM DATA

MODAL COMBO	DIRECTION COMBO	MODAL DAMPING	SPECTRUM ANGLE	TYPICAL ECCEN
SRSS	SRSS	0.0200	0.0000	0.0500

RESPONSE SPECTRUM FUNCTION ASSIGNMENT DATA

DIRECTION	FUNCTION	SCALE FACT
U1	----	N/A
U2	UMBRAL	19.1860
UZ	----	N/A

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L O A D I N G C O M B I N A T I O N S

COMBO	COMBO TYPE	CASE	CASE TYPE	SCALE FACTOR
COMDIS1	ADD	DEAD	Static	1.4000
COMDIS2	ADD	DEAD	Static	1.2000
COMDIS3	ADD	LIVE	Static	1.6000
		DEAD	Static	1.2000
		LIVE	Static	1.0000
COMDIS4	ADD	SISDISX	Spectra	1.0000
		SISDISY	Spectra	0.3000
		DEAD	Static	1.2000
		LIVE	Static	1.0000
COMDIS5	ADD	SISDISX	Spectra	0.3000
		SISDISY	Spectra	1.0000
		DEAD	Static	0.9000
COMDIS6	ADD	SISDISX	Spectra	1.0000
		SISDISY	Spectra	0.3000
		DEAD	Static	0.9000
COMDIS7	ADD	SISDISX	Spectra	0.3000
		SISDISY	Spectra	1.0000
COMDIS8	ADD	DEAD	Static	1.2000
		VIVACUB	Static	0.5000
		DEAD	Static	1.2000
COMDIS9	ADD	VIVACUB	Static	1.6000
		VIENTO	Static	0.5000
		DEAD	Static	1.2000
ENVOLVENTE	ENVE	VIVACUB	Static	1.6000
		VIENTO	Static	-0.5000
		COMDIS1	Combo	1.0000
		COMDIS2	Combo	1.0000
		COMDIS3	Combo	1.0000
		COMDIS4	Combo	1.0000
		COMDIS5	Combo	1.0000
		COMDIS6	Combo	1.0000
		COMDIS7	Combo	1.0000
		COMDIS8	Combo	1.0000
COMDIS9	Combo	1.0000		
COMDER1	ADD	SISDERX	Spectra	1.0000
		SISDERY	Spectra	0.3000
COMDER2	ADD	SISDERX	Spectra	0.3000
		SISDERY	Spectra	1.0000
CIMEN	ADD	DEAD	Static	1.0000
		LIVE	Static	1.0000
DEFLEX1	ADD	DEAD	Static	1.0000
DEFLEX2	ADD	DEAD	Static	1.0000
		LIVE	Static	1.0000
COMDERUMX	ADD	SISUMBX	Spectra	1.0000

COMDERUMY	ADD	SISUMBY	Spectra	0.3000
		SISUMBX	Spectra	0.3000
		SISUMBY	Spectra	1.0000
COMDIS10	ADD	DEAD	Static	1.2000
		VIVACUB	Static	0.5000
		VIENTO	Static	1.0000
COMDIS11	ADD	DEAD	Static	1.2000
		VIVACUB	Static	0.5000
		VIENTO	Static	-1.0000

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R E S P O N S E S P E C T R U M F U N C T I O N - F R O M F I L E

FUNCTION NAME: DERIVAS

FILE NAME: c:\users\jair useche\desktop\proyectos abby\dye14-2059 - cae el redentor\bloque b1\modelo\derivadas.txt
 DATA TYPE: Period vs Acceleration
 NUMBER OF HEADER LINES = 0

PERIOD	ACCEL
0.0000	0.5630
0.1600	0.5630
0.3200	0.5630
0.4800	0.5630
0.6400	0.5630
0.8000	0.5630
0.9600	0.5630
1.1200	0.5630
1.3031	0.4830
1.4862	0.4240
1.6692	0.3770
1.8523	0.3400
2.0354	0.3100
2.2185	0.2840
2.4015	0.2620
2.5846	0.2440
2.7677	0.2280
2.9508	0.2140
3.1338	0.2010
3.3169	0.1900
3.5000	0.1800
4.0625	0.1340
4.6250	0.1030
5.1875	0.0820
5.7500	0.0670
6.3125	0.0550
6.8750	0.0470
7.4375	0.0400
8.0000	0.0345

FUNCTION NAME: DISENO

FILE NAME: c:\users\jair useche\desktop\proyectos abby\dye14-2059 - cae el redentor\bloque b1\modelo\diseño.txt
 DATA TYPE: Period vs Acceleration
 NUMBER OF HEADER LINES = 0

PERIOD	ACCEL
0.0000	0.1667
0.1600	0.1667
0.3200	0.1667
0.4800	0.1667
0.6400	0.1667
0.8000	0.1667
0.9600	0.1667
1.1200	0.1667
1.3031	0.1433
1.4862	0.1256
1.6692	0.1118
1.8523	0.1008
2.0354	0.0917
2.2185	0.0841
2.4015	0.0777
2.5846	0.0722
2.7677	0.0674
2.9508	0.0633

3.1338	0.0596
3.3169	0.0563
3.5000	0.0533
4.0625	0.0396
4.6250	0.0305
5.1875	0.0243
5.7500	0.0198
6.3125	0.0164
6.8750	0.0138
7.4375	0.0118
8.0000	0.0102

FUNCTION NAME: UMBRAL

FILE NAME: c:\users\jair useche\desktop\proyectos abby\dye14-2059 - cae el redentor\bloque b1\modelo\umbral.txt
 DATA TYPE: Period vs Acceleration
 NUMBER OF HEADER LINES = 0

PERIOD	ACCEL
0.0000	0.0800
0.2100	0.2520
0.2792	0.2520
0.3483	0.2520
0.4175	0.2520
0.4867	0.2520
0.5558	0.2520
0.6250	0.2520
0.6942	0.2520
0.7633	0.2520
0.8325	0.2520
0.9017	0.2520
0.9708	0.2520
1.0400	0.2520
1.3475	0.1937
1.6550	0.1577
1.9625	0.1330
2.2700	0.1150
2.5775	0.1013
2.8850	0.0905
3.1925	0.0818
3.5000	0.0746
4.0625	0.0554
4.6250	0.0427
5.1875	0.0339
5.7500	0.0276
6.3125	0.0229
6.8750	0.0193
7.4375	0.0165
8.0000	0.0143

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F R A M E S E C T I O N A S S I G N M E N T S T O L I N E O B J E C T S

STORY LEVEL	LINE ID	LINE TYPE	SECTION TYPE	AUTO SELECT SECTION	ANALYSIS SECTION	DESIGN PROCEDURE	DESIGN SECTION
N+17.00	C5-1	Column	Box/Tube	None	TEC1-150X15	Steel Frame	TEC1-150X15
N+17.00	C4-1	Column	Box/Tube	None	TEC1-150X15	Steel Frame	TEC1-150X15
N+17.00	C8-1	Column	Box/Tube	None	TEC1-150X15	Steel Frame	TEC1-150X15
N+17.00	C9-1	Column	Box/Tube	None	TEC1-150X15	Steel Frame	TEC1-150X15
N+17.00	C6-1	Column	Box/Tube	None	TEC1-150X15	Steel Frame	TEC1-150X15
N+17.00	C7-1	Column	Box/Tube	None	TEC1-150X15	Steel Frame	TEC1-150X15
N+8.90	C1	Column	Rectangular	None	COL45X45	Conc Frame	COL45X45
N+8.90	C2	Column	Rectangular	None	COL45X45	Conc Frame	COL45X45
N+8.90	C3	Column	Rectangular	None	COL45X45	Conc Frame	COL45X45
N+8.90	C4	Column	Rectangular	None	COL45X45	Conc Frame	COL45X45
N+8.90	C5	Column	Rectangular	None	COL45X45	Conc Frame	COL45X45
N+8.90	C6	Column	Rectangular	None	COL45X45	Conc Frame	COL45X45
N+8.90	C7	Column	Rectangular	None	COL45X45	Conc Frame	COL45X45
N+8.90	C8	Column	Rectangular	None	COL45X45	Conc Frame	COL45X45
N+8.90	C9	Column	Rectangular	None	COL45X45	Conc Frame	COL45X45
N+8.90	C10	Column	Rectangular	None	COL45X45	Conc Frame	COL45X45
N+8.90	C11	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+8.90	C12	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+8.90	C13	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+8.90	C14	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+8.90	C15	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50

N+8.90	C16	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+4.45	C1	Column	Rectangular	None	COL45X45	Conc Frame	COL45X45
N+4.45	C2	Column	Rectangular	None	COL45X45	Conc Frame	COL45X45
N+4.45	C3	Column	Rectangular	None	COL45X45	Conc Frame	COL45X45
N+4.45	C4	Column	Rectangular	None	COL45X45	Conc Frame	COL45X45
N+4.45	C5	Column	Rectangular	None	COL45X45	Conc Frame	COL45X45
N+4.45	C6	Column	Rectangular	None	COL45X45	Conc Frame	COL45X45
N+4.45	C7	Column	Rectangular	None	COL45X45	Conc Frame	COL45X45
N+4.45	C8	Column	Rectangular	None	COL45X45	Conc Frame	COL45X45
N+4.45	C9	Column	Rectangular	None	COL45X45	Conc Frame	COL45X45
N+4.45	C10	Column	Rectangular	None	COL45X45	Conc Frame	COL45X45
N+4.45	C11	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+4.45	C12	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+4.45	C13	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+4.45	C14	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+4.45	C15	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+4.45	C16	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+17.00	B17	Beam	Box/Tube	None	TER1-150X25	Steel Frame	TER1-150X25
N+17.00	B18	Beam	Box/Tube	None	TER2-200X40	Steel Frame	TER2-200X40
N+17.00	B19	Beam	Box/Tube	None	TER1-150X25	Steel Frame	TER1-150X25
N+17.00	B20	Beam	Box/Tube	None	TER1-150X25	Steel Frame	TER1-150X25
N+17.00	B21	Beam	Box/Tube	None	TER1-150X25	Steel Frame	TER1-150X25
N+17.00	B22	Beam	Box/Tube	None	TER1-150X25	Steel Frame	TER1-150X25
N+17.00	B23	Beam	Box/Tube	None	TER1-150X25	Steel Frame	TER1-150X25
N+8.90	B1	Beam	Rectangular	None	VIGA30X50	Conc Frame	VIGA30X50
N+8.90	B2	Beam	Rectangular	None	VIGA30X50	Conc Frame	VIGA30X50
N+8.90	B3	Beam	Rectangular	None	VIGA30X50	Conc Frame	VIGA30X50
N+8.90	B4	Beam	Rectangular	None	VIGA30X50	Conc Frame	VIGA30X50
N+8.90	B5	Beam	Rectangular	None	VIGA30X50	Conc Frame	VIGA30X50
N+8.90	B6	Beam	Rectangular	None	VIGA30X50	Conc Frame	VIGA30X50
N+8.90	B7	Beam	Rectangular	None	VIGA30X50	Conc Frame	VIGA30X50
N+8.90	B8	Beam	Rectangular	None	VIGA30X50	Conc Frame	VIGA30X50
N+8.90	B9	Beam	Rectangular	None	VIGA30X50	Conc Frame	VIGA30X50
N+8.90	B10	Beam	Rectangular	None	VIGA30X50	Conc Frame	VIGA30X50
N+8.90	B11	Beam	Rectangular	None	VIGA30X50	Conc Frame	VIGA30X50
N+8.90	B12	Beam	Rectangular	None	VIGA30X50	Conc Frame	VIGA30X50
N+8.90	B13	Beam	Rectangular	None	VIGA30X50	Conc Frame	VIGA30X50
N+8.90	B14	Beam	Rectangular	None	VIGA30X50	Conc Frame	VIGA30X50
N+8.90	B15	Beam	Rectangular	None	VIGA30X50	Conc Frame	VIGA30X50
N+8.90	B16	Beam	Rectangular	None	VIGA30X50	Conc Frame	VIGA30X50
N+4.45	B1	Beam	Rectangular	None	VIGA30X50	Conc Frame	VIGA30X50
N+4.45	B2	Beam	Rectangular	None	VIGA30X50	Conc Frame	VIGA30X50
N+4.45	B3	Beam	Rectangular	None	VIGA30X50	Conc Frame	VIGA30X50
N+4.45	B4	Beam	Rectangular	None	VIGA30X50	Conc Frame	VIGA30X50
N+4.45	B5	Beam	Rectangular	None	VIGA30X50	Conc Frame	VIGA30X50
N+4.45	B6	Beam	Rectangular	None	VIGA30X50	Conc Frame	VIGA30X50
N+4.45	B7	Beam	Rectangular	None	VIGA30X50	Conc Frame	VIGA30X50
N+4.45	B8	Beam	Rectangular	None	VIGA30X50	Conc Frame	VIGA30X50
N+4.45	B9	Beam	Rectangular	None	VIGA30X50	Conc Frame	VIGA30X50
N+4.45	B10	Beam	Rectangular	None	VIGA30X50	Conc Frame	VIGA30X50
N+4.45	B11	Beam	Rectangular	None	VIGA30X50	Conc Frame	VIGA30X50
N+4.45	B12	Beam	Rectangular	None	VIGA30X50	Conc Frame	VIGA30X50
N+4.45	B13	Beam	Rectangular	None	VIGA30X50	Conc Frame	VIGA30X50
N+4.45	B14	Beam	Rectangular	None	VIGA30X50	Conc Frame	VIGA30X50
N+4.45	B15	Beam	Rectangular	None	VIGA30X50	Conc Frame	VIGA30X50
N+4.45	B16	Beam	Rectangular	None	VIGA30X50	Conc Frame	VIGA30X50
N+17.00	D4	Brace	Box/Tube	None	TER2-200X40	Steel Frame	TER2-200X40
N+17.00	D7	Brace	Box/Tube	None	TER1-150X25	Steel Frame	TER1-150X25
N+17.00	D8	Brace	Box/Tube	None	TER1-150X25	Steel Frame	TER1-150X25
N+17.00	D9	Brace	Box/Tube	None	TER1-150X25	Steel Frame	TER1-150X25
N+17.00	D10	Brace	Box/Tube	None	TER1-150X25	Steel Frame	TER1-150X25
N+17.00	D11	Brace	Box/Tube	None	TER1-150X25	Steel Frame	TER1-150X25
N+17.00	D12	Brace	Box/Tube	None	TER1-150X25	Steel Frame	TER1-150X25
N+17.00	D13	Brace	Box/Tube	None	TER1-150X25	Steel Frame	TER1-150X25
N+17.00	D14	Brace	Box/Tube	None	TER1-150X25	Steel Frame	TER1-150X25
N+17.00	D15	Brace	Box/Tube	None	TER1-150X25	Steel Frame	TER1-150X25
N+17.00	D16	Brace	Box/Tube	None	TER1-150X25	Steel Frame	TER1-150X25
N+17.00	D25	Brace	Box/Tube	None	TER2-200X40	Steel Frame	TER2-200X40
N+17.00	D26	Brace	Box/Tube	None	TER2-200X40	Steel Frame	TER2-200X40
N+17.00	D27	Brace	Box/Tube	None	TER2-200X40	Steel Frame	TER2-200X40

PROYECTO: CENTRO DE ATENCIÓN ESPECIALIZADA - EL REDENTOR, BLOQUE B1, BOGOTÁ (CUNDINAMARCA)

FUERZAS EN VIGAS

BEAM FORCES

UNID: kN-m

Story	Beam	Load	Loc	P	V2	T	M3
N+8.90	B1	ENVOLVENTE MAX	0	11.13	3.5	8.708	23.878
N+8.90	B1	ENVOLVENTE MAX	4.85	11.13	22.13	8.708	15.638
N+8.90	B1	ENVOLVENTE MIN	0	-12.94	-19.78	-16.008	-32.226
N+8.90	B1	ENVOLVENTE MIN	4.85	-12.94	-1.74	-16.008	-33.98
N+4.45	B1	ENVOLVENTE MAX	0	3.62	9.17	7.051	36.402
N+4.45	B1	ENVOLVENTE MAX	4.85	3.62	27.68	7.051	31.729
N+4.45	B1	ENVOLVENTE MIN	0	-0.64	-26.28	-14.224	-47.334
N+4.45	B1	ENVOLVENTE MIN	4.85	-0.64	-8.12	-14.224	-48.61
N+8.90	B2	ENVOLVENTE MAX	0	5	1.01	11.93	14.323
N+8.90	B2	ENVOLVENTE MAX	4.93	5	19.48	11.93	19.726
N+8.90	B2	ENVOLVENTE MIN	0	-6.72	-20.81	-2.355	-32.504
N+8.90	B2	ENVOLVENTE MIN	4.93	-6.72	-2.01	-2.355	-32.147
N+4.45	B2	ENVOLVENTE MAX	0	4.17	6.8	4.009	29.847
N+4.45	B2	ENVOLVENTE MAX	4.93	4.17	25.35	4.009	31.174
N+4.45	B2	ENVOLVENTE MIN	0	-1.33	-26.03	-14.32	-46.631
N+4.45	B2	ENVOLVENTE MIN	4.93	-1.33	-7.31	-14.32	-45.024
N+8.90	B3	ENVOLVENTE MAX	0	5.09	2.02	2.113	19.736
N+8.90	B3	ENVOLVENTE MAX	4.93	5.09	20.83	2.113	14.313
N+8.90	B3	ENVOLVENTE MIN	0	-6.81	-19.48	-12.026	-32.164
N+8.90	B3	ENVOLVENTE MIN	4.93	-6.81	-1.01	-12.026	-32.572
N+4.45	B3	ENVOLVENTE MAX	0	4.15	7.33	14.211	31.202
N+4.45	B3	ENVOLVENTE MAX	4.93	4.15	26.05	14.211	29.908
N+4.45	B3	ENVOLVENTE MIN	0	-1.31	-25.37	-3.876	-45.072
N+4.45	B3	ENVOLVENTE MIN	4.93	-1.31	-6.82	-3.876	-46.711
N+8.90	B4	ENVOLVENTE MAX	0	11.28	1.38	15.982	15.317
N+8.90	B4	ENVOLVENTE MAX	4.93	11.28	19.72	15.982	23.494
N+8.90	B4	ENVOLVENTE MIN	0	-13.23	-22.05	-8.716	-34.111
N+8.90	B4	ENVOLVENTE MIN	4.93	-13.23	-3.12	-8.716	-32.225
N+4.45	B4	ENVOLVENTE MAX	0	3.72	7.58	14.19	31.19
N+4.45	B4	ENVOLVENTE MAX	4.93	3.72	26.04	14.19	35.822
N+4.45	B4	ENVOLVENTE MIN	0	-0.66	-27.43	-7.066	-48.561
N+4.45	B4	ENVOLVENTE MIN	4.93	-0.66	-8.62	-7.066	-47.179
N+8.90	B5	ENVOLVENTE MAX	0	12.4	5.56	16.909	30.784
N+8.90	B5	ENVOLVENTE MAX	4.85	12.4	24.18	16.909	18.715
N+8.90	B5	ENVOLVENTE MIN	0	-12.68	-21.93	-8.408	-39.736
N+8.90	B5	ENVOLVENTE MIN	4.85	-12.68	-3.88	-8.408	-37.221
N+4.45	B5	ENVOLVENTE MAX	0	4.17	10.37	15.229	39.147
N+4.45	B5	ENVOLVENTE MAX	4.85	4.17	28.89	15.229	34.567
N+4.45	B5	ENVOLVENTE MIN	0	-1.59	-27.35	-7.2	-49.766
N+4.45	B5	ENVOLVENTE MIN	4.85	-1.59	-9.21	-7.2	-51.713
N+8.90	B6	ENVOLVENTE MAX	0	10.91	5.72	1.686	21.203
N+8.90	B6	ENVOLVENTE MAX	4.93	10.91	24.14	1.686	37.011
N+8.90	B6	ENVOLVENTE MIN	0	-11.3	-25.84	-7.397	-40.095
N+8.90	B6	ENVOLVENTE MIN	4.93	-11.3	-6.99	-7.397	-48.581
N+4.45	B6	ENVOLVENTE MAX	0	7.12	7.42	17.815	31.892
N+4.45	B6	ENVOLVENTE MAX	4.93	7.12	25.94	17.815	32.641
N+4.45	B6	ENVOLVENTE MIN	0	-4.47	-26.85	-4.329	-49.179
N+4.45	B6	ENVOLVENTE MIN	4.93	-4.47	-8.1	-4.329	-45.998
N+8.90	B7	ENVOLVENTE MAX	0	10.88	7	7.468	36.999
N+8.90	B7	ENVOLVENTE MAX	4.93	10.88	25.85	7.468	21.186
N+8.90	B7	ENVOLVENTE MIN	0	-11.24	-24.14	-1.479	-48.596
N+8.90	B7	ENVOLVENTE MIN	4.93	-11.24	-5.72	-1.479	-40.144
N+4.45	B7	ENVOLVENTE MAX	0	7.05	8.12	4.211	32.668
N+4.45	B7	ENVOLVENTE MAX	4.93	7.05	26.87	4.211	31.957
N+4.45	B7	ENVOLVENTE MIN	0	-4.42	-25.96	-17.677	-46.047
N+4.45	B7	ENVOLVENTE MIN	4.93	-4.42	-7.44	-17.677	-49.26
N+8.90	B8	ENVOLVENTE MAX	0	12.54	3.48	8.418	18.404
N+8.90	B8	ENVOLVENTE MAX	4.93	12.54	21.84	8.418	30.377
N+8.90	B8	ENVOLVENTE MIN	0	-12.95	-24.06	-16.823	-37.346
N+8.90	B8	ENVOLVENTE MIN	4.93	-12.95	-5.15	-16.823	-39.727
N+4.45	B8	ENVOLVENTE MAX	0	4.28	8.65	7.207	34.006
N+4.45	B8	ENVOLVENTE MAX	4.93	4.28	27.09	7.207	38.554
N+4.45	B8	ENVOLVENTE MIN	0	-1.62	-28.62	-15.127	-51.641
N+4.45	B8	ENVOLVENTE MIN	4.93	-1.62	-9.79	-15.127	-49.598
N+8.90	B9	ENVOLVENTE MAX	0	31.74	3.83	14.28	26.049
N+8.90	B9	ENVOLVENTE MAX	4.85	31.74	22.55	14.28	14.943
N+8.90	B9	ENVOLVENTE MIN	0	-8.56	-19.52	-14.084	-31.598
N+8.90	B9	ENVOLVENTE MIN	4.85	-8.56	-1.57	-14.084	-33.325
N+4.45	B9	ENVOLVENTE MAX	0	6.67	9.98	12.27	39.866
N+4.45	B9	ENVOLVENTE MAX	4.85	6.67	28.34	12.27	33.738

N+4.45	B9	ENVOLVENTE MIN	0	-1.97	-28.19	-11.625	-54.36
N+4.45	B9	ENVOLVENTE MIN	4.85	-1.97	-9.88	-11.625	-48.831
N+8.90	B10	ENVOLVENTE MAX	0	24.46	-0.03	6.714	12.675
N+8.90	B10	ENVOLVENTE MAX	4.93	24.46	18.56	6.714	13.889
N+8.90	B10	ENVOLVENTE MIN	0	-2.65	-18.96	-6.823	-29.193
N+8.90	B10	ENVOLVENTE MIN	4.93	-2.65	-0.27	-6.823	-28.682
N+4.45	B10	ENVOLVENTE MAX	0	4.07	6.68	6.469	29.311
N+4.45	B10	ENVOLVENTE MAX	4.93	4.07	25.32	6.469	29.803
N+4.45	B10	ENVOLVENTE MIN	0	-0.66	-25.27	-6.679	-44.478
N+4.45	B10	ENVOLVENTE MIN	4.93	-0.66	-6.64	-6.679	-45.167
N+8.90	B11	ENVOLVENTE MAX	0	18.58	0.08	8.294	13.492
N+8.90	B11	ENVOLVENTE MAX	4.93	18.58	18.76	8.294	12.354
N+8.90	B11	ENVOLVENTE MIN	0	-1.59	-18.43	-7.78	-28.317
N+8.90	B11	ENVOLVENTE MIN	4.93	-1.59	0.17	-7.78	-28.607
N+4.45	B11	ENVOLVENTE MAX	0	3.29	6.55	7.405	29.585
N+4.45	B11	ENVOLVENTE MAX	4.93	3.29	25.18	7.405	29.111
N+4.45	B11	ENVOLVENTE MIN	0	-0.69	-25.25	-7.076	-45.02
N+4.45	B11	ENVOLVENTE MIN	4.93	-0.69	-6.6	-7.076	-44.251
N+8.90	B12	ENVOLVENTE MAX	0	25.55	1.96	12.881	15.741
N+8.90	B12	ENVOLVENTE MAX	4.85	25.55	20.05	12.881	24.477
N+8.90	B12	ENVOLVENTE MIN	0	-7.52	-21.97	-13.371	-32.58
N+8.90	B12	ENVOLVENTE MIN	4.85	-7.52	-3.4	-13.371	-33.14
N+4.45	B12	ENVOLVENTE MAX	0	4.8	9.92	11.013	33.947
N+4.45	B12	ENVOLVENTE MAX	4.85	4.8	28.22	11.013	40.174
N+4.45	B12	ENVOLVENTE MIN	0	-2.1	-28.46	-11.786	-49.088
N+4.45	B12	ENVOLVENTE MIN	4.85	-2.1	-10.1	-11.786	-54.272
N+8.90	B13	ENVOLVENTE MAX	0	31.52	3.61	14.207	25.462
N+8.90	B13	ENVOLVENTE MAX	4.85	31.52	22.32	14.207	14.421
N+8.90	B13	ENVOLVENTE MIN	0	-8.44	-19.29	-14.342	-30.983
N+8.90	B13	ENVOLVENTE MIN	4.85	-8.44	-1.33	-14.342	-32.821
N+4.45	B13	ENVOLVENTE MAX	0	6.68	9.56	11.752	38.783
N+4.45	B13	ENVOLVENTE MAX	4.85	6.68	27.92	11.752	32.765
N+4.45	B13	ENVOLVENTE MIN	0	-1.88	-27.76	-12.353	-53.252
N+4.45	B13	ENVOLVENTE MIN	4.85	-1.88	-9.45	-12.353	-47.875
N+8.90	B14	ENVOLVENTE MAX	0	24.29	-0.22	6.867	12.195
N+8.90	B14	ENVOLVENTE MAX	4.93	24.29	18.36	6.867	13.408
N+8.90	B14	ENVOLVENTE MIN	0	-2.61	-18.76	-6.753	-28.716
N+8.90	B14	ENVOLVENTE MIN	4.93	-2.61	-0.08	-6.753	-28.201
N+4.45	B14	ENVOLVENTE MAX	0	4.09	6.32	6.715	28.431
N+4.45	B14	ENVOLVENTE MAX	4.93	4.09	24.96	6.715	28.91
N+4.45	B14	ENVOLVENTE MIN	0	-0.64	-24.91	-6.501	-43.598
N+4.45	B14	ENVOLVENTE MIN	4.93	-0.64	-6.28	-6.501	-44.276
N+8.90	B15	ENVOLVENTE MAX	0	18.46	-0.11	7.813	13.019
N+8.90	B15	ENVOLVENTE MAX	4.93	18.46	18.57	7.813	11.883
N+8.90	B15	ENVOLVENTE MIN	0	-1.55	-18.23	-8.343	-27.84
N+8.90	B15	ENVOLVENTE MIN	4.93	-1.55	0.36	-8.343	-28.143
N+4.45	B15	ENVOLVENTE MAX	0	3.29	6.19	7.112	28.698
N+4.45	B15	ENVOLVENTE MAX	4.93	3.29	24.82	7.112	28.234
N+4.45	B15	ENVOLVENTE MIN	0	-0.68	-24.89	-7.449	-44.13
N+4.45	B15	ENVOLVENTE MIN	4.93	-0.68	-6.24	-7.449	-43.379
N+8.90	B16	ENVOLVENTE MAX	0	25.4	1.72	13.44	15.214
N+8.90	B16	ENVOLVENTE MAX	4.85	25.4	19.81	13.44	23.88
N+8.90	B16	ENVOLVENTE MIN	0	-7.38	-21.75	-13.003	-32.067
N+8.90	B16	ENVOLVENTE MIN	4.85	-7.38	-3.17	-13.003	-32.523
N+4.45	B16	ENVOLVENTE MAX	0	4.73	9.48	11.869	32.966
N+4.45	B16	ENVOLVENTE MAX	4.85	4.73	27.79	11.869	39.078
N+4.45	B16	ENVOLVENTE MIN	0	-2.01	-28.04	-11.136	-48.118
N+4.45	B16	ENVOLVENTE MIN	4.85	-2.01	-9.67	-11.136	-53.156
N+17.00	B17	ENVOLVENTE MAX	0	-1.93	-2.88	2.398	-2.735
N+17.00	B17	ENVOLVENTE MAX	3.05	-1.93	4.44	2.398	4.143
N+17.00	B17	ENVOLVENTE MIN	0	-14.46	-16.61	-0.897	-19.269
N+17.00	B17	ENVOLVENTE MIN	3.05	-14.46	-0.41	-0.897	-1.405
N+17.00	B18	ENVOLVENTE MAX	0	-6.14	-7.31	4.49	-7.705
N+17.00	B18	ENVOLVENTE MAX	3.05	-6.14	3.03	4.49	53.797
N+17.00	B18	ENVOLVENTE MIN	0	-80.5	-47.58	-4.457	-54.381
N+17.00	B18	ENVOLVENTE MIN	3.05	-80.5	-9.74	-4.457	-11.739
N+17.00	B19	ENVOLVENTE MAX	0	-1.96	-2.9	0.899	-2.751
N+17.00	B19	ENVOLVENTE MAX	3.05	-1.96	4.43	0.899	4.172
N+17.00	B19	ENVOLVENTE MIN	0	-14.51	-16.62	-2.403	-19.287
N+17.00	B19	ENVOLVENTE MIN	3.05	-14.51	-0.4	-2.403	-1.364
N+17.00	B20	ENVOLVENTE MAX	0	2.58	0.29	-0.423	13.539
N+17.00	B20	ENVOLVENTE MAX	9.78	2.58	10.74	-0.423	13.642
N+17.00	B20	ENVOLVENTE MIN	0	-3.88	-10.45	-1.746	-21.142
N+17.00	B20	ENVOLVENTE MIN	9.78	-3.88	-0.13	-1.746	-23.079
N+17.00	B21	ENVOLVENTE MAX	0	2.56	0.06	1.732	13.502
N+17.00	B21	ENVOLVENTE MAX	9.86	2.56	10.52	1.732	13.492
N+17.00	B21	ENVOLVENTE MIN	0	-3.87	-10.83	0.42	-23.099
N+17.00	B21	ENVOLVENTE MIN	9.86	-3.87	-0.23	0.42	-21.179
N+17.00	B22	ENVOLVENTE MAX	0	1.48	1.61	-0.27	19.867
N+17.00	B22	ENVOLVENTE MAX	9.78	1.48	11.12	-0.27	17.525
N+17.00	B22	ENVOLVENTE MIN	0	-2.95	-9.8	-1.92	-26.956

N+17.00	B22	ENVOLVENTE MIN	9.78	-2.95	-1.14	-1.92	-29.948
N+17.00	B23	ENVOLVENTE MAX	0	1.47	1.06	1.904	17.345
N+17.00	B23	ENVOLVENTE MAX	9.86	1.47	9.89	1.904	19.734
N+17.00	B23	ENVOLVENTE MIN	0	-2.96	-11.19	0.268	-29.89
N+17.00	B23	ENVOLVENTE MIN	9.86	-2.96	-1.52	0.268	-26.961

FUERZAS EN COLUMNAS

BEAM FORCES

UNID: kN-m

Story	Column	Load	Loc	P	V2	V3	T	M2	M3
N+8.90	C1	ENVOLVENTE MAX	0	-24.44	6.75	11.77	20.996	21.183	12.39
N+8.90	C1	ENVOLVENTE MAX	4.45	-4.98	6.75	11.77	20.996	21.543	26.512
N+8.90	C1	ENVOLVENTE MIN	0	-77.87	-10.35	-8.24	-13.944	-15.235	-19.712
N+8.90	C1	ENVOLVENTE MIN	4.45	-51.92	-10.35	-8.24	-13.944	-31.269	-17.818
N+4.45	C1	ENVOLVENTE MAX	0	-36.84	13.67	17.16	15.421	48.861	39.817
N+4.45	C1	ENVOLVENTE MAX	4.5	-17.16	13.67	17.16	15.421	27.522	26.247
N+4.45	C1	ENVOLVENTE MIN	0	-140.16	-15.14	-16.85	-10.291	-48.437	-42.071
N+4.45	C1	ENVOLVENTE MIN	4.5	-113.92	-15.14	-16.85	-10.291	-28.499	-21.865
N+8.90	C2	ENVOLVENTE MAX	0	-25.24	10.4	11.54	14.135	20.785	19.752
N+8.90	C2	ENVOLVENTE MAX	4.45	-5.78	10.4	11.54	14.135	20.904	17.66
N+8.90	C2	ENVOLVENTE MIN	0	-78.07	-6.67	-8.01	-21.083	-14.823	-12.176
N+8.90	C2	ENVOLVENTE MIN	4.45	-52.12	-6.67	-8.01	-21.083	-30.643	-26.684
N+4.45	C2	ENVOLVENTE MAX	0	-38.87	15.16	16.74	10.44	47.665	42.103
N+4.45	C2	ENVOLVENTE MAX	4.5	-19.19	15.16	16.74	10.44	26.83	21.771
N+4.45	C2	ENVOLVENTE MIN	0	-138.78	-13.65	-16.43	-15.489	-47.232	-39.811
N+4.45	C2	ENVOLVENTE MIN	4.5	-112.54	-13.65	-16.43	-15.489	-27.823	-26.285
N+8.90	C3	ENVOLVENTE MAX	0	-24.86	7.06	7.7	14.697	14.645	14.497
N+8.90	C3	ENVOLVENTE MAX	4.45	-5.4	7.06	7.7	14.697	31.968	25.103
N+8.90	C3	ENVOLVENTE MIN	0	-106.43	-10.25	-11.89	-21.44	-21.043	-21.305
N+8.90	C3	ENVOLVENTE MIN	4.45	-80.47	-10.25	-11.89	-21.44	-19.708	-17.719
N+4.45	C3	ENVOLVENTE MAX	0	-37.05	13.89	16.77	10.66	48.234	40.743
N+4.45	C3	ENVOLVENTE MAX	4.5	-17.37	13.89	16.77	10.66	28.158	26.432
N+4.45	C3	ENVOLVENTE MIN	0	-159	-15.39	-17.08	-15.684	-48.851	-43.024
N+4.45	C3	ENVOLVENTE MIN	4.5	-132.76	-15.39	-17.08	-15.684	-27.392	-21.977
N+8.90	C4	ENVOLVENTE MAX	0	-37.16	8.25	17.88	19.708	36.227	26.727
N+8.90	C4	ENVOLVENTE MAX	4.45	-17.69	8.25	17.88	19.708	41.999	16.686
N+8.90	C4	ENVOLVENTE MIN	0	-101.75	-7.45	-17.47	-19.164	-35.759	-26.099
N+8.90	C4	ENVOLVENTE MIN	4.45	-75.8	-7.45	-17.47	-19.164	-43.347	-19.584
N+4.45	C4	ENVOLVENTE MAX	0	-69.59	13.73	21.18	15.29	54.85	73.594
N+4.45	C4	ENVOLVENTE MAX	4.5	-49.91	13.73	21.18	15.29	41.025	20.61
N+4.45	C4	ENVOLVENTE MIN	0	-149.1	-12.25	-21.4	-14.77	-55.301	-67.149
N+4.45	C4	ENVOLVENTE MIN	4.5	-122.85	-12.25	-21.4	-14.77	-40.484	-20.837
N+8.90	C5	ENVOLVENTE MAX	0	-43.77	11.53	16.75	5.987	33.927	35.389
N+8.90	C5	ENVOLVENTE MAX	4.45	-24.31	11.53	16.75	5.987	40.515	21.469
N+8.90	C5	ENVOLVENTE MIN	0	-91.95	-11.12	-16.69	-6.309	-33.765	-35.285
N+8.90	C5	ENVOLVENTE MIN	4.45	-66	-11.12	-16.69	-6.309	-40.613	-23.184
N+4.45	C5	ENVOLVENTE MAX	0	-79.55	18.6	20.79	5.222	54.296	99.013
N+4.45	C5	ENVOLVENTE MAX	4.5	-59.87	18.6	20.79	5.222	39.525	25.881
N+4.45	C5	ENVOLVENTE MIN	0	-139.56	-17.81	-20.9	-5.364	-54.551	-94.781
N+4.45	C5	ENVOLVENTE MIN	4.5	-113.31	-17.81	-20.9	-5.364	-39.292	-25.236
N+8.90	C6	ENVOLVENTE MAX	0	-43.57	7.5	17.58	19.591	35.937	23.464
N+8.90	C6	ENVOLVENTE MAX	4.45	-24.11	7.5	17.58	19.591	42.936	13.235
N+8.90	C6	ENVOLVENTE MIN	0	-98.19	-6.76	-17.71	-20.094	-35.904	-22.041
N+8.90	C6	ENVOLVENTE MIN	4.45	-72.24	-6.76	-17.71	-20.094	-42.294	-15.076
N+4.45	C6	ENVOLVENTE MAX	0	-75.91	13.22	21.28	15.02	55.02	70.232
N+4.45	C6	ENVOLVENTE MAX	4.5	-56.23	13.22	21.28	15.02	40.789	18.696
N+4.45	C6	ENVOLVENTE MIN	0	-145.9	-11.81	-21.31	-15.494	-55.134	-63.577
N+4.45	C6	ENVOLVENTE MIN	4.5	-119.65	-11.81	-21.31	-15.494	-40.756	-18.375
N+8.90	C7	ENVOLVENTE MAX	0	-43.62	6.83	17.16	20.312	35.106	22.25
N+8.90	C7	ENVOLVENTE MAX	4.45	-24.16	6.83	17.16	20.312	41.941	15.109
N+8.90	C7	ENVOLVENTE MIN	0	-98.19	-7.55	-17.3	-19.781	-35.079	-23.625
N+8.90	C7	ENVOLVENTE MIN	4.45	-72.24	-7.55	-17.3	-19.781	-41.293	-13.299
N+4.45	C7	ENVOLVENTE MAX	0	-76.04	11.92	20.76	15.662	53.671	64.131
N+4.45	C7	ENVOLVENTE MAX	4.5	-56.35	11.92	20.76	15.662	39.799	18.558
N+4.45	C7	ENVOLVENTE MIN	0	-145.9	-13.3	-20.79	-15.173	-53.783	-70.652
N+4.45	C7	ENVOLVENTE MIN	4.5	-119.65	-13.3	-20.79	-15.173	-39.764	-18.862
N+8.90	C8	ENVOLVENTE MAX	0	-43.81	11.27	16.35	6.073	33.142	35.659
N+8.90	C8	ENVOLVENTE MAX	4.45	-24.34	11.27	16.35	6.073	39.547	23.416
N+8.90	C8	ENVOLVENTE MIN	0	-91.97	-11.66	-16.29	-5.743	-32.977	-35.699
N+8.90	C8	ENVOLVENTE MIN	4.45	-66.02	-11.66	-16.29	-5.743	-39.647	-21.695
N+4.45	C8	ENVOLVENTE MAX	0	-79.59	18.05	20.28	5.154	52.962	95.974
N+4.45	C8	ENVOLVENTE MAX	4.5	-59.9	18.05	20.28	5.154	38.563	25.507
N+4.45	C8	ENVOLVENTE MIN	0	-139.57	-18.83	-20.39	-5.008	-53.215	-100.061
N+4.45	C8	ENVOLVENTE MIN	4.5	-113.33	-18.83	-20.39	-5.008	-38.332	-26.098
N+8.90	C9	ENVOLVENTE MAX	0	-37.29	7.53	17.47	19.363	35.409	26.305
N+8.90	C9	ENVOLVENTE MAX	4.45	-17.83	7.53	17.47	19.363	40.998	19.627
N+8.90	C9	ENVOLVENTE MIN	0	-101.76	-8.31	-17.06	-19.934	-34.927	-26.866
N+8.90	C9	ENVOLVENTE MIN	4.45	-75.81	-8.31	-17.06	-19.934	-42.362	-16.744
N+4.45	C9	ENVOLVENTE MAX	0	-69.8	12.37	20.66	14.927	53.504	67.752
N+4.45	C9	ENVOLVENTE MAX	4.5	-50.11	12.37	20.66	14.927	40.035	21.022
N+4.45	C9	ENVOLVENTE MIN	0	-149.11	-13.82	-20.88	-15.462	-53.952	-74.047

PROYECTO: CENTRO DE ATENCIÓN ESPECIALIZADA - EL REDENTOR - BLOQUE B
BOGOTÁ (CUNDINAMARCA)
DATOS DE SALIDA DEL MODELO

N+4.45	C9	ENVOLVENTE MIN	4.5	-122.87	-13.82	-20.88	-15.462	-39.498	-20.768
N+8.90	C10	ENVOLVENTE MAX	0	-25.67	10.26	7.46	21.5	14.225	21.283
N+8.90	C10	ENVOLVENTE MAX	4.45	-6.21	10.26	7.46	21.5	31.336	17.504
N+8.90	C10	ENVOLVENTE MIN	0	-106.67	-6.95	-11.66	-14.886	-20.635	-14.228
N+8.90	C10	ENVOLVENTE MIN	4.45	-80.72	-6.95	-11.66	-14.886	-19.065	-25.193
N+4.45	C10	ENVOLVENTE MAX	0	-38.97	15.4	16.35	15.747	47.033	43.044
N+4.45	C10	ENVOLVENTE MAX	4.5	-19.29	15.4	16.35	15.747	27.483	21.844
N+4.45	C10	ENVOLVENTE MIN	0	-159.39	-13.86	-16.66	-10.816	-47.655	-40.727
N+4.45	C10	ENVOLVENTE MIN	4.5	-133.14	-13.86	-16.66	-10.816	-26.701	-26.433
N+8.90	C11	ENVOLVENTE MAX	0	-38.45	18.13	10.83	35.709	32.214	35.287
N+8.90	C11	ENVOLVENTE MAX	4.45	-14.42	18.13	10.83	35.709	3.879	45.276
N+8.90	C11	ENVOLVENTE MIN	0	-64.18	-18.05	-6.22	-17.334	-24.232	-35.073
N+8.90	C11	ENVOLVENTE MIN	4.45	-26.8	-18.05	-6.22	-17.334	-18.636	-45.437
N+4.45	C11	ENVOLVENTE MAX	0	-78.3	23.87	21.94	34.909	122.807	65.169
N+4.45	C11	ENVOLVENTE MAX	4.5	-54	23.87	21.94	34.909	30.097	42.401
N+4.45	C11	ENVOLVENTE MIN	0	-127.84	-23.92	-11.18	-13.635	-64.728	-65.318
N+4.45	C11	ENVOLVENTE MIN	4.5	-90.04	-23.92	-11.18	-13.635	-20.419	-42.285
N+8.90	C12	ENVOLVENTE MAX	0	-70.02	17.21	65.14	12.412	57.193	33.186
N+8.90	C12	ENVOLVENTE MAX	4.45	-45.99	17.21	65.14	12.412	-12.851	44.166
N+8.90	C12	ENVOLVENTE MIN	0	-229.83	-17.21	-4.4	-12.332	-33.454	-33.194
N+8.90	C12	ENVOLVENTE MIN	4.45	-197.79	-17.21	-4.4	-12.332	-255.483	-44.167
N+4.45	C12	ENVOLVENTE MAX	0	-110	23.76	48.27	7.641	241.498	65.044
N+4.45	C12	ENVOLVENTE MAX	4.5	-85.7	23.76	48.27	7.641	34.827	41.918
N+4.45	C12	ENVOLVENTE MIN	0	-281.72	-23.77	-12.8	-7.574	-79.241	-65.072
N+4.45	C12	ENVOLVENTE MIN	4.5	-249.32	-23.77	-12.8	-7.574	-28.758	-41.906
N+8.90	C13	ENVOLVENTE MAX	0	-38.69	17.93	11.02	17.162	32.911	34.803
N+8.90	C13	ENVOLVENTE MAX	4.45	-14.66	17.93	11.02	17.162	3.98	45.563
N+8.90	C13	ENVOLVENTE MIN	0	-64.38	-18.17	-6.35	-35.37	-24.697	-35.323
N+8.90	C13	ENVOLVENTE MIN	4.45	-27	-18.17	-6.35	-35.37	-18.715	-45.028
N+4.45	C13	ENVOLVENTE MAX	0	-79.05	23.85	22.11	13.522	123.922	65.196
N+4.45	C13	ENVOLVENTE MAX	4.5	-54.75	23.85	22.11	13.522	30.667	42.252
N+4.45	C13	ENVOLVENTE MIN	0	-128.23	-23.86	-11.31	-34.698	-65.414	-65.17
N+4.45	C13	ENVOLVENTE MIN	4.5	-90.43	-23.86	-11.31	-34.698	-20.774	-42.205
N+8.90	C14	ENVOLVENTE MAX	0	-36.99	22.03	6.26	16.888	22.557	42.842
N+8.90	C14	ENVOLVENTE MAX	4.45	-12.96	22.03	6.26	16.888	19.603	55.639
N+8.90	C14	ENVOLVENTE MIN	0	-64.33	-22.13	-11.01	-43.137	-31.659	-42.908
N+8.90	C14	ENVOLVENTE MIN	4.45	-27.47	-22.13	-11.01	-43.137	-5.742	-55.253
N+4.45	C14	ENVOLVENTE MAX	0	-78.09	23.96	12.01	14.157	67.877	66.193
N+4.45	C14	ENVOLVENTE MAX	4.5	-53.79	23.96	12.01	14.157	18.797	41.887
N+4.45	C14	ENVOLVENTE MIN	0	-128.2	-24	-22.74	-43.927	-128.648	-66.32
N+4.45	C14	ENVOLVENTE MIN	4.5	-90.4	-24	-22.74	-43.927	-30.506	-41.812
N+8.90	C15	ENVOLVENTE MAX	0	-86.06	16.51	8.38	20.876	28.777	33.749
N+8.90	C15	ENVOLVENTE MAX	4.45	-62.03	16.51	8.38	20.876	266.943	43.865
N+8.90	C15	ENVOLVENTE MIN	0	-271.6	-16.5	-76.53	-20.936	-73.634	-33.754
N+8.90	C15	ENVOLVENTE MIN	4.45	-239.56	-16.5	-76.53	-20.936	-9.547	-43.876
N+4.45	C15	ENVOLVENTE MAX	0	-125.87	24.81	15.74	10.682	88.533	67.498
N+4.45	C15	ENVOLVENTE MAX	4.5	-101.57	24.81	15.74	10.682	23.413	44.212
N+4.45	C15	ENVOLVENTE MIN	0	-322.97	-24.82	-56.9	-10.741	-294.202	-67.53
N+4.45	C15	ENVOLVENTE MIN	4.5	-290.57	-24.82	-56.9	-10.741	-38.141	-44.196
N+8.90	C16	ENVOLVENTE MAX	0	-37.01	22.01	6.39	42.771	23.013	42.632
N+8.90	C16	ENVOLVENTE MAX	4.45	-12.98	22.01	6.39	42.771	19.698	55.342
N+8.90	C16	ENVOLVENTE MIN	0	-64.52	-22.06	-11.2	-16.711	-32.349	-42.872
N+8.90	C16	ENVOLVENTE MIN	4.45	-27.73	-22.06	-11.2	-16.711	-5.86	-55.356
N+4.45	C16	ENVOLVENTE MAX	0	-78.5	23.93	12.14	43.731	68.594	66.188
N+4.45	C16	ENVOLVENTE MAX	4.5	-54.2	23.93	12.14	43.731	19.137	41.781
N+4.45	C16	ENVOLVENTE MIN	0	-128.59	-23.95	-22.91	-14.043	-129.501	-66.191
N+4.45	C16	ENVOLVENTE MIN	4.5	-90.79	-23.95	-22.91	-14.043	-30.992	-41.688
N+17.00	C5-1	ENVOLVENTE MAX	0	-8.44	3.28	0.12	1.081	0.435	15.932
N+17.00	C5-1	ENVOLVENTE MAX	6.883	-6.8	3.28	0.12	1.081	0.657	10.093
N+17.00	C5-1	ENVOLVENTE MIN	0	-45.56	-4.11	-0.18	-1.317	-0.565	-18.27
N+17.00	C5-1	ENVOLVENTE MIN	6.883	-43.36	-4.11	-0.18	-1.317	-0.378	-6.699
N+17.00	C4-1	ENVOLVENTE MAX	0	-2.9	3.58	0.58	0.754	1.542	16.633
N+17.00	C4-1	ENVOLVENTE MAX	7.857	-1.03	3.58	0.58	0.754	-0.219	16.017
N+17.00	C4-1	ENVOLVENTE MIN	0	-48.86	-4.48	0.05	-0.663	0.087	-19.226
N+17.00	C4-1	ENVOLVENTE MIN	7.857	-46.36	-4.48	0.05	-0.663	-3.032	-11.525
N+17.00	C8-1	ENVOLVENTE MAX	0	-8.48	4.12	0.12	1.318	0.426	18.324
N+17.00	C8-1	ENVOLVENTE MAX	6.883	-6.84	4.12	0.12	1.318	0.647	6.671
N+17.00	C8-1	ENVOLVENTE MIN	0	-45.58	-3.28	-0.17	-1.079	-0.554	-15.959
N+17.00	C8-1	ENVOLVENTE MIN	6.883	-43.38	-3.28	-0.17	-1.079	-0.371	-10.111
N+17.00	C9-1	ENVOLVENTE MAX	0	-2.99	4.49	0.58	0.667	1.54	19.249
N+17.00	C9-1	ENVOLVENTE MAX	7.857	-1.11	4.49	0.58	0.667	-0.22	11.465
N+17.00	C9-1	ENVOLVENTE MIN	0	-48.87	-3.57	0.05	-0.76	0.091	-16.616
N+17.00	C9-1	ENVOLVENTE MIN	7.857	-46.37	-3.57	0.05	-0.76	-3.03	-16.031
N+17.00	C6-1	ENVOLVENTE MAX	0	-10.23	2.72	0.14	1.478	0.401	9.959
N+17.00	C6-1	ENVOLVENTE MAX	3.413	-9.41	2.72	0.14	1.478	0.098	1.1
N+17.00	C6-1	ENVOLVENTE MIN	0	-47.85	-3.08	-0.05	-1.676	-0.346	-10.796
N+17.00	C6-1	ENVOLVENTE MIN	3.413	-46.76	-3.08	-0.05	-1.676	-0.394	-0.717
N+17.00	C7-1	ENVOLVENTE MAX	0	-10.23	3.08	0.14	1.677	0.391	10.821
N+17.00	C7-1	ENVOLVENTE MAX	3.413	-9.42	3.08	0.14	1.677	0.097	0.715
N+17.00	C7-1	ENVOLVENTE MIN	0	-47.85	-2.72	-0.05	-1.475	-0.336	-9.977
N+17.00	C7-1	ENVOLVENTE MIN	3.413	-46.76	-2.72	-0.05	-1.475	-0.392	-1.108

10. VERIFICACIONES

VERIFICACIONES

**VERIFICACIONES DE CORTANTE
PARA VIGAS
C.21.3.3.1 (a)
C.21.3.3.1 (b)**

PROYECTO: CENTRO DE ATENCIÓN ESPECIALIZADA - EL REDENTOR, BLOQUE B1, BOGOTÁ (CUNDINAMARCA)
RESISTENCIA A CORTANTE PARA VIGAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3 (a)

F_c = 21.1 MPa
f_y = 420 MPa
 $\phi_{cortante}$ = 0.75
Estribos ϕ = 9.5 mm
Av = 71 mm²
R = 3.38

M_n = Momentos nominales de la viga en cada extremo restringido de la luz libre.
V_g = Cortante calculado para cargas gravitacionales mayoradas.
V_u = Cortante debido a bases en curvatura inversa.
V_u = V_m + V_g

COMBIS3 = 1.2C.M + 1.0C.V + 1.0E_x+0.3E_y
COMBIS4 = 1.2C.M + 1.0C.V + 1.0(E_x+0.3E_y)
COMBIS5 = 1.2C.M + 1.0C.V + 1.0E_x+0.3(E_y)
COMBIS6 = 1.2C.M + 1.0C.V + 1.0(E_x+0.3(E_y)
COMBIS7 = 1.2C.M + 1.0C.V + 0.3E_x+1.0E_y
COMBIS8 = 1.2C.M + 1.0C.V + 0.3(E_x+1.0E_y)

COMBIS9 = 1.2C.M + 1.0C.V + 0.3E_x+1.0(E_y)
COMBIS10 = 1.2C.M + 1.0C.V + 0.3(E_x+1.0(E_y)
COMBIS11 = 0.9C.M + 1.0E_x+0.3E_y
COMBIS12 = 0.9C.M + 1.0(E_x+0.3E_y)
COMBIS13 = 0.9C.M + 1.0E_x+0.3(E_y)
COMBIS14 = 0.9C.M + 1.0(E_x+0.3(E_y)

COMBIS15 = 0.9C.M + 0.3E_x+1.0E_y
COMBIS16 = 0.9C.M + 0.3(E_x+1.0E_y)
COMBIS17 = 0.9C.M + 0.3E_x+1.0(E_y)
COMBIS18 = 0.9C.M + 0.3(E_x+1.0(E_y)

NIVEL	VIGA ELEMENTO	LOC. (m)	LONG. (m)	PROPIEDADES DEL ELEMENTO						M ₃																				
				SECCION	b (m)	d (m)	C.M. (KN.m)	C.V. (KN.m)	SISMO X			SISMO Y			Combinaciones para resistencias nominales a momento															
									SISMO X (KN.m)	SISMO Y (KN.m)	-SISMO X (KN.m)	-SISMO Y (KN.m)	COMBIS3	COMBIS4	COMBIS5	COMBIS6	COMBIS7	COMBIS8	COMBIS9	COMBIS10	COMBIS11	COMBIS12	COMBIS13	COMBIS14	COMBIS15	COMBIS16	COMBIS17	COMBIS18		
N-4.45	B15	0.000	4.930	VIGA30X50	0.30	0.45	-7.348	0.000	5.273	117.702	-5.273	-117.702	3.189	0.069	17.704	20.825	28.473	25.537	43.173	44.109	5.394	2.274	15.500	18.620	28.678	27.742	40.968	41.904		
	B15	4.930					-2.212	0.000	5.094	-115.771	-5.094	-115.771	5.128	0.114	17.423	20.437	28.050	25.145	42.454	43.358	5.292	2.278	15.259	18.273	28.213	27.309	40.290	41.195		
N-8.90	B16	0.000	4.850	VIGA30X50	0.30	0.45	-6.025	0.000	4.058	74.556	-4.058	-74.556	4.902	4.201	15.029	17.458	19.794	12.868	31.228	32.854	6.605	1.814	12.631	15.850	15.201	14.416	28.701	29.446		
	B16	4.850					-3.116	0.000	5.017	97.675	-5.017	-97.675	4.682	1.715	11.552	14.560	22.629	21.738	31.617	32.907	5.917	2.948	10.752	13.526	23.864	22.913	30.352	31.072		
N-4.45	B16	0.000	4.850	VIGA30X50	0.30	0.45	-7.215	0.000	6.421	131.369	-6.421	-131.369	4.902	1.302	18.418	22.218	30.778	29.639	46.955	48.094	7.066	3.267	16.254	20.053	32.943	31.803	44.790	45.930		
	B16	4.850					-4.704	0.000	7.117	150.251	-7.117	-150.251	7.397	3.185	19.275	23.486	37.040	35.776	51.866	53.129	8.408	5.197	17.264	21.475	39.051	37.788	49.855	51.118		

PROYECTO: CENTRO DE ATENCIÓN ESPECIALIZADA - EL REDENTOR, BLOQUE B1, BOGOTÁ (CUNDINAMARCA)
RESISTENCIA A CORTANTE PARA VIGAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3 (a)

F_c = 21.1 MPa
F_y = 420 MPa
φ_{corrosión} = 0.75
Estribos φ = 9.5 mm
Av = 71 mm²
R = 3.38

M_n = Momentos nominales de la viga en cada extremo restringido de la luz libre.
V_g = Cortante calculado para cargas gravitacionales mejoradas.
V_m = Cortante debido a flexión en curvatura inversa.
V_u = V_m + V_g

V _u = V _m + V _g																W _{max} (kN)	S (m)	φV _s (kN)	φV _c (kN)	φV _n (kN)	φV _n > V _{u,max} (kN)
COMBDIS3	COMBDIS4	COMBDIS5	COMBDIS6	COMBDIS7	COMBDIS8	COMBDIS9	COMBDIS10	COMBDIS11	COMBDIS12	COMBDIS13	COMBDIS14	COMBDIS15	COMBDIS16	COMBDIS17	COMBDIS18						
(kN)																					
11.961	10.717	17.805	19.049	21.334	20.960	28.048	28.422	12.847	11.403	16.919	18.163	22.220	21.846	27.162	27.536	28.4	0.11	178.92	77.51	256.43	OK
10.620	10.620	10.620	10.620	10.620	10.620	10.620	10.620	10.620	10.620	10.620	10.620	10.620	10.620	10.620	10.620	24.8	0.11	178.92	77.51	256.43	OK
12.785	12.672	16.499	16.680	18.782	18.418	24.426	24.768	12.792	12.438	18.188	17.299	19.983	19.189	23.875	24.809						
9.504	9.504	9.504	9.504	9.504	9.504	9.504	9.504	9.504	9.504	9.504	9.504	9.504	9.504	9.504	9.504						
13.144	11.492	18.380	20.032	24.591	24.096	30.983	31.479	14.005	12.353	17.519	19.171	25.462	24.957	30.122	30.618	31.5	0.11	178.92	77.51	256.43	OK
10.344	10.344	10.344	10.344	10.344	10.344	10.344	10.344	10.344	10.344	10.344	10.344	10.344	10.344	10.344	10.344						

**VERIFICACIONES DE CORTANTE
PARA COLUMNAS**

C.21.3.3.2 (a)

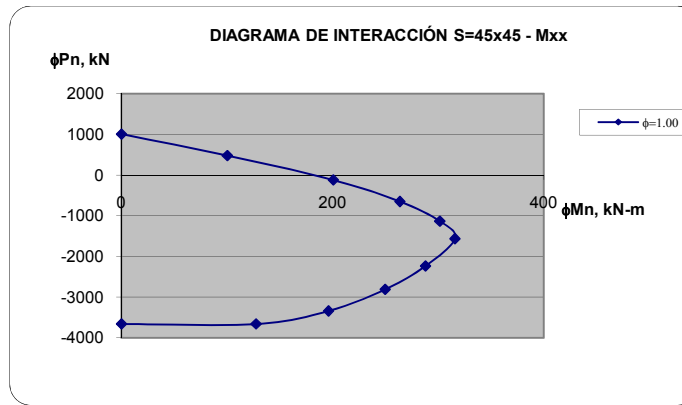
C.21.3.3.2 (b)

PROYECTO: CENTRO DE ATENCIÓN ESPECIALIZADA - EL REDENTOR, BLOQUE B1, BOGOTÁ (CUNDINAMARCA)
RESISTENCIA A CORTANTE PARA COLUMNAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3 (a) - COLUMNAS S=45x45 - 6#5+6#5

$f_c = 21.1$ MPa **Estribos $\Phi = 9.5$** mm
 $f_y = 420$ MPa **$A_v = 71$** mm²
 $\Phi_{\text{Cortante}} = 0.75$ **Cantidad de ramas = 3**
 $b_x = 0.45$ m **$S = 0.20$** m
 $b_y = 0.45$ m **Recub. = 0.05** m
 $L_{col} = 4.00$ m

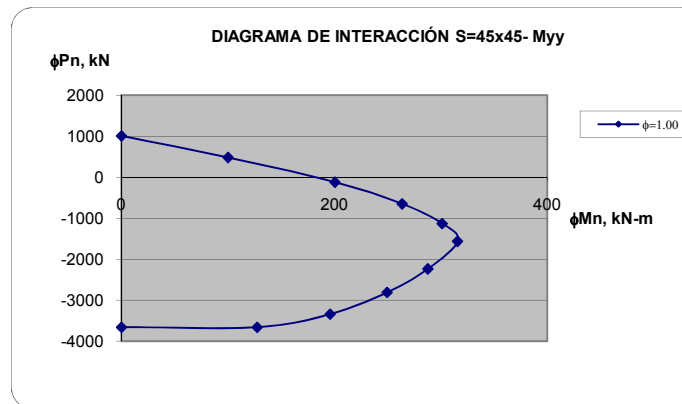
C.21.3.3.2(a) El cortante ΦV_n no debe ser menor que la suma del cortante debido a flexión en curvatura inversa asociado con el desarrollo de los momentos nominales de la columna en cada extremo restringido de la longitud libre.

DATOS PARA LOS DIAGRAMAS DE ITERACIÓN			
No.	Curve 1	0. degrees	
	P	M3	M2
1	-3664.00	0.00	0.00
2	-3664.00	127.50	0.00
3	-3343.00	196.05	0.00
4	-2812.00	249.75	0.00
5	-2237.00	287.97	0.00
6	-1565.00	315.88	0.00
7	-1133.00	301.45	0.00
8	-651.65	263.71	0.00
9	-121.96	200.57	0.00
10	480.07	100.27	0.00
11	1008.00	0.00	0.00



$P_{ua} = -152.77$ kN
 $P_{ub} = -126.53$ kN
 $\Phi M_{na} = 204.25$ kN-m
 $\Phi M_{nb} = 201.12$ kN-m
 $V_{umax} = 101.34$ kN
 $\Phi V_s = 134.19$ kN
 $\Phi V_c = 103.35$ kN
 $\Phi V_n = 237.54$ kN
 $\Phi V_n > V_{umax} = \text{OK}$

DATOS PARA LOS DIAGRAMAS DE ITERACIÓN			
No.	Curve 7	90. degrees	
	P	M3	M2
1	-3664.00	0.00	0.00
2	-3664.00	0.00	127.50
3	-3343.00	0.00	196.05
4	-2812.00	0.00	249.75
5	-2237.00	0.00	287.97
6	-1565.00	0.00	315.88
7	-1133.00	0.00	301.45
8	-651.65	0.00	263.71
9	-121.96	0.00	200.57
10	480.07	0.00	100.27
11	1008.00	0.00	0.00



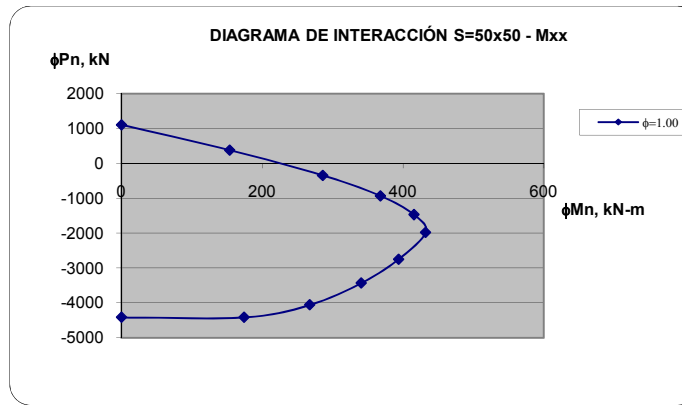
$P_{ua} = -154.83$ kN
 $P_{ub} = -128.59$ kN
 $\Phi M_{na} = 204.49$ kN-m
 $\Phi M_{nb} = 201.36$ kN-m
 $V_{umax} = 101.46$ kN
 $\Phi V_s = 134.19$ kN
 $\Phi V_c = 103.35$ kN
 $\Phi V_n = 237.54$ kN
 $\Phi V_n > V_{umax} = \text{OK}$

PROYECTO: CENTRO DE ATENCIÓN ESPECIALIZADA - EL REDENTOR, BLOQUE B1, BOGOTÁ (CUNDINAMARCA)
RESISTENCIA A CORTANTE PARA COLUMNAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3 (a) - COLUMNAS S=50x50 - 8#5+8#4

$f_c = 21.1$ MPa **Estribos $\Phi = 9.5$** mm
 $f_y = 420$ MPa **Av = 71** mm²
 $\Phi_{\text{Cortante}} = 0.75$ **Cantidad de ramas = 3**
bx = 0.50 m **S = 0.20** m
by = 0.50 m **Recub. = 0.05** m
Lcol = 4.00 m

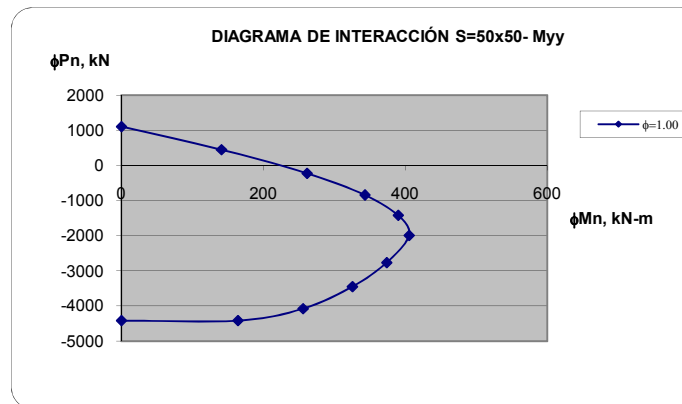
C.21.3.3.2(a) El cortante ΦV_n no debe ser menor que la suma del cortante debido a flexión en curvatura inversa asociado con el desarrollo de los momentos nominales de la columna en cada extremo restringido de la longitud libre.

DATOS PARA LOS DIAGRAMAS DE ITERACIÓN			
No.	Curve 1	0. degrees	
	P	M3	M2
1	-4417.00	0.00	0.00
2	-4417.00	174.28	4.10
3	-4058.00	267.64	4.74
4	-3434.00	340.63	5.96
5	-2751.00	393.80	7.67
6	-1981.00	432.25	10.23
7	-1471.00	415.63	10.30
8	-935.00	368.13	9.64
9	-344.44	285.99	8.21
10	378.47	153.88	4.13
11	1105.55	0.00	0.00



$P_{ua} = -196.13$ kN
 $P_{ub} = -163.73$ kN
 $\Phi M_{na} = 258.89$ kN-m
 $\Phi M_{nb} = 252.97$ kN-m
 $V_{umax} = 127.96$ kN
 $\Phi V_s = 150.96$ kN
 $\Phi V_c = 129.19$ kN
 $\Phi V_n = 280.16$ kN
 $\Phi V_n > V_{umax} = \text{OK}$

DATOS PARA LOS DIAGRAMAS DE ITERACIÓN			
No.	Curve 7	90. degrees	
	P	M3	M2
1	-4417.00	0.00	0.00
2	-4417.00	4.11	164.21
3	-4075.00	4.72	255.87
4	-3451.00	5.94	325.32
5	-2765.00	7.65	373.87
6	-1991.00	10.22	405.38
7	-1422.00	10.26	389.85
8	-841.33	9.61	343.08
9	-225.02	8.20	261.61
10	446.76	4.18	140.99
11	1105.55	0.00	0.00



$P_{ua} = -208.11$ kN
 $P_{ub} = -175.71$ kN
 $\Phi M_{na} = 258.57$ kN-m
 $\Phi M_{nb} = 252.75$ kN-m
 $V_{umax} = 127.83$ kN
 $\Phi V_s = 150.96$ kN
 $\Phi V_c = 129.19$ kN
 $\Phi V_n = 280.16$ kN
 $\Phi V_n > V_{umax} = \text{OK}$

PROYECTO: CENTRO DE ATENCIÓN ESPECIALIZADA - EL REDENTOR, BLOQUE B1, BOGOTÁ (CUNDINAMARCA)
RESISTENCIA A CORTANTE PARA COLUMNAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3 (b) - COLUMNA S=45x45

$f_c = 21.1$ MPa
 $f_y = 420$ MPa
 $\Phi_{\text{Cortante}} = 0.75$
 $b_x = 0.45$ m
 $b_y = 0.45$ m

Estribos $\Phi = 9.5$ mm
 $A_v = 71$ mm²
Cantidad de ramas = 3
 $S = 0.20$ m
 $\Omega_o = 3.00$
Recub. = 0.05 m

C.21.3.3.2(b) El cortante ΦV_n no debe ser menor que el cortante máximo obtenido de las combinaciones de carga de diseño que incluyan E, con E incrementado por medio de Ω_o .

Para cortante V2

$\Omega_o * V_{um\acute{a}x} = 56.49$ kN
 $\Phi V_s = 134.19$ kN
 $\Phi V_c = 103.35$ kN
 $\Phi V_n = 237.54$ kN
 $\Phi V_n > \Omega_o * V_{um\acute{a}x} = \text{OK}$

Para cortante V3

$\Omega_o * V_{um\acute{a}x} = 64.20$ kN
 $\Phi V_s = 134.19$ kN
 $\Phi V_c = 103.35$ kN
 $\Phi V_n = 237.54$ kN
 $\Phi V_n > \Omega_o * V_{um\acute{a}x} = \text{OK}$

PROYECTO: CENTRO DE ATENCIÓN ESPECIALIZADA - EL REDENTOR, BLOQUE B1, BOGOTÁ (CUNDINAMARCA)
RESISTENCIA A CORTANTE PARA COLUMNAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3 (b) - COLUMNA S=50X50

$f_c = 21.1$ MPa
 $f_y = 420$ MPa
 $\Phi_{\text{cortante}} = 0.75$
 $b_x = 0.50$ m
 $b_y = 0.50$ m

Estribos $\Phi = 9.5$ mm
 $A_v = 71$ mm²
Cantidad de ramas = 3
 $S = 0.20$ m
 $\Omega_o = 3.00$
Recub. = 0.05 m

C.21.3.3.2(b) El cortante ΦV_n no debe ser menor que el cortante máximo obtenido de las combinaciones de carga de diseño que incluyan E, con E incrementado por medio de Ω_o .

Para cortante V2

$\Omega_o * V_{um\acute{a}x} = 74.46$ kN
 $\Phi V_s = 150.96$ kN
 $\Phi V_c = 129.19$ kN
 $\Phi V_n = 280.16$ kN
 $\Phi V_n > \Omega_o * V_{um\acute{a}x} = \text{OK}$

Para cortante V3

$\Omega_o * V_{um\acute{a}x} = 229.59$ kN
 $\Phi V_s = 150.96$ kN
 $\Phi V_c = 129.19$ kN
 $\Phi V_n = 280.16$ kN
 $\Phi V_n > \Omega_o * V_{um\acute{a}x} = \text{OK}$