PROYECTO: INSTITUCIÓN EDUCATIVA MARCELO MIRANDA, IPIALES NARIÑO

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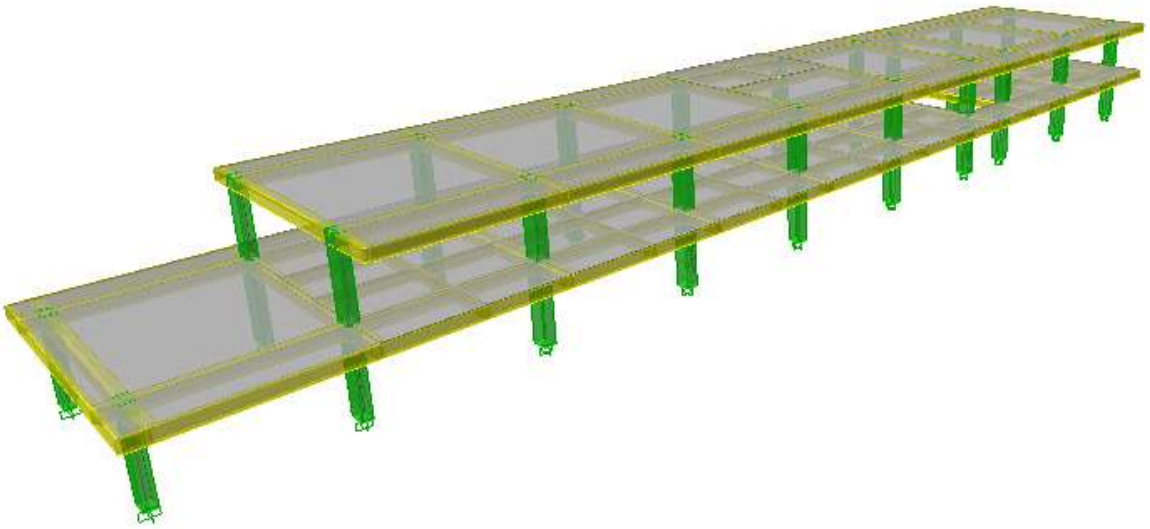


MEMORIAS DE ANÁLISIS Y DISEÑO ESTRUCTURAL

BOGOTÁ D.C., 18 DE NOVIEMBRE DE 2016

1. DESCRIPCIÓN DEL PROYECTO

1.1. INTRODUCCIÓN

El presente documento contiene las memorias de análisis y diseño estructural correspondiente al proyecto INSTITUCIÓN EDUCATIVA MARCELO MIRANDA ubicado IPIALES NARIÑO.

1.2. DESCRIPCIÓN ARQUITECTÓNICA

El proyecto se encuentra ubicado en un lote de **1015 m²** de área aproximadamente, en la cual se contempla la construcción del INSTITUCION EDUCATIVA MARCELO MIRANDA ubicado en IPIALES NARIÑO. El lote será destinado para uso Institucional.

1.3. DESCRIPCIÓN SISTEMA ESTRUCTURAL

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: ***Alta***
- ✓ Capacidad de disipación de energía: ***Especial***
- ✓ Coeficiente de disipación de energía: $R_0 = 7.00$

El coeficiente de disipación de energía no se afecta por ninguna irregularidad descrita en la norma

Por lo tanto el valor final del coeficiente R es igual a **7.00**

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 solicitación ocasionados por las

derivas presentes. Las cargas vivas de diseño son: **2.00 kN/m²** para SALONES, **1.80 kN/m²** y carga de granizo de **0.5K N/m2** para cubierta, **5.00 kN/m²** para escaleras de acuerdo a lo establecido en las tablas 4.2.1-1 y 4.2.1-2 de la NSR-10.

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, Decreto 092 del 17 de Enero de 2011, Decreto 0340 del 13 de Febrero de 2012 y en el Reglamento para Concreto Estructural ACI 318S-08.

1.4. MATERIALES

Los materiales utilizados son:

Concreto	21.1 MPa para vigas, columnas y placas.
Concreto	14 MPa (para concreto de limpieza).
Acero	para refuerzo fy = 420 MPa para todos los diámetros.

Atentamente:

_____

EDGAR ROLANDO BARRERA
ING. ESTRUCTURAL
T.P. 15202-102710 BYC

_____

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

MEMORIAL DE RESPONSABILIDAD

IPIALES, 18 de Noviembre de 2016

Señores
PLANEACION MUNICIPAL
La Ciudad

Yo, **EDGAR ROLANDO BARRERA,** ingeniero civil con Matrícula Profesional Nº **15202-102710** de **BOYACÁ,** y Yo, **JAIR USECHE MACÍAS,** ingeniero civil con Matrícula Profesional Nº **25202-56174** de **CUNDINAMARCA** debidamente registrados en el consejo profesional de Ingeniería y Arquitectura de Boyacá y Cundinamarca, presentamos 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 INSTITUCION EDUCATIVA MARCELO IRANDA ubicado en el municipio de IPIALES (NARIÑO), declaramos que asumimos la responsabilidad por los perjuicios que causa de ellos puedan deducirse, exonerando a PLANEACION MUNICIPAL de cualquier responsabilidad.

Aceptamos y reconocemos que la revisión efectuada por PLANEACION MUNICIPAL no constituye una aprobación al Diseño Estructural, sino una verificación del cumplimiento de la **NORMA COLOMBIANA DE DISEÑO Y CONSTRUCCIÓN SISMO RESISTENTE**.

Atentamente,

EDGAR ROLANDO BARRERA
ING. ESTRUCTURAL
T.P. 15202-102710 BYC

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


REPUBLICA DE COLOMBIA
Consejo Profesional Nacional de Ingeniería y Arquitectura
MATRICULA No. 2520256174CND
INGENIERO CIVIL
DE FECHA 27/07/95
APELLIDOS
USECHE MACIAS
NOMBRES
JAIR
C.C 19,428,425
UNIV. NACIONAL - BOGOTA
Presidente del Consejo

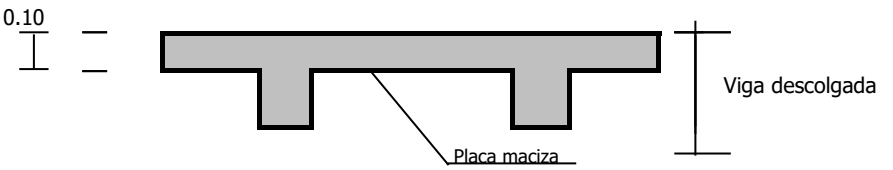
2. AVALÚO DE CARGAS

AVALÚO DE CARGAS

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA

AVALUO DE CARGAS

1. PLACA MACIZA ENTREPISO



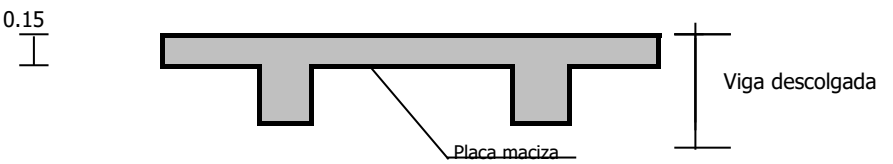
Placa maciza e=0.10m	0.1x24		2.40 kN/m²
Acabados	22x0.05		1.10 kN/m²
		CM	3.50 kN/m²
		CV	5.00 kN/m²
		CR	8.50 kN/m²

CU = 1.2x3.5+1.6x5 = 12.2 kN/m²

Espesor de placa equivalente:

e=CM/24 0.146 m

2. PLACA MACIZA CUBIERTA



Placa maciza e=0.15m	0.15x24		3.60 kN/m²
Impermeabilización	20x0.05		1.00 kN/m²
		CM	4.60 kN/m²
		CV	5.00 kN/m²
		CR	9.60 kN/m²

CU = 1.2x4.6+1.6x5 = 13.5 kN/m²

Espesor de placa equivalente:

e=CM/24 0.192 m

3. CUBIERTA LIVIANA

Teja termo-acústica			0.10 kN/m²
Correas metálicas			0.10 kN/m²
Acabados e iluminacion			0.10 kN/m²
		CM	0.30 kN/m²
Tabla 4.2.1-2 de NSR-10 (Tipo de cubierta F)		CV	0.35 kN/m²
		CR	0.65 kN/m²

Muros culata 0.90x0.15x13 1.76 kN/m

CU = 1.2x0.3+1.6x0.35 = 0.92 kN/m²

Espesor de placa equivalente:

e=CM/24 0.013 m

Pendiente de Cubierta α (º) = **8.58** → Equivale a 15.1%

Altitud de al cabecera municipal (m.s.n.m.) 2900

B.4.8.3 de NSR-10 (Carga de granizo) CG 0.50 kN/m²

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/m^2.
Según B.4.8.3.1 - Las cargas de granizo deben tenerse en cuenta en las regiones del país con más de 2.000 metros de altura sobre el nivel del mar o en lugares de menor altura donde la autoridad municipal o distrital así lo exija.
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/m^2.

PROYECTO: I.E MARCELO MIRANDA

AVALÚO DE CARGAS DE VIENTO
ANÁLISIS SIMPLIFICADO (sprfv)

Para que el análisis se pueda realizar mediante el método de diseño simplificado se requiere que se cumpla con lo establecido por la NSR-10 titulo B.6.4.1.1. y B.6.4.1.2.

a - El edificio sea de diafragma simple como se define en la sección B.6.2.
b - El edificio sea bajo de acuerdo con lo establecido con la sección B.6.2.
c - El edificio sea cerrado como se define en la sección B.6.2. y cumpla las provisiones de zonas propensas a huracanes de acuerdo con la sección B.6.5.9.3.
d - El edificio sea de forma regular como se define en la sección B.6.2.
e - El edificio no sea clasificado como flexible como se define en la sección B.6.2.
f - Las características de respuesta del edificio sean tales que el mismo no esté sujeto a las cargas por viento a travéz de él, a generación de vórtices, a inestabilidad por golpeteo o aleteo, y no esté ubicado en un sitio en el que se puedan presentar efectos de canalización o sacudimiento por la estela de obstrucciones en barlovento, que obliguen a concideraciones especiales.
g - El edificio tenga una sección transversal aproximadamente simétrica en cada dirección y tenga una cubierta plana o cubierta a dos o cuatro aguas con ángulo de inclinación $\emptyset \leq 45°$
h - El edificio esta eximido de los casos de carga torsional indicados en la nota 5 de la figura B.6.5.7. o estos casos no conctrolan el diseño de ninguno de los elementos del SPRFV del edificio.

De los anteriores parametros se observa que la edificación cumple con lo estipulado, por lo tanto:

Tipo de análisis permitido: ANÁLISIS SIMPLIFICADO

Entonces: $Ps = \lambda KztIPs_{10}$

Donde:

- λ= Factor de ajuste por altura y exposición, figura B.6.4.2.
- K_{zt}= Factor topográfico comose define en la sección B.6.5.7. evaluado a la altura promedio de la cubierta, **h,** B.6.5.1.
- I= Factor de importancia como se define en la sección B.6.5.5.
- P_{s10}= Presión de viento de diseño simplificado para la categoria de exposición **B,** con **h=10** m de la figura B.6.4.2.

	CIUDAD	**ZONA**	**VELOCIDAD DEL VIENTO**
Zona de amenza eólica=	IPIALES	3	100 Km/h

Luego:

λ=	1.0
K_{zt}=	1.0
I=	1.3
P_{s10}=	**0.04**

Según B.6.4.2.1.1. Presiones mínimas: Los efectos de carga de las presiones de viento de diseño de la sección B.6.4.2.1. no serán menores que el caso de carga mínima de la sección B.6.1.3.1. suponiendo presiones Ps, de +0.40 kN/m^2 para las zonas de A, B, C y D y de 0.00 kN/m^2 paras las zonas E, F, G y H.

Por lo tanto la carga de viento a emplear es: **0.40** kN/m^2

3. ANÁLISIS SÍSMICO

ANÁLISIS MODAL
CÁLCULO DE DERIVAS MÁXIMAS

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA
ANÁLISIS SÍSMICO (ESPECTRO DE DISEÑO NSR-10)

ZONA DE AMENAZA SÍSMICA
ALTA

EFECTOS LOCALES

Perfil de Suelo	**D**
Coeficiente Aa	**0.30**
Coeficiente Av	**0.25**

COEFICIENTE DE IMPORTANCIA

Grupo de Uso	**III**
Coeficiente de importancia I	**1.25**

PERIODO FUNDAMENTAL DE LA EDIFICACIÓN

$T_a = C_t h^{\alpha}$		
C_t =	**0.047**	
h =	**6.65**	m
α =	**0.90**	
T_a=	**0.26**	Seg

VARIACIÓN COEFICIENTE DE CAPACIDAD DE DISIPACIÓN DE ENERGÍA

Ro: 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

Ro	**7.00**
ϕ_a	**0.90**
ϕ_p	**1.00**
ϕ_r	**0.75**
ϕ	**1.00**
R	**4.73**

TIPO	DESCRIPCIÓN	VALOR
3P	IRREGULARIDAD DIAFRAGMA	ϕ_P: 0.90
	REDUNDANCIA	ϕ_r: 0.75

ESPECTRO DE DISEÑO (AMORTIGUAMIENTO ξ=5% DEL CRÍTICO)

Fa: Factor de ampliación de la aceleración.
Fv: Factor de ampliación de la aceleración en el rango de velocidades constantes.
Sa: Valor del espectro de aceleraciones de diseño para un periodo de vibración dado.
Aa: Coeficiente que representa la aceleración horizontal pico efectiva para diseño.
Av: Coeficiente que representa la velocidad horizontal pico efectiva para diseño.
T: Periodo de vibración del sistema elástico, en segundos.
T_C: Periodo de vibración, en segundos, correspondiente a la transición entre la zona de aceleración constante del espectro de diseño, para periodos cortos, y la parte descendiente del mismo.
T_L: Periodo de vibración, en segundos, correspondiente al inicio de la zona de desplazamiento aproximadamente constante del espectro de diseño para periodos largos.

ZONA DE AMENAZA ALTA		
T_o:	0.13	Seg
T_C:	0.63	Seg
T_L:	4.56	Seg
Aa:	0.30	
Av:	0.25	
Fa:	1.20	
Fv:	1.90	

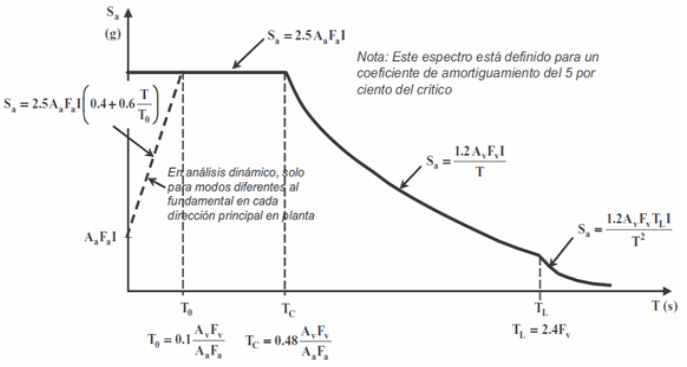
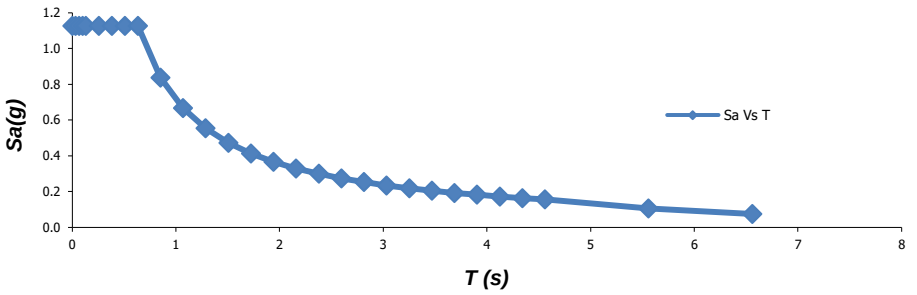


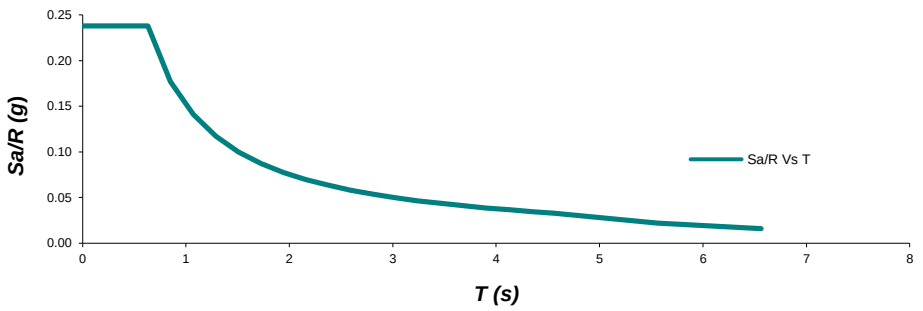
Figura A.2.6-1 — Espectro Elástico de Aceleraciones de Diseño como fracción de g

T	Sa	$Sa/R_{adoptado}$
(Seg)	**(%g)**	**(%g)**
0.00	1.125	0.238
0.03	1.125	0.238
0.07	1.125	0.238
0.10	1.125	0.238
0.13	1.125	0.238
0.26	1.125	0.238
0.38	1.125	0.238
0.51	1.125	0.238
0.63	1.125	0.238
0.85	0.837	0.177
1.07	0.666	0.141
1.29	0.553	0.117
1.51	0.473	0.100
1.72	0.413	0.087
1.94	0.367	0.078
2.16	0.330	0.070
2.38	0.300	0.063
2.60	0.274	0.058
2.81	0.253	0.054
3.03	0.235	0.050
3.25	0.219	0.046
3.47	0.205	0.043
3.69	0.193	0.041
3.91	0.182	0.039
4.12	0.173	0.037
4.34	0.164	0.035
4.56	0.156	0.033
5.56	0.105	0.022
6.56	0.075	0.016

Espectro Elástico de Diseño



Espectro Elástico de Diseño/R_{adop}



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

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 rigidos 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: INSTITUCION EDUCATIVA MARCELO MIRANDA
ANÁLISIS SÍSMICO (ESPECTRO DE UMBRAL DE DAÑO NSR-10)

ZONA DE AMENAZA SÍSMICA
ALTA

EFECTOS LOCALES

Perfil de Suelo	**D**
Coeficiente Ad	**0.07**
Coeficiente Fv	**2.40**

COEFICIENTE DE IMPORTANCIA

Grupo de Uso	**III**
Coeficiente de importancia I	**1.25**
Coeficiente de Sitio Ŝ:	**3.00**

ESPECTRO DE UMBRAL DE DAÑO (AMORTIGUAMIENTO ξ=2% DEL CRÍTICO)

Sad: Valor del espectro de aceleraciones del umbral de daño para un periodo de vibración dado.
Ad: Máxima aceleración pico efectiva para el umbral de daño.
T: Periodo de vibración del sistema elástico, en segundos.
T_{Cd}: Periodo de vibración, en segundos, correspondiente a la transición entre la zona de aceleración constante del espectro sísmico del umbral de daño, para periodos cortos, y la parte descendiente del mismo.
T_{Ld}: Periodo de vibración, en segundos, correspondiente a la transición entre la zona de desplazamiento constante del espectro sísmico del umbral de daño, para periodos largos.

Ad: **0.07**
T_{Cd}: 1.50 Seg
T_{Ld}: 7.2 Seg

T (Seg)	Sad (%g)
0.00	0.070
0.05	0.098
0.10	0.126
0.15	0.154
0.20	0.182
0.25	0.210
0.41	0.210
0.56	0.210
0.72	0.210
0.88	0.210
1.03	0.210
1.19	0.210
1.34	0.210

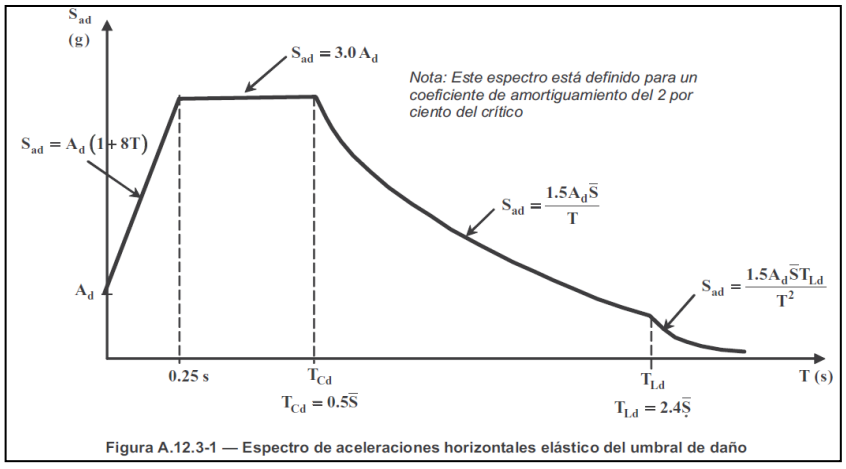
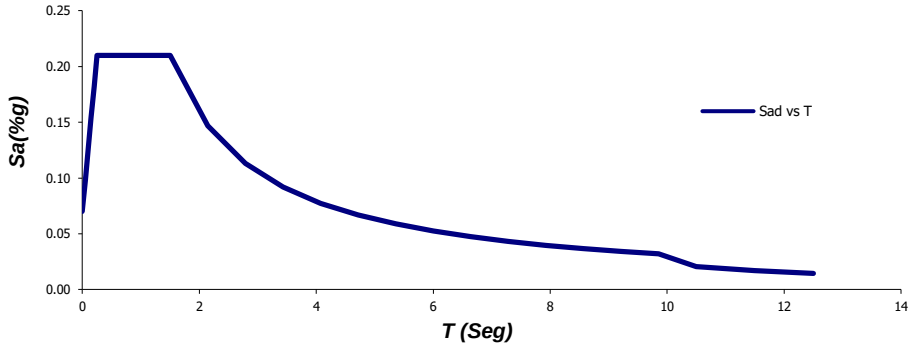


Figura A.12.3-1 — Espectro de aceleraciones horizontales elástico del umbral de daño

1.50	0.210
2.14	0.147
2.79	0.113
3.43	0.092
4.07	0.077
4.71	0.067
5.36	0.059
6.00	0.053
6.64	0.047
7.29	0.043
7.93	0.040
8.57	0.037
9.21	0.034
9.86	0.032
10.50	0.021
11.50	0.017
12.50	0.015

Espectro Del Umbral de Daño



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

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 rigidos 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: INSTITUCION EDUCATIVA MARCELO MIRANDA
CALCULO DEL CORTANTE BASAL DE LA ESTRUCTURA (ESPECTRO DE DISEÑO NSR-10)

CALCULO DEL CORTANTE BASAL DE LA ESTRUCTURA

$H_{edificio}$ =	6.65	m	
Tipo de Perfil:	D		
Aa =	0.30		
Av =	0.25		
Fa =	1.20		
Fv =	1.90		
T_c =	0.63	Seg	
C_t =	0.047		
α =	0.90		
T_a =	0.26	Seg	
C_u =	1.20		
$C_u T_a$ =	0.31	Seg	
$T_{modelación\ estructural}$ =	0.28	Seg	
ΔT =	8.27	%	Ok!
$T_{adoptado}$ =	0.28	Seg	
S_a =	1.125		S_a obtenido del espectro de diseño
g =	9.81	m/s^2	
M =	725.80	Ton	Masa obtenida del modelo
V_s =	8010.15	kN	
90% Vs =	7209.14	kN	Cortante basal para comparación de acuerdo a A.5.4.5 NSR-10

MODELO INICIAL
Response Espectrum 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
$V_{s(x)}$=	5043.03	-	5043.03	1.430	14.02	Se aplica en SISMO X
$V_{s(y)}$=	-	4632.52	4632.52	1.556	15.27	Se aplica en SISMO Y

MODELO CORREGIDO
Response Espectrum Base Reactions

	F1	F2	Total	90% Vs
$V_{s(x)}$=	7207.26	-	7207.26	**7209.14**
$V_{s(y)}$=	-	7210.87	7210.87	**7209.14**

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA
CALCULO DEL CORTANTE BASAL DE LA ESTRUCTURA (ESPECTRO DE UMBRAL DE DAÑO NSR-10)

CALCULO DEL CORTANTE BASAL DE LA ESTRUCTURA

$H_{edificio}$=	6.65	m	
Tipo de Perfil:	D		
Ad =	0.07		
Fv =	2.40		
C_t =	0.047		
α =	0.90		
T_a =	0.26	Seg	
C_u =	1.20		
$C_u T_a$ =	0.31	Seg	
$T_{modelación\ estructural}$ =	0.28	Seg	
ΔT =	8.27	%	Ok!
$T_{adoptado}$ =	0.26	Seg	
S_a =	0.210		S_a obtenido del espectro de diseño
g =	9.81	m/s^2	
M =	725.80	Ton	Masa obtenida del modelo
V_s =	1495.23	kN	

MODELO INICIAL
Response Espectrum 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
$V_{s(x)}$=	938.36	-	938.36	1.593	15.63	Se aplica en SISMO X
$V_{s(y)}$=	-	858.40	858.40	1.742	17.09	Se aplica en SISMO Y

MODELO CORREGIDO
Response Espectrum Base Reactions

	F1	F2	Total	100% Vs
$V_{s(x)}$=	1495.07	-	1495.07	**1495.23**
$V_{s(y)}$=	-	1495.41	1495.41	**1495.23**

Diseños & Estructuras

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA

CÁLCULO DE DERIVAS MÁXIMAS

ALTURA DE N+6.65	3.20	m
ALTURA DE N+3.45	3.50	m
ALTURA DE BASE	0.00	m

Deriva Máxima Permitida **1.00** **%**

Nivel	Punto	COMBINACIÓN DE CARGA	DESPLAZAMIENTOS FUERZA SÍSMICA		Deriva Δ	Deriva Δ	Observación
			Desplazamiento X	Desplazamiento Y	*m*	*%*	
N+6.65	2	COMDER1 MAX	0.033768	0.035784	0.02501	0.78	OK
N+6.65	2	COMDER1 MIN	-0.033768	-0.035784	0.02501	0.78	OK
N+6.65	2	COMDER2 MAX	0.014616	0.055152	0.03100	0.97	OK
N+6.65	2	COMDER2 MIN	-0.014616	-0.055152	0.03100	0.97	OK
N+3.45	2	COMDER1 MAX	0.018216	0.0162	0.02438	0.70	OK
N+3.45	2	COMDER1 MIN	-0.018216	-0.0162	0.02438	0.70	OK
N+3.45	2	COMDER2 MAX	0.007776	0.024912	0.02610	0.75	OK
N+3.45	2	COMDER2 MIN	-0.007776	-0.024912	0.02610	0.75	OK
BASE	2	COMDER1 MAX	0	0	--	--	--
BASE	2	COMDER1 MIN	0	0	--	--	--
BASE	2	COMDER2 MAX	0	0	--	--	--
BASE	2	COMDER2 MIN	0	0	--	--	--
N+6.65	3	COMDER1 MAX	0.033768	0.028872	0.02220	0.69	OK
N+6.65	3	COMDER1 MIN	-0.033768	-0.028872	0.02220	0.69	OK
N+6.65	3	COMDER2 MAX	0.014616	0.044496	0.02535	0.79	OK
N+6.65	3	COMDER2 MIN	-0.014616	-0.044496	0.02535	0.79	OK
N+3.45	3	COMDER1 MAX	0.018216	0.013032	0.02240	0.64	OK
N+3.45	3	COMDER1 MIN	-0.018216	-0.013032	0.02240	0.64	OK
N+3.45	3	COMDER2 MAX	0.007776	0.020088	0.02154	0.62	OK
N+3.45	3	COMDER2 MIN	-0.007776	-0.020088	0.02154	0.62	OK
BASE	3	COMDER1 MAX	0	0	--	--	--
BASE	3	COMDER1 MIN	0	0	--	--	--
BASE	3	COMDER2 MAX	0	0	--	--	--
BASE	3	COMDER2 MIN	0	0	--	--	--
N+6.65	4	COMDER1 MAX	0.033768	0.022248	0.01979	0.62	OK
N+6.65	4	COMDER1 MIN	-0.033768	-0.022248	0.01979	0.62	OK
N+6.65	4	COMDER2 MAX	0.014616	0.035208	0.02061	0.64	OK
N+6.65	4	COMDER2 MIN	-0.014616	-0.035208	0.02061	0.64	OK
N+3.45	4	COMDER1 MAX	0.018216	0.010008	0.02078	0.59	OK
N+3.45	4	COMDER1 MIN	-0.018216	-0.010008	0.02078	0.59	OK
N+3.45	4	COMDER2 MAX	0.007776	0.015768	0.01758	0.50	OK
N+3.45	4	COMDER2 MIN	-0.007776	-0.015768	0.01758	0.50	OK
BASE	4	COMDER1 MAX	0	0	--	--	--
BASE	4	COMDER1 MIN	0	0	--	--	--
BASE	4	COMDER2 MAX	0	0	--	--	--
BASE	4	COMDER2 MIN	0	0	--	--	--
N+6.65	5	COMDER1 MAX	0.033768	0.016632	0.01808	0.56	OK
N+6.65	5	COMDER1 MIN	-0.033768	-0.016632	0.01808	0.56	OK
N+6.65	5	COMDER2 MAX	0.014616	0.028512	0.01732	0.54	OK
N+6.65	5	COMDER2 MIN	-0.014616	-0.028512	0.01732	0.54	OK
N+3.45	5	COMDER1 MAX	0.018216	0.007416	0.01967	0.56	OK
N+3.45	5	COMDER1 MIN	-0.018216	-0.007416	0.01967	0.56	OK
N+3.45	5	COMDER2 MAX	0.007776	0.0126	0.01481	0.42	OK
N+3.45	5	COMDER2 MIN	-0.007776	-0.0126	0.01481	0.42	OK
BASE	5	COMDER1 MAX	0	0	--	--	--
BASE	5	COMDER1 MIN	0	0	--	--	--
BASE	5	COMDER2 MAX	0	0	--	--	--
BASE	5	COMDER2 MIN	0	0	--	--	--
N+6.65	6	COMDER1 MAX	0.033768	0.012384	0.01702	0.53	OK
N+6.65	6	COMDER1 MIN	-0.033768	-0.012384	0.01702	0.53	OK
N+6.65	6	COMDER2 MAX	0.014616	0.02592	0.01607	0.50	OK
N+6.65	6	COMDER2 MIN	-0.014616	-0.02592	0.01607	0.50	OK
N+3.45	6	COMDER1 MAX	0.018216	0.005472	0.01902	0.54	OK
N+3.45	6	COMDER1 MIN	-0.018216	-0.005472	0.01902	0.54	OK
N+3.45	6	COMDER2 MAX	0.007776	0.011376	0.01378	0.39	OK
N+3.45	6	COMDER2 MIN	-0.007776	-0.011376	0.01378	0.39	OK
BASE	6	COMDER1 MAX	0	0	--	--	--
BASE	6	COMDER1 MIN	0	0	--	--	--

Diseños & Estructuras

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA

CÁLCULO DE DERIVAS MÁXIMAS

ALTURA DE N+6.65	3.20	m
ALTURA DE N+3.45	3.50	m
ALTURA DE BASE	0.00	m

Deriva Máxima Permitida **1.00** **%**

Nivel	Punto	COMBINACIÓN DE CARGA	DESPLAZAMIENTOS FUERZA SÍSMICA		Deriva Δ *m*	Deriva Δ *%*	Observación
			Desplazamiento X	Desplazamiento Y			
BASE	6	COMDER2 MAX	0	0	--	--	--
BASE	6	COMDER2 MIN	0	0	--	--	--
N+6.65	7	COMDER1 MAX	0.033768	0.012384	0.01702	0.53	OK
N+6.65	7	COMDER1 MIN	-0.033768	-0.012384	0.01702	0.53	OK
N+6.65	7	COMDER2 MAX	0.014616	0.0306	0.01838	0.57	OK
N+6.65	7	COMDER2 MIN	-0.014616	-0.0306	0.01838	0.57	OK
N+3.45	7	COMDER1 MAX	0.018216	0.005472	0.01902	0.54	OK
N+3.45	7	COMDER1 MIN	-0.018216	-0.005472	0.01902	0.54	OK
N+3.45	7	COMDER2 MAX	0.007776	0.013536	0.01561	0.45	OK
N+3.45	7	COMDER2 MIN	-0.007776	-0.013536	0.01561	0.45	OK
BASE	7	COMDER1 MAX	0	0	--	--	--
BASE	7	COMDER1 MIN	0	0	--	--	--
BASE	7	COMDER2 MAX	0	0	--	--	--
BASE	7	COMDER2 MIN	0	0	--	--	--
N+6.65	8	COMDER1 MAX	0.033768	0.014256	0.01742	0.54	OK
N+6.65	8	COMDER1 MIN	-0.033768	-0.014256	0.01742	0.54	OK
N+6.65	8	COMDER2 MAX	0.014616	0.034848	0.02054	0.64	OK
N+6.65	8	COMDER2 MIN	-0.014616	-0.034848	0.02054	0.64	OK
N+3.45	8	COMDER1 MAX	0.018216	0.006408	0.01931	0.55	OK
N+3.45	8	COMDER1 MIN	-0.018216	-0.006408	0.01931	0.55	OK
N+3.45	8	COMDER2 MAX	0.007776	0.01548	0.01732	0.49	OK
N+3.45	8	COMDER2 MIN	-0.007776	-0.01548	0.01732	0.49	OK
BASE	8	COMDER1 MAX	0	0	--	--	--
BASE	8	COMDER1 MIN	0	0	--	--	--
BASE	8	COMDER2 MAX	0	0	--	--	--
BASE	8	COMDER2 MIN	0	0	--	--	--
N+6.65	9	COMDER1 MAX	0.033768	0.020088	0.01906	0.60	OK
N+6.65	9	COMDER1 MIN	-0.033768	-0.020088	0.01906	0.60	OK
N+6.65	9	COMDER2 MAX	0.014616	0.044424	0.02549	0.80	OK
N+6.65	9	COMDER2 MIN	-0.014616	-0.044424	0.02549	0.80	OK
N+3.45	9	COMDER1 MAX	0.018216	0.009072	0.02035	0.58	OK
N+3.45	9	COMDER1 MIN	-0.018216	-0.009072	0.02035	0.58	OK
N+3.45	9	COMDER2 MAX	0.007776	0.019872	0.02134	0.61	OK
N+3.45	9	COMDER2 MIN	-0.007776	-0.019872	0.02134	0.61	OK
BASE	9	COMDER1 MAX	0	0	--	--	--
BASE	9	COMDER1 MIN	0	0	--	--	--
BASE	9	COMDER2 MAX	0	0	--	--	--
BASE	9	COMDER2 MIN	0	0	--	--	--
N+6.65	10	COMDER1 MAX	0.033768	0.026784	0.02134	0.67	OK
N+6.65	10	COMDER1 MIN	-0.033768	-0.026784	0.02134	0.67	OK
N+6.65	10	COMDER2 MAX	0.014616	0.055152	0.03107	0.97	OK
N+6.65	10	COMDER2 MIN	-0.014616	-0.055152	0.03107	0.97	OK
N+3.45	10	COMDER1 MAX	0.018216	0.012168	0.02191	0.63	OK
N+3.45	10	COMDER1 MIN	-0.018216	-0.012168	0.02191	0.63	OK
N+3.45	10	COMDER2 MAX	0.007776	0.02484	0.02603	0.74	OK
N+3.45	10	COMDER2 MIN	-0.007776	-0.02484	0.02603	0.74	OK
BASE	10	COMDER1 MAX	0	0	--	--	--
BASE	10	COMDER1 MIN	0	0	--	--	--
BASE	10	COMDER2 MAX	0	0	--	--	--
BASE	10	COMDER2 MIN	0	0	--	--	--
N+6.65	11	COMDER1 MAX	0.032616	0.035784	0.02457	0.77	OK
N+6.65	11	COMDER1 MIN	-0.032616	-0.035784	0.02457	0.77	OK
N+6.65	11	COMDER2 MAX	0.020376	0.055152	0.03179	0.99	OK
N+6.65	11	COMDER2 MIN	-0.020376	-0.055152	0.03179	0.99	OK
N+3.45	11	COMDER1 MAX	0.017784	0.0162	0.02406	0.69	OK
N+3.45	11	COMDER1 MIN	-0.017784	-0.0162	0.02406	0.69	OK
N+3.45	11	COMDER2 MAX	0.010584	0.024912	0.02707	0.77	OK
N+3.45	11	COMDER2 MIN	-0.010584	-0.024912	0.02707	0.77	OK

Diseños & Estructuras

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA

CÁLCULO DE DERIVAS MÁXIMAS

ALTURA DE N+6.65	3.20	m
ALTURA DE N+3.45	3.50	m
ALTURA DE BASE	0.00	m

Deriva Máxima Permitida **1.00** **%**

Nivel	Punto	COMBINACIÓN DE CARGA	DESPLAZAMIENTOS FUERZA SÍSMICA		Deriva Δ *m*	Deriva Δ *%*	Observación
			Desplazamiento X	Desplazamiento Y			
BASE	11	COMDER1 MAX	0	0	--	--	--
BASE	11	COMDER1 MIN	0	0	--	--	--
BASE	11	COMDER2 MAX	0	0	--	--	--
BASE	11	COMDER2 MIN	0	0	--	--	--
N+6.65	12	COMDER1 MAX	0.032616	0.028872	0.02170	0.68	OK
N+6.65	12	COMDER1 MIN	-0.032616	-0.028872	0.02170	0.68	OK
N+6.65	12	COMDER2 MAX	0.020376	0.044496	0.02630	0.82	OK
N+6.65	12	COMDER2 MIN	-0.020376	-0.044496	0.02630	0.82	OK
N+3.45	12	COMDER1 MAX	0.017784	0.013032	0.02205	0.63	OK
N+3.45	12	COMDER1 MIN	-0.017784	-0.013032	0.02205	0.63	OK
N+3.45	12	COMDER2 MAX	0.010584	0.020088	0.02271	0.65	OK
N+3.45	12	COMDER2 MIN	-0.010584	-0.020088	0.02271	0.65	OK
BASE	12	COMDER1 MAX	0	0	--	--	--
BASE	12	COMDER1 MIN	0	0	--	--	--
BASE	12	COMDER2 MAX	0	0	--	--	--
BASE	12	COMDER2 MIN	0	0	--	--	--
N+6.65	13	COMDER1 MAX	0.032616	0.022248	0.01923	0.60	OK
N+6.65	13	COMDER1 MIN	-0.032616	-0.022248	0.01923	0.60	OK
N+6.65	13	COMDER2 MAX	0.020376	0.035208	0.02177	0.68	OK
N+6.65	13	COMDER2 MIN	-0.020376	-0.035208	0.02177	0.68	OK
N+3.45	13	COMDER1 MAX	0.017784	0.010008	0.02041	0.58	OK
N+3.45	13	COMDER1 MIN	-0.017784	-0.010008	0.02041	0.58	OK
N+3.45	13	COMDER2 MAX	0.010584	0.015768	0.01899	0.54	OK
N+3.45	13	COMDER2 MIN	-0.010584	-0.015768	0.01899	0.54	OK
BASE	13	COMDER1 MAX	0	0	--	--	--
BASE	13	COMDER1 MIN	0	0	--	--	--
BASE	13	COMDER2 MAX	0	0	--	--	--
BASE	13	COMDER2 MIN	0	0	--	--	--
N+6.65	14	COMDER1 MAX	0.032616	0.016632	0.01746	0.55	OK
N+6.65	14	COMDER1 MIN	-0.032616	-0.016632	0.01746	0.55	OK
N+6.65	14	COMDER2 MAX	0.020376	0.028512	0.01868	0.58	OK
N+6.65	14	COMDER2 MIN	-0.020376	-0.028512	0.01868	0.58	OK
N+3.45	14	COMDER1 MAX	0.017784	0.007416	0.01927	0.55	OK
N+3.45	14	COMDER1 MIN	-0.017784	-0.007416	0.01927	0.55	OK
N+3.45	14	COMDER2 MAX	0.010584	0.0126	0.01646	0.47	OK
N+3.45	14	COMDER2 MIN	-0.010584	-0.0126	0.01646	0.47	OK
BASE	14	COMDER1 MAX	0	0	--	--	--
BASE	14	COMDER1 MIN	0	0	--	--	--
BASE	14	COMDER2 MAX	0	0	--	--	--
BASE	14	COMDER2 MIN	0	0	--	--	--
N+6.65	15	COMDER1 MAX	0.032616	0.012384	0.01636	0.51	OK
N+6.65	15	COMDER1 MIN	-0.032616	-0.012384	0.01636	0.51	OK
N+6.65	15	COMDER2 MAX	0.020376	0.02592	0.01753	0.55	OK
N+6.65	15	COMDER2 MIN	-0.020376	-0.02592	0.01753	0.55	OK
N+3.45	15	COMDER1 MAX	0.017784	0.005472	0.01861	0.53	OK
N+3.45	15	COMDER1 MIN	-0.017784	-0.005472	0.01861	0.53	OK
N+3.45	15	COMDER2 MAX	0.010584	0.011376	0.01554	0.44	OK
N+3.45	15	COMDER2 MIN	-0.010584	-0.011376	0.01554	0.44	OK
BASE	15	COMDER1 MAX	0	0	--	--	--
BASE	15	COMDER1 MIN	0	0	--	--	--
BASE	15	COMDER2 MAX	0	0	--	--	--
BASE	15	COMDER2 MIN	0	0	--	--	--
N+6.65	16	COMDER1 MAX	0.032616	0.012384	0.01636	0.51	OK
N+6.65	16	COMDER1 MIN	-0.032616	-0.012384	0.01636	0.51	OK
N+6.65	16	COMDER2 MAX	0.020376	0.0306	0.01967	0.61	OK
N+6.65	16	COMDER2 MIN	-0.020376	-0.0306	0.01967	0.61	OK
N+3.45	16	COMDER1 MAX	0.017784	0.005472	0.01861	0.53	OK
N+3.45	16	COMDER1 MIN	-0.017784	-0.005472	0.01861	0.53	OK

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA

CÁLCULO DE DERIVAS MÁXIMAS

ALTURA DE N+6.65	**3.20**	**m**
ALTURA DE N+3.45	**3.50**	**m**
ALTURA DE BASE	**0.00**	**m**

Deriva Máxima Permitida **1.00** **%**

Nivel	Punto	COMBINACIÓN DE CARGA	DESPLAZAMIENTOS FUERZA SÍSMICA		Deriva Δ *m*	Deriva Δ *%*	Observación
			Desplazamiento X	Desplazamiento Y			
N+3.45	16	COMDER2 MAX	0.010584	0.013536	0.01718	0.49	OK
N+3.45	16	COMDER2 MIN	-0.010584	-0.013536	0.01718	0.49	OK
BASE	16	COMDER1 MAX	0	0	--	--	--
BASE	16	COMDER1 MIN	0	0	--	--	--
BASE	16	COMDER2 MAX	0	0	--	--	--
BASE	16	COMDER2 MIN	0	0	--	--	--
N+6.65	17	COMDER1 MAX	0.032616	0.014256	0.01678	0.52	OK
N+6.65	17	COMDER1 MIN	-0.032616	-0.014256	0.01678	0.52	OK
N+6.65	17	COMDER2 MAX	0.020376	0.034848	0.02170	0.68	OK
N+6.65	17	COMDER2 MIN	-0.020376	-0.034848	0.02170	0.68	OK
N+3.45	17	COMDER1 MAX	0.017784	0.006408	0.01890	0.54	OK
N+3.45	17	COMDER1 MIN	-0.017784	-0.006408	0.01890	0.54	OK
N+3.45	17	COMDER2 MAX	0.010584	0.01548	0.01875	0.54	OK
N+3.45	17	COMDER2 MIN	-0.010584	-0.01548	0.01875	0.54	OK
BASE	17	COMDER1 MAX	0	0	--	--	--
BASE	17	COMDER1 MIN	0	0	--	--	--
BASE	17	COMDER2 MAX	0	0	--	--	--
BASE	17	COMDER2 MIN	0	0	--	--	--
N+6.65	18	COMDER1 MAX	0.032616	0.020088	0.01848	0.58	OK
N+6.65	18	COMDER1 MIN	-0.032616	-0.020088	0.01848	0.58	OK
N+6.65	18	COMDER2 MAX	0.020376	0.044424	0.02643	0.83	OK
N+6.65	18	COMDER2 MIN	-0.020376	-0.044424	0.02643	0.83	OK
N+3.45	18	COMDER1 MAX	0.017784	0.009072	0.01996	0.57	OK
N+3.45	18	COMDER1 MIN	-0.017784	-0.009072	0.01996	0.57	OK
N+3.45	18	COMDER2 MAX	0.010584	0.019872	0.02251	0.64	OK
N+3.45	18	COMDER2 MIN	-0.010584	-0.019872	0.02251	0.64	OK
BASE	18	COMDER1 MAX	0	0	--	--	--
BASE	18	COMDER1 MIN	0	0	--	--	--
BASE	18	COMDER2 MAX	0	0	--	--	--
BASE	18	COMDER2 MIN	0	0	--	--	--
N+6.65	19	COMDER1 MAX	0.032616	0.026784	0.02082	0.65	OK
N+6.65	19	COMDER1 MIN	-0.032616	-0.026784	0.02082	0.65	OK
N+6.65	19	COMDER2 MAX	0.020376	0.055152	0.03185	1.00	OK
N+6.65	19	COMDER2 MIN	-0.020376	-0.055152	0.03185	1.00	OK
N+3.45	19	COMDER1 MAX	0.017784	0.012168	0.02155	0.62	OK
N+3.45	19	COMDER1 MIN	-0.017784	-0.012168	0.02155	0.62	OK
N+3.45	19	COMDER2 MAX	0.010584	0.02484	0.02700	0.77	OK
N+3.45	19	COMDER2 MIN	-0.010584	-0.02484	0.02700	0.77	OK
BASE	19	COMDER1 MAX	0	0	--	--	--
BASE	19	COMDER1 MIN	0	0	--	--	--
BASE	19	COMDER2 MAX	0	0	--	--	--
BASE	19	COMDER2 MIN	0	0	--	--	--

Diseños & Estructuras

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA

CÁLCULO DE DERIVAS MÁXIMAS (ESPECTRO DE UMBRAL DE DAÑO)

ALTURA DE N+6.65	3.20	m
ALTURA DE N+3.45	3.50	m
ALTURA DE BASE	0.00	m
ALTURA DE	0.00	m
ALTURA DE	0.00	m
ALTURA DE	0.00	m

Deriva Máxima Permitida **0.40** **%**

Nivel	Punto	COMBINACIÓN DE CARGA	DESPLAZAMIENTOS FUERZA SÍSMICA		Deriva Δ	Deriva Δ	Observación
			Desplazamiento X	Desplazamiento Y	*m*	*%*	
N+6.65	2	COMDERUMB1 MAX	0.00980	0.01030	0.00718	0.22	OK
N+6.65	2	COMDERUMB1 MIN	-0.00980	-0.01030	0.00718	0.22	OK
N+6.65	2	COMDERUMB2 MAX	0.00420	0.01590	0.00893	0.28	OK
N+6.65	2	COMDERUMB2 MIN	-0.00420	-0.01590	0.00893	0.28	OK
N+3.45	2	COMDERUMB1 MAX	0.00530	0.00470	0.00708	0.20	OK
N+3.45	2	COMDERUMB1 MIN	-0.00530	-0.00470	0.00708	0.20	OK
N+3.45	2	COMDERUMB2 MAX	0.00220	0.00720	0.00753	0.22	OK
N+3.45	2	COMDERUMB2 MIN	-0.00220	-0.00720	0.00753	0.22	OK
BASE	2	COMDERUMB1 MAX	0.00000	0.00000	--	--	--
BASE	2	COMDERUMB1 MIN	0.00000	0.00000	--	--	--
BASE	2	COMDERUMB2 MAX	0.00000	0.00000	--	--	--
BASE	2	COMDERUMB2 MIN	0.00000	0.00000	--	--	--
N+6.65	3	COMDERUMB1 MAX	0.00980	0.00830	0.00644	0.20	OK
N+6.65	3	COMDERUMB1 MIN	-0.00980	-0.00830	0.00644	0.20	OK
N+6.65	3	COMDERUMB2 MAX	0.00420	0.01280	0.00728	0.23	OK
N+6.65	3	COMDERUMB2 MIN	-0.00420	-0.01280	0.00728	0.23	OK
N+3.45	3	COMDERUMB1 MAX	0.00530	0.00370	0.00646	0.18	OK
N+3.45	3	COMDERUMB1 MIN	-0.00530	-0.00370	0.00646	0.18	OK
N+3.45	3	COMDERUMB2 MAX	0.00220	0.00580	0.00620	0.18	OK
N+3.45	3	COMDERUMB2 MIN	-0.00220	-0.00580	0.00620	0.18	OK
BASE	3	COMDERUMB1 MAX	0.00000	0.00000	--	--	--
BASE	3	COMDERUMB1 MIN	0.00000	0.00000	--	--	--
BASE	3	COMDERUMB2 MAX	0.00000	0.00000	--	--	--
BASE	3	COMDERUMB2 MIN	0.00000	0.00000	--	--	--
N+6.65	4	COMDERUMB1 MAX	0.00980	0.00640	0.00570	0.18	OK
N+6.65	4	COMDERUMB1 MIN	-0.00980	-0.00640	0.00570	0.18	OK
N+6.65	4	COMDERUMB2 MAX	0.00420	0.01010	0.00595	0.19	OK
N+6.65	4	COMDERUMB2 MIN	-0.00420	-0.01010	0.00595	0.19	OK
N+3.45	4	COMDERUMB1 MAX	0.00530	0.00290	0.00604	0.17	OK
N+3.45	4	COMDERUMB1 MIN	-0.00530	-0.00290	0.00604	0.17	OK
N+3.45	4	COMDERUMB2 MAX	0.00220	0.00450	0.00501	0.14	OK
N+3.45	4	COMDERUMB2 MIN	-0.00220	-0.00450	0.00501	0.14	OK
BASE	4	COMDERUMB1 MAX	0.00000	0.00000	--	--	--
BASE	4	COMDERUMB1 MIN	0.00000	0.00000	--	--	--
BASE	4	COMDERUMB2 MAX	0.00000	0.00000	--	--	--
BASE	4	COMDERUMB2 MIN	0.00000	0.00000	--	--	--
N+6.65	5	COMDERUMB1 MAX	0.00980	0.00480	0.00525	0.16	OK
N+6.65	5	COMDERUMB1 MIN	-0.00980	-0.00480	0.00525	0.16	OK
N+6.65	5	COMDERUMB2 MAX	0.00420	0.00820	0.00502	0.16	OK
N+6.65	5	COMDERUMB2 MIN	-0.00420	-0.00820	0.00502	0.16	OK
N+3.45	5	COMDERUMB1 MAX	0.00530	0.00210	0.00570	0.16	OK
N+3.45	5	COMDERUMB1 MIN	-0.00530	-0.00210	0.00570	0.16	OK
N+3.45	5	COMDERUMB2 MAX	0.00220	0.00360	0.00422	0.12	OK
N+3.45	5	COMDERUMB2 MIN	-0.00220	-0.00360	0.00422	0.12	OK
BASE	5	COMDERUMB1 MAX	0.00000	0.00000	--	--	--
BASE	5	COMDERUMB1 MIN	0.00000	0.00000	--	--	--
BASE	5	COMDERUMB2 MAX	0.00000	0.00000	--	--	--
BASE	5	COMDERUMB2 MIN	0.00000	0.00000	--	--	--
N+6.65	6	COMDERUMB1 MAX	0.00980	0.00360	0.00492	0.15	OK
N+6.65	6	COMDERUMB1 MIN	-0.00980	-0.00360	0.00492	0.15	OK
N+6.65	6	COMDERUMB2 MAX	0.00420	0.00750	0.00465	0.15	OK
N+6.65	6	COMDERUMB2 MIN	-0.00420	-0.00750	0.00465	0.15	OK
N+3.45	6	COMDERUMB1 MAX	0.00530	0.00160	0.00554	0.16	OK
N+3.45	6	COMDERUMB1 MIN	-0.00530	-0.00160	0.00554	0.16	OK
N+3.45	6	COMDERUMB2 MAX	0.00220	0.00330	0.00397	0.11	OK
N+3.45	6	COMDERUMB2 MIN	-0.00220	-0.00330	0.00397	0.11	OK
BASE	6	COMDERUMB1 MAX	0.00000	0.00000	--	--	--
BASE	6	COMDERUMB1 MIN	0.00000	0.00000	--	--	--
BASE	6	COMDERUMB2 MAX	0.00000	0.00000	--	--	--
BASE	6	COMDERUMB2 MIN	0.00000	0.00000	--	--	--

Diseños & Estructuras

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA

CÁLCULO DE DERIVAS MÁXIMAS (ESPECTRO DE UMBRAL DE DAÑO)

ALTURA DE N+6.65	3.20	m
ALTURA DE N+3.45	3.50	m
ALTURA DE BASE	0.00	m
ALTURA DE	0.00	m
ALTURA DE	0.00	m
ALTURA DE	0.00	m

Deriva Máxima Permitida **0.40** **%**

Nivel	Punto	COMBINACIÓN DE CARGA	DESPLAZAMIENTOS FUERZA SÍSMICA Desplazamiento X	Desplazamiento Y	Deriva Δ *m*	Deriva Δ *%*	Observación
N+6.65	7	COMDERUMB1 MAX	0.00980	0.00360	0.00492	0.15	OK
N+6.65	7	COMDERUMB1 MIN	-0.00980	-0.00360	0.00492	0.15	OK
N+6.65	7	COMDERUMB2 MAX	0.00420	0.00880	0.00529	0.17	OK
N+6.65	7	COMDERUMB2 MIN	-0.00420	-0.00880	0.00529	0.17	OK
N+3.45	7	COMDERUMB1 MAX	0.00530	0.00160	0.00554	0.16	OK
N+3.45	7	COMDERUMB1 MIN	-0.00530	-0.00160	0.00554	0.16	OK
N+3.45	7	COMDERUMB2 MAX	0.00220	0.00390	0.00448	0.13	OK
N+3.45	7	COMDERUMB2 MIN	-0.00220	-0.00390	0.00448	0.13	OK
BASE	7	COMDERUMB1 MAX	0.00000	0.00000	--	--	--
BASE	7	COMDERUMB1 MIN	0.00000	0.00000	--	--	--
BASE	7	COMDERUMB2 MAX	0.00000	0.00000	--	--	--
BASE	7	COMDERUMB2 MIN	0.00000	0.00000	--	--	--
N+6.65	8	COMDERUMB1 MAX	0.00980	0.00410	0.00505	0.16	OK
N+6.65	8	COMDERUMB1 MIN	-0.00980	-0.00410	0.00505	0.16	OK
N+6.65	8	COMDERUMB2 MAX	0.00420	0.01000	0.00585	0.18	OK
N+6.65	8	COMDERUMB2 MIN	-0.00420	-0.01000	0.00585	0.18	OK
N+3.45	8	COMDERUMB1 MAX	0.00530	0.00180	0.00560	0.16	OK
N+3.45	8	COMDERUMB1 MIN	-0.00530	-0.00180	0.00560	0.16	OK
N+3.45	8	COMDERUMB2 MAX	0.00220	0.00450	0.00501	0.14	OK
N+3.45	8	COMDERUMB2 MIN	-0.00220	-0.00450	0.00501	0.14	OK
BASE	8	COMDERUMB1 MAX	0.00000	0.00000	--	--	--
BASE	8	COMDERUMB1 MIN	0.00000	0.00000	--	--	--
BASE	8	COMDERUMB2 MAX	0.00000	0.00000	--	--	--
BASE	8	COMDERUMB2 MIN	0.00000	0.00000	--	--	--
N+6.65	9	COMDERUMB1 MAX	0.00980	0.00580	0.00552	0.17	OK
N+6.65	9	COMDERUMB1 MIN	-0.00980	-0.00580	0.00552	0.17	OK
N+6.65	9	COMDERUMB2 MAX	0.00420	0.01280	0.00738	0.23	OK
N+6.65	9	COMDERUMB2 MIN	-0.00420	-0.01280	0.00738	0.23	OK
N+3.45	9	COMDERUMB1 MAX	0.00530	0.00260	0.00590	0.17	OK
N+3.45	9	COMDERUMB1 MIN	-0.00530	-0.00260	0.00590	0.17	OK
N+3.45	9	COMDERUMB2 MAX	0.00220	0.00570	0.00611	0.17	OK
N+3.45	9	COMDERUMB2 MIN	-0.00220	-0.00570	0.00611	0.17	OK
BASE	9	COMDERUMB1 MAX	0.00000	0.00000	--	--	--
BASE	9	COMDERUMB1 MIN	0.00000	0.00000	--	--	--
BASE	9	COMDERUMB2 MAX	0.00000	0.00000	--	--	--
BASE	9	COMDERUMB2 MIN	0.00000	0.00000	--	--	--
N+6.65	10	COMDERUMB1 MAX	0.00980	0.00770	0.00616	0.19	OK
N+6.65	10	COMDERUMB1 MIN	-0.00980	-0.00770	0.00616	0.19	OK
N+6.65	10	COMDERUMB2 MAX	0.00420	0.01590	0.00902	0.28	OK
N+6.65	10	COMDERUMB2 MIN	-0.00420	-0.01590	0.00902	0.28	OK
N+3.45	10	COMDERUMB1 MAX	0.00530	0.00350	0.00635	0.18	OK
N+3.45	10	COMDERUMB1 MIN	-0.00530	-0.00350	0.00635	0.18	OK
N+3.45	10	COMDERUMB2 MAX	0.00220	0.00710	0.00743	0.21	OK
N+3.45	10	COMDERUMB2 MIN	-0.00220	-0.00710	0.00743	0.21	OK
BASE	10	COMDERUMB1 MAX	0.00000	0.00000	--	--	--
BASE	10	COMDERUMB1 MIN	0.00000	0.00000	--	--	--
BASE	10	COMDERUMB2 MAX	0.00000	0.00000	--	--	--
BASE	10	COMDERUMB2 MIN	0.00000	0.00000	--	--	--
N+6.65	11	COMDERUMB1 MAX	0.00940	0.01030	0.00706	0.22	OK
N+6.65	11	COMDERUMB1 MIN	-0.00940	-0.01030	0.00706	0.22	OK
N+6.65	11	COMDERUMB2 MAX	0.00590	0.01590	0.00914	0.29	OK
N+6.65	11	COMDERUMB2 MIN	-0.00590	-0.01590	0.00914	0.29	OK
N+3.45	11	COMDERUMB1 MAX	0.00510	0.00470	0.00694	0.20	OK
N+3.45	11	COMDERUMB1 MIN	-0.00510	-0.00470	0.00694	0.20	OK
N+3.45	11	COMDERUMB2 MAX	0.00310	0.00720	0.00784	0.22	OK
N+3.45	11	COMDERUMB2 MIN	-0.00310	-0.00720	0.00784	0.22	OK
BASE	11	COMDERUMB1 MAX	0.00000	0.00000	--	--	--
BASE	11	COMDERUMB1 MIN	0.00000	0.00000	--	--	--
BASE	11	COMDERUMB2 MAX	0.00000	0.00000	--	--	--
BASE	11	COMDERUMB2 MIN	0.00000	0.00000	--	--	--

Diseños & Estructuras

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA

CÁLCULO DE DERIVAS MÁXIMAS (ESPECTRO DE UMBRAL DE DAÑO)

ALTURA DE N+6.65	3.20	m
ALTURA DE N+3.45	3.50	m
ALTURA DE BASE	0.00	m
ALTURA DE	0.00	m
ALTURA DE	0.00	m
ALTURA DE	0.00	m

Deriva Máxima Permitida **0.40** **%**

Nivel	Punto	COMBINACIÓN DE CARGA	DESPLAZAMIENTOS FUERZA SÍSMICA Desplazamiento X	Desplazamiento Y	Deriva Δ *m*	Deriva Δ *%*	Observación
N+6.65	12	COMDERUMB1 MAX	0.00940	0.00830	0.00630	0.20	OK
N+6.65	12	COMDERUMB1 MIN	-0.00940	-0.00830	0.00630	0.20	OK
N+6.65	12	COMDERUMB2 MAX	0.00590	0.01280	0.00754	0.24	OK
N+6.65	12	COMDERUMB2 MIN	-0.00590	-0.01280	0.00754	0.24	OK
N+3.45	12	COMDERUMB1 MAX	0.00510	0.00370	0.00630	0.18	OK
N+3.45	12	COMDERUMB1 MIN	-0.00510	-0.00370	0.00630	0.18	OK
N+3.45	12	COMDERUMB2 MAX	0.00310	0.00580	0.00658	0.19	OK
N+3.45	12	COMDERUMB2 MIN	-0.00310	-0.00580	0.00658	0.19	OK
BASE	12	COMDERUMB1 MAX	0.00000	0.00000	--	--	--
BASE	12	COMDERUMB1 MIN	0.00000	0.00000	--	--	--
BASE	12	COMDERUMB2 MAX	0.00000	0.00000	--	--	--
BASE	12	COMDERUMB2 MIN	0.00000	0.00000	--	--	--
N+6.65	13	COMDERUMB1 MAX	0.00940	0.00640	0.00554	0.17	OK
N+6.65	13	COMDERUMB1 MIN	-0.00940	-0.00640	0.00554	0.17	OK
N+6.65	13	COMDERUMB2 MAX	0.00590	0.01010	0.00626	0.20	OK
N+6.65	13	COMDERUMB2 MIN	-0.00590	-0.01010	0.00626	0.20	OK
N+3.45	13	COMDERUMB1 MAX	0.00510	0.00290	0.00587	0.17	OK
N+3.45	13	COMDERUMB1 MIN	-0.00510	-0.00290	0.00587	0.17	OK
N+3.45	13	COMDERUMB2 MAX	0.00310	0.00450	0.00546	0.16	OK
N+3.45	13	COMDERUMB2 MIN	-0.00310	-0.00450	0.00546	0.16	OK
BASE	13	COMDERUMB1 MAX	0.00000	0.00000	--	--	--
BASE	13	COMDERUMB1 MIN	0.00000	0.00000	--	--	--
BASE	13	COMDERUMB2 MAX	0.00000	0.00000	--	--	--
BASE	13	COMDERUMB2 MIN	0.00000	0.00000	--	--	--
N+6.65	14	COMDERUMB1 MAX	0.00940	0.00480	0.00508	0.16	OK
N+6.65	14	COMDERUMB1 MIN	-0.00940	-0.00480	0.00508	0.16	OK
N+6.65	14	COMDERUMB2 MAX	0.00590	0.00820	0.00539	0.17	OK
N+6.65	14	COMDERUMB2 MIN	-0.00590	-0.00820	0.00539	0.17	OK
N+3.45	14	COMDERUMB1 MAX	0.00510	0.00210	0.00552	0.16	OK
N+3.45	14	COMDERUMB1 MIN	-0.00510	-0.00210	0.00552	0.16	OK
N+3.45	14	COMDERUMB2 MAX	0.00310	0.00360	0.00475	0.14	OK
N+3.45	14	COMDERUMB2 MIN	-0.00310	-0.00360	0.00475	0.14	OK
BASE	14	COMDERUMB1 MAX	0.00000	0.00000	--	--	--
BASE	14	COMDERUMB1 MIN	0.00000	0.00000	--	--	--
BASE	14	COMDERUMB2 MAX	0.00000	0.00000	--	--	--
BASE	14	COMDERUMB2 MIN	0.00000	0.00000	--	--	--
N+6.65	15	COMDERUMB1 MAX	0.00940	0.00360	0.00474	0.15	OK
N+6.65	15	COMDERUMB1 MIN	-0.00940	-0.00360	0.00474	0.15	OK
N+6.65	15	COMDERUMB2 MAX	0.00590	0.00750	0.00505	0.16	OK
N+6.65	15	COMDERUMB2 MIN	-0.00590	-0.00750	0.00505	0.16	OK
N+3.45	15	COMDERUMB1 MAX	0.00510	0.00160	0.00535	0.15	OK
N+3.45	15	COMDERUMB1 MIN	-0.00510	-0.00160	0.00535	0.15	OK
N+3.45	15	COMDERUMB2 MAX	0.00310	0.00330	0.00453	0.13	OK
N+3.45	15	COMDERUMB2 MIN	-0.00310	-0.00330	0.00453	0.13	OK
BASE	15	COMDERUMB1 MAX	0.00000	0.00000	--	--	--
BASE	15	COMDERUMB1 MIN	0.00000	0.00000	--	--	--
BASE	15	COMDERUMB2 MAX	0.00000	0.00000	--	--	--
BASE	15	COMDERUMB2 MIN	0.00000	0.00000	--	--	--
N+6.65	16	COMDERUMB1 MAX	0.00940	0.00360	0.00474	0.15	OK
N+6.65	16	COMDERUMB1 MIN	-0.00940	-0.00360	0.00474	0.15	OK
N+6.65	16	COMDERUMB2 MAX	0.00590	0.00880	0.00564	0.18	OK
N+6.65	16	COMDERUMB2 MIN	-0.00590	-0.00880	0.00564	0.18	OK
N+3.45	16	COMDERUMB1 MAX	0.00510	0.00160	0.00535	0.15	OK
N+3.45	16	COMDERUMB1 MIN	-0.00510	-0.00160	0.00535	0.15	OK
N+3.45	16	COMDERUMB2 MAX	0.00310	0.00390	0.00498	0.14	OK
N+3.45	16	COMDERUMB2 MIN	-0.00310	-0.00390	0.00498	0.14	OK
BASE	16	COMDERUMB1 MAX	0.00000	0.00000	--	--	--
BASE	16	COMDERUMB1 MIN	0.00000	0.00000	--	--	--
BASE	16	COMDERUMB2 MAX	0.00000	0.00000	--	--	--
BASE	16	COMDERUMB2 MIN	0.00000	0.00000	--	--	--

Diseños & Estructuras

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA

CÁLCULO DE DERIVAS MÁXIMAS (ESPECTRO DE UMBRAL DE DAÑO)

ALTURA DE N+6.65	**3.20**	**m**
ALTURA DE N+3.45	**3.50**	**m**
ALTURA DE BASE	**0.00**	**m**
ALTURA DE	**0.00**	**m**
ALTURA DE	**0.00**	**m**
ALTURA DE	**0.00**	**m**

Deriva Máxima Permitida **0.40** **%**

Nivel	Punto	COMBINACIÓN DE CARGA	DESPLAZAMIENTOS FUERZA SÍSMICA		Deriva Δ *m*	Deriva Δ *%*	Observación
			Desplazamiento X	Desplazamiento Y			
N+6.65	17	COMDERUMB1 MAX	0.00940	0.00410	0.00488	0.15	OK
N+6.65	17	COMDERUMB1 MIN	-0.00940	-0.00410	0.00488	0.15	OK
N+6.65	17	COMDERUMB2 MAX	0.00590	0.01000	0.00617	0.19	OK
N+6.65	17	COMDERUMB2 MIN	-0.00590	-0.01000	0.00617	0.19	OK
N+3.45	17	COMDERUMB1 MAX	0.00510	0.00180	0.00541	0.15	OK
N+3.45	17	COMDERUMB1 MIN	-0.00510	-0.00180	0.00541	0.15	OK
N+3.45	17	COMDERUMB2 MAX	0.00310	0.00450	0.00546	0.16	OK
N+3.45	17	COMDERUMB2 MIN	-0.00310	-0.00450	0.00546	0.16	OK
BASE	17	COMDERUMB1 MAX	0.00000	0.00000	--	--	--
BASE	17	COMDERUMB1 MIN	0.00000	0.00000	--	--	--
BASE	17	COMDERUMB2 MAX	0.00000	0.00000	--	--	--
BASE	17	COMDERUMB2 MIN	0.00000	0.00000	--	--	--
N+6.65	18	COMDERUMB1 MAX	0.00940	0.00580	0.00536	0.17	OK
N+6.65	18	COMDERUMB1 MIN	-0.00940	-0.00580	0.00536	0.17	OK
N+6.65	18	COMDERUMB2 MAX	0.00590	0.01280	0.00763	0.24	OK
N+6.65	18	COMDERUMB2 MIN	-0.00590	-0.01280	0.00763	0.24	OK
N+3.45	18	COMDERUMB1 MAX	0.00510	0.00260	0.00572	0.16	OK
N+3.45	18	COMDERUMB1 MIN	-0.00510	-0.00260	0.00572	0.16	OK
N+3.45	18	COMDERUMB2 MAX	0.00310	0.00570	0.00649	0.19	OK
N+3.45	18	COMDERUMB2 MIN	-0.00310	-0.00570	0.00649	0.19	OK
BASE	18	COMDERUMB1 MAX	0.00000	0.00000	--	--	--
BASE	18	COMDERUMB1 MIN	0.00000	0.00000	--	--	--
BASE	18	COMDERUMB2 MAX	0.00000	0.00000	--	--	--
BASE	18	COMDERUMB2 MIN	0.00000	0.00000	--	--	--
N+6.65	19	COMDERUMB1 MAX	0.00940	0.00770	0.00601	0.19	OK
N+6.65	19	COMDERUMB1 MIN	-0.00940	-0.00770	0.00601	0.19	OK
N+6.65	19	COMDERUMB2 MAX	0.00590	0.01590	0.00923	0.29	OK
N+6.65	19	COMDERUMB2 MIN	-0.00590	-0.01590	0.00923	0.29	OK
N+3.45	19	COMDERUMB1 MAX	0.00510	0.00350	0.00619	0.18	OK
N+3.45	19	COMDERUMB1 MIN	-0.00510	-0.00350	0.00619	0.18	OK
N+3.45	19	COMDERUMB2 MAX	0.00310	0.00710	0.00775	0.22	OK
N+3.45	19	COMDERUMB2 MIN	-0.00310	-0.00710	0.00775	0.22	OK
BASE	19	COMDERUMB1 MAX	0.00000	0.00000	--	--	--
BASE	19	COMDERUMB1 MIN	0.00000	0.00000	--	--	--
BASE	19	COMDERUMB2 MAX	0.00000	0.00000	--	--	--
BASE	19	COMDERUMB2 MIN	0.00000	0.00000	--	--	--

Diseños & Estructuras

PROYECTO: I.E. MARCELO MIRANDA
VERIFICACIÓN DE INDICE DE ESTABILIDAD Qi

DESPLAZAMIENTO DE DIAFRAGMAS RIGIDOS

NIVEL	Diaphragm	COMBINACIÓN	DESPLAZAMIENTOS FUERZA SÍSMICA		Deriva Δ
		DE CARGA	Desplazamiento X	Desplazamiento Y	*m*
N+6.65	D1	COMDER1 MAX	0.0761	0.026	0.043
N+6.65	D1	COMDER1 MIN	-0.0761	-0.026	0.043
N+6.65	D1	COMDER2 MAX	0.0236	0.0842	0.054
N+6.65	D1	COMDER2 MIN	-0.0236	-0.0842	0.054
N+3.45	D1	COMDER1 MAX	0.0365	0.0096	0.038
N+3.45	D1	COMDER1 MIN	-0.0365	-0.0096	0.038
N+3.45	D1	COMDER2 MAX	0.0112	0.0312	0.033
N+3.45	D1	COMDER2 MIN	-0.0112	-0.0312	0.033

Diseños & Estructuras

PROYECTO: I.E. MARCELO MIRANDA
VERIFICACIÓN DE INDICE DE ESTABILIDAD Qi

DESPLAZAMIENTO DE DIAFRAGMAS RIGIDOS

FUERZA CORTANTE DEL PISO i

PISO	Fx	Vi
	kN	kN
N+6.65	769.2	769.22
N+3.45	6259.9	7029.11

CÁLCULO DE CARGA MUERTA POR NIVEL

NIVEL	Área	Carga Muerta kN	Acumulado Carga Muerta	Carga Viva kN/m^2	Carga Viva kN	Acumulado Carga Viva	Sumatoria de Cargas
N+6.65	645.54	179.00	179.00	5.00	3227.70	3227.70	3406.70
N+3.45	726.53	441.36	441.36	5.00	3632.65	3632.65	4074.01

INDICE DE ESTABILIDAD

$$Qi = \frac{Pi\Delta cm}{ViHpi}$$

Donde:

Pi — Suma de la carga vertical total, incluyendo muerta y viva, que existe en el piso i, y todos los pisos localizados por encima. Para el cálculo de los efectos P-Delta, no hay necesidad que los coeficientes de carga sean mayores que la unidad.

Δcm — Deriva del piso i, en la dirección bajo estudio, medida en el centro de masa del piso, como la diferencia entre el desplazamiento horizontal del piso i menos el del piso i-1.

Vi — Fuerza cortante del piso, en la dirección bajo estudio, sin dividir por **R.** Se determina por medio de la ecuación A.3-2. Corresponde a la suma de las fuerzas horizontales sísmicas que se aplican en el nivel i, y todos los niveles localizados por encima de él.

Hpi — Altura del piso i, medida desde la superficie del diafragma del piso i hasta la superficie del diafragma del piso inmediatamente inferior i-1.

PROYECTO: I.E. MARCELO MIRANDA
VERIFICACIÓN DE INDICE DE ESTABILIDAD Qi

DESPLAZAMIENTO DE DIAFRAGMAS RIGIDOS

VERIFICACIÓN DE ESTABILIDAD

$$Qi(x) = \frac{Pi\Delta cm}{ViHpi}$$

NIVEL	COMBINACIÓN DE CARGA	Hpi m	Pi kN	Δcm m	Vi kN	Qi	ESTABILIDAD Qi<0.10
N+6.65	COMDER1 MAX	3.20	3406.702	0.043	769.222	0.0593	ESTABLE
N+6.65	COMDER1 MIN	3.20	3406.702	0.043	769.222	0.0593	ESTABLE
N+6.65	COMDER2 MAX	3.20	3406.702	0.054	769.222	0.0753	ESTABLE
N+6.65	COMDER2 MIN	3.20	3406.702	0.054	769.222	0.0753	ESTABLE
N+3.45	COMDER1 MAX	3.45	4074.006	0.038	7029.114	0.0063	ESTABLE
N+3.45	COMDER1 MIN	3.45	4074.006	0.038	7029.114	0.0063	ESTABLE
N+3.45	COMDER2 MAX	3.45	4074.006	0.033	7029.114	0.0056	ESTABLE
N+3.45	COMDER2 MIN	3.45	4074.006	0.033	7029.114	0.0056	ESTABLE

4. DISEÑO DE CIMENTACIÓN

DISEÑO DE CIMENTACIÓN

PROYECTO: INSTITUCIÓN EDUCATIVA MARCELO MIRANDA
ELECCIÓN DE CARGAS PARA DISEÑO DE CIMENTACIÓN

Combinaciones de carga

		NSR-10	**F.S.**
Cargas Gravitacionales:	CIMEN= 1D + 1L	B.2.3-2	**3.00**
Cargas por Estado Límite de Servicio	CIMEN2= 1D + 0.75L + 0.70*(0.75/R)Ex + 0.21*(0.75/R)Ey	**B.2.3-8**	**1.50**
	CIMEN3= 1D + 0.75L + 0.21*(0.75/R)Ex + 0.70*(0.75/R)Ey		

Story	Point	Load	FX	FY	FZ	MX	MY	MZ	Load	COMBINACIÓN	Pumax
BASE	128	CIM1	-1.940	41.220	214.970	-63.392	-1.196	0.029	CIM1		
BASE	128	CIM2 MAX	5.560	37.040	187.950	-41.997	14.100	0.130	CIM2 MAX		
BASE	128	CIM2 MIN	-8.010	29.230	181.440	-61.756	-15.119	-0.077	CIM2 MIN	CIM1	215.0
BASE	128	CIM3 MAX	1.350	43.470	187.540	-24.748	4.944	0.301	CIM3 MAX		
BASE	128	CIM3 MIN	-3.800	22.790	181.860	-79.005	-5.963	-0.249	CIM3 MIN		
BASE	129	CIM1	-1.290	-28.280	192.230	11.794	-0.595	0.029	CIM1		
BASE	129	CIM2 MAX	6.210	-18.140	169.120	17.577	14.738	0.130	CIM2 MAX		
BASE	129	CIM2 MIN	-7.530	-25.860	162.480	-2.047	-14.721	-0.077	CIM2 MIN	CIM1	192.2
BASE	129	CIM3 MAX	2.060	-11.660	168.710	34.883	5.784	0.301	CIM3 MAX		
BASE	129	CIM3 MIN	-3.390	-32.330	162.890	-19.353	-5.768	-0.249	CIM3 MIN		
BASE	130	CIM1	21.630	34.600	579.610	-56.521	25.380	0.029	CIM1		
BASE	130	CIM2 MAX	26.830	31.020	504.780	-38.641	38.076	0.130	CIM2 MAX		
BASE	130	CIM2 MIN	11.800	25.620	499.120	-55.245	7.229	-0.077	CIM2 MIN	CIM1	579.6
BASE	130	CIM3 MAX	22.030	35.880	506.230	-23.312	28.259	0.301	CIM3 MAX		
BASE	130	CIM3 MIN	16.600	20.750	497.670	-70.574	17.046	-0.249	CIM3 MIN		
BASE	131	CIM1	18.690	-39.830	520.480	23.997	21.936	0.029	CIM1		
BASE	131	CIM2 MAX	24.290	-29.770	455.230	27.204	35.117	0.130	CIM2 MAX		
BASE	131	CIM2 MIN	9.120	-35.310	449.630	10.579	4.063	-0.077	CIM2 MIN	CIM1	520.5
BASE	131	CIM3 MAX	19.610	-24.950	456.750	42.521	25.569	0.301	CIM3 MAX		
BASE	131	CIM3 MIN	13.790	-40.120	448.110	-4.738	13.611	-0.249	CIM3 MIN		
BASE	132	CIM1	-1.200	57.660	899.800	-86.657	0.591	0.048	CIM1		
BASE	132	CIM2 MAX	10.780	52.720	784.060	-64.287	27.293	0.220	CIM2 MAX		
BASE	132	CIM2 MIN	-12.920	46.330	780.310	-84.404	-26.281	-0.131	CIM2 MIN	CIM1	899.8
BASE	132	CIM3 MAX	3.170	59.010	787.350	-44.596	10.207	0.512	CIM3 MAX		
BASE	132	CIM3 MIN	-5.31	40.03	777.01	-104.095	-9.195	-0.423	CIM3 MIN		
BASE	133	CIM1	-1.2	-61.27	807.74	42.004	0.339	0.048	CIM1		
BASE	133	CIM2 MAX	10.83	-49.5	706.3	46.307	27.172	0.22	CIM2 MAX		
BASE	133	CIM2 MIN	-13.01	-55.89	702.72	26.155	-26.654	-0.131	CIM2 MIN	CIM1	807.7
BASE	133	CIM3 MAX	3.41	-43.2	709.66	65.981	10.546	0.512	CIM3 MAX		
BASE	133	CIM3 MIN	-5.58	-62.18	699.37	6.481	-10.028	-0.423	CIM3 MIN		
BASE	134	CIM1	0.26	55.47	871.01	-84.721	2.219	0.048	CIM1		
BASE	134	CIM2 MAX	12.22	50.89	759.87	-62.811	28.897	0.22	CIM2 MAX		
BASE	134	CIM2 MIN	-11.8	44.58	756.28	-82.794	-25.034	-0.131	CIM2 MIN	CIM1	871.0

PROYECTO: INSTITUCIÓN EDUCATIVA MARCELO MIRANDA
ELECCIÓN DE CARGAS PARA DISEÑO DE CIMENTACIÓN

Combinaciones de carga

		NSR-10	**F.S.**
Cargas Gravitacionales:	CIMEN= 1D + 1L	B.2.3-2	**3.00**
Cargas por Estado Límite de Servicio	CIMEN2= 1D + 0.75L + 0.70*(0.75/R)Ex + 0.21*(0.75/R)Ey	**B.2.3-8**	**1.50**
	CIMEN3= 1D + 0.75L + 0.21*(0.75/R)Ex + 0.70*(0.75/R)Ey		

Story	Point	Load	FX	FY	FZ	MX	MY	MZ	Load	COMBINACIÓN	Pumax
BASE	134	CIM3 MAX	4.5	57.43	763.23	-42.377	11.697	0.512	CIM3 MAX		
BASE	134	CIM3 MIN	-4.09	38.04	752.92	-103.229	-7.834	-0.423	CIM3 MIN		
BASE	135	CIM1	1.38	-57.07	780.52	37.031	3.218	0.048	CIM1		
BASE	135	CIM2 MAX	13.34	-45.97	682.89	41.985	29.968	0.22	CIM2 MAX		
BASE	135	CIM2 MIN	-10.85	-52.29	679.51	22	-24.251	-0.131	CIM2 MIN	CIM1	780.5
BASE	135	CIM3 MAX	5.81	-39.44	686.32	62.417	13.221	0.512	CIM3 MAX		
BASE	135	CIM3 MIN	-3.32	-58.82	676.08	1.569	-7.503	-0.423	CIM3 MIN		
BASE	136	CIM1	4.72	49.27	897.93	-78.424	7.193	0.048	CIM1		
BASE	136	CIM2 MAX	15.87	45.69	785.43	-57.516	32.977	0.22	CIM2 MAX		
BASE	136	CIM2 MIN	-7.96	39.34	781.85	-77.568	-20.757	-0.131	CIM2 MIN	CIM1	897.9
BASE	136	CIM3 MAX	8.22	52.56	788.93	-36.091	15.839	0.512	CIM3 MAX		
BASE	136	CIM3 MIN	-0.31	32.47	778.35	-98.993	-3.619	-0.423	CIM3 MIN		
BASE	137	CIM1	-10.45	-53.86	835.18	33.139	-9.974	0.048	CIM1		
BASE	137	CIM2 MAX	2.26	-43.52	742.17	39.054	17.615	0.22	CIM2 MAX		
BASE	137	CIM2 MIN	-21.69	-49.92	738.52	18.941	-36.342	-0.131	CIM2 MIN	CIM1	835.2
BASE	137	CIM3 MAX	-5.23	-36.73	745.66	60.386	0.914	0.512	CIM3 MAX		
BASE	137	CIM3 MIN	-14.2	-56.71	735.04	-2.391	-19.641	-0.423	CIM3 MIN		
BASE	138	CIM1	-2.32	49.24	900.19	-78.835	-0.66	0.048	CIM1		
BASE	138	CIM2 MAX	10.07	46.25	787.66	-56.483	26.509	0.22	CIM2 MAX		
BASE	138	CIM2 MIN	-13.77	38.74	783.57	-79.372	-27.234	-0.131	CIM2 MIN	CIM1	900.2
BASE	138	CIM3 MAX	2.42	54.05	791.39	-32.515	9.378	0.512	CIM3 MAX		
BASE	138	CIM3 MIN	-6.12	30.95	779.84	-103.34	-10.103	-0.423	CIM3 MIN		
BASE	139	CIM1	12.52	-52.55	838.58	31.288	15.649	0.048	CIM1		
BASE	139	CIM2 MAX	23.53	-41.92	745.13	38.733	41.332	0.22	CIM2 MAX		
BASE	139	CIM2 MIN	-0.45	-49.28	741.53	16.02	-12.656	-0.131	CIM2 MIN	CIM1	838.6
BASE	139	CIM3 MAX	16.11	-34.14	749.04	62.689	24.706	0.512	CIM3 MAX		
BASE	139	CIM3 MIN	6.97	-57.06	737.62	-7.937	3.97	-0.423	CIM3 MIN		
BASE	140	CIM1	-22.76	26.38	612.07	-54.511	-23.449	0.048	CIM1		
BASE	140	CIM2 MAX	-7.71	27.26	547.08	-33.713	6.676	0.22	CIM2 MAX		
BASE	140	CIM2 MIN	-33.22	18.58	527.89	-60.539	-48.926	-0.131	CIM2 MIN	CIM1	612.1
BASE	140	CIM3 MAX	-15.97	36.01	546.36	-6.58	-11.133	0.512	CIM3 MAX		
BASE	140	CIM3 MIN	-24.97	9.83	528.61	-87.672	-31.117	-0.423	CIM3 MIN		
BASE	141	CIM1	-23.95	-27.79	513.68	4.089	-25.029	0.048	CIM1		

PROYECTO: INSTITUCIÓN EDUCATIVA MARCELO MIRANDA
ELECCIÓN DE CARGAS PARA DISEÑO DE CIMENTACIÓN

Combinaciones de carga

		NSR-10	**F.S.**
Cargas Gravitacionales:	CIMEN= 1D + 1L	B.2.3-2	**3.00**
Cargas por Estado Límite de Servicio	CIMEN2= 1D + 0.75L + 0.70*(0.75/R)Ex + 0.21*(0.75/R)Ey	**B.2.3-8**	**1.50**
	CIMEN3= 1D + 0.75L + 0.21*(0.75/R)Ex + 0.70*(0.75/R)Ey		

Story	Point	Load	FX	FY	FZ	MX	MY	MZ	Load	COMBINACIÓN	Pumax
BASE	141	CIM2 MAX	-8.64	-19.64	463.07	17.094	5.463	0.22	CIM2 MAX		
BASE	141	CIM2 MIN	-34.35	-28.39	443.74	-9.799	-50.459	-0.131	CIM2 MIN	CIM1	513.7
BASE	141	CIM3 MAX	-16.72	-10.92	462.53	44.202	-11.904	0.512	CIM3 MAX		
BASE	141	CIM3 MIN	-26.27	-37.11	444.28	-36.907	-33.093	-0.423	CIM3 MIN		
BASE	142	CIM1	26.79	27.33	617.33	-55.771	31.808	0.048	CIM1		
BASE	142	CIM2 MAX	36.75	28.5	551	-33.577	56.255	0.22	CIM2 MAX		
BASE	142	CIM2 MIN	11.18	18.95	532.59	-62.837	0.592	-0.131	CIM2 MIN	CIM1	617.3
BASE	142	CIM3 MAX	28.62	37.89	549.76	-4.539	38.599	0.512	CIM3 MAX		
BASE	142	CIM3 MIN	19.3	9.56	533.83	-91.875	18.248	-0.423	CIM3 MIN		
BASE	143	CIM1	26.15	-28.91	519.74	5.073	30.839	0.048	CIM1		
BASE	143	CIM2 MAX	36.22	-20.25	468.46	19.078	55.488	0.22	CIM2 MAX		
BASE	143	CIM2 MIN	10.45	-29.72	449.51	-10.104	-0.497	-0.131	CIM2 MIN	CIM1	519.7
BASE	143	CIM3 MAX	28.31	-10.83	466.79	48.139	38.314	0.512	CIM3 MAX		
BASE	143	CIM3 MIN	18.36	-39.14	451.18	-39.166	16.677	-0.423	CIM3 MIN		
BASE	144	CIM1	3.22	59.39	902.77	-90.872	5.514	0.048	CIM1		
BASE	144	CIM2 MAX	14.9	56.7	787.99	-61.228	31.896	0.22	CIM2 MAX		
BASE	144	CIM2 MIN	-9.08	45.45	782.4	-95.128	-21.998	-0.131	CIM2 MIN	CIM1	902.8
BASE	144	CIM3 MAX	7.2	67.53	792.93	-28.377	14.702	0.512	CIM3 MAX		
BASE	144	CIM3 MIN	-1.37	34.61	777.46	-127.979	-4.805	-0.423	CIM3 MIN		
BASE	145	CIM1	2.77	-56.61	811.7	34.624	4.772	0.048	CIM1		
BASE	145	CIM2 MAX	14.6	-43.09	710.84	46.716	31.369	0.22	CIM2 MAX		
BASE	145	CIM2 MIN	-9.55	-54.33	705.59	12.824	-22.799	-0.131	CIM2 MIN	CIM1	811.7
BASE	145	CIM3 MAX	7.07	-32.26	715.91	79.559	14.633	0.512	CIM3 MAX		
BASE	145	CIM3 MIN	-2.03	-65.16	700.52	-20.02	-6.063	-0.423	CIM3 MIN		
BASE	146	CIM1	-27.94	30.57	448.35	-54.704	-30.517	0.029	CIM1		
BASE	146	CIM2 MAX	-19.13	31.54	401.77	-32.054	-13.761	0.13	CIM2 MAX		
BASE	146	CIM2 MIN	-31.53	21.47	389.36	-62.593	-41.632	-0.077	CIM2 MIN	CIM1	448.4
BASE	146	CIM3 MAX	-23.2	41.06	402.93	-3.019	-22.764	0.301	CIM3 MAX		
BASE	146	CIM3 MIN	-27.46	11.95	388.21	-91.628	-32.628	-0.249	CIM3 MIN		
BASE	147	CIM1	-25.08	-24.95	398.88	5.359	-27.425	0.029	CIM1		
BASE	147	CIM2 MAX	-16.56	-16.51	359.74	19.948	-10.955	0.13	CIM2 MAX		
BASE	147	CIM2 MIN	-29.04	-26.6	346.92	-10.612	-38.964	-0.077	CIM2 MIN	CIM1	398.9
BASE	147	CIM3 MAX	-20.57	-7	360.62	48.971	-19.746	0.301	CIM3 MAX		

PROYECTO: INSTITUCIÓN EDUCATIVA MARCELO MIRANDA
ELECCIÓN DE CARGAS PARA DISEÑO DE CIMENTACIÓN

Combinaciones de carga

		NSR-10	F.S.
Cargas Gravitacionales:	CIMEN= 1D + 1L	B.2.3-2	**3.00**
Cargas por Estado Límite de Servicio	CIMEN2= 1D + 0.75L + 0.70*(0.75/R)Ex + 0.21*(0.75/R)Ey CIMEN3= 1D + 0.75L + 0.21*(0.75/R)Ex + 0.70*(0.75/R)Ey	**B.2.3-8**	**1.50**

Story	Point	Load	FX	FY	FZ	MX	MY	MZ	Load	COMBINACIÓN	Pumax
BASE	147	CIM3 MIN	-25.03	-36.11	346.04	-39.635	-30.172	-0.249	CIM3 MIN		

DISEÑO VIGAS DE AMARRE

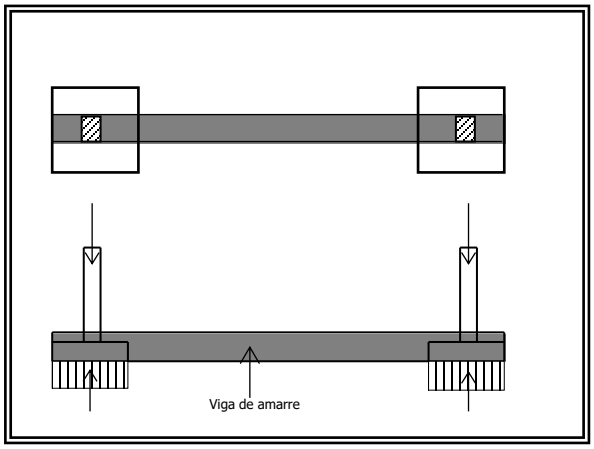
PROYECTO: INSTITUCIÓN EDUCATIVA MARCELO MIRANDA

VIGA DE AMARRE TIPO

f'c = **21.1** MPa
fy = **420** MPa

b = **0.40** m
h = **0.40** m

Pmáx = 900.19 kN



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

Aa = ***0.20***
Paxial = 0.25*Aa*Pmáx
Paxial = *45.0* kN

DISEÑO A TENSIÓN

As = 1.7*45.0095/(0.90*420)
As = **2.02** cm^2

DISEÑO A COMPRESIÓN

P com = 1.7*45.0095
P com = *76.5* kN

Para esta carga la sección requiere cuantía mínima:

As = 0.00333*0.4*0.35
As = **4.66** cm^2

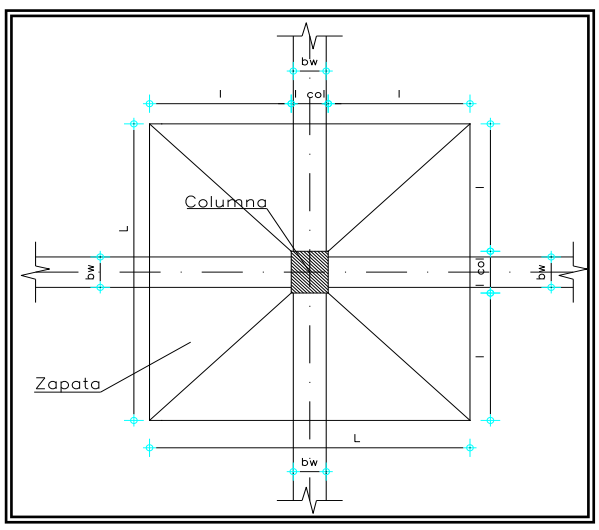
Se suministra un refuerzo constituido por 4#4 arriba y abajo (como refuerzo mínimo).

PROYECTO: INSTITUCIÓN EDUCATIVA MARCELO MIRANDA

ZAPATA TIPO 1 (3 Und).

Columna	**b =**	**50**	cm		**f'c =**	**21.1**	MPa		**σ =**	**0.158**	MPa
	t =	**70**	cm		**fy =**	**420**	MPa				

PREDIMENSIONAMIENTO



L =	1.70	m	
lcol =	0.70	m	
l =	0.50	m	

Cargas

Mu=	**0.00**	kN*m
Pu =	**398.90**	kN
Pp (10%) =	39.89	kN
Σ P =	438.79	kN

Area necesaria = $\frac{\Sigma P}{\sigma} = \frac{438.79}{0.158} =$ 2.78 m²

e =	0.00	m
L =	1.67	m

Aproximamos = **1.70** m

Carga de diseño = $\frac{Pu}{A\ real} = \frac{398.9}{2.890} =$ 0.138 MPa

Esfuerzos

σmáx=	0.152	MPa	**OK**
σmin=	0.152	MPa	**OK**

DISEÑO DE ZAPATA CONCENTRICA

FLEXIÓN

M borde de la columna = 18.98 kN*m

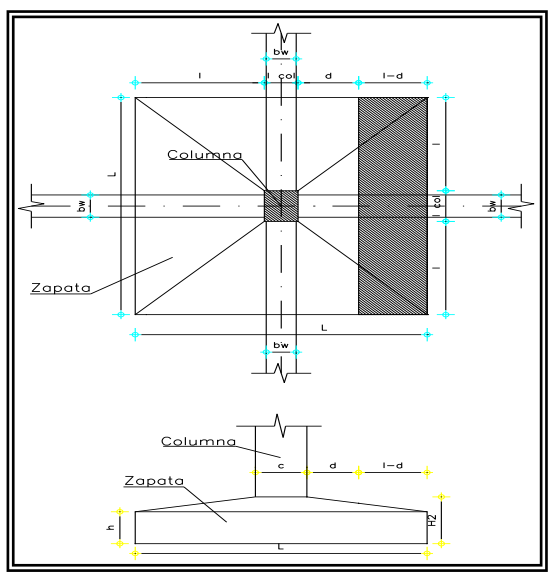
Mu = 1,7 * M borde de la columna = 32.26 kN*m

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

d=	0.23	m
Cuantia =	0.0020	
As =	4.60	cm²/m

Armadura: **9#420c./0.20 en ambos sentidos**

CORTANTE



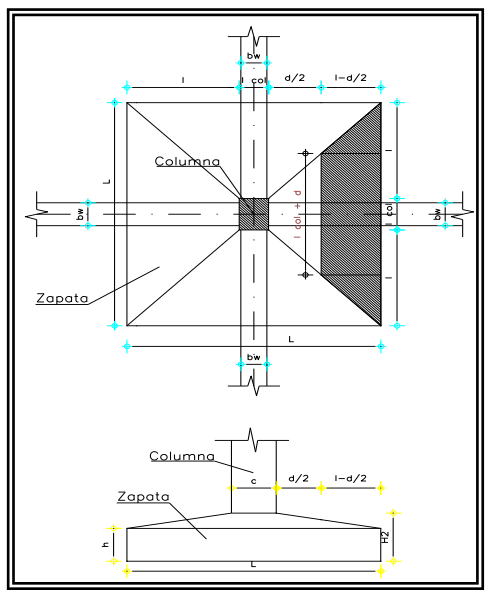
a. En una dirección (d)

L =	1.70	m	**H =**	**0.30**	m
l =	0.50	m	**h =**	**0.30**	m
l - d =	0.27	m	**H-h =**	0.00	m

V (d) =	69.69	kN
Vu (d)=	1.7*V(d)	
Vu (d) =	118.47	kN
h´=	0.23	m

$\upsilon\nu = \frac{Vu}{L * h'} =$ 0.303 MPa

ϕνc = 0.574 MPa **OK**



b. En dos direcciones (d/2)

ZAPATA TIPO 1 (3 Und).

L =	1.70	m
d/2 =	0.12	m
l - d/2 =	0.39	m

H =	**0.30**	m
h =	**0.30**	m
H-h =	0.00	m

V (d/2) =	76.9	kN
Vu (d/2) =	1.5*V(d)	
Vu (d/2) =	115.3	kN
d_1 =	0.23	m

$$\nu u = \frac{Vu}{bo \times d_1} = 0.539 \text{ MPa}$$

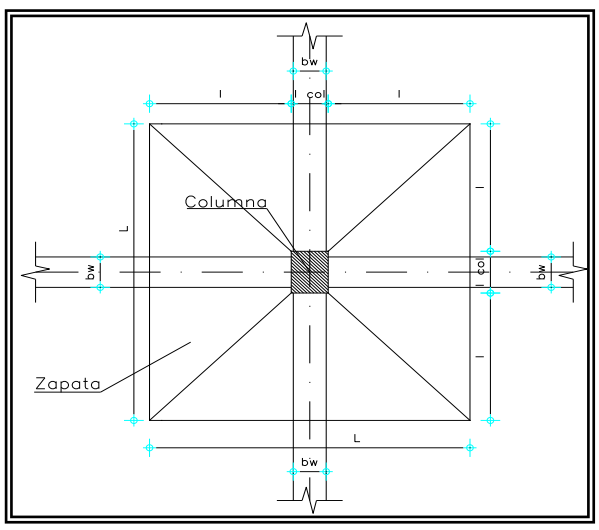
$\phi\nu c$= 1.15 MPa **OK**

PROYECTO: INSTITUCIÓN EDUCATIVA MARCELO MIRANDA

ZAPATA TIPO 2 (7 Und).

Columna	**b =**	**50**	cm	**f'c =**	**21.1**	MPa	**σ =**	**0.158**	MPa
	t =	**70**	cm	**fy =**	**420**	MPa			

PREDIMENSIONAMIENTO



L = 2.20 m
lcol = 0.70 m
l = 0.75 m

Cargas

Mu=	**0.00**	kN*m
Pu =	**617.30**	kN
Pp (10%) =	61.73	kN
Σ P =	679.03	kN

Area necesaria = $\frac{\Sigma P}{\sigma} = \frac{679.03}{0.158} =$ 4.30 m²

e = 0.00 m
L = 2.07 m

Aproximamos = **2.20** m

Carga de diseño = $\frac{Pu}{A\ real} = \frac{617.3}{4.840} =$ 0.128 MPa

Esfuerzos

σmáx=	0.140	MPa	**OK**
σmin=	0.140	MPa	**OK**

DISEÑO DE ZAPATA CONCENTRICA

FLEXIÓN

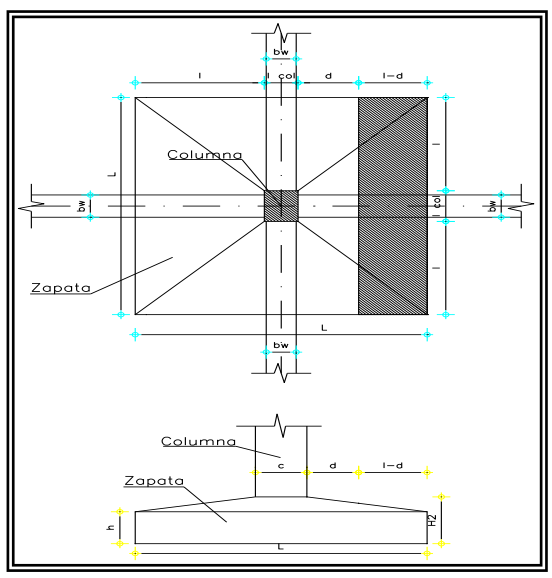
M borde de la columna = 39.46 kN*m

Mu = 1,7 * M borde de la columna = 67.08 kN*m

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

d= 0.23 m
Cuantia = 0.0031
As = 7.21 cm²/m
Armadura: **12#525c./0.20**
en ambos sentidos

CORTANTE



a. En una dirección (d)

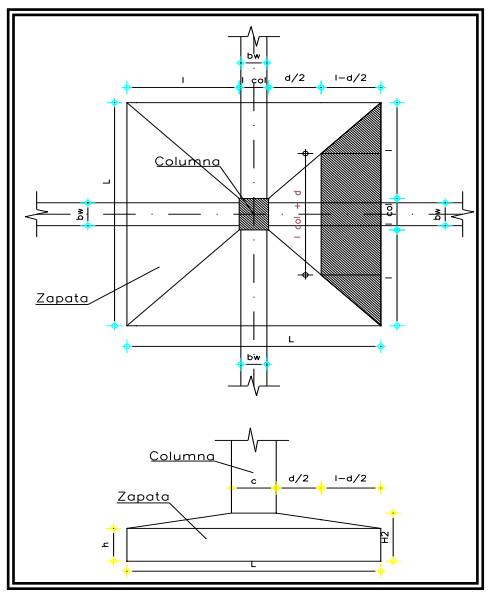
L = 2.20 m
l = 0.75 m
l - d = 0.52 m

H = **0.30** m
h = **0.30** m
H-h = 0.00 m

V (d) = 160.50 kN
Vu (d)= 1.7*V(d)
Vu (d) = 272.85 kN
h´= 0.23 m

$\upsilon\nu = \frac{Vu}{L * h'} =$ 0.539 MPa

ϕνc = 0.574 MPa **OK**



b. En dos direcciones (d/2)

ZAPATA TIPO 2 (7 Und).

L =	2.20	m	**H =**	**0.30**	m
d/2 =	0.12	m	**h =**	**0.30**	m
l - d/2 =	0.64	m	**H-h =**	0.00	m
V (d/2) =	139.4	kN			
Vu (d/2) =	1.5*V(d)				
Vu (d/2) =	209.1	kN			
d_1 =	0.23	m			

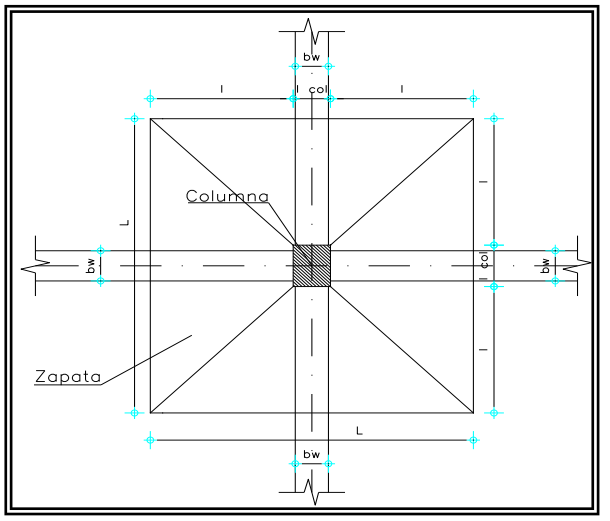
$$\nu u = \frac{Vu}{bo \times d_1} = 0.978 \text{ MPa}$$

$\phi\nu c$= 1.15 MPa **OK**

PROYECTO: INSTITUCIÓN EDUCATIVA MARCELO MIRANDA
ZAPATA TIPO 3 (10 Und).

Columna	**b =**	**50**	cm	**f'c =**	**21.1**	MPa		**σ =**	**0.158**	MPa
	t =	**70**	cm	**fy =**	**420**	MPa				

PREDIMENSIONAMIENTO



L =	2.60	m
lcol =	0.70	m
l =	0.95	m

Cargas

Mu=	**0.00**	kN*m
Pu =	**902.80**	kN
Pp (10%) =	90.28	kN
Σ P =	993.08	kN

Area necesaria = $\frac{\Sigma P}{\sigma} = \frac{993.08}{0.158} =$ 6.29 m²

e =	0.00	m
L =	2.51	m

Aproximamos = **2.60** m

Carga de diseño = $\frac{Pu}{A\ real} = \frac{902.8}{6.760} =$ 0.134 MPa

Esfuerzos

σmáx=	0.147	MPa	**OK**
σmin=	0.147	MPa	**OK**

DISEÑO DE ZAPATA CONCENTRICA

FLEXIÓN

M borde de la columna = 66.29 kN*m

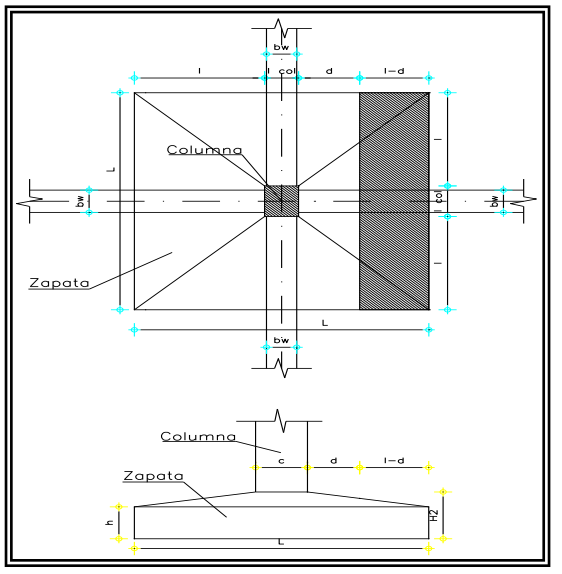
Mu = 1,7 * M borde de la columna = 112.69 kN*m

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

d=	0.33	m
Cuantia =	0.0025	
As =	8.38	cm²/m

Armadura: **14#529c./0.20 en ambos sentidos**

CORTANTE



a. En una dirección (d)

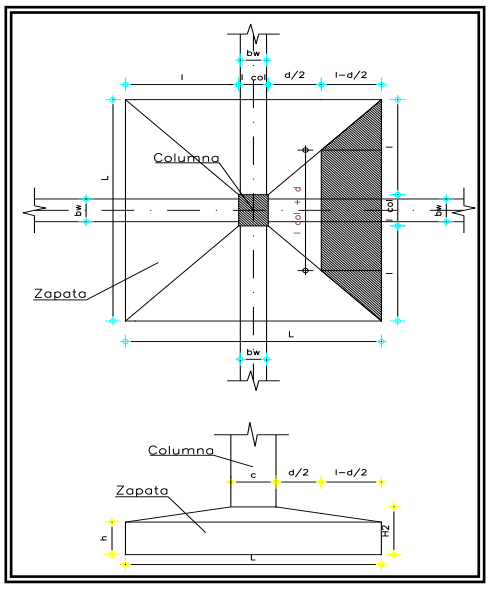
L =	2.60	m
l =	0.95	m
l - d =	0.62	m

H =	**0.40**	m
h =	**0.30**	m
H-h =	0.10	m

V (d) =	236.81	kN
Vu (d)=	1.7*V(d)	
Vu (d) =	402.58	kN
h´ =	0.30	m

$\upsilon v = \frac{Vu}{L * h'} =$ 0.518 MPa

ϕvc = 0.574 MPa **OK**



b. En dos direcciones (d/2)

ZAPATA TIPO 3 (10 Und).

L =	2.60	m	**H =**	**0.40**	m
d/2 =	0.17	m	**h =**	**0.30**	m
l - d/2 =	0.79	m	**H-h =**	0.10	m

V (d/2) =	209.3	kN
Vu (d/2) =	1.5*V(d)	
Vu (d/2) =	314.0	kN
d_1 =	0.317222222	m

$$\nu u = \frac{Vu}{bo \times d_1} = 0.961 \text{ MPa}$$

$\phi\nu c$= 1.15 MPa **OK**

5. DISEÑO DE VIGAS, VIGUETAS, COLUMNAS Y PANTALLAS

DISEÑO DE VIGAS, VIGUETAS, COLUMNAS Y PANTALLAS

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA

V-101/N+3.45

B=0.20 H=0.45 L=0.40			B=0.20 H=0.45 L=5.90			B=0.20 H=0.45 L=6.63		
Mu=-3.25 As =2.54 As(r)=2.61		Mu=-5.11 As =2.54 As(r)=2.61	Mu=-19.69 As =2.54 As(r)=2.61		Mu=-29.23 As =2.54 As(r)=2.61	Mu=-30.44 As =2.54 As(r)=2.61		Mu=-48.12 As =3.96 As(r)=3.38
	Mu=3.07 As =2.54 As(r)=2.61			Mu=7.31 As =2.54 As(r)=2.61			Mu=18.13 As =2.54 As(r)=2.61	
Vu=-9.54	Vu=-8.63	Vu=-7.72	Vu=-10.11	Vu=6.60	Vu=14.76	Vu=-29.43	Vu=8.93	Vu=34.15

B=0.20 H=0.45 L=6.70			B=0.20 H=0.45 L=6.58			B=0.20 H=0.45 L=6.95		
Mu=-51.58 As =3.96 As(r)=3.64		Mu=-48.62 As =3.96 As(r)=3.42	Mu=-50.39 As =3.96 As(r)=3.55		Mu=-40.47 As =2.54 As(r)=2.82	Mu=-30.76 As =2.54 As(r)=2.61		Mu=-31.13 As =2.54 As(r)=2.61
	Mu=17.74 As =2.54 As(r)=2.61			Mu=18.60 As =2.54 As(r)=2.61			Mu=7.78 As =2.54 As(r)=2.61	
Vu=-35.00	Vu=6.80	Vu=33.70	Vu=-34.93	Vu=5.91	Vu=30.88	Vu=-13.70	Vu=4.09	Vu=13.74

B=0.20 H=0.45 L=6.45			B=0.20 H=0.45 L=3.35			B=0.20 H=0.45 L=6.58		
Mu=-42.77 As =2.54 As(r)=2.99		Mu=-36.63 As =2.54 As(r)=2.61	Mu=-31.62 As =2.54 As(r)=2.61		Mu=-31.34 As =3.96 As(r)=2.61	Mu=-36.03 As =3.96 As(r)=2.61		Mu=-52.87 As =3.96 As(r)=3.74
	Mu=21.53 As =2.54 As(r)=2.61			Mu=7.91 As =2.54 As(r)=2.61			Mu=20.80 As =2.75 As(r)=2.61	
Vu=-32.93	Vu=6.48	Vu=30.53	Vu=-14.63	Vu=-9.64	Vu=14.21	Vu=-31.00	Vu=9.06	Vu=35.49

B=0.20 H=0.45 L=6.63		
Mu=-54.88 As =3.96 As(r)=3.89		Mu=-28.06 As =3.96 As(r)=2.61
	Mu=22.85 As =5.08 As(r)=2.61	
Vu=-37.19	Vu=-5.42	Vu=26.96

V-102/N+3.45

B=0.40 H=0.45 L=0.40			B=0.40 H=0.45 L=5.90			B=0.40 H=0.45 L=6.63		
Mu=-1.26 As =6.50 As(r)=5.23		Mu=-27.05 As =6.50 As(r)=5.23	Mu=-79.36 As =6.50 As(r)=5.53		Mu=-98.16 As =13.46 As(r)=6.91	Mu=-201.87 As =13.46 As(r)=15.20		Mu=-234.62 As =17.90 As(r)=18.11
	Mu=0.00 As =5.94 As(r)=5.23			Mu=24.54 As =5.94 As(r)=5.23			Mu=145.28 As =5.94 As(r)=10.53	
Vu=39.11	Vu=40.92	Vu=42.73	Vu=-33.70	Vu=24.39	Vu=40.72	Vu=-132.60	Vu=-56.16	Vu=143.35

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA

B=0.40 H=0.45 L=6.70			B=0.40 H=0.45 L=6.58			B=0.40 H=0.45 L=6.95		
Mu=-227.28 As =17.90 As(r)=17.44		Mu=-227.67 As =17.90 As(r)=17.48	Mu=-227.28 As =17.90 As(r)=17.44		Mu=-217.02 As =15.52 As(r)=16.53	Mu=-193.67 As =15.52 As(r)=14.50		Mu=-192.51 As =15.52 As(r)=14.40
	Mu=128.45 As =5.94 As(r)=9.21			Mu=130.27 As =5.94 As(r)=9.35			Mu=99.93 As =5.94 As(r)=7.04	
Vu=-132.14	Vu=-55.84	Vu=135.11	Vu=-132.54	Vu=-59.63	Vu=131.31	Vu=-98.75	Vu=-47.86	Vu=99.50

B=0.40 H=0.45 L=6.45			B=0.40 H=0.45 L=3.35			B=0.40 H=0.45 L=6.58		
Mu=-218.43 As =15.52 As(r)=16.65		Mu=-204.87 As =15.52 As(r)=15.46	Mu=-137.54 As =15.52 As(r)=9.92		Mu=-132.39 As =14.24 As(r)=9.52	Mu=-206.48 As =15.52 As(r)=15.60		Mu=-228.13 As =15.52 As(r)=17.52
	Mu=129.90 As =5.94 As(r)=9.32			Mu=34.39 As =5.94 As(r)=5.23			Mu=128.01 As =9.17 As(r)=9.18	
Vu=-129.75	Vu=-59.49	Vu=128.05	Vu=-71.46	Vu=-61.49	Vu=68.84	Vu=-125.79	Vu=-52.98	Vu=136.54

B=0.40 H=0.45 L=6.63		
Mu=-241.54 As =15.52 As(r)=18.75		Mu=-202.62 As =15.52 As(r)=15.27
	Mu=140.62 As =7.68 As(r)=10.16	
Vu=-139.89	Vu=-65.78	Vu=131.24

V-103/N+3.45

B=0.40 H=0.45 L=0.40			B=0.40 H=0.45 L=5.90			B=0.40 H=0.45 L=6.63		
Mu=-1.01 As =6.50 As(r)=5.23		Mu=-30.06 As =6.50 As(r)=5.23	Mu=-79.53 As =6.50 As(r)=5.54		Mu=-101.12 As =13.46 As(r)=7.13	Mu=-218.60 As =13.46 As(r)=16.67		Mu=-256.70 As =17.90 As(r)=20.17
	Mu=0.00 As =5.94 As(r)=5.23			Mu=25.28 As =5.94 As(r)=5.23			Mu=167.01 As =5.94 As(r)=12.28	
Vu=43.78	Vu=45.59	Vu=47.40	Vu=-33.41	Vu=25.00	Vu=41.33	Vu=-147.47	Vu=-63.52	Vu=160.30

B=0.40 H=0.45 L=6.70			B=0.40 H=0.45 L=6.58			B=0.40 H=0.45 L=6.95		
Mu=-246.91 As =17.90 As(r)=19.25		Mu=-247.28 As =17.90 As(r)=19.28	Mu=-242.12 As =17.90 As(r)=18.80		Mu=-244.39 As =17.90 As(r)=19.01	Mu=-256.41 As =17.90 As(r)=20.14		Mu=-256.55 As =15.52 As(r)=20.16
	Mu=148.29 As =5.94 As(r)=10.77			Mu=146.32 As =5.94 As(r)=10.61			Mu=162.73 As =5.94 As(r)=11.93	
Vu=-147.30	Vu=-63.50	Vu=150.82	Vu=-145.07	Vu=-65.35	Vu=148.42	Vu=-153.39	Vu=-65.00	Vu=156.20

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA

B=0.40 H=0.45 L=6.45			B=0.40 H=0.45 L=3.35			B=0.40 H=0.45 L=6.58		
Mu=-244.62 As =15.52 As(r)=19.03		Mu=-219.49 As =15.52 As(r)=16.75	Mu=-147.52 As =15.52 As(r)=10.71		Mu=-143.89 As =14.24 As(r)=10.42	Mu=-224.62 As =15.52 As(r)=17.20		Mu=-248.67 As =17.90 As(r)=19.41
	Mu=145.31 As =5.94 As(r)=10.53			Mu=36.88 As =5.94 As(r)=5.23			Mu=147.00 As =9.17 As(r)=10.67	
Vu=-146.03	Vu=-68.61	Vu=140.65	Vu=-84.94	Vu=-61.23	Vu=83.11	Vu=-140.36	Vu=-60.17	Vu=152.33

B=0.40 H=0.45 L=6.63		
Mu=-261.19 As =17.90 As(r)=20.60		Mu=-219.51 As =15.52 As(r)=16.75
	Mu=160.59 As =7.68 As(r)=11.75	
Vu=-155.24	Vu=-73.66	Vu=145.82

V-104/N+3.45

B=0.20 H=0.45 L=0.40			B=0.20 H=0.45 L=5.90			B=0.20 H=0.45 L=6.63		
Mu=-3.52 As =2.54 As(r)=2.61		Mu=-3.70 As =2.54 As(r)=2.61	Mu=-18.89 As =2.54 As(r)=2.61		Mu=-25.17 As =2.54 As(r)=2.61	Mu=-28.61 As =2.54 As(r)=2.61		Mu=-49.72 As =3.96 As(r)=3.50
	Mu=2.47 As =2.54 As(r)=2.61			Mu=6.29 As =2.54 As(r)=2.61			Mu=17.95 As =2.54 As(r)=2.61	
Vu=-9.12	Vu=-8.21	Vu=-7.30	Vu=-9.86	Vu=5.24	Vu=13.40	Vu=-32.37	Vu=11.02	Vu=38.43

B=0.20 H=0.45 L=6.70			B=0.20 H=0.45 L=6.58			B=0.20 H=0.45 L=6.95		
Mu=-52.46 As =3.96 As(r)=3.71		Mu=-48.31 As =3.96 As(r)=3.40	Mu=-49.05 As =3.96 As(r)=3.45		Mu=-49.44 As =3.96 As(r)=3.48	Mu=-52.14 As =3.96 As(r)=3.68		Mu=-52.16 As =3.96 As(r)=3.69
	Mu=16.96 As =2.54 As(r)=2.61			Mu=15.74 As =2.54 As(r)=2.61			Mu=19.47 As =2.54 As(r)=2.61	
Vu=-39.40	Vu=7.83	Vu=37.21	Vu=-37.60	Vu=8.00	Vu=36.94	Vu=-40.66	Vu=7.62	Vu=39.83

B=0.20 H=0.45 L=6.45			B=0.20 H=0.45 L=3.35			B=0.20 H=0.45 L=6.58		
Mu=-51.71 As =3.96 As(r)=3.65		Mu=-37.63 As =2.54 As(r)=2.62	Mu=-35.59 As =2.54 As(r)=2.61		Mu=-36.19 As =3.96 As(r)=2.61	Mu=-38.88 As =3.96 As(r)=2.71		Mu=-53.25 As =3.96 As(r)=3.77
	Mu=18.24 As =2.54 As(r)=2.61			Mu=9.05 As =2.54 As(r)=2.61			Mu=19.60 As =2.75 As(r)=2.61	
Vu=-39.10	Vu=5.86	Vu=33.40	Vu=-25.80	Vu=7.10	Vu=25.82	Vu=-35.60	Vu=9.96	Vu=38.98

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA

B=0.20 H=0.45 L=6.63		
Mu=-54.76 As =3.96 As(r)=3.88		Mu=-26.54 As =3.96 As(r)=2.61
	Mu=27.38 As =5.08 As(r)=2.61	
Vu=-41.89	Vu=5.24	Vu=30.38

V-105/N+3.45

B=0.20 H=0.45 L=1.85			B=0.20 H=0.45 L=7.80			B=0.20 H=0.45 L=1.27		
Mu=-3.27 As =3.96 As(r)=2.61		Mu=-30.30 As =3.96 As(r)=2.61	Mu=-49.45 As =3.96 As(r)=3.48		Mu=-39.29 As =2.54 As(r)=2.74	Mu=-20.92 As =2.54 As(r)=2.61		Mu=-3.08 As =2.54 As(r)=2.61
	Mu=0.00 As =2.54 As(r)=2.61			Mu=19.89 As =2.54 As(r)=2.61			Mu=1.53 As =2.54 As(r)=2.61	
Vu=9.12	Vu=13.93	Vu=18.76	Vu=-25.08	Vu=-6.74	Vu=22.57	Vu=-16.56	Vu=-13.05	Vu=-9.54

V-106/N+3.45

B=0.40 H=0.45 L=1.70			B=0.40 H=0.45 L=7.50			B=0.40 H=0.45 L=1.12		
Mu=-2.32 As =15.52 As(r)=5.23		Mu=-82.32 As =15.52 As(r)=5.74	Mu=-199.51 As =15.52 As(r)=15.00		Mu=-176.62 As =15.52 As(r)=13.07	Mu=-47.14 As =15.52 As(r)=5.23		Mu=-1.80 As =15.52 As(r)=5.23
	Mu=0.00 As =7.92 As(r)=5.23			Mu=104.29 As =11.88 As(r)=7.37			Mu=0.08 As =7.92 As(r)=5.23	
Vu=11.01	Vu=38.15	Vu=75.23	Vu=-144.81	Vu=-16.63	Vu=138.04	Vu=-56.68	Vu=-31.80	Vu=-13.75

V-107/N+3.45

B=0.40 H=0.45 L=1.70			B=0.40 H=0.45 L=7.50			B=0.40 H=0.45 L=1.12		
Mu=-0.00 As =26.66 As(r)=5.23		Mu=-173.45 As =26.66 As(r)=12.81	Mu=-361.05 As =26.66 As(r)=30.31		Mu=-318.46 As =26.66 As(r)=27.66	Mu=-102.31 As =26.66 As(r)=7.22		Mu=-0.00 As =26.66 As(r)=5.23
	Mu=0.00 As =11.40 As(r)=5.23			Mu=183.00 As =16.03 As(r)=13.60			Mu=0.00 As =11.40 As(r)=5.23	
Vu=42.55	Vu=83.54	Vu=124.52	Vu=-237.29	Vu=-21.12	Vu=224.54	Vu=-97.39	Vu=-68.85	Vu=-40.31

V-107A/N+3.45

B=0.20 H=0.45 L=2.00			B=0.20 H=0.45 L=2.51			B=0.20 H=0.45 L=2.47		
Mu=-8.96 As =10.14 As(r)=2.61		Mu=-71.57 As =10.14 As(r)=5.18	Mu=-115.42 As =10.14 As(r)=8.88		Mu=-28.85 As =3.96 As(r)=2.61	Mu=-21.62 As =3.96 As(r)=2.61		Mu=-21.62 As =3.96 As(r)=2.61
	Mu=0.00 As =2.54 As(r)=2.61			Mu=28.85 As =2.54 As(r)=2.61			Mu=85.94 As =2.54 As(r)=6.38	
Vu=13.11	Vu=29.12	Vu=46.01	Vu=-88.64	Vu=-63.60	Vu=-38.56	Vu=-31.81	Vu=-11.94	Vu=21.99

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA

B=0.20 H=0.45 L=2.72			B=0.20 H=0.45 L=1.42		
Mu=-23.25 As =3.96 As(r)=2.61		Mu=-93.01 As =7.76 As(r)=6.93	Mu=-37.40 As =7.76 As(r)=2.61		Mu=-10.52 As =7.76 As(r)=2.61
	Mu=26.20 As =2.54 As(r)=2.61			Mu=0.00 As =2.54 As(r)=2.61	
Vu=28.36	Vu=57.21	Vu=86.06	Vu=-26.67	Vu=-17.59	Vu=-9.88

V-108/N+3.45

B=0.50 H=0.45 L=1.70			B=0.50 H=0.45 L=7.50			B=0.50 H=0.45 L=1.12		
Mu=-0.00 As =26.66 As(r)=6.53		Mu=-203.77 As =26.66 As(r)=14.94	Mu=-465.26 As =26.66 As(r)=38.75		Mu=-413.62 As =26.66 As(r)=35.54	Mu=-118.40 As =26.66 As(r)=8.32		Mu=-0.00 As =26.66 As(r)=6.53
	Mu=0.00 As =17.90 As(r)=6.53			Mu=238.59 As =17.79 As(r)=17.83			Mu=0.00 As =17.90 As(r)=6.53	
Vu=77.83	Vu=98.90	Vu=119.97	Vu=-278.99	Vu=-26.91	Vu=258.21	Vu=-94.37	Vu=-81.76	Vu=-69.15

V-108A/N+3.45

B=0.20 H=0.45 L=2.00			B=0.20 H=0.45 L=2.51			B=0.20 H=0.45 L=2.47		
Mu=-8.87 As =10.14 As(r)=2.61		Mu=-63.05 As =10.14 As(r)=4.51	Mu=-100.11 As =10.14 As(r)=7.53		Mu=-25.03 As =3.96 As(r)=2.61	Mu=-19.24 As =3.96 As(r)=2.61		Mu=-19.24 As =3.96 As(r)=2.61
	Mu=0.00 As =2.54 As(r)=2.61			Mu=25.03 As =2.54 As(r)=2.61			Mu=76.52 As =2.54 As(r)=5.61	
Vu=10.48	Vu=25.20	Vu=42.09	Vu=-78.76	Vu=-53.72	Vu=-28.68	Vu=-31.87	Vu=-12.01	Vu=22.39

B=0.20 H=0.45 L=2.72			B=0.20 H=0.45 L=1.42		
Mu=-20.34 As =3.96 As(r)=2.61		Mu=-81.38 As =7.76 As(r)=5.97	Mu=-32.59 As =7.76 As(r)=2.61		Mu=-9.82 As =7.76 As(r)=2.61
	Mu=27.20 As =2.54 As(r)=2.61			Mu=0.00 As =2.54 As(r)=2.61	
Vu=19.44	Vu=48.30	Vu=77.15	Vu=-23.01	Vu=-15.23	Vu=-7.52

V-109/N+3.45

B=0.50 H=0.45 L=1.70			B=0.50 H=0.45 L=7.50			B=0.50 H=0.45 L=1.12		
Mu=-0.00 As =26.66 As(r)=6.53		Mu=-197.46 As =26.66 As(r)=14.43	Mu=-449.58 As =26.66 As(r)=37.78		Mu=-403.21 As =26.66 As(r)=34.89	Mu=-117.83 As =26.66 As(r)=8.28		Mu=-0.00 As =26.66 As(r)=6.53
	Mu=0.00 As =17.90 As(r)=6.53			Mu=229.68 As =17.79 As(r)=17.08			Mu=0.00 As =17.90 As(r)=6.53	
Vu=74.81	Vu=95.88	Vu=116.95	Vu=-270.05	Vu=-26.81	Vu=250.10	Vu=-93.84	Vu=-81.24	Vu=-68.63

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA

V-109A/N+3.45

B=0.20 H=0.45 L=2.00			B=0.20 H=0.45 L=2.51			B=0.20 H=0.45 L=2.47		
Mu=-8.77 As =10.14 As(r)=2.61		Mu=-63.37 As =10.14 As(r)=4.54	Mu=-100.06 As =10.14 As(r)=7.53		Mu=-25.01 As =3.96 As(r)=2.61	Mu=-18.84 As =3.96 As(r)=2.61		Mu=-18.84 As =3.96 As(r)=2.61
	Mu=0.00 As =2.54 As(r)=2.61			Mu=25.01 As =2.54 As(r)=2.61			Mu=74.90 As =2.54 As(r)=5.48	
Vu=10.70	Vu=25.39	Vu=42.28	Vu=-78.08	Vu=-53.04	Vu=-28.01	Vu=-32.14	Vu=-12.27	Vu=22.52

B=0.20 H=0.45 L=2.72			B=0.20 H=0.45 L=1.42		
Mu=-20.22 As =3.96 As(r)=2.61		Mu=-80.88 As =7.76 As(r)=5.92	Mu=-33.29 As =7.76 As(r)=2.61		Mu=-8.66 As =7.76 As(r)=2.61
	Mu=27.17 As =2.54 As(r)=2.61			Mu=0.00 As =2.54 As(r)=2.61	
Vu=18.48	Vu=47.33	Vu=76.18	Vu=-24.45	Vu=-16.14	Vu=-8.44

V-110/N+3.45

B=0.50 H=0.45 L=1.70			B=0.50 H=0.45 L=7.50			B=0.50 H=0.45 L=1.12		
Mu=-0.00 As =26.66 As(r)=6.53		Mu=-202.96 As =26.66 As(r)=14.87	Mu=-463.18 As =26.66 As(r)=38.62		Mu=-412.62 As =26.66 As(r)=35.48	Mu=-73.44 As =26.66 As(r)=6.53		Mu=-0.00 As =26.66 As(r)=6.53
	Mu=0.00 As =17.90 As(r)=6.53			Mu=234.07 As =17.79 As(r)=17.45			Mu=0.00 As =17.90 As(r)=6.53	
Vu=77.60	Vu=98.67	Vu=119.74	Vu=-276.79	Vu=-27.40	Vu=254.66	Vu=-58.21	Vu=-49.36	Vu=-40.51

V-110A/N+3.45

B=0.20 H=0.45 L=2.00			B=0.20 H=0.45 L=2.51			B=0.20 H=0.45 L=2.47		
Mu=-9.40 As =7.76 As(r)=2.61		Mu=-63.69 As =7.76 As(r)=4.56	Mu=-103.61 As =7.76 As(r)=7.83		Mu=-25.90 As =3.96 As(r)=2.61	Mu=-20.95 As =3.96 As(r)=2.61		Mu=-20.95 As =3.96 As(r)=2.61
	Mu=0.00 As =2.54 As(r)=2.61			Mu=25.90 As =2.54 As(r)=2.61			Mu=82.79 As =2.54 As(r)=6.16	
Vu=10.47	Vu=25.25	Vu=42.14	Vu=-81.54	Vu=-56.50	Vu=-31.47	Vu=-33.40	Vu=-13.48	Vu=20.52

B=0.20 H=0.45 L=2.67		
Mu=-18.32 As =3.96 As(r)=2.61		Mu=-73.27 As =3.96 As(r)=5.31
	Mu=32.32 As =2.54 As(r)=2.92	
Vu=21.17	Vu=50.02	Vu=78.87

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA

V-111/N+3.45

B=0.50 H=0.45 L=1.70			B=0.50 H=0.45 L=7.50			B=0.50 H=0.45 L=1.12		
Mu=-0.00 As =26.66 As(r)=6.53		Mu=-206.01 As =26.66 As(r)=15.12	Mu=-468.54 As =26.66 As(r)=38.96		Mu=-422.80 As =26.66 As(r)=36.11	Mu=-77.30 As =26.66 As(r)=6.53		Mu=-0.00 As =26.66 As(r)=6.53
	Mu=0.00 As =17.90 As(r)=6.53			Mu=234.57 As =17.79 As(r)=17.49			Mu=0.00 As =17.90 As(r)=6.53	
Vu=78.93	Vu=100.00	Vu=121.07	Vu=-277.93	Vu=-29.27	Vu=255.72	Vu=-60.31	Vu=-51.46	Vu=-42.61

V-111A/N+3.45

B=0.20 H=0.45 L=2.00			B=0.20 H=0.45 L=2.51			B=0.20 H=0.45 L=2.47		
Mu=-7.88 As =10.14 As(r)=2.61		Mu=-62.45 As =10.14 As(r)=4.47	Mu=-100.22 As =10.14 As(r)=7.54		Mu=-25.06 As =3.96 As(r)=2.61	Mu=-17.22 As =3.96 As(r)=2.61		Mu=-17.22 As =3.96 As(r)=2.61
	Mu=0.00 As =2.54 As(r)=2.61			Mu=25.06 As =2.54 As(r)=2.61			Mu=68.53 As =2.54 As(r)=4.97	
Vu=11.40	Vu=25.38	Vu=42.27	Vu=-75.77	Vu=-50.73	Vu=-25.70	Vu=-33.19	Vu=-13.33	Vu=24.20

B=0.20 H=0.45 L=2.72			B=0.20 H=0.45 L=1.42		
Mu=-20.63 As =3.96 As(r)=2.61		Mu=-82.51 As =7.76 As(r)=6.06	Mu=-34.67 As =7.76 As(r)=2.61		Mu=-7.41 As =7.76 As(r)=2.61
	Mu=29.47 As =2.54 As(r)=2.61			Mu=0.00 As =2.54 As(r)=2.61	
Vu=16.41	Vu=44.72	Vu=73.57	Vu=-25.20	Vu=-17.44	Vu=-9.74

V-112/N+3.45

B=0.50 H=0.45 L=1.70			B=0.50 H=0.45 L=7.50			B=0.50 H=0.45 L=1.12		
Mu=-0.00 As =26.66 As(r)=6.53		Mu=-163.25 As =26.66 As(r)=11.72	Mu=-323.93 As =26.66 As(r)=25.51		Mu=-282.27 As =26.66 As(r)=21.64	Mu=-66.05 As =26.66 As(r)=6.53		Mu=-0.00 As =26.66 As(r)=6.53
	Mu=0.00 As =13.46 As(r)=6.53			Mu=125.61 As =18.09 As(r)=8.91			Mu=0.00 As =13.46 As(r)=6.53	
Vu=56.57	Vu=77.64	Vu=98.71	Vu=-153.50	Vu=-32.64	Vu=140.99	Vu=-53.46	Vu=-44.62	Vu=-36.18

V-113/N+3.45

B=0.50 H=0.45 L=1.70			B=0.50 H=0.45 L=7.50			B=0.50 H=0.45 L=1.12		
Mu=-0.00 As =26.66 As(r)=6.53		Mu=-167.87 As =26.66 As(r)=12.08	Mu=-336.15 As =26.66 As(r)=26.69		Mu=-295.68 As =26.66 As(r)=22.86	Mu=-66.29 As =26.66 As(r)=6.53		Mu=-0.00 As =26.66 As(r)=6.53
	Mu=0.00 As =13.46 As(r)=6.53			Mu=129.05 As =18.09 As(r)=9.17			Mu=0.00 As =13.46 As(r)=6.53	
Vu=58.82	Vu=79.89	Vu=100.96	Vu=-158.22	Vu=-34.69	Vu=145.64	Vu=-53.44	Vu=-44.59	Vu=-36.43

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA

V-113A/N+3.45

B=0.20 H=0.45 L=2.00			B=0.20 H=0.45 L=2.51			B=0.20 H=0.45 L=2.47		
Mu=-8.29 As =7.76 As(r)=2.61		Mu=-62.79 As =7.76 As(r)=4.49	Mu=-106.03 As =7.76 As(r)=8.04		Mu=-26.51 As =3.96 As(r)=2.61	Mu=-17.95 As =3.96 As(r)=2.61		Mu=-17.95 As =3.96 As(r)=2.61
	Mu=0.00 As =2.54 As(r)=2.61			Mu=26.51 As =2.54 As(r)=2.61			Mu=71.44 As =2.54 As(r)=5.20	
Vu=12.34	Vu=25.77	Vu=42.24	Vu=-77.32	Vu=-52.28	Vu=-27.24	Vu=-35.07	Vu=-15.21	Vu=25.99

B=0.20 H=0.45 L=2.72			B=0.20 H=0.45 L=1.42		
Mu=-22.27 As =3.96 As(r)=2.61		Mu=-89.08 As =7.76 As(r)=6.60	Mu=-36.28 As =7.76 As(r)=2.61		Mu=-8.79 As =7.76 As(r)=2.61
	Mu=33.62 As =2.54 As(r)=2.91			Mu=0.90 As =2.54 As(r)=2.61	
Vu=18.71	Vu=46.49	Vu=75.34	Vu=-25.42	Vu=-17.71	Vu=-10.01

V-114/N+3.45

B=0.50 H=0.45 L=1.70			B=0.50 H=0.45 L=7.50			B=0.50 H=0.45 L=1.12		
Mu=-0.00 As =26.66 As(r)=6.53		Mu=-210.21 As =26.66 As(r)=15.46	Mu=-510.29 As =26.66 As(r)=41.55		Mu=-465.58 As =26.66 As(r)=38.77	Mu=-124.51 As =26.66 As(r)=8.78		Mu=-0.00 As =26.66 As(r)=6.53
	Mu=0.00 As =17.90 As(r)=6.53			Mu=238.81 As =17.79 As(r)=17.85			Mu=0.00 As =17.90 As(r)=6.53	
Vu=80.86	Vu=101.93	Vu=123.00	Vu=-280.55	Vu=-37.66	Vu=259.63	Vu=-97.89	Vu=-85.28	Vu=-72.68

V-114A/N+3.45

B=0.20 H=0.45 L=2.00			B=0.20 H=0.45 L=2.51			B=0.20 H=0.45 L=2.47		
Mu=-7.17 As =10.14 As(r)=2.61		Mu=-66.63 As =10.14 As(r)=4.79	Mu=-115.65 As =10.14 As(r)=8.90		Mu=-28.91 As =3.96 As(r)=2.61	Mu=-19.60 As =3.96 As(r)=2.61		Mu=-19.60 As =3.96 As(r)=2.61
	Mu=0.00 As =2.54 As(r)=2.61			Mu=28.91 As =2.54 As(r)=2.61			Mu=78.00 As =2.54 As(r)=5.72	
Vu=14.40	Vu=27.82	Vu=44.54	Vu=-83.38	Vu=-58.35	Vu=-33.31	Vu=-36.03	Vu=-16.17	Vu=26.89

B=0.20 H=0.45 L=2.72			B=0.20 H=0.45 L=1.42		
Mu=-24.81 As =3.96 As(r)=2.61		Mu=-99.23 As =7.76 As(r)=7.45	Mu=-40.59 As =7.76 As(r)=2.83		Mu=-8.93 As =7.76 As(r)=2.61
	Mu=35.30 As =2.54 As(r)=3.12			Mu=0.69 As =2.54 As(r)=2.61	
Vu=23.83	Vu=52.42	Vu=81.27	Vu=-27.94	Vu=-20.23	Vu=-12.52

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA

V-115/N+3.45

B=0.40 H=0.45 L=1.70			B=0.40 H=0.45 L=7.50			B=0.40 H=0.45 L=1.12		
Mu=-0.00 As =26.66 As(r)=5.23		Mu=-89.74 As =26.66 As(r)=6.29	Mu=-299.31 As =26.66 As(r)=26.46		Mu=-269.37 As =22.28 As(r)=21.40	Mu=-50.52 As =22.28 As(r)=5.23		Mu=-0.00 As =22.28 As(r)=5.23
Mu=0.00 As =11.40 As(r)=5.23			Mu=110.44 As =16.03 As(r)=7.91			Mu=0.00 As =11.40 As(r)=5.23		
Vu=30.38	Vu=43.01	Vu=55.63	Vu=-137.90	Vu=-32.96	Vu=128.58	Vu=-42.09	Vu=-34.26	Vu=-26.96

V-201/N+6.65

B=0.20 H=0.45 L=6.63			B=0.20 H=0.45 L=6.70			B=0.20 H=0.45 L=6.58		
Mu=-21.48 As =3.96 As(r)=2.61		Mu=-46.88 As =3.96 As(r)=3.29	Mu=-43.08 As =3.96 As(r)=3.01		Mu=-36.58 As =3.96 As(r)=2.61	Mu=-34.83 As =3.96 As(r)=2.61		Mu=-47.32 As =3.96 As(r)=3.33
Mu=28.09 As =3.25 As(r)=2.61			Mu=19.60 As =3.25 As(r)=2.61			Mu=16.53 As =3.25 As(r)=2.61		
Vu=-27.49	Vu=6.58	Vu=37.40	Vu=-33.91	Vu=-3.34	Vu=32.09	Vu=-30.64	Vu=4.46	Vu=34.26

B=0.20 H=0.45 L=6.95			B=0.20 H=0.45 L=6.45			B=0.20 H=0.45 L=3.35		
Mu=-48.25 As =3.96 As(r)=3.39		Mu=-48.01 As =3.96 As(r)=3.38	Mu=-48.74 As =3.96 As(r)=3.43		Mu=-26.69 As =3.96 As(r)=2.61	Mu=-24.63 As =3.96 As(r)=2.61		Mu=-26.41 As =3.96 As(r)=2.61
Mu=26.77 As =3.25 As(r)=2.61			Mu=18.72 As =3.25 As(r)=2.61			Mu=6.60 As =3.25 As(r)=2.61		
Vu=-40.41	Vu=3.70	Vu=39.85	Vu=-35.34	Vu=-5.53	Vu=28.37	Vu=-18.26	Vu=6.07	Vu=19.18

B=0.20 H=0.45 L=6.58			B=0.20 H=0.45 L=6.63		
Mu=-31.41 As =3.96 As(r)=2.61		Mu=-42.63 As =3.96 As(r)=2.98	Mu=-46.73 As =3.96 As(r)=3.28		Mu=-20.93 As =3.96 As(r)=2.61
Mu=21.20 As =3.25 As(r)=2.61			Mu=27.89 As =3.25 As(r)=2.61		
Vu=-30.64	Vu=3.82	Vu=34.26	Vu=-37.30	Vu=-6.32	Vu=27.59

V-202/N+6.65

B=0.40 H=0.45 L=6.63			B=0.40 H=0.45 L=6.70			B=0.40 H=0.45 L=6.58		
Mu=-150.12 As =13.46 As(r)=10.91		Mu=-211.78 As =15.52 As(r)=16.06	Mu=-203.35 As =15.52 As(r)=15.33		Mu=-194.88 As =15.52 As(r)=14.60	Mu=-188.41 As =15.52 As(r)=14.05		Mu=-206.12 As =15.52 As(r)=15.57
Mu=109.05 As =7.92 As(r)=7.73			Mu=99.57 As =7.92 As(r)=7.02			Mu=91.54 As =7.92 As(r)=6.42		
Vu=-154.12	Vu=19.39	Vu=172.21	Vu=-167.11	Vu=-13.11	Vu=164.76	Vu=-160.67	Vu=15.12	Vu=165.67

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA

B=0.40 H=0.45 L=6.95			B=0.40 H=0.45 L=6.45			B=0.40 H=0.45 L=3.35		
Mu=-207.57 As =15.52 As(r)=15.70		Mu=-207.55 As =15.52 As(r)=15.69	Mu=-207.73 As =15.52 As(r)=15.71		Mu=-165.47 As =13.46 As(r)=12.15	Mu=-116.49 As =13.46 As(r)=8.29		Mu=-117.61 As =13.46 As(r)=8.38
	Mu=147.98 As =7.92 As(r)=10.74			Mu=91.70 As =7.92 As(r)=6.43			Mu=29.40 As =7.92 As(r)=5.23	
Vu=-144.38	Vu=-46.37	Vu=145.96	Vu=-166.25	Vu=-17.48	Vu=154.09	Vu=-96.77	Vu=36.80	Vu=97.32

B=0.40 H=0.45 L=6.58			B=0.40 H=0.45 L=6.63		
Mu=-179.75 As =13.46 As(r)=13.33		Mu=-199.07 As =15.52 As(r)=14.96	Mu=-211.94 As =15.52 As(r)=16.08		Mu=-148.91 As =13.46 As(r)=10.82
	Mu=99.40 As =7.92 As(r)=7.01			Mu=108.38 As =12.55 As(r)=7.68	
Vu=-160.44	Vu=13.85	Vu=165.90	Vu=-172.07	Vu=-18.51	Vu=154.27

V-203/N+6.65

B=0.40 H=0.45 L=3.63			B=0.40 H=0.45 L=3.42		
Mu=-118.44 As =7.92 As(r)=8.44		Mu=-40.26 As =7.92 As(r)=5.23	Mu=-40.32 As =7.92 As(r)=5.23		Mu=-117.21 As =7.92 As(r)=8.35
	Mu=99.24 As =11.40 As(r)=8.84			Mu=90.57 As =11.40 As(r)=8.20	
Vu=-146.53	Vu=-72.98	Vu=-6.76	Vu=11.75	Vu=76.93	Vu=145.44

V-204/N+6.65

B=0.40 H=0.45 L=6.63			B=0.40 H=0.45 L=6.70			B=0.40 H=0.45 L=6.58		
Mu=-155.12 As =13.46 As(r)=11.31		Mu=-223.39 As =15.52 As(r)=17.09	Mu=-213.04 As =15.52 As(r)=16.18		Mu=-206.87 As =15.52 As(r)=15.64	Mu=-204.34 As =15.52 As(r)=15.42		Mu=-201.87 As =15.52 As(r)=15.20
	Mu=114.88 As =7.92 As(r)=8.17			Mu=104.46 As =7.92 As(r)=7.38			Mu=100.92 As =7.92 As(r)=7.12	
Vu=-162.10	Vu=19.80	Vu=181.44	Vu=-175.53	Vu=-12.88	Vu=173.82	Vu=-172.12	Vu=12.84	Vu=171.42

B=0.40 H=0.45 L=6.95			B=0.40 H=0.45 L=6.45			B=0.40 H=0.45 L=3.35		
Mu=-161.09 As =15.52 As(r)=11.79		Mu=-159.17 As =15.52 As(r)=11.64	Mu=-202.82 As =15.52 As(r)=15.29		Mu=-180.43 As =13.46 As(r)=13.38	Mu=-121.29 As =13.46 As(r)=8.66		Mu=-120.22 As =13.46 As(r)=8.58
	Mu=80.64 As =7.92 As(r)=5.62			Mu=101.34 As =7.92 As(r)=7.15			Mu=30.32 As =7.92 As(r)=5.23	
Vu=-129.53	Vu=-11.53	Vu=129.01	Vu=-171.83	Vu=-14.81	Vu=165.39	Vu=-100.57	Vu=-37.05	Vu=99.98

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA

B=0.40 H=0.45 L=6.58			B=0.40 H=0.45 L=6.63		
Mu=-188.26 As =13.46 As(r)=14.04		Mu=-210.14 As =15.52 As(r)=15.92	Mu=-223.06 As =15.52 As(r)=17.06		Mu=-156.64 As =13.46 As(r)=11.44
	Mu=104.83 As =7.92 As(r)=7.41			Mu=114.18 As =12.55 As(r)=8.12	
Vu=-168.68	Vu=14.13	Vu=174.86	Vu=-181.15	Vu=-18.83	Vu=162.38

V-205/N+6.65

B=0.20 H=0.45 L=6.63			B=0.20 H=0.45 L=6.70			B=0.20 H=0.45 L=6.58		
Mu=-23.25 As =3.96 As(r)=2.61		Mu=-56.12 As =3.96 As(r)=3.98	Mu=-52.82 As =3.96 As(r)=3.74		Mu=-48.31 As =3.96 As(r)=3.40	Mu=-46.99 As =3.96 As(r)=3.30		Mu=-51.31 As =3.96 As(r)=3.62
	Mu=35.81 As =3.25 As(r)=2.61			Mu=24.57 As =3.25 As(r)=2.61			Mu=23.50 As =3.25 As(r)=2.61	
Vu=-35.60	Vu=6.36	Vu=46.49	Vu=-42.37	Vu=-2.67	Vu=41.11	Vu=-40.43	Vu=2.77	Vu=41.65

B=0.20 H=0.45 L=6.95			B=0.20 H=0.45 L=6.45			B=0.20 H=0.45 L=3.35		
Mu=-53.19 As =3.96 As(r)=3.76		Mu=-52.67 As =3.96 As(r)=3.72	Mu=-51.14 As =3.96 As(r)=3.61		Mu=-36.12 As =3.96 As(r)=2.61	Mu=-27.41 As =3.96 As(r)=2.61		Mu=-27.96 As =3.96 As(r)=2.61
	Mu=27.51 As =3.25 As(r)=2.61			Mu=26.38 As =3.25 As(r)=2.61			Mu=6.99 As =3.25 As(r)=2.61	
Vu=-43.26	Vu=-2.18	Vu=43.12	Vu=-42.45	Vu=-3.82	Vu=38.13	Vu=-22.12	Vu=4.38	Vu=22.52

B=0.20 H=0.45 L=6.58			B=0.20 H=0.45 L=6.63		
Mu=-39.21 As =3.96 As(r)=2.73		Mu=-51.80 As =3.96 As(r)=3.66	Mu=-55.63 As =3.96 As(r)=3.95		Mu=-22.91 As =3.96 As(r)=2.61
	Mu=27.14 As =3.25 As(r)=2.61			Mu=35.72 As =3.25 As(r)=2.61	
Vu=-39.27	Vu=3.44	Vu=42.82	Vu=-46.33	Vu=-6.08	Vu=35.76

V-206/N+6.65

B=0.40 H=0.45 L=1.70			B=0.40 H=0.45 L=7.50			B=0.40 H=0.45 L=1.12		
Mu=-1.57 As =9.66 As(r)=5.23		Mu=-90.09 As =9.66 As(r)=6.31	Mu=-123.96 As =9.66 As(r)=8.86		Mu=-89.60 As =7.92 As(r)=6.28	Mu=-50.34 As =7.92 As(r)=5.23		Mu=-0.89 As =7.92 As(r)=5.23
	Mu=0.00 As =6.50 As(r)=5.23			Mu=30.99 As =9.04 As(r)=5.23			Mu=0.00 As =6.50 As(r)=5.23	
Vu=35.60	Vu=41.17	Vu=46.74	Vu=-43.46	Vu=-22.20	Vu=34.64	Vu=-35.63	Vu=-31.56	Vu=-27.49

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA

V-207/N+6.65

B=0.40 H=0.45 L=1.70			B=0.40 H=0.45 L=7.50			B=0.40 H=0.45 L=1.12		
Mu=-0.00 As =11.40 As(r)=5.23		Mu=-204.22 As =11.40 As(r)=15.41	Mu=-158.01 As =11.40 As(r)=11.55		Mu=-111.18 As =7.92 As(r)=7.89	Mu=-118.98 As =7.92 As(r)=8.48		Mu=-0.00 As =7.92 As(r)=5.23
Mu=0.00 As =6.50 As(r)=5.23			Mu=39.50 As =9.04 As(r)=5.23			Mu=0.00 As =6.50 As(r)=5.23		
Vu=88.86	Vu=95.82	Vu=102.79	Vu=-54.19	Vu=-27.62	Vu=42.39	Vu=-81.48	Vu=-76.40	Vu=-71.31

V-208/N+6.65

B=0.40 H=0.45 L=1.70			B=0.40 H=0.45 L=7.50			B=0.40 H=0.45 L=1.12		
Mu=-0.00 As =11.40 As(r)=5.23		Mu=-190.24 As =11.40 As(r)=14.21	Mu=-156.26 As =11.40 As(r)=11.41		Mu=-109.88 As =7.92 As(r)=7.79	Mu=-106.18 As =7.92 As(r)=7.51		Mu=-0.18 As =7.92 As(r)=5.23
Mu=0.00 As =6.50 As(r)=5.23			Mu=39.07 As =9.04 As(r)=5.23			Mu=0.00 As =6.50 As(r)=5.23		
Vu=81.55	Vu=88.51	Vu=95.48	Vu=-53.95	Vu=-27.38	Vu=42.17	Vu=-72.90	Vu=-67.81	Vu=-62.72

V-209/N+6.65

B=0.40 H=0.45 L=1.70			B=0.40 H=0.45 L=7.50			B=0.40 H=0.45 L=1.12		
Mu=-0.28 As =15.52 As(r)=5.23		Mu=-197.82 As =15.52 As(r)=14.85	Mu=-254.43 As =15.52 As(r)=19.96		Mu=-251.10 As =15.52 As(r)=19.64	Mu=-127.09 As =15.52 As(r)=9.11		Mu=-0.00 As =15.52 As(r)=5.23
Mu=0.00 As =9.66 As(r)=5.23			Mu=127.38 As =14.29 As(r)=11.91			Mu=0.00 As =9.66 As(r)=5.23		
Vu=84.91	Vu=91.88	Vu=98.85	Vu=-100.34	Vu=-73.77	Vu=141.29	Vu=-93.18	Vu=-83.92	Vu=-74.67

V-210/N+6.65

B=0.20 H=0.45 L=3.05			B=0.20 H=0.45 L=1.42		
Mu=-19.20 As =5.70 As(r)=2.61		Mu=-76.82 As =5.70 As(r)=5.60	Mu=-29.15 As =5.70 As(r)=2.61		Mu=-10.51 As =5.70 As(r)=2.61
Mu=29.84 As =2.54 As(r)=2.61			Mu=0.00 As =2.54 As(r)=2.61		
Vu=-11.50	Vu=33.27	Vu=74.38	Vu=-22.24	Vu=-12.63	Vu=-4.11

V-211/N+6.65

B=0.40 H=0.45 L=1.70			B=0.40 H=0.45 L=7.50			B=0.40 H=0.45 L=1.12		
Mu=-0.00 As =15.52 As(r)=5.23		Mu=-198.34 As =15.52 As(r)=14.90	Mu=-258.71 As =15.52 As(r)=20.36		Mu=-256.19 As =15.52 As(r)=20.12	Mu=-127.18 As =15.52 As(r)=9.11		Mu=-0.00 As =15.52 As(r)=5.23
Mu=0.00 As =9.66 As(r)=5.23			Mu=129.36 As =14.29 As(r)=11.80			Mu=0.00 As =9.66 As(r)=5.23		
Vu=85.57	Vu=92.54	Vu=99.50	Vu=-101.39	Vu=-74.82	Vu=140.49	Vu=-93.70	Vu=-84.45	Vu=-75.19

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA

V-212/N+6.65

B=0.40 H=0.45 L=1.70			B=0.40 H=0.45 L=7.50			B=0.40 H=0.45 L=1.12		
Mu=-0.83 As =11.40 As(r)=5.23		Mu=-145.27 As =11.40 As(r)=10.53	Mu=-169.51 As =11.40 As(r)=12.48		Mu=-127.26 As =7.92 As(r)=9.12	Mu=-79.62 As =7.92 As(r)=5.55		Mu=-0.51 As =7.92 As(r)=5.23
	Mu=0.00 As =6.50 As(r)=5.23			Mu=42.38 As =9.04 As(r)=5.23			Mu=0.00 As =6.50 As(r)=5.23	
Vu=60.25	Vu=67.22	Vu=74.18	Vu=-57.98	Vu=-31.41	Vu=47.04	Vu=-55.68	Vu=-50.60	Vu=-45.51

V-213/N+6.65

B=0.40 H=0.45 L=1.70			B=0.40 H=0.45 L=7.50			B=0.40 H=0.45 L=1.12		
Mu=-0.95 As =11.40 As(r)=5.23		Mu=-148.72 As =11.40 As(r)=10.80	Mu=-176.84 As =11.40 As(r)=13.09		Mu=-135.01 As =7.92 As(r)=9.72	Mu=-84.98 As =7.92 As(r)=5.94		Mu=-0.54 As =7.92 As(r)=5.23
	Mu=0.00 As =6.50 As(r)=5.23			Mu=44.21 As =9.04 As(r)=5.23			Mu=0.00 As =6.50 As(r)=5.23	
Vu=61.78	Vu=68.75	Vu=75.71	Vu=-59.69	Vu=-33.13	Vu=48.93	Vu=-58.96	Vu=-53.87	Vu=-48.78

V-214/N+6.65

B=0.40 H=0.45 L=1.70			B=0.40 H=0.45 L=7.50			B=0.40 H=0.45 L=1.12		
Mu=-0.00 As =15.52 As(r)=5.23		Mu=-204.00 As =15.52 As(r)=15.39	Mu=-196.06 As =15.52 As(r)=14.70		Mu=-150.30 As =15.52 As(r)=10.93	Mu=-118.93 As =15.52 As(r)=8.48		Mu=-0.00 As =15.52 As(r)=5.23
	Mu=0.00 As =9.66 As(r)=5.23			Mu=49.01 As =14.29 As(r)=5.23			Mu=0.00 As =9.66 As(r)=5.23	
Vu=89.15	Vu=96.11	Vu=103.08	Vu=-63.51	Vu=-36.94	Vu=52.20	Vu=-81.73	Vu=-76.65	Vu=-71.56

V-215/N+6.65

B=0.40 H=0.45 L=1.70			B=0.40 H=0.45 L=7.50			B=0.40 H=0.45 L=1.12		
Mu=-1.60 As =11.40 As(r)=5.23		Mu=-90.47 As =11.40 As(r)=6.34	Mu=-163.21 As =11.40 As(r)=11.97		Mu=-130.38 As =7.92 As(r)=9.36	Mu=-50.54 As =7.92 As(r)=5.23		Mu=-0.90 As =7.92 As(r)=5.23
	Mu=0.00 As =6.50 As(r)=5.23			Mu=40.80 As =9.04 As(r)=5.23			Mu=0.00 As =6.50 As(r)=5.23	
Vu=35.76	Vu=41.34	Vu=46.91	Vu=-53.19	Vu=-31.93	Vu=44.71	Vu=-35.73	Vu=-31.66	Vu=-27.59

V-102A/N+3.45

B=0.20 H=0.45 L=3.32			B=0.20 H=0.45 L=3.31			B=0.20 H=0.45 L=3.35		
Mu=-30.44 As =3.96 As(r)=2.61		Mu=-7.61 As =3.96 As(r)=2.61	Mu=-12.03 As =3.96 As(r)=2.61		Mu=-48.12 As =3.96 As(r)=3.38	Mu=-51.58 As =3.96 As(r)=3.64		Mu=-12.90 As =3.96 As(r)=2.61
	Mu=16.41 As =2.54 As(r)=2.61			Mu=13.55 As =2.54 As(r)=2.61			Mu=14.67 As =2.54 As(r)=2.61	
Vu=-29.43	Vu=-15.41	Vu=8.93	Vu=8.93	Vu=18.36	Vu=34.15	Vu=-35.00	Vu=-19.91	Vu=6.80

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA

B=0.20 H=0.45 L=3.35			B=0.20 H=0.45 L=3.29			B=0.20 H=0.45 L=3.29		
Mu=-12.16 As =3.96 As(r)=2.61		Mu=-48.62 As =3.96 As(r)=3.42	Mu=-50.39 As =3.96 As(r)=3.55		Mu=-12.60 As =3.96 As(r)=2.61	Mu=-10.12 As =3.96 As(r)=2.61		Mu=-40.47 As =3.96 As(r)=2.82
	Mu=13.60 As =2.54 As(r)=2.61			Mu=14.42 As =2.54 As(r)=2.61			Mu=17.76 As =2.54 As(r)=2.61	
Vu=6.80	Vu=19.15	Vu=33.70	Vu=-34.93	Vu=-20.07	Vu=5.91	Vu=5.91	Vu=17.39	Vu=30.88

B=0.20 H=0.45 L=3.48			B=0.20 H=0.45 L=3.48			B=0.20 H=0.45 L=3.23		
Mu=-30.76 As =3.96 As(r)=2.61		Mu=-7.69 As =3.96 As(r)=2.61	Mu=-7.78 As =3.96 As(r)=2.61		Mu=-31.13 As =3.96 As(r)=2.61	Mu=-42.77 As =3.96 As(r)=2.99		Mu=-10.69 As =3.96 As(r)=2.61
	Mu=7.69 As =2.54 As(r)=2.61			Mu=7.78 As =2.54 As(r)=2.61			Mu=21.39 As =2.54 As(r)=2.61	
Vu=-13.70	Vu=-9.26	Vu=4.09	Vu=4.09	Vu=9.49	Vu=13.74	Vu=-32.93	Vu=-18.54	Vu=6.48

B=0.20 H=0.45 L=3.23		
Mu=-9.16 As =3.96 As(r)=2.61		Mu=-36.63 As =3.96 As(r)=2.61
	Mu=18.09 As =2.54 As(r)=2.61	
Vu=6.48	Vu=17.40	Vu=30.53

V-102B/N+3.45

B=0.20 H=0.45 L=3.32			B=0.20 H=0.45 L=3.31			B=0.20 H=0.45 L=3.35		
Mu=-30.44 As =3.96 As(r)=2.61		Mu=-7.61 As =3.96 As(r)=2.61	Mu=-12.03 As =3.96 As(r)=2.61		Mu=-48.12 As =3.96 As(r)=3.38	Mu=-51.58 As =3.96 As(r)=3.64		Mu=-12.90 As =3.96 As(r)=2.61
	Mu=16.41 As =2.54 As(r)=2.61			Mu=13.55 As =2.54 As(r)=2.61			Mu=14.67 As =2.54 As(r)=2.61	
Vu=-29.43	Vu=-15.41	Vu=8.93	Vu=8.93	Vu=18.36	Vu=34.15	Vu=-35.00	Vu=-19.91	Vu=6.80

B=0.20 H=0.45 L=3.35			B=0.20 H=0.45 L=3.29			B=0.20 H=0.45 L=3.29		
Mu=-12.16 As =3.96 As(r)=2.61		Mu=-48.62 As =3.96 As(r)=3.42	Mu=-50.39 As =3.96 As(r)=3.55		Mu=-12.60 As =3.96 As(r)=2.61	Mu=-10.12 As =3.96 As(r)=2.61		Mu=-40.47 As =3.96 As(r)=2.82
	Mu=13.60 As =2.54 As(r)=2.61			Mu=14.42 As =2.54 As(r)=2.61			Mu=17.76 As =2.54 As(r)=2.61	
Vu=6.80	Vu=19.15	Vu=33.70	Vu=-34.93	Vu=-20.07	Vu=5.91	Vu=5.91	Vu=17.39	Vu=30.88

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA

B=0.20 H=0.45 L=3.48			B=0.20 H=0.45 L=3.48			B=0.20 H=0.45 L=3.23		
Mu=-30.76 As =3.96 As(r)=2.61		Mu=-7.69 As =3.96 As(r)=2.61	Mu=-7.78 As =3.96 As(r)=2.61		Mu=-31.13 As =3.96 As(r)=2.61	Mu=-42.77 As =3.96 As(r)=2.99		Mu=-10.69 As =3.96 As(r)=2.61
	Mu=7.69 As =2.54 As(r)=2.61			Mu=7.78 As =2.54 As(r)=2.61			Mu=21.39 As =2.54 As(r)=2.61	
Vu=-13.70	Vu=-9.26	Vu=4.09	Vu=4.09	Vu=9.49	Vu=13.74	Vu=-32.93	Vu=-18.54	Vu=6.48

B=0.20 H=0.45 L=3.23		
Mu=-9.16 As =3.96 As(r)=2.61		Mu=-36.63 As =3.96 As(r)=2.61
	Mu=18.09 As =2.54 As(r)=2.61	
Vu=6.48	Vu=17.40	Vu=30.53

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA

Columnas A'-2, A'-1

Nivel	H Libre	Losa	B	H	M1	M2	P	V1	V2	Cuantia	m/mr	Col/Vig Eje ppal	Col/vig Eje sec
N+3.45					27.20	161.08				18/#4 #5 (1.0%)	0.45	1.21	1.24
	3.00	.45	.70	.40			-207.33	65.12	139.19				
		1.00			-50.45	-319.28				18/#4 #5 (1.0%)	0.87		

Columnas A-2, A-1

Nivel	H Libre	Losa	B	H	M1	M2	P	V1	V2	Cuantia	m/mr	Col/Vig Eje ppal	Col/vig Eje sec
N+6.65					178.59	9.98				18/#4 #5 (1.0%)	0.89	1.28	1.73
	2.75	.45	.70	.40			-177.73	105.30	72.40				
					127.60	-181.10				18/#4 #5 (1.0%)	0.66		
N+3.45					152.52	83.59				18/#4 #5 (1.0%)	0.57	1.57	1.56
	3.00	.45	.70	.40			-606.62	94.04	106.49				
		1.00			-65.62	-235.68				18/#4 #5 (1.0%)	0.66		

Columnas B-2, B-1, C-2, C-1, D-2, D-1, E-2, E-1, F-2, F-1, G-2, G-1, H-2

Nivel	H Libre	Losa	B	H	M1	M2	P	V1	V2	Cuantia	m/mr	Col/Vig Eje ppal	Col/vig Eje sec
N+6.65					116.17	-112.23				16/#6 #5 (1.1%)	0.37	1.20	2.15
	2.75	.45	.70	.50			-393.57	58.15	72.29				
					-21.46	-221.48				16/#6 #5 (1.1%)	0.43		
N+3.45					125.88	139.99				16/#6 #5 (1.1%)	0.40	2.07	1.83
	3.00	.45	.70	.50			-967.92	111.56	150.40				
		1.00			250.24	-189.09				16/#6 #5 (1.1%)	0.72		

Columna H-1

Nivel	H Libre	Losa	B	H	M1	M2	P	V1	V2	Cuantia	m/mr	Col/Vig Eje ppal	Col/vig Eje sec
N+6.65					61.82	195.10				16/#6 (1.3%)	0.38	1.34	1.79
	2.75	.45	.70	.50			-315.08	60.94	85.55				
					24.52	199.41				16/#6 (1.3%)	0.36		
N+3.45					130.25	-199.75				16/#6 (1.3%)	0.44	2.62	2.12
	3.00	.45	.70	.50			-916.11	115.58	215.35				
		1.00			95.83	480.35				16/#6 (1.3%)	0.90		

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA

Columna I-2

Nivel	H Libre	Losa	B	H	M1	M2	P	V1	V2	Cuantia	m/mr	Col/Vig Eje ppal	Col/vig Eje sec
N+6.65					174.51	-35.30				18/#5 (1.3%)	0.66	1.41	1.89
	2.75	.45	.70	.40			-262.03	104.05	80.48				
					152.57	-28.37				18/#5 (1.3%)	0.60		
N+3.45					143.78	33.65				18/#5 (1.3%)	0.52	2.57	1.79
	3.00	.45	.70	.40			-554.09	89.13	169.62				
		1.00			-29.08	-438.40				18/#5 (1.3%)	1.00		

Columna I-1

Nivel	H Libre	Losa	B	H	M1	M2	P	V1	V2	Cuantia	m/mr	Col/Vig Eje ppal	Col/vig Eje sec
N+6.65					169.00	-14.94				16/#6 #5 (1.4%)	0.66	1.50	2.48
	2.75	.45	.70	.40			-200.51	97.16	73.33				
					143.83	42.95				16/#6 #5 (1.4%)	0.50		
N+3.45					136.68	-110.17				16/#6 #5 (1.4%)	0.46	2.72	2.07
	3.00	.45	.70	.40			-502.76	86.36	163.39				
		1.00			65.38	418.05				16/#6 #5 (1.4%)	0.97		

6. DISEÑO DE ELEMENTOS COMPLEMENTARIOS

DISEÑO DE ELEMENTOS
COMPLEMENTARIOS

PROYECTO: I.E. MARCELO MIRANDA
DISEÑO MIEMBROS ENSAMBLADOS

MATERIALES

Acero	**A-36**	
f_y =	**252**	N/mm^2
F_u =	**400**	N/mm^2

CARGAS

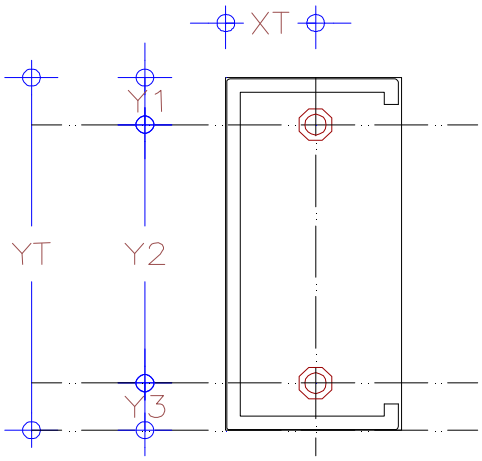
V = **4.66** KN

Pernos Φ = **6.35** mm
Agujeros Φ = **9.5** mm

Espesor platina = **6.35** mm

DATOS DEL ELEMENTO

X1 =	**55**	mm
t =	**25**	mm
XT =	**55**	mm
Y1 =	**55**	mm
Y2 =	**245**	mm
Y3 =	**55**	mm
YT =	**355**	mm
A_g =	1905	mm^2
A_e =	1754	mm^2



FLUENCIA EN LA SECCIÓN BRUTA

Se debe cumplir:

$Pu < 0.90\ F_y\ A_g$

Pu < 432 kN
OK

$A_{g\ Diseño}$ = 21 mm^2
OK

FRACTURA EN LA SECCIÓN EFECTIVA

Se debe cumplir:

$Pu < 0.75\ F_u\ A_e$

Pu < 526 kN
OK

$A_{e\ Diseño}$ = 16 mm^2
OK

Resistencia al desgarre de un bloque por tensión y cortante

A_{nv} =	1754	mm^2
A_{nt} =	320	mm^2
$F_u\ A_{nt}$ =	-	KN
$0.6\ F_u\ A_{nv}$ =	421	KN

Para el analisis se supone riesgo de falla por bloque, con base en dos estados limites definidos asi:

Si $F_u\ A_{nt} > 0.6\ F_u\ A_{nv}$ entonces; $P_u = \Phi\ [0.6\ F_y\ A_{gv} + F_u\ A_{nt}]$

Si $0.6\ F_u\ A_{nv} > F_u\ A_{nv}$ entonces; $P_u = \Phi\ [0.6\ F_u\ A_{nv} + F_y\ A_{gt}]$

Fractura de la sección neta a tensión y fluencia de la sección bruta a corte.

A_{gv} =	2254.25	mm^2
A_{gt} =	349.25	mm^2

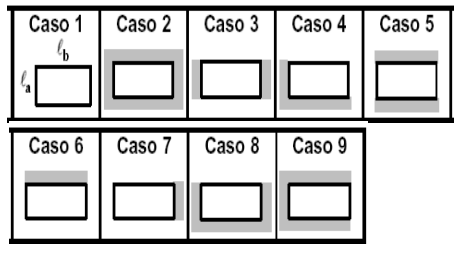
Por lo tanto,

P_u = 352 kN

OK

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA
DISEÑO PLACA MACIZA ENTREPISO

El diseño de la placa maciza se realiza de acuerdo con lo establecido en C.13.9 de las NSR - 10



Geometría de la losa

la =	**2.45**	m	fy =	**420**	MPa
lb =	**3.45**	m	f'c =	**21.1**	MPa
Relación m =	**0.71**				

Espesor escogido: **0.10** **m**

Cargas

Peso propio de la losa	0.1x1.0x24	2.40	kN/m²
Acabados	0.05x22	1.10	kN/m²
Carga Muerta Total		3.50	kN/m²
Carga Viva		5.00	kN/m²
Carga Última		13.40	kN/m²

Tipo de soporte CASO Nº 1

DISEÑO A MOMENTO FLECTOR

Coeficientes para momento positivo por carga muerta y viva:

C_{aD} =	0.0360						
C_{bD} =	0.0360						
C_{aV} =	0.0360						
C_{bV} =	0.0360						
Mu_a =	**1.84**	kN.m	*Cuantía:*	0.0020	*As =*	2.00	cm²/m
Mu_b =	**3.64**	kN.m	*Cuantía:*	0.0020	*As =*	2.00	cm²/m

Coeficientes para momento negativo por carga última:

C_a =	0.000	Mu_a =	**0.00**	kN.m	*Cuantía:*	0.0020	*As =*	2.00	cm²/m
C_b =	0.000	Mu_b =	**0.00**	kN.m	*Cuantía:*	0.0020	*As =*	2.00	cm²/m

Distribución de refuerzo:
Colocar 1 Malla Φ6.00mm c/.15 Transversal y longitudinalmente.

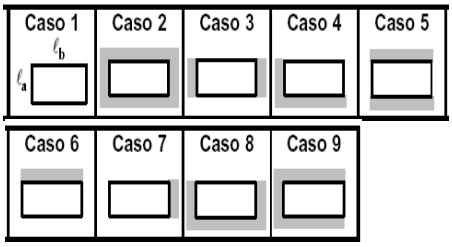
REVISIÓN A CORTANTE

Coeficientes de relación de carga en las dos direcciones para cortante:

W_a =	0.50		
W_b =	0.50		
ϕvc =	**0.574**	**MPa**	
ϕvu_a =	**0.116**	**MPa**	**OK**
ϕvu_b =	**0.082**	**MPa**	**OK**

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA
DISEÑO PLACA MACIZA CUBIERTA

El diseño de la placa maciza se realiza de acuerdo con lo establecido en C.13.9 de las NSR - 10



Geometría de la losa

la =	**2.70**	m	fy =	**420**	MPa
lb =	**3.50**	m	f'c =	**21.1**	MPa
Relación m =	**0.771**				

Espesor escogido: **0.15** **m**

Cargas

Peso propio de la losa	0.15x1.0x24	3.60	kN/m²
Inpermeabilizacion	0.05x20	0.10	kN/m²
Carga Muerta Total		3.70	kN/m²
Carga Viva		5.00	kN/m²
Carga Última		13.68	kN/m²

Tipo de soporte CASO Nº 1

DISEÑO A MOMENTO FLECTOR

Coeficientes para momento positivo por carga muerta y viva:

C_{aD} =	0.0360
C_{bD} =	0.0360
C_{aV} =	0.0360
C_{bV} =	0.0360

Mu_a =	**2.28**	kN.m	*Cuantía:*	0.0020	*As =*	3.00 cm²/m
Mu_b =	**3.84**	kN.m	*Cuantía:*	0.0020	*As =*	3.00 cm²/m

Coeficientes para momento negativo por carga última:

C_a =	0.000	Mu_a =	**0.00**	kN.m	*Cuantía:*	0.0020	*As =*	3.00 cm²/m
C_b =	0.000	Mu_b =	**0.00**	kN.m	*Cuantía:*	0.0020	*As =*	3.00 cm²/m

Distribución de refuerzo:
Colocar 1 Malla Φ5.00mm c/.15 Transversal y longitudinalmente.
Colocar 1 Malla Φ5.00mm c/.15 Transversal y longitudinalmente.

REVISIÓN A CORTANTE

Coeficientes de relación de carga en las dos direcciones para cortante:

W_a =	0.50
W_b =	0.50

$\phi v c$ =	**0.574**	**MPa**	
$\phi v u_a$ =	**0.080**	**MPa**	**OK**
$\phi v u_b$ =	**0.062**	**MPa**	**OK**

Memorias de Cálculo

PROGRAMA DE DISEÑO Y CALCULO ESTRUCTURAL
ARQUIMET 2.0

Proyecto: _____ **Fecha:** _____

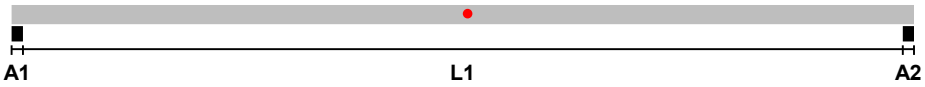
Ingeniero:_____ **Firma:** _____

Elementos calculados con el programa de diseño Arquimet 2.0 de ACESCO

REPORTE DE CORREAS

PHR C con atiesador 355 x 110 x 25 (2.50 mm)
con Fy = 35.15 Kgf/mm² cada 1.40 m con arriostramiento cada L/2.

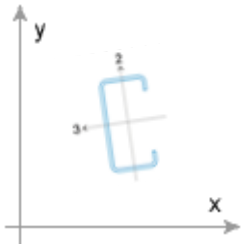
SECCION LONGITUDINAL

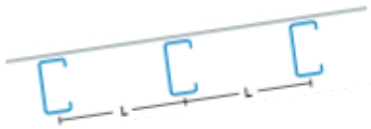


L1	7.80 m
A1	0.10 m
A2	0.10 m

CONFIGURACION	
TIPO DE CARGA	DISTRIBUIDA
Carga muerta	0.20 KN/m²
Peso propio correa	0.12 KN/m
Carga viva	0.50 KN/m²
Carga granizo	0.50 KN/m²
Viento compresión (Perpendicular)	0.40 KN/m²
Viento succión (Perpendicular)	0.40 KN/m²
Pendiente sección transversal	8.5° = 14.9450%

SECCION TRANSVERSAL





L = 1.40 m

REPORTES DE DISEÑO

REPORTE FLEXION				
	Apoyos		Interiores	
Ejes locales	3	2	3	2
Resistente (KN.m)	43.8606	8.3672	33.6423	7.5356
Calculado (KN.m)	5.0566E-06	1.9154E-08	14.4963	0.4600

REPORTE CORTANTE		
Ejes locales	2	3
Resistente (KN)	42.8651	93.3378
Calculado (KN)	7.3283	0.4673

REPORTE DEFLEXION		
Deflexiones máximas	Instantanea	Permanente
Admisible (m)	0.0293	0.0000
Calculado (m)	0.0061	0.0000

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

REACCIONES - EJES GLOBALES (KN-m)

Elementos calculados con el programa de diseño Arquimet 2.0 de ACESCO

APOYO 1		
Combinacion	Rx	Ry
Muerta	-0.1431	1.5445
Viva de Cub.	-0.2526	2.7272
Granizo	-0.2526	2.7272
Viento Comp.	-0.3270	2.1877
Viento Succion	0.3270	-2.1877
Comb. 1	-0.2003	2.1624
Comb. 2	-0.2980	3.2171
Comb. 3	-0.2980	3.2171
Comb. 4	-0.7394	7.3109
Comb. 5	-0.7394	7.3109
Comb. 6	-0.7394	7.3109
Comb. 7	-0.7394	7.3109
Comb. 8	-0.6250	5.4048
Comb. 9	-0.6250	5.4048
Comb. 10	-0.6250	5.4048
Comb. 11	-0.6250	5.4048
Comb. 12	-0.4557	3.5778
Comb. 13	-0.4557	3.5778

APOYO 2		
Combinacion	Rx	Ry
Muerta	-0.1431	1.5445
Viva de Cub.	-0.2526	2.7272
Granizo	-0.2526	2.7272
Viento Comp.	-0.3270	2.1877
Viento Succion	0.3270	-2.1877
Comb. 1	-0.2003	2.1624
Comb. 2	-0.2980	3.2171
Comb. 3	-0.2980	3.2171
Comb. 4	-0.7394	7.3109
Comb. 5	-0.7394	7.3109
Comb. 6	-0.7394	7.3109
Comb. 7	-0.7394	7.3109
Comb. 8	-0.6250	5.4048
Comb. 9	-0.6250	5.4048
Comb. 10	-0.6250	5.4048
Comb. 11	-0.6250	5.4048
Comb. 12	-0.4557	3.5778
Comb. 13	-0.4557	3.5778

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	0.0868	1.5487	4.7884E-09	-1.1109E-06
Viva de Cub.	0.1533	2.7346	0.0000	-1.9920E-06
Granizo	0.1533	2.7346	0.0000	-1.9920E-06
Viento Comp.	0.0000	2.2120	0.0000	-1.0726E-06
Viento Succion	0.0000	2.2120	0.0000	-1.0726E-06
Comb. 1	0.1215	2.1682	6.7038E-09	-1.5553E-06
Comb. 2	0.1808	3.2258	5.7461E-09	-2.3291E-06
Comb. 3	0.1808	3.2258	5.7461E-09	-2.3291E-06
Comb. 4	0.3494	7.3399	5.7461E-09	-5.0566E-06
Comb. 5	0.3494	7.3399	5.7461E-09	-5.0566E-06
Comb. 6	0.3494	7.3399	5.7461E-09	-5.0566E-06
Comb. 7	0.3494	7.3399	5.7461E-09	-5.0566E-06
Comb. 8	0.1808	5.4378	5.7461E-09	-3.4017E-06
Comb. 9	0.1808	5.4378	5.7461E-09	-3.4017E-06
Comb. 10	0.1808	5.4378	5.7461E-09	-3.4017E-06
Comb. 11	0.1808	5.4378	5.7461E-09	-3.4017E-06
Comb. 12	0.0781	3.6059	4.3096E-09	-2.0724E-06
Comb. 13	0.0781	3.6059	4.3096E-09	-2.0724E-06

APOYO 2				
Combinacion	R2	R3	M2	M3
Muerta	0.0868	1.5487	-9.5768E-09	0.0000
Viva de Cub.	0.1533	2.7346	1.9154E-08	6.1292E-07
Granizo	0.1533	2.7346	1.9154E-08	6.1292E-07
Viento Comp.	0.0000	2.2120	0.0000	3.0646E-07
Viento Succion	0.0000	2.2120	0.0000	3.0646E-07
Comb. 1	0.1215	2.1682	-1.3408E-08	0.0000
Comb. 2	0.1808	3.2258	-1.9154E-09	3.0646E-07
Comb. 3	0.1808	3.2258	-1.9154E-09	3.0646E-07
Comb. 4	0.3494	7.3399	1.9154E-08	1.1339E-06
Comb. 5	0.3494	7.3399	1.9154E-08	1.1339E-06
Comb. 6	0.3494	7.3399	1.9154E-08	1.1339E-06
Comb. 7	0.3494	7.3399	1.9154E-08	1.1339E-06
Comb. 8	0.1808	5.4378	-1.9154E-09	6.1292E-07
Comb. 9	0.1808	5.4378	-1.9154E-09	6.1292E-07
Comb. 10	0.1808	5.4378	-1.9154E-09	6.1292E-07
Comb. 11	0.1808	5.4378	-1.9154E-09	6.1292E-07
Comb. 12	0.0781	3.6059	-8.6191E-09	3.0646E-07
Comb. 13	0.0781	3.6059	-8.6191E-09	3.0646E-07

PROYECTO: I.E. MARCELO MIRANDA
CALCULO DE DEFLEXIONES

VIGA CON APOYOS CONTINUOS

Las deflexiones inmediatas se calcularán por las fórmulas de la teoría de la elasticidad considerando los efectos que tienen la fisuración y el refuerzo sobre la rigidez de la viga; las deflexiones adicionales deben determinarse multiplicando las deflexiones inmediatas causadas por la carga muerta por el factor λ de la NSR-10 Titulo C.9.5.2.5. En luces continuas el momento de inercia efectivo debe tomarse como el promedio de los valores del momento de inercia efectivo para la sección crítica del momento positivo y la seccion crítica de momento negativo.

MOMENTO POSITIVO

f'c=	**21.1**	**MPa**	h=	**45**	**cm**
fy=	**420**	**MPa**	d=	40	**cm**
			b=	**40**	**cm**

As=	**1342** **mm²**	13.42 **cm²**
n=	**9.3**	
As'=	**1020** **mm²**	10.20 **cm²**

DETERMINACIÓN DE LA PROFUNDIDAD DEL EJE NEUTRO

$$\frac{bx^2}{2}+(2n-1)As'(x\ -d')=nAs(d-x)$$

Donde:

n	Relación de módulos de elasticidad entre acero/concreto
b	Base de la sección
d	Altura efectiva de la sección
d'	Recubrimiento del refuerzo superior
x	Profundidad del eje neutro
As'	Área del acero a compresión (mm^2)
As	Área del acero a tracción (mm^2)

Luego:

n	**9.3**			
As'	**1020** mm^2	(2n-1)A's =	17878.23	mm^2
As	**1342** mm^2	nAs =	12432.07	mm^2
d'	**50** mm	5	cm	

Profundidad del eje neutro:

x=	111.8 **mm**		11.18 **cm**

PROYECTO: I.E. MARCELO MIRANDA
CALCULO DE DEFLEXIONES

MOMENTO DE INERCIA DE LA SECCION TRANSFORMADA FISURADA

$$\frac{bx^3}{3} + (2n-1)As'(x - d')^2 + nAs(d-x)^2$$

I cr= 128720.04 **cm^4** 0.00129 **m^4**

MOMENTO DE INERCIA SECCIÓN TOTAL DE CONCRETO

Ig= 303750 **cm^4** 0.00304 **m^4**
Yt= 33.82 **cm**

Mcr= $\frac{frIg}{Y_t}$ $fr = 0.7\sqrt{f'c}$

Mcr= 28.88 **kN-m**

Ma = Momento máximo presente en la viga

Ma= **208.0** **kN-m**

$$Ie = \left\{\frac{Mcr}{Ma}\right\}^3 * Ig + \left\{1 - \left\{\frac{Mcr}{Ma}\right\}^3\right\} * Icr$$

Ie= 129188.4 **cm^4** 12.919 ***OK***

PROYECTO: I.E. MARCELO MIRANDA
CALCULO DE DEFLEXIONES

MOMENTO NEGATIVO

f'c=	**21.1**	**MPa**	h=	**45**	**cm**
fy=	**420**	**MPa**	d=	40	**cm**
			b=	**40**	**cm**

As=	**1342**	**mm²**	13.42 **cm²**
n=	**9.3**		
As'=	**2040**	**mm²**	20.40 **cm²**

DETERMINACIÓN DE LA PROFUNDIDAD DEL EJE NEUTRO

$$\frac{bx^2}{2} + (2n-1)As'(x - d') = nAs(d-x)$$

Donde:

n	Relación de módulos de elasticidad entre acero/concreto
b	Base de la sección
d	Altura efectiva de la sección
d'	Recubrimiento del refuerzo superior
x	Profundidad del eje neutro
As'	Área del acero a compresión (mm^2)
As	Área del acero a tracción (mm^2)

Luego:

n	**9.3**			
As'	**2040** mm²	(2n-1)A's =	35756.46	mm²
As	**1342** mm²	nAs =	12432.07	mm²
d'	**50** mm	5	cm	

Profundidad del eje neutro:

x=	99.0	**mm**	9.90 **cm**

MOMENTO DE INERCIA DE LA SECCION TRANSFORMADA FISURADA

$$\frac{bx^3}{3} + (2n-1)As'(x - d')^2 + nAs(d-x)^2$$

I cr=	134158.56	**cm⁴**	0.00134 **m⁴**

PROYECTO: I.E. MARCELO MIRANDA
CALCULO DE DEFLEXIONES

MOMENTO DE INERCIA SECCIÓN TOTAL DE CONCRETO

Ig= 303750 **cm^4** 0.00304 **m^4**
Yt= 35.10 **cm**

Mcr= $\frac{frIg}{Y_t}$ $fr = 0.7\sqrt{f'c}$

Mcr= 27.82 **kN-m**

Ma = Momento máximo presente en la viga

Ma= **227.4** **kN-m**

$$Ie=\left\{\frac{Mcr}{Ma}\right\}^3 * Ig + \left\{1-\left\{\frac{Mcr}{Ma}\right\}^3\right\} * Icr$$

Ie= 134469.4 **cm^4** 13.447 ***OK***

Según el numeral C.9.5.2.3. la inercia efectiva es igual al promedio de las secciones críticas:

Ie= 131828.87 **cm^4** 13.183 **m^4**

DEFLEXIÓN ELÁSTICA INMEDIATA

$$\delta = \frac{5\,wl^4}{384\,EIg}$$

Donde:

δ	Deflexión elástica inmediata
w	Carga por metro lineal
l	Longitud de la viga
E	Módulo de elasticidad del concreto
Ig	Momento de la sección total

Luego:

w **1.98** **kN/m**
E **21589** **MPa**

δ= **0.0007** **m**

DEFLEXIÓN INMEDIATA POR :

CARGA MUERTA 80%	0.001 m	0.060 mm
CARGA VIVA 20%	0.000 m	0.013 mm

DEFLEXIÓN ADICIONAL LARGO PLAZO (5 AÑOS O MAS)

PROYECTO: I.E. MARCELO MIRANDA
CALCULO DE DEFLEXIONES

La deflexión adicional a largo plazo causada por la retracción de fraguado y el flujo plástico, se determinará multiplicando la deflexión causada por la carga muerta por el factor λ.

$$\lambda = \frac{\xi}{1 + 50\ \rho'}$$

Donde:

ξ	Coeficientes de efectos de largo plazo. Según NSR- 10 Titulo C.9.5.2.5
ρ'	Cuantia del refuerzo a compresión

Luego:

ξ	2.0
ρ'	0.00680

λ= **1.493**

δ= **0.0008** m

COMPARACION CON TABLA C.9-2 NSR 98
DEFLEXIONES MAXIMAS CALCULADAS PERMISIBLES

	L=	**6.60 m**	
DEFLEXION LIMITE	L/480	**0.0138 m**	
DEFLEXION LARGO PLAZO		**0.0010 m**	***OK***

7. DISEÑO DE ELEMENTOS NO ESTRUCTURALES

DISEÑO DE ELEMENTOS NO ESTRUCTURALES

PROYECTO: INSTITUCIÓN EDUCATIVA MARCELO MIRANDA
DISEÑO DE ELEMENTOS NO ESTRUCTURALES

Units: kN*m

STORY DATA

Story	Height	Elevation	SimilarTo
N+6.65	3.20	6.65	None
N+3.45	3.45	3.45	None
BASE	0.00	0.00	None

CENTER MASS RIGIDITY

Story	Diaphragm	MassX	MassY	XCM	YCM	CumMassX	CumMassY
N+6.65	D1	179.0018	179.0018	33.222	11.17	179.0018	179.0018
N+3.45	D1	441.3555	441.3555	31.397	10.702	620.3573	620.3573

XCCM	YCCM	XCR	YCR
33.222	11.17	32.028	11.023
31.924	10.837	31.06	11.012

STORY SHEARS

Story	Load	Loc	P	VX	VY	T	MX	MY
N+6.65	SISDISX	Top	0	714.37	480.8	23952.952	0	0
N+6.65	SISDISX	Bottom	0	714.37	480.8	23952.952	1538.556	2285.993
N+6.65	SISDISY	Top	0	449.53	766.57	27618.56	0	0
N+6.65	SISDISY	Bottom	0	449.53	766.57	27618.56	2453.014	1438.493
N+3.45	SISDISX	Top	0	1581.32	955.68	48782.486	1538.556	2285.993
N+3.45	SISDISX	Bottom	0	1581.32	955.68	48782.486	4835.594	7594.179
N+3.45	SISDISY	Top	0	1040.88	1500.69	53794.466	2453.014	1438.493
N+3.45	SISDISY	Bottom	0	1040.88	1500.69	53794.466	7451.912	5029.43

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

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

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

$$V_s = S_a g M$$

g: 9.81 m/s^2
Sa: 0.984 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

ANALISIS DE CARGAS PARA MUROS

Espesor de muros:	0.15	m
Espesor de pañete en una cara:	0	m
Densidad de mamposteria:	13	kN/m3
Densidad mortero de pañete:	21	kN/m3
Altura Fachada:	3.20	m
Carga	6.24	kN/m
Descripción:	mamposteria reforzada, separada lateralmente de la estructura, apoyada arriba y abajo	
ap:	1.0	
Rp:	6	

ANALISIS DE CARGAS PARA ANTEPECHOS

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

Sección de vigas verticales: 0.15x0.25 m
f'c = 21.1 MPa
fy = 420 MPa

DISEÑO PARA MUROS

Story	Fx	Wx	ax	ap	Rp	Fp	M	V
N+6.65	714.37	179.00	1.968	1.0	6	2.047	2.620	3.275
N+3.45	866.95	441.36	1.964	1.0	6	2.043	2.615	3.269

	Sección Vigas V.			As. (cm2)		Separación column.		Fl. 1/4"
Story	b	d	ρ	neces.	ubicado	S max	S escogida	S estribos
N+6.65	0.15	0.21	0.00095	0.30	0.71	2.36	2.40	0.188
N+3.45	0.15	0.21	0.00095	0.30	0.71	2.37	2.40	0.188

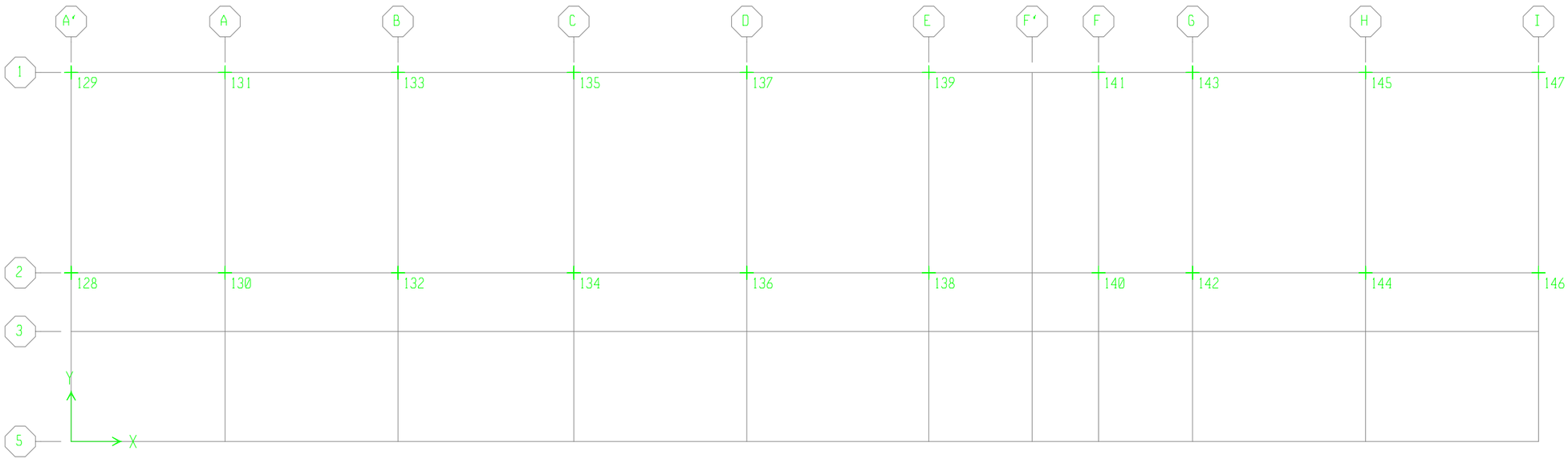
DISEÑO PARA ANTEPECHOS

Story	Fx	Wx	ax	ap	Rp	Fp	M	V
N+6.65	714.37	179.00	1.968	2.5	6	5.117	6.550	8.187
N+3.45	866.95	441.36	1.964	2.5	6	5.107	6.537	8.171

	Sección columneta			As. (cm2)		Separación column.		Fl. 1/4"
Story	b	d	ρ	neces.	ubicado	S max	S escogida	S estribos
N+6.65	0.15	0.21	0.00243	0.76	1.29	1.69	1.70	0.188
N+3.45	0.15	0.21	0.00242	0.76	1.29	1.69	1.70	0.188

8. ANEXOS DE COMPUTADOR

ANEXOS DE COMPUTADOR


A'
A
B
C
D
E
F'
F
G
H
I
1
2
3
5
129
131
133
135
137
139
141
143
145
147
128
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132
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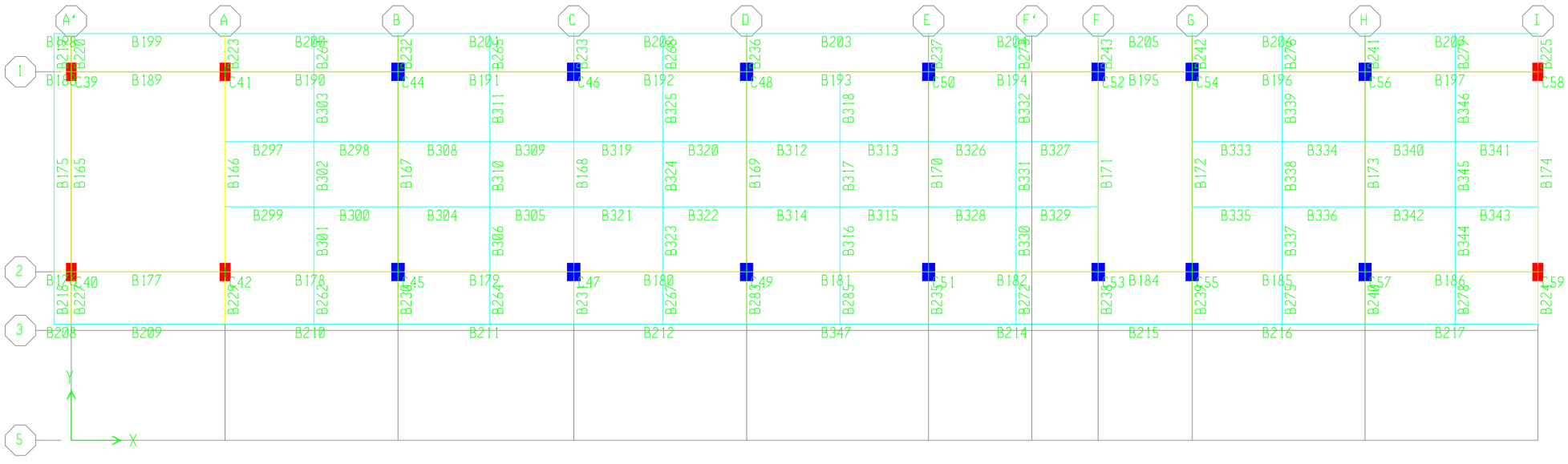
136
138
140
142
144
146
Y
X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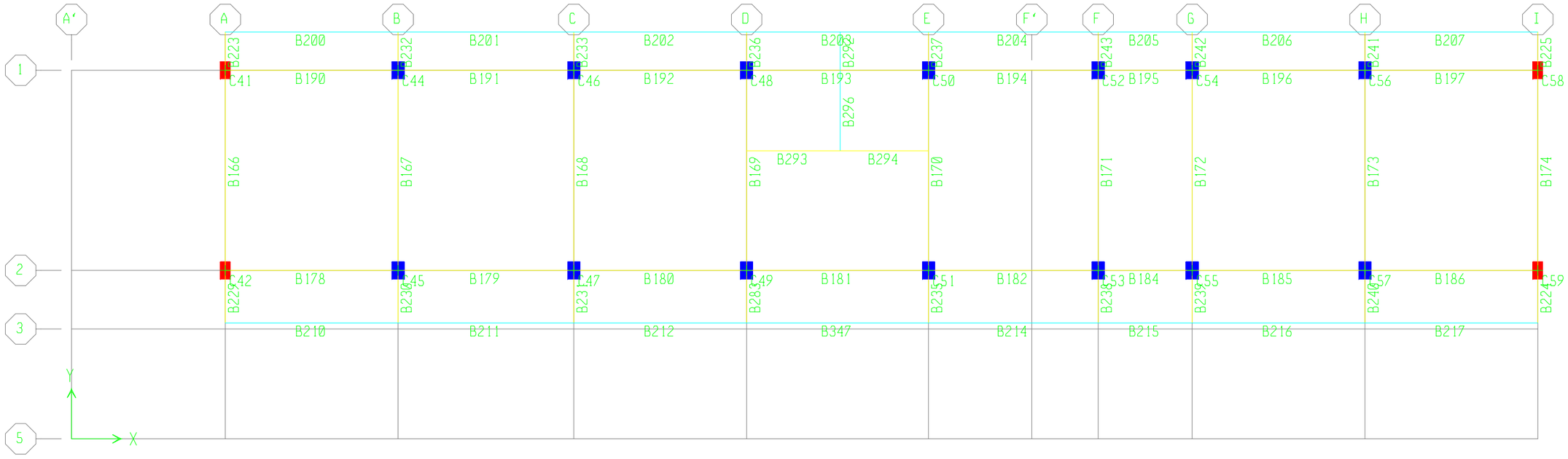
Y
X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S T O R Y D A T A

STORY	SIMILAR TO	HEIGHT	ELEVATION
N+6.65	None	3.200	6.650
N+3.45	None	3.450	3.450
BASE	None		0.000

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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
128	0.000	6.900	0.000
129	0.000	15.100	0.000
130	6.300	6.900	0.000
131	6.300	15.100	0.000
132	13.380	6.900	0.000
133	13.380	15.100	0.000
134	20.580	6.900	0.000
135	20.580	15.100	0.000
136	27.660	6.900	0.000
137	27.660	15.100	0.000
138	35.110	6.900	0.000
139	35.110	15.100	0.000
140	42.060	6.900	0.000
141	42.060	15.100	0.000
142	45.910	6.900	0.000
143	45.910	15.100	0.000
144	52.990	6.900	0.000
145	52.990	15.100	0.000
146	60.070	6.900	0.000
147	60.070	15.100	0.000
148	-0.700	6.900	0.000
149	-0.700	15.100	0.000
152	-0.700	16.670	0.000
153	0.000	16.670	0.000
154	6.300	16.670	0.000
155	13.380	16.670	0.000
156	20.580	16.670	0.000
157	27.660	16.670	0.000
158	35.110	16.670	0.000
159	42.060	16.670	0.000
160	45.910	16.670	0.000
161	52.990	16.670	0.000
162	60.070	16.670	0.000
163	-0.700	4.750	0.000
164	0.000	4.750	0.000
165	6.300	4.750	0.000
166	13.380	4.750	0.000
167	20.580	4.750	0.000
168	27.660	4.750	0.000
169	35.110	4.750	0.000
170	42.060	4.750	0.000
171	45.910	4.750	0.000
172	52.990	4.750	0.000
173	60.070	4.750	0.000
177	6.300	12.230	0.000
178	13.380	12.230	0.000
179	20.580	12.230	0.000
180	27.660	12.230	0.000
181	35.110	12.230	0.000
182	42.060	12.230	0.000
183	45.910	12.230	0.000
184	52.990	12.230	0.000
185	60.070	12.230	0.000
186	6.300	9.560	0.000
187	13.380	9.560	0.000
188	20.580	9.560	0.000
189	27.660	9.560	0.000
190	35.110	9.560	0.000
191	42.060	9.560	0.000
192	45.910	9.560	0.000
193	52.990	9.560	0.000

194	60.070	9.560	0.000
195	9.940	6.900	0.000
196	9.940	15.100	0.000
197	9.940	16.670	0.000
198	9.940	4.750	0.000
199	17.130	6.900	0.000
200	17.130	15.100	0.000
201	17.130	4.750	0.000
202	17.130	16.670	0.000
203	24.220	6.900	0.000
204	24.220	15.100	0.000
205	24.220	4.750	0.000
206	24.220	16.670	0.000
207	31.490	6.900	0.000
208	31.490	15.100	0.000
210	38.690	6.900	0.000
211	38.690	15.100	0.000
212	38.690	4.750	0.000
213	38.690	16.670	0.000
214	49.600	6.900	0.000
215	49.600	15.100	0.000
216	49.600	4.750	0.000
217	49.600	16.670	0.000
218	56.680	6.900	0.000
219	56.680	15.100	0.000
220	56.680	4.750	0.000
221	56.680	16.670	0.000
222	31.490	4.750	0.000
231	27.660	11.800	0.000
232	35.110	11.800	0.000
233	31.490	16.670	0.000
234	31.490	11.800	0.000
235	24.220	12.230	0.000
236	24.220	9.560	0.000
237	17.130	12.230	0.000
238	9.940	12.230	0.000
239	9.940	9.560	0.000
240	17.130	9.560	0.000
241	31.490	12.230	0.000
242	31.490	9.560	0.000
243	38.690	12.230	0.000
244	38.690	9.560	0.000
245	49.600	12.230	0.000
246	49.600	9.560	0.000
247	56.680	12.230	0.000
248	56.680	9.560	0.000

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
C39	129	129	Below
C40	128	128	Below
C41	131	131	Below
C42	130	130	Below
C44	133	133	Below
C45	132	132	Below
C46	135	135	Below
C47	134	134	Below
C48	137	137	Below
C49	136	136	Below
C50	139	139	Below
C51	138	138	Below
C52	141	141	Below
C53	140	140	Below
C54	143	143	Below
C55	142	142	Below
C56	145	145	Below
C57	144	144	Below
C58	147	147	Below
C59	146	146	Below

B E A M C O N N E C T I V I T Y D A T A

BEAM	I END PT	J END PT
B165	128	129

B166	130	131
B167	132	133
B168	134	135
B169	136	137
B170	138	139
B171	140	141
B172	142	143
B173	144	145
B174	146	147
B175	148	149
B176	148	128
B177	128	130
B178	130	132
B179	132	134
B180	134	136
B181	136	138
B182	138	140
B184	140	142
B185	142	144
B186	144	146
B188	149	129
B189	129	131
B190	131	133
B191	133	135
B192	135	137
B193	137	139
B194	139	141
B195	141	143
B196	143	145
B197	145	147
B198	152	153
B199	153	154
B200	154	155
B201	155	156
B202	156	157
B203	157	158
B204	158	159
B205	159	160
B206	160	161
B207	161	162
B208	163	164
B209	164	165
B210	165	166
B211	166	167
B212	167	168
B214	169	170
B215	170	171
B216	171	172
B217	172	173
B218	163	148
B219	149	152
B220	129	153
B223	131	154
B224	173	146
B225	147	162
B227	164	128
B229	165	130
B230	166	132
B231	167	134
B232	133	155
B233	135	156
B235	169	138
B236	137	157
B237	139	158
B238	170	140
B239	171	142
B240	172	144
B241	145	161
B242	143	160
B243	141	159
B261	196	197
B262	198	195
B264	201	199
B265	200	202
B267	205	203
B268	204	206
B272	212	210
B273	211	213
B275	216	214
B276	215	217
B278	220	218

B279	219	221
B283	168	136
B285	222	207
B292	208	233
B293	231	234
B294	234	232
B296	234	208
B297	177	238
B298	238	178
B299	186	239
B300	239	187
B301	195	239
B302	239	238
B303	238	196
B304	187	240
B305	240	188
B306	199	240
B308	178	237
B309	237	179
B310	240	237
B311	237	200
B312	180	241
B313	241	181
B314	189	242
B315	242	190
B316	207	242
B317	242	241
B318	241	208
B319	179	235
B320	235	180
B321	188	236
B322	236	189
B323	203	236
B324	236	235
B325	235	204
B326	181	243
B327	243	182
B328	190	244
B329	244	191
B330	210	244
B331	244	243
B332	243	211
B333	183	245
B334	245	184
B335	192	246
B336	246	193
B337	214	246
B338	246	245
B339	245	215
B340	184	247
B341	247	185
B342	193	248
B343	248	194
B344	218	248
B345	248	247
B346	247	219
B347	168	169

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

STORY	DIAPHRAGM	POINT	POINT	POINT	POINT	POINT
N+6.65	D1	130	131	132	133	134
		135	136	137	138	139
		140	141	142	143	144
		145	146	147	154	155
		156	157	158	159	160
		161	162	165	166	167
		168	169	170	171	172
		173	231	232	208	233
		234				
N+3.45	D1	128	129	130	131	132
		133	134	135	136	137
		138	139	140	141	142
		143	144	145	146	147
		148	149	152	153	154
		155	156	157	158	159
		160	161	162	163	164

165	166	167	168	169
170	171	172	173	177
178	179	180	181	182
183	184	185	186	187
188	189	190	191	192
193	194	195	196	197
198	199	200	201	202
203	204	205	206	207
208	210	211	212	213
214	215	216	217	218
219	220	221	222	235
236	237	238	239	240
241	242	243	244	245
246	247	248		

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
CON21	Iso	Concrete	All	21538000.000	0.2000	9.9000E-06	8974166.667
CON28	Iso	Concrete	All	24870000.000	0.2000	9.9000E-06	10362500.000
A500	Iso	Steel	All	199900000.00	0.3000	1.1700E-05	76884615.38

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
CON21	2.4000E+00	2.4000E+01
CON28	2.4000E+00	2.4000E+01
A500	7.8271E+00	7.6820E+01

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
CON21	No	21000.000	420000.000	420000.000	N/A
CON28	No	28000.000	420000.000	420000.000	N/A

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
C-50X70	CON21	Rectangular	Yes	
V-20X45	CON21	Rectangular		Yes
V-50X45	CON21	Rectangular		Yes
V-40X45	CON21	Rectangular		Yes
C-40X70	CON21	Rectangular	Yes	
VIG25X40	CON21	Rectangular		Yes
VIG40X40	CON21	Rectangular		Yes
COL40X40	CON21	Rectangular	Yes	

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
C-50X70	0.5000	0.7000	0.0000	0.0000	0.0000	0.0000
V-20X45	0.4500	0.2000	0.0000	0.0000	0.0000	0.0000

V-50X45	0.4500	0.5000	0.0000	0.0000	0.0000	0.0000
V-40X45	0.4500	0.4000	0.0000	0.0000	0.0000	0.0000
C-40X70	0.4000	0.7000	0.0000	0.0000	0.0000	0.0000
VIG25X40	0.4000	0.2500	0.0000	0.0000	0.0000	0.0000
VIG40X40	0.4000	0.4000	0.0000	0.0000	0.0000	0.0000
COL40X40	0.4000	0.4000	0.0000	0.0000	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

	SECTION	TORSIONAL	MOMENTS OF INERTIA		SHEAR AREAS	
FRAME SECTION NAME	AREA	CONSTANT	I33	I22	A2	A3
C-50X70	0.3500	0.0163	0.0073	0.0143	0.2917	0.2917
V-20X45	0.0900	0.0009	0.0015	0.0003	0.0750	0.0750
V-50X45	0.2250	0.0070	0.0038	0.0047	0.1875	0.1875
V-40X45	0.1800	0.0045	0.0030	0.0024	0.1500	0.1500
C-40X70	0.2800	0.0096	0.0037	0.0114	0.2333	0.2333
VIG25X40	0.1000	0.0013	0.0013	0.0005	0.0833	0.0833
VIG40X40	0.1600	0.0036	0.0021	0.0021	0.1333	0.1333
COL40X40	0.1600	0.0036	0.0021	0.0021	0.1333	0.1333

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

	SECTION MODULI		PLASTIC MODULI		RADIUS OF GYRATION	
FRAME SECTION NAME	S33	S22	Z33	Z22	R33	R22
C-50X70	0.0292	0.0408	0.0438	0.0613	0.1443	0.2021
V-20X45	0.0068	0.0030	0.0101	0.0045	0.1299	0.0577
V-50X45	0.0169	0.0188	0.0253	0.0281	0.1299	0.1443
V-40X45	0.0135	0.0120	0.0203	0.0180	0.1299	0.1155
C-40X70	0.0187	0.0327	0.0280	0.0490	0.1155	0.2021
VIG25X40	0.0067	0.0042	0.0100	0.0063	0.1155	0.0722
VIG40X40	0.0107	0.0107	0.0160	0.0160	0.1155	0.1155
COL40X40	0.0107	0.0107	0.0160	0.0160	0.1155	0.1155

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

	TOTAL	TOTAL
FRAME SECTION NAME	WEIGHT	MASS
C-50X70	782.0400	78.2040
V-20X45	923.5728	92.3573
V-50X45	450.5760	45.0576
V-40X45	1639.7424	163.9742
C-40X70	225.1200	22.5120
VIG25X40	0.0000	0.0000
VIG40X40	0.0000	0.0000
COL40X40	0.0000	0.0000

C O N C R E T E C O L U M N D A T A

	REINF CONFIGURATION		REINF	NUM BARS	NUM BARS	BAR
FRAME SECTION NAME	LONGIT	LATERAL	SIZE/TYPE	3DIR/2DIR	CIRCULAR	COVER
C-50X70	Rectangular	Ties	#8/Design	7/5	N/A	0.0500
C-40X70	Rectangular	Ties	#8/Design	7/4	N/A	0.0500
COL40X40	Rectangular	Ties	#8/Check	4/4	N/A	0.0500

C O N C R E T E B E A M D A T A

	TOP	BOT	TOP LEFT	TOP RIGHT	BOT LEFT	BOT RIGHT
FRAME SECTION NAME	COVER	COVER	AREA	AREA	AREA	AREA
V-20X45	0.0500	0.0500	0.000	0.000	0.000	0.000
V-50X45	0.0500	0.0500	0.000	0.000	0.000	0.000
V-40X45	0.0500	0.0500	0.000	0.000	0.000	0.000
VIG25X40	0.0500	0.0500	0.000	0.000	0.000	0.000
VIG40X40	0.0500	0.0500	0.000	0.000	0.000	0.000

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

SHELL	MATERIAL	SHELL	LOAD DIST	MEMBRANE	BENDING	TOTAL	TOTAL

SECTION	NAME	TYPE	ONE WAY	THICK	THICK	WEIGHT	MASS
CUBIERTA	CON21	Membrane	Yes	0.0130	0.0130	214.6862	21.4686
MACIZAENTRE	CON21	Membrane	No	0.1460	146.0000	2073.0624	207.3062
MACIZACUB	CON21	Membrane	No	0.1920	0.1920	167.1852	16.7185
ESCALERA	CON21	Membrane	No	0.3330	0.3330	0.0000	0.0000

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

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		

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R E S P O N S E S P E C T R U M C A S E S

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	14.0200
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	15.2700
UZ	----	N/A

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	14.0200
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	15.2700
UZ	----	N/A

RESP SPEC CASE: SISUMBY

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	UMBRAL	17.0900
UZ	----	N/A

RESP SPEC CASE: SISUMBX

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	UMBRAL	15.6300
U2	----	N/A
UZ	----	N/A

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
		LIVE	Static	1.6000
COMDIS3	ADD	DEAD	Static	1.2000
		LIVE	Static	1.0000
		SISDISX	Spectra	1.0000
		SISDISY	Spectra	0.3000
COMDIS4	ADD	DEAD	Static	1.2000
		LIVE	Static	1.0000
		SISDISX	Spectra	0.3000
		SISDISY	Spectra	1.0000
COMDIS5	ADD	DEAD	Static	0.9000
		SISDISX	Spectra	1.0000
		SISDISY	Spectra	0.3000
COMDIS6	ADD	DEAD	Static	0.9000
		SISDISX	Spectra	0.3000
		SISDISY	Spectra	1.0000
COMDER1	ADD	SISDERX	Spectra	1.0000
		SISDERY	Spectra	0.3000
COMDER2	ADD	SISDERX	Spectra	0.3000
		SISDERY	Spectra	1.0000

COMDERUMB1	ADD	SISUMBX	Spectra	1.0000
		SISUMBY	Spectra	0.3000
COMDERUMB2	ADD	SISUMBX	Spectra	0.3000
		SISUMBY	Spectra	1.0000
ENVOLVENTE	ENVE	COMDIS1	Combo	1.0000
		COMDIS2	Combo	1.0000
		COMDIS3	Combo	1.0000
		COMDIS4	Combo	1.0000
		COMDIS5	Combo	1.0000
		COMDIS6	Combo	1.0000
CIM1	ADD	DEAD	Static	1.0000
		LIVE	Static	1.0000
CIM2	ADD	DEAD	Static	1.0000
		LIVE	Static	0.7500
		SISDISX	Spectra	0.1110
		SISDISY	Spectra	0.0330
CIM3	ADD	DEAD	Static	1.0000
		LIVE	Static	0.7500
		SISDISX	Spectra	0.0330
		SISDISY	Spectra	0.1110

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\andrea s\desktop\2253 politecnico marcelo miranda\colegio\modelo\derivas.txt
DATA TYPE: Period vs Acceleration
NUMBER OF HEADER LINES = 0

PERIOD	ACCEL
0.0000	1.1250
0.0300	1.1250
0.0700	1.1250
0.1000	1.1250
0.1300	1.1250
0.2600	1.1250
0.3800	1.1250
0.5100	1.1250
0.6300	1.1250
0.8500	0.8370
1.0700	0.6660
1.2900	0.5530
1.5100	0.4730
1.7200	0.4130
1.9400	0.3670
2.1600	0.3300
2.3800	0.3000
2.6000	0.2740
2.8100	0.2530
3.0300	0.2350
3.2500	0.2190
3.4700	0.2050
3.6900	0.1930
3.9100	0.1820
4.1200	0.1730
4.3400	0.1640
4.5600	0.1560
5.5600	0.1050
6.5600	0.0750

FUNCTION NAME: DISENO

FILE NAME: c:\users\andrea s\desktop\2253 politecnico marcelo miranda\colegio\modelo\diseño.txt
DATA TYPE: Period vs Acceleration
NUMBER OF HEADER LINES = 0

PERIOD	ACCEL
0.0000	0.2380
0.0300	0.2380
0.0700	0.2380
0.1000	0.2380
0.1300	0.2380
0.2600	0.2380
0.3800	0.2380

0.5100	0.2380
0.6300	0.2380
0.8500	0.1770
1.0700	0.1410
1.2900	0.1170
1.5100	0.1000
1.7200	0.0870
1.9400	0.0780
2.1600	0.0700
2.3800	0.0630
2.6000	0.0580
2.8100	0.0540
3.0300	0.0500
3.2500	0.0460
3.4700	0.0430
3.6900	0.0410
3.9100	0.0390
4.1200	0.0370
4.3400	0.0350
4.5600	0.0330
5.5600	0.0220
6.5600	0.0160

FUNCTION NAME: UMBRAL

FILE NAME: c:\users\andrea s\desktop\2253 politecnico marcelo miranda\colegio\modelo\umbral.txt
DATA TYPE: Period vs Acceleration
NUMBER OF HEADER LINES = 0

PERIOD	ACCEL
0.0000	0.0700
0.0500	0.0980
0.1000	0.1260
0.1500	0.1540
0.2000	0.1820
0.2500	0.2100
0.4100	0.2100
0.5600	0.2100
0.7200	0.2100
0.8800	0.2100
1.0300	0.2100
1.1900	0.2100
1.3400	0.2100
1.5000	0.2100
2.1400	0.1470
2.7900	0.1130
3.4300	0.0920
4.0700	0.0770
4.7100	0.0670
5.3600	0.0590
6.0000	0.0530
6.6400	0.0470
7.2900	0.0430
7.9300	0.0400
8.5700	0.0370
9.2100	0.0340
9.8600	0.0320
10.5000	0.0210
11.5000	0.0170
12.5000	0.0150

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+6.65	C41	Column	Rectangular	None	C-40X70	Conc Frame	C-40X70
N+6.65	C42	Column	Rectangular	None	C-40X70	Conc Frame	C-40X70
N+6.65	C44	Column	Rectangular	None	C-50X70	Conc Frame	C-50X70
N+6.65	C45	Column	Rectangular	None	C-50X70	Conc Frame	C-50X70
N+6.65	C46	Column	Rectangular	None	C-50X70	Conc Frame	C-50X70
N+6.65	C47	Column	Rectangular	None	C-50X70	Conc Frame	C-50X70
N+6.65	C48	Column	Rectangular	None	C-50X70	Conc Frame	C-50X70
N+6.65	C49	Column	Rectangular	None	C-50X70	Conc Frame	C-50X70
N+6.65	C50	Column	Rectangular	None	C-50X70	Conc Frame	C-50X70
N+6.65	C51	Column	Rectangular	None	C-50X70	Conc Frame	C-50X70

N+6.65	C52	Column	Rectangular	None	C-50X70	Conc Frame	C-50X70
N+6.65	C53	Column	Rectangular	None	C-50X70	Conc Frame	C-50X70
N+6.65	C54	Column	Rectangular	None	C-50X70	Conc Frame	C-50X70
N+6.65	C55	Column	Rectangular	None	C-50X70	Conc Frame	C-50X70
N+6.65	C56	Column	Rectangular	None	C-50X70	Conc Frame	C-50X70
N+6.65	C57	Column	Rectangular	None	C-50X70	Conc Frame	C-50X70
N+6.65	C58	Column	Rectangular	None	C-40X70	Conc Frame	C-40X70
N+6.65	C59	Column	Rectangular	None	C-40X70	Conc Frame	C-40X70
N+3.45	C39	Column	Rectangular	None	C-40X70	Conc Frame	C-40X70
N+3.45	C40	Column	Rectangular	None	C-40X70	Conc Frame	C-40X70
N+3.45	C41	Column	Rectangular	None	C-40X70	Conc Frame	C-40X70
N+3.45	C42	Column	Rectangular	None	C-40X70	Conc Frame	C-40X70
N+3.45	C44	Column	Rectangular	None	C-50X70	Conc Frame	C-50X70
N+3.45	C45	Column	Rectangular	None	C-50X70	Conc Frame	C-50X70
N+3.45	C46	Column	Rectangular	None	C-50X70	Conc Frame	C-50X70
N+3.45	C47	Column	Rectangular	None	C-50X70	Conc Frame	C-50X70
N+3.45	C48	Column	Rectangular	None	C-50X70	Conc Frame	C-50X70
N+3.45	C49	Column	Rectangular	None	C-50X70	Conc Frame	C-50X70
N+3.45	C50	Column	Rectangular	None	C-50X70	Conc Frame	C-50X70
N+3.45	C51	Column	Rectangular	None	C-50X70	Conc Frame	C-50X70
N+3.45	C52	Column	Rectangular	None	C-50X70	Conc Frame	C-50X70
N+3.45	C53	Column	Rectangular	None	C-50X70	Conc Frame	C-50X70
N+3.45	C54	Column	Rectangular	None	C-50X70	Conc Frame	C-50X70
N+3.45	C55	Column	Rectangular	None	C-50X70	Conc Frame	C-50X70
N+3.45	C56	Column	Rectangular	None	C-50X70	Conc Frame	C-50X70
N+3.45	C57	Column	Rectangular	None	C-50X70	Conc Frame	C-50X70
N+3.45	C58	Column	Rectangular	None	C-40X70	Conc Frame	C-40X70
N+3.45	C59	Column	Rectangular	None	C-40X70	Conc Frame	C-40X70
N+6.65	B166	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B167	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B168	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B169	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B170	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B171	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B172	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B173	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B174	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B178	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B179	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B180	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B181	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B182	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B184	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B185	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B186	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B190	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B191	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B192	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B193	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B194	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B195	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B196	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B197	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B200	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+6.65	B201	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+6.65	B202	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+6.65	B203	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+6.65	B204	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+6.65	B205	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+6.65	B206	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+6.65	B207	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+6.65	B210	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+6.65	B211	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+6.65	B212	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+6.65	B214	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+6.65	B215	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+6.65	B216	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+6.65	B217	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+6.65	B223	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B224	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B225	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B229	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B230	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B231	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B232	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B233	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B235	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B236	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B237	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B238	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B239	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45

N+6.65	B240	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B241	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B242	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B243	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B283	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B292	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+6.65	B293	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B294	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+6.65	B296	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+6.65	B347	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B165	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+3.45	B166	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+3.45	B167	Beam	Rectangular	None	V-50X45	Conc Frame	V-50X45
N+3.45	B168	Beam	Rectangular	None	V-50X45	Conc Frame	V-50X45
N+3.45	B169	Beam	Rectangular	None	V-50X45	Conc Frame	V-50X45
N+3.45	B170	Beam	Rectangular	None	V-50X45	Conc Frame	V-50X45
N+3.45	B171	Beam	Rectangular	None	V-50X45	Conc Frame	V-50X45
N+3.45	B172	Beam	Rectangular	None	V-50X45	Conc Frame	V-50X45
N+3.45	B173	Beam	Rectangular	None	V-50X45	Conc Frame	V-50X45
N+3.45	B174	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+3.45	B175	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B176	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+3.45	B177	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+3.45	B178	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+3.45	B179	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+3.45	B180	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+3.45	B181	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+3.45	B182	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+3.45	B184	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+3.45	B185	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+3.45	B186	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+3.45	B188	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+3.45	B189	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+3.45	B190	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+3.45	B191	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+3.45	B192	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+3.45	B193	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+3.45	B194	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+3.45	B195	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+3.45	B196	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+3.45	B197	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+3.45	B198	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B199	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B200	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B201	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B202	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B203	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B204	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B205	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B206	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B207	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B208	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B209	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B210	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B211	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B212	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B214	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B215	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B216	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B217	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B218	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B219	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B220	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+3.45	B223	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+3.45	B224	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+3.45	B225	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+3.45	B227	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+3.45	B229	Beam	Rectangular	None	V-40X45	Conc Frame	V-40X45
N+3.45	B230	Beam	Rectangular	None	V-50X45	Conc Frame	V-50X45
N+3.45	B231	Beam	Rectangular	None	V-50X45	Conc Frame	V-50X45
N+3.45	B232	Beam	Rectangular	None	V-50X45	Conc Frame	V-50X45
N+3.45	B233	Beam	Rectangular	None	V-50X45	Conc Frame	V-50X45
N+3.45	B235	Beam	Rectangular	None	V-50X45	Conc Frame	V-50X45
N+3.45	B236	Beam	Rectangular	None	V-50X45	Conc Frame	V-50X45
N+3.45	B237	Beam	Rectangular	None	V-50X45	Conc Frame	V-50X45
N+3.45	B238	Beam	Rectangular	None	V-50X45	Conc Frame	V-50X45
N+3.45	B239	Beam	Rectangular	None	V-50X45	Conc Frame	V-50X45
N+3.45	B240	Beam	Rectangular	None	V-50X45	Conc Frame	V-50X45
N+3.45	B241	Beam	Rectangular	None	V-50X45	Conc Frame	V-50X45
N+3.45	B242	Beam	Rectangular	None	V-50X45	Conc Frame	V-50X45
N+3.45	B243	Beam	Rectangular	None	V-50X45	Conc Frame	V-50X45

N+3.45	B261	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B262	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B264	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B265	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B267	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B268	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B272	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B273	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B275	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B276	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B278	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B279	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B283	Beam	Rectangular	None	V-50X45	Conc Frame	V-50X45
N+3.45	B285	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B297	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B298	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B299	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B300	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B301	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B302	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B303	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B304	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B305	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B306	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B308	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B309	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B310	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B311	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B312	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B313	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B314	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B315	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B316	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B317	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B318	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B319	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B320	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B321	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B322	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B323	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B324	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B325	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B326	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B327	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B328	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B329	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B330	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B331	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B332	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B333	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B334	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B335	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B336	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B337	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B338	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B339	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B340	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B341	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B342	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B343	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B344	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B345	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B346	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45
N+3.45	B347	Beam	Rectangular	None	V-20X45	Conc Frame	V-20X45

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

CASE	STORY	AREA	AREATYPE	DIRECTION	LOAD
LIVE	N+6.65	F45	Floor	Gravity	5.0000
LIVE	N+6.65	F46	Floor	Gravity	5.0000
LIVE	N+6.65	F47	Floor	Gravity	5.0000
LIVE	N+6.65	F48	Floor	Gravity	5.0000
LIVE	N+6.65	F49	Floor	Gravity	5.0000
LIVE	N+6.65	F50	Floor	Gravity	5.0000
LIVE	N+6.65	F51	Floor	Gravity	5.0000
LIVE	N+6.65	F52	Floor	Gravity	5.0000
LIVE	N+6.65	F53	Floor	Gravity	5.0000
LIVE	N+6.65	F54	Floor	Gravity	5.0000

LIVE	N+6.65	F55	Floor	Gravity	5.0000
LIVE	N+6.65	F56	Floor	Gravity	5.0000
LIVE	N+6.65	F58	Floor	Gravity	5.0000
LIVE	N+6.65	F59	Floor	Gravity	5.0000
LIVE	N+6.65	F60	Floor	Gravity	5.0000
LIVE	N+6.65	F61	Floor	Gravity	5.0000
LIVE	N+6.65	F62	Floor	Gravity	5.0000
LIVE	N+6.65	F63	Floor	Gravity	5.0000
LIVE	N+6.65	F64	Floor	Gravity	5.0000
LIVE	N+6.65	F65	Floor	Gravity	5.0000
LIVE	N+6.65	F66	Floor	Gravity	5.0000
LIVE	N+6.65	F67	Floor	Gravity	5.0000
LIVE	N+6.65	F68	Floor	Gravity	5.0000
LIVE	N+6.65	F69	Floor	Gravity	5.0000
LIVE	N+6.65	F70	Floor	Gravity	5.0000
LIVE	N+6.65	F71	Floor	Gravity	5.0000
LIVE	N+6.65	F72	Floor	Gravity	5.0000
LIVE	N+3.45	F39	Floor	Gravity	5.0000
LIVE	N+3.45	F40	Floor	Gravity	5.0000
LIVE	N+3.45	F41	Floor	Gravity	5.0000
LIVE	N+3.45	F42	Floor	Gravity	5.0000
LIVE	N+3.45	F43	Floor	Gravity	5.0000
LIVE	N+3.45	F44	Floor	Gravity	5.0000
LIVE	N+3.45	F58	Floor	Gravity	5.0000
LIVE	N+3.45	F73	Floor	Gravity	5.0000
LIVE	N+3.45	F74	Floor	Gravity	5.0000
LIVE	N+3.45	F75	Floor	Gravity	5.0000
LIVE	N+3.45	F76	Floor	Gravity	5.0000
LIVE	N+3.45	F77	Floor	Gravity	5.0000
LIVE	N+3.45	F78	Floor	Gravity	5.0000
LIVE	N+3.45	F79	Floor	Gravity	5.0000
LIVE	N+3.45	F80	Floor	Gravity	5.0000
LIVE	N+3.45	F81	Floor	Gravity	5.0000
LIVE	N+3.45	F82	Floor	Gravity	5.0000
LIVE	N+3.45	F83	Floor	Gravity	5.0000
LIVE	N+3.45	F84	Floor	Gravity	5.0000
LIVE	N+3.45	F85	Floor	Gravity	5.0000
LIVE	N+3.45	F86	Floor	Gravity	5.0000
LIVE	N+3.45	F87	Floor	Gravity	5.0000
LIVE	N+3.45	F88	Floor	Gravity	5.0000
LIVE	N+3.45	F89	Floor	Gravity	5.0000
LIVE	N+3.45	F90	Floor	Gravity	5.0000
LIVE	N+3.45	F91	Floor	Gravity	5.0000
LIVE	N+3.45	F92	Floor	Gravity	5.0000
LIVE	N+3.45	F93	Floor	Gravity	5.0000
LIVE	N+3.45	F94	Floor	Gravity	5.0000
LIVE	N+3.45	F95	Floor	Gravity	5.0000
LIVE	N+3.45	F96	Floor	Gravity	5.0000
LIVE	N+3.45	F97	Floor	Gravity	5.0000
LIVE	N+3.45	F98	Floor	Gravity	5.0000
LIVE	N+3.45	F99	Floor	Gravity	5.0000
LIVE	N+3.45	F100	Floor	Gravity	5.0000
LIVE	N+3.45	F101	Floor	Gravity	5.0000
LIVE	N+3.45	F102	Floor	Gravity	5.0000
LIVE	N+3.45	F103	Floor	Gravity	5.0000
LIVE	N+3.45	F104	Floor	Gravity	5.0000
LIVE	N+3.45	F105	Floor	Gravity	5.0000
LIVE	N+3.45	F106	Floor	Gravity	5.0000
LIVE	N+3.45	F107	Floor	Gravity	5.0000
LIVE	N+3.45	F108	Floor	Gravity	5.0000
LIVE	N+3.45	F109	Floor	Gravity	5.0000
LIVE	N+3.45	F110	Floor	Gravity	5.0000
LIVE	N+3.45	F111	Floor	Gravity	5.0000
LIVE	N+3.45	F112	Floor	Gravity	5.0000
LIVE	N+3.45	F113	Floor	Gravity	5.0000
LIVE	N+3.45	F114	Floor	Gravity	5.0000
LIVE	N+3.45	F115	Floor	Gravity	5.0000
LIVE	N+3.45	F116	Floor	Gravity	5.0000
LIVE	N+3.45	F117	Floor	Gravity	5.0000
LIVE	N+3.45	F118	Floor	Gravity	5.0000
LIVE	N+3.45	F119	Floor	Gravity	5.0000
LIVE	N+3.45	F120	Floor	Gravity	5.0000
LIVE	N+3.45	F121	Floor	Gravity	5.0000
LIVE	N+3.45	F122	Floor	Gravity	5.0000
LIVE	N+3.45	F123	Floor	Gravity	5.0000
LIVE	N+3.45	F124	Floor	Gravity	5.0000
LIVE	N+3.45	F126	Floor	Gravity	5.0000
LIVE	N+3.45	F127	Floor	Gravity	5.0000
LIVE	N+3.45	F128	Floor	Gravity	5.0000
LIVE	N+3.45	F129	Floor	Gravity	5.0000
LIVE	N+3.45	F130	Floor	Gravity	5.0000

LIVE	N+3.45	F131	Floor	Gravity	5.0000
LIVE	N+3.45	F132	Floor	Gravity	5.0000
LIVE	N+3.45	F133	Floor	Gravity	5.0000
LIVE	N+3.45	F134	Floor	Gravity	5.0000
LIVE	N+3.45	F135	Floor	Gravity	5.0000
LIVE	N+3.45	F136	Floor	Gravity	5.0000
LIVE	N+3.45	F137	Floor	Gravity	5.0000
LIVE	N+3.45	F138	Floor	Gravity	5.0000
LIVE	N+3.45	F139	Floor	Gravity	5.0000
LIVE	N+3.45	F140	Floor	Gravity	5.0000
LIVE	N+3.45	F141	Floor	Gravity	5.0000

Diseños & Estructuras

PROYECTO: INSTITUCIÓN EDUCATIVA MARCELO MIRANDA

FUERZAS EN VIGAS

BEAM FORCES
UNID: kN-m

Story	Beam	Load	Loc	P	V2	V3	T	M2	M3
N+3.45	B165	ENVOLVENTE MAX	0	0	-6.78	0	0.961	0	27.592
N+3.45	B165	ENVOLVENTE MAX	4.1	0	13.19	0	0.961	0	104.29
N+3.45	B165	ENVOLVENTE MAX	8.2	0	137.95	0	0.961	0	34.679
N+3.45	B165	ENVOLVENTE MIN	0	0	-144.91	0	-0.788	0	-199.901
N+3.45	B165	ENVOLVENTE MIN	4.1	0	-16.67	0	-0.788	0	14.064
N+3.45	B165	ENVOLVENTE MIN	8.2	0	5.04	0	-0.788	0	-176.18
N+6.65	B166	ENVOLVENTE MAX	0	0	0.89	0	1.205	0	46.742
N+6.65	B166	ENVOLVENTE MAX	4.1	0	16.83	0	1.205	0	16.146
N+6.65	B166	ENVOLVENTE MAX	8.2	0	34.82	0	1.205	0	61.157
N+6.65	B166	ENVOLVENTE MIN	0	0	-44.21	0	-1.426	0	-127.052
N+6.65	B166	ENVOLVENTE MIN	4.1	0	-22.95	0	-1.426	0	8.758
N+6.65	B166	ENVOLVENTE MIN	8.2	0	-3.74	0	-1.426	0	-91.261
N+3.45	B166	ENVOLVENTE MAX	0	0	-34.01	0	41.95	0	-12.761
N+3.45	B166	ENVOLVENTE MAX	2.66	0	-15.73	0	41.95	0	129.481
N+3.45	B166	ENVOLVENTE MAX	2.66	0	4.36	0	2.198	0	128.813
N+3.45	B166	ENVOLVENTE MAX	4.1	0	14.47	0	2.198	0	183.023
N+3.45	B166	ENVOLVENTE MAX	5.33	0	45.42	0	2.198	0	159.713
N+3.45	B166	ENVOLVENTE MAX	5.33	0	108.59	0	-4.938	0	160.196
N+3.45	B166	ENVOLVENTE MAX	8.2	0	224.31	0	-4.938	0	-2.49
N+3.45	B166	ENVOLVENTE MIN	0	0	-237.52	0	4.947	0	-361.956
N+3.45	B166	ENVOLVENTE MIN	2.66	0	-131.98	0	4.947	0	8.03
N+3.45	B166	ENVOLVENTE MIN	2.66	0	-64.59	0	-1.804	0	7.882
N+3.45	B166	ENVOLVENTE MIN	4.1	0	-21.37	0	-1.804	0	39.274
N+3.45	B166	ENVOLVENTE MIN	5.33	0	-9.9	0	-1.804	0	18.169
N+3.45	B166	ENVOLVENTE MIN	5.33	0	10.97	0	-40.459	0	18.328
N+3.45	B166	ENVOLVENTE MIN	8.2	0	31.16	0	-40.459	0	-317.529
N+6.65	B167	ENVOLVENTE MAX	0	0	0.92	0	1.122	0	45.482
N+6.65	B167	ENVOLVENTE MAX	4.1	0	16.86	0	1.122	0	14.086
N+6.65	B167	ENVOLVENTE MAX	8.2	0	34.49	0	1.122	0	60.158
N+6.65	B167	ENVOLVENTE MIN	0	0	-44.72	0	-1.134	0	-132.299
N+6.65	B167	ENVOLVENTE MIN	4.1	0	-23.47	0	-1.134	0	4.745
N+6.65	B167	ENVOLVENTE MIN	8.2	0	-3.91	0	-1.134	0	-92.744
N+3.45	B167	ENVOLVENTE MAX	0	0	-72.01	0	19.799	0	-67.647
N+3.45	B167	ENVOLVENTE MAX	2.66	0	-47.92	0	19.799	0	196.259
N+3.45	B167	ENVOLVENTE MAX	2.66	0	2.36	0	1.546	0	192.868
N+3.45	B167	ENVOLVENTE MAX	4.1	0	15.83	0	1.546	0	238.666
N+3.45	B167	ENVOLVENTE MAX	5.33	0	32.68	0	1.546	0	231.573
N+3.45	B167	ENVOLVENTE MAX	5.33	0	189.07	0	22.121	0	234.485
N+3.45	B167	ENVOLVENTE MAX	8.2	0	257.93	0	22.121	0	-51.586
N+3.45	B167	ENVOLVENTE MIN	0	0	-279.25	0	-23.092	0	-466.2
N+3.45	B167	ENVOLVENTE MIN	2.66	0	-218.84	0	-23.092	0	38.798
N+3.45	B167	ENVOLVENTE MIN	2.66	0	-55.23	0	-1.583	0	36.507
N+3.45	B167	ENVOLVENTE MIN	4.1	0	-27.01	0	-1.583	0	78.923
N+3.45	B167	ENVOLVENTE MIN	5.33	0	-11.22	0	-1.583	0	52.547
N+3.45	B167	ENVOLVENTE MIN	5.33	0	39.09	0	-18.831	0	54.707
N+3.45	B167	ENVOLVENTE MIN	8.2	0	66.03	0	-18.831	0	-412.445
N+6.65	B168	ENVOLVENTE MAX	0	0	0.67	0	1.012	0	44.617
N+6.65	B168	ENVOLVENTE MAX	4.1	0	16.61	0	1.012	0	14.326
N+6.65	B168	ENVOLVENTE MAX	8.2	0	34.26	0	1.012	0	59.84
N+6.65	B168	ENVOLVENTE MIN	0	0	-44.51	0	-1.323	0	-130.873
N+6.65	B168	ENVOLVENTE MIN	4.1	0	-23.26	0	-1.323	0	5.52
N+6.65	B168	ENVOLVENTE MIN	8.2	0	-3.72	0	-1.323	0	-91.556
N+3.45	B168	ENVOLVENTE MAX	0	0	-69.13	0	20.738	0	-62.329
N+3.45	B168	ENVOLVENTE MAX	2.66	0	-45.05	0	20.738	0	188.169
N+3.45	B168	ENVOLVENTE MAX	2.66	0	2.53	0	1.833	0	184.434
N+3.45	B168	ENVOLVENTE MAX	4.1	0	16	0	1.833	0	229.764
N+3.45	B168	ENVOLVENTE MAX	5.33	0	33.01	0	1.833	0	222.273
N+3.45	B168	ENVOLVENTE MAX	5.33	0	180.96	0	20.134	0	225.69
N+3.45	B168	ENVOLVENTE MAX	8.2	0	249.83	0	20.134	0	-46.42
N+3.45	B168	ENVOLVENTE MIN	0	0	-270.3	0	-20.945	0	-450.465
N+3.45	B168	ENVOLVENTE MIN	2.66	0	-209.88	0	-20.945	0	36.109
N+3.45	B168	ENVOLVENTE MIN	2.66	0	-55.08	0	-1.338	0	33.918
N+3.45	B168	ENVOLVENTE MIN	4.1	0	-26.86	0	-1.338	0	76.673
N+3.45	B168	ENVOLVENTE MIN	5.33	0	-11.23	0	-1.338	0	49.841
N+3.45	B168	ENVOLVENTE MIN	5.33	0	36.4	0	-19.587	0	52.016
N+3.45	B168	ENVOLVENTE MIN	8.2	0	63.34	0	-19.587	0	-401.897
N+6.65	B169	ENVOLVENTE MAX	0	0	-12.34	0	40.614	0	16.236

N+6.65	B169	ENVOLVENTE MAX	4.1	0	3.6	0	40.614	0	123.405
N+6.65	B169	ENVOLVENTE MAX	4.9	0	6.72	0	40.614	0	175.357
N+6.65	B169	ENVOLVENTE MAX	4.9	0	80.17	0	-5.329	0	154.689
N+6.65	B169	ENVOLVENTE MAX	8.2	0	134.11	0	-5.329	0	6.263
N+6.65	B169	ENVOLVENTE MIN	0	0	-90.32	0	5.868	0	-228.484
N+6.65	B169	ENVOLVENTE MIN	4.1	0	-69.07	0	5.868	0	33.7
N+6.65	B169	ENVOLVENTE MIN	4.9	0	-64.92	0	5.868	0	29.937
N+6.65	B169	ENVOLVENTE MIN	4.9	0	3.92	0	-54.8	0	30.865
N+6.65	B169	ENVOLVENTE MIN	8.2	0	28.04	0	-54.8	0	-229.435
N+3.45	B169	ENVOLVENTE MAX	0	0	-70.88	0	25.316	0	-64.913
N+3.45	B169	ENVOLVENTE MAX	2.66	0	-46.79	0	25.316	0	192.371
N+3.45	B169	ENVOLVENTE MAX	2.66	0	2.88	0	0.76	0	188.548
N+3.45	B169	ENVOLVENTE MAX	4.1	0	16.35	0	0.76	0	233.989
N+3.45	B169	ENVOLVENTE MAX	5.33	0	33.36	0	0.76	0	226.592
N+3.45	B169	ENVOLVENTE MAX	5.33	0	185.41	0	16.348	0	229.352
N+3.45	B169	ENVOLVENTE MAX	8.2	0	254.27	0	16.348	0	-45.844
N+3.45	B169	ENVOLVENTE MIN	0	0	-276.89	0	-18.861	0	-463.804
N+3.45	B169	ENVOLVENTE MIN	2.66	0	-216.48	0	-18.861	0	36.499
N+3.45	B169	ENVOLVENTE MIN	2.66	0	-55.63	0	-3.118	0	34.23
N+3.45	B169	ENVOLVENTE MIN	4.1	0	-27.41	0	-3.118	0	77.886
N+3.45	B169	ENVOLVENTE MIN	5.33	0	-11.78	0	-3.118	0	50.957
N+3.45	B169	ENVOLVENTE MIN	5.33	0	36.74	0	-27.493	0	52.931
N+3.45	B169	ENVOLVENTE MIN	8.2	0	63.68	0	-27.493	0	-411.105
N+6.65	B170	ENVOLVENTE MAX	0	0	-11.38	0	-5.642	0	20.365
N+6.65	B170	ENVOLVENTE MAX	4.1	0	4.56	0	-5.642	0	123.074
N+6.65	B170	ENVOLVENTE MAX	4.9	0	7.67	0	-5.642	0	174.796
N+6.65	B170	ENVOLVENTE MAX	4.9	0	79.56	0	54.079	0	152.981
N+6.65	B170	ENVOLVENTE MAX	8.2	0	133.17	0	54.079	0	11.944
N+6.65	B170	ENVOLVENTE MIN	0	0	-91.01	0	-40.261	0	-231.87
N+6.65	B170	ENVOLVENTE MIN	4.1	0	-69.76	0	-40.261	0	33.514
N+6.65	B170	ENVOLVENTE MIN	4.9	0	-65.61	0	-40.261	0	29.41
N+6.65	B170	ENVOLVENTE MIN	4.9	0	2.03	0	4.794	0	30.891
N+6.65	B170	ENVOLVENTE MIN	8.2	0	26.15	0	4.794	0	-233.69
N+3.45	B170	ENVOLVENTE MAX	0	0	-69.8	0	20.15	0	-58.633
N+3.45	B170	ENVOLVENTE MAX	2.66	0	-45.71	0	20.15	0	195.44
N+3.45	B170	ENVOLVENTE MAX	2.66	0	4.55	0	3.336	0	191.074
N+3.45	B170	ENVOLVENTE MAX	4.1	0	18.02	0	3.336	0	236.766
N+3.45	B170	ENVOLVENTE MAX	5.33	0	34.96	0	3.336	0	229.583
N+3.45	B170	ENVOLVENTE MAX	5.33	0	188.6	0	25.432	0	232.766
N+3.45	B170	ENVOLVENTE MAX	8.2	0	257.46	0	25.432	0	-39.654
N+3.45	B170	ENVOLVENTE MIN	0	0	-280.27	0	-23.138	0	-471.279
N+3.45	B170	ENVOLVENTE MIN	2.66	0	-219.86	0	-23.138	0	35.22
N+3.45	B170	ENVOLVENTE MIN	2.66	0	-57.51	0	-0.708	0	32.703
N+3.45	B170	ENVOLVENTE MIN	4.1	0	-29.3	0	-0.708	0	78.458
N+3.45	B170	ENVOLVENTE MIN	5.33	0	-13.6	0	-0.708	0	49.81
N+3.45	B170	ENVOLVENTE MIN	5.33	0	35.76	0	-17.477	0	51.994
N+3.45	B170	ENVOLVENTE MIN	8.2	0	62.69	0	-17.477	0	-423.828
N+6.65	B171	ENVOLVENTE MAX	0	0	4.25	0	1.212	0	60.27
N+6.65	B171	ENVOLVENTE MAX	4.1	0	20.19	0	1.212	0	15.81
N+6.65	B171	ENVOLVENTE MAX	8.2	0	38.16	0	1.212	0	75.716
N+6.65	B171	ENVOLVENTE MIN	0	0	-47.7	0	-0.866	0	-141.116
N+6.65	B171	ENVOLVENTE MIN	4.1	0	-26.44	0	-0.866	0	9.259
N+6.65	B171	ENVOLVENTE MIN	8.2	0	-7.21	0	-0.866	0	-105.306
N+3.45	B171	ENVOLVENTE MAX	0	0	-25.98	0	-4.626	0	23.696
N+3.45	B171	ENVOLVENTE MAX	2.66	0	-7.47	0	-4.626	0	105.725
N+3.45	B171	ENVOLVENTE MAX	2.66	0	13.39	0	3.591	0	107.755
N+3.45	B171	ENVOLVENTE MAX	4.1	0	23.62	0	3.591	0	116.72
N+3.45	B171	ENVOLVENTE MAX	5.33	0	34.6	0	3.591	0	122.922
N+3.45	B171	ENVOLVENTE MAX	5.33	0	94.77	0	59.233	0	121.034
N+3.45	B171	ENVOLVENTE MAX	8.2	0	132.32	0	59.233	0	40.664
N+3.45	B171	ENVOLVENTE MIN	0	0	-143.23	0	-62.568	0	-305.518
N+3.45	B171	ENVOLVENTE MIN	2.66	0	-109.71	0	-62.568	0	-6.639
N+3.45	B171	ENVOLVENTE MIN	2.66	0	-51.03	0	-5.598	0	-6.713
N+3.45	B171	ENVOLVENTE MIN	4.1	0	-32.26	0	-5.598	0	39.377
N+3.45	B171	ENVOLVENTE MIN	5.33	0	-19.93	0	-5.598	0	8.79
N+3.45	B171	ENVOLVENTE MIN	5.33	0	0.04	0	4.685	0	9.101
N+3.45	B171	ENVOLVENTE MIN	8.2	0	20.49	0	4.685	0	-265.856
N+6.65	B172	ENVOLVENTE MAX	0	0	5.74	0	1.043	0	66.27
N+6.65	B172	ENVOLVENTE MAX	4.1	0	21.68	0	1.043	0	15.622
N+6.65	B172	ENVOLVENTE MAX	8.2	0	39.68	0	1.043	0	81.143
N+6.65	B172	ENVOLVENTE MIN	0	0	-49.09	0	-1.169	0	-147.125
N+6.65	B172	ENVOLVENTE MIN	4.1	0	-27.84	0	-1.169	0	8.901
N+6.65	B172	ENVOLVENTE MIN	8.2	0	-8.64	0	-1.169	0	-111.535
N+3.45	B172	ENVOLVENTE MAX	0	0	-23.79	0	66.244	0	31.788
N+3.45	B172	ENVOLVENTE MAX	2.66	0	-5.28	0	66.244	0	109.655
N+3.45	B172	ENVOLVENTE MAX	2.66	0	15.1	0	3.222	0	111.575
N+3.45	B172	ENVOLVENTE MAX	4.1	0	25.33	0	3.222	0	120.17
N+3.45	B172	ENVOLVENTE MAX	5.33	0	36.23	0	3.222	0	128.978

N+3.45	B172	ENVOLVENTE MAX	5.33	0	98.07	0	-5.213	0	127.193
N+3.45	B172	ENVOLVENTE MAX	8.2	0	135.62	0	-5.213	0	45.236
N+3.45	B172	ENVOLVENTE MIN	0	0	-149.31	0	5.756	0	-320.543
N+3.45	B172	ENVOLVENTE MIN	2.66	0	-115.79	0	5.756	0	-7.161
N+3.45	B172	ENVOLVENTE MIN	2.66	0	-52.9	0	-1.57	0	-7.255
N+3.45	B172	ENVOLVENTE MIN	4.1	0	-34.13	0	-1.57	0	40.213
N+3.45	B172	ENVOLVENTE MIN	5.33	0	-21.73	0	-1.57	0	6.46
N+3.45	B172	ENVOLVENTE MIN	5.33	0	-0.02	0	-63.016	0	6.571
N+3.45	B172	ENVOLVENTE MIN	8.2	0	20.43	0	-63.016	0	-276.102
N+6.65	B173	ENVOLVENTE MAX	0	0	8.53	0	1.148	0	76.752
N+6.65	B173	ENVOLVENTE MAX	4.1	0	24.47	0	1.148	0	14.132
N+6.65	B173	ENVOLVENTE MAX	8.2	0	42.32	0	1.148	0	90.649
N+6.65	B173	ENVOLVENTE MIN	0	0	-52.14	0	-1.147	0	-162.63
N+6.65	B173	ENVOLVENTE MIN	4.1	0	-30.89	0	-1.147	0	4.869
N+6.65	B173	ENVOLVENTE MIN	8.2	0	-11.54	0	-1.147	0	-123.931
N+3.45	B173	ENVOLVENTE MAX	0	0	-60.95	0	24.443	0	-22.82
N+3.45	B173	ENVOLVENTE MAX	2.66	0	-36.86	0	24.443	0	199.405
N+3.45	B173	ENVOLVENTE MAX	2.66	0	12.33	0	1.687	0	196.17
N+3.45	B173	ENVOLVENTE MAX	4.1	0	25.79	0	1.687	0	240.919
N+3.45	B173	ENVOLVENTE MAX	5.33	0	42.57	0	1.687	0	234.127
N+3.45	B173	ENVOLVENTE MAX	5.33	0	192.34	0	18.733	0	238.13
N+3.45	B173	ENVOLVENTE MAX	8.2	0	261.2	0	18.733	0	-5.578
N+3.45	B173	ENVOLVENTE MIN	0	0	-282.81	0	-19.654	0	-511.024
N+3.45	B173	ENVOLVENTE MIN	2.66	0	-222.39	0	-19.654	0	25.637
N+3.45	B173	ENVOLVENTE MIN	2.66	0	-65.58	0	-1.564	0	22.672
N+3.45	B173	ENVOLVENTE MIN	4.1	0	-37.37	0	-1.564	0	80.311
N+3.45	B173	ENVOLVENTE MIN	5.33	0	-21.5	0	-1.564	0	41.569
N+3.45	B173	ENVOLVENTE MIN	5.33	0	27.7	0	-23.256	0	44.409
N+3.45	B173	ENVOLVENTE MIN	8.2	0	54.64	0	-23.256	0	-465
N+6.65	B174	ENVOLVENTE MAX	0	0	10.41	0	1.221	0	85.571
N+6.65	B174	ENVOLVENTE MAX	4.1	0	26.35	0	1.221	0	15.909
N+6.65	B174	ENVOLVENTE MAX	8.2	0	44.54	0	1.221	0	100.191
N+6.65	B174	ENVOLVENTE MIN	0	0	-53.58	0	-1.039	0	-164.893
N+6.65	B174	ENVOLVENTE MIN	4.1	0	-32.33	0	-1.039	0	9.721
N+6.65	B174	ENVOLVENTE MIN	8.2	0	-13.32	0	-1.039	0	-130.537
N+3.45	B174	ENVOLVENTE MAX	0	0	-18.01	0	-1.669	0	41.917
N+3.45	B174	ENVOLVENTE MAX	2.66	0	-2.09	0	-1.669	0	105.467
N+3.45	B174	ENVOLVENTE MAX	2.66	0	17.01	0	4.051	0	107.5
N+3.45	B174	ENVOLVENTE MAX	4.1	0	25.84	0	4.051	0	110.338
N+3.45	B174	ENVOLVENTE MAX	5.33	0	36.05	0	4.051	0	118.833
N+3.45	B174	ENVOLVENTE MAX	5.33	0	93.8	0	45.167	0	116.75
N+3.45	B174	ENVOLVENTE MAX	8.2	0	127.64	0	45.167	0	55.406
N+3.45	B174	ENVOLVENTE MIN	0	0	-136.65	0	-46.892	0	-297.185
N+3.45	B174	ENVOLVENTE MIN	2.66	0	-106.58	0	-46.892	0	-10.515
N+3.45	B174	ENVOLVENTE MIN	2.66	0	-49.64	0	-4.651	0	-10.948
N+3.45	B174	ENVOLVENTE MIN	4.1	0	-32.74	0	-4.651	0	36.874
N+3.45	B174	ENVOLVENTE MIN	5.33	0	-22.44	0	-4.651	0	3.123
N+3.45	B174	ENVOLVENTE MIN	5.33	0	-4.1	0	2.175	0	3.686
N+3.45	B174	ENVOLVENTE MIN	8.2	0	13.55	0	2.175	0	-266.303
N+3.45	B175	ENVOLVENTE MAX	0	0	-3.33	0	0.202	0	10.016
N+3.45	B175	ENVOLVENTE MAX	4.1	0	5.04	0	0.202	0	19.892
N+3.45	B175	ENVOLVENTE MAX	8.2	0	22.53	0	0.202	0	13.666
N+3.45	B175	ENVOLVENTE MIN	0	0	-25.09	0	-0.144	0	-49.52
N+3.45	B175	ENVOLVENTE MIN	4.1	0	-6.75	0	-0.144	0	6.391
N+3.45	B175	ENVOLVENTE MIN	8.2	0	2.47	0	-0.144	0	-39.127
N+3.45	B176	ENVOLVENTE MAX	0	0	43.28	0	20.149	0	3.448
N+3.45	B176	ENVOLVENTE MAX	0.35	0	45.09	0	20.149	0	-1.26
N+3.45	B176	ENVOLVENTE MAX	0.7	0	46.91	0	20.149	0	-4.561
N+3.45	B176	ENVOLVENTE MIN	0	0	6.02	0	-12.535	0	-0.838
N+3.45	B176	ENVOLVENTE MIN	0.35	0	7.38	0	-12.535	0	-13.94
N+3.45	B176	ENVOLVENTE MIN	0.7	0	8.74	0	-12.535	0	-29.56
N+3.45	B177	ENVOLVENTE MAX	0	0	10.49	0	2.755	0	57.647
N+3.45	B177	ENVOLVENTE MAX	3.15	0	24.38	0	2.755	0	5.922
N+3.45	B177	ENVOLVENTE MAX	6.3	0	40.71	0	2.755	0	39.866
N+3.45	B177	ENVOLVENTE MIN	0	0	-32.81	0	-2.31	0	-77.525
N+3.45	B177	ENVOLVENTE MIN	3.15	0	-18.11	0	-2.31	0	-0.525
N+3.45	B177	ENVOLVENTE MIN	6.3	0	-5.87	0	-2.31	0	-99.211
N+6.65	B178	ENVOLVENTE MAX	0	0	-5.14	0	2.938	0	28.374
N+6.65	B178	ENVOLVENTE MAX	3.54	0	19.57	0	2.938	0	114.918
N+6.65	B178	ENVOLVENTE MAX	7.08	0	181.57	0	2.938	0	21.916
N+6.65	B178	ENVOLVENTE MIN	0	0	-161.96	0	-1.079	0	-154.392
N+6.65	B178	ENVOLVENTE MIN	3.54	0	-12.48	0	-1.079	0	11.192
N+6.65	B178	ENVOLVENTE MIN	7.08	0	6.43	0	-1.079	0	-223.824
N+3.45	B178	ENVOLVENTE MAX	0	0	-33.29	0	-0.94	0	-8.551
N+3.45	B178	ENVOLVENTE MAX	3.54	0	-1.17	0	-0.94	0	167.084
N+3.45	B178	ENVOLVENTE MAX	3.64	0	-0.75	0	-0.94	0	172.865
N+3.45	B178	ENVOLVENTE MAX	3.64	0	79.9	0	22.082	0	171.687
N+3.45	B178	ENVOLVENTE MAX	7.08	0	160.34	0	22.082	0	-12.823

N+3.45	B178	ENVOLVENTE MIN	0	0	-147.53	0	-22.589	0	-215.276
N+3.45	B178	ENVOLVENTE MIN	3.54	0	-62.01	0	-22.589	0	48.287
N+3.45	B178	ENVOLVENTE MIN	3.64	0	-61.4	0	-22.589	0	48.797
N+3.45	B178	ENVOLVENTE MIN	3.64	0	5.5	0	0.37	0	50.218
N+3.45	B178	ENVOLVENTE MIN	7.08	0	35.75	0	0.37	0	-255.135
N+6.65	B179	ENVOLVENTE MAX	0	0	-7.29	0	1.613	0	19.838
N+6.65	B179	ENVOLVENTE MAX	3.6	0	11.94	0	1.613	0	104.471
N+6.65	B179	ENVOLVENTE MAX	7.2	0	173.89	0	1.613	0	21.111
N+6.65	B179	ENVOLVENTE MIN	0	0	-175.47	0	-1.844	0	-212.79
N+6.65	B179	ENVOLVENTE MIN	3.6	0	-12.64	0	-1.844	0	11.452
N+6.65	B179	ENVOLVENTE MIN	7.2	0	7.01	0	-1.844	0	-207.106
N+3.45	B179	ENVOLVENTE MAX	0	0	-32.94	0	-0.114	0	-8.673
N+3.45	B179	ENVOLVENTE MAX	3.6	0	0.2	0	-0.114	0	148.352
N+3.45	B179	ENVOLVENTE MAX	3.75	0	0.86	0	-0.114	0	156.454
N+3.45	B179	ENVOLVENTE MAX	3.75	0	73.91	0	20.753	0	156.74
N+3.45	B179	ENVOLVENTE MAX	7.2	0	150.84	0	20.753	0	-5.293
N+3.45	B179	ENVOLVENTE MIN	0	0	-147.35	0	-18.789	0	-242.788
N+3.45	B179	ENVOLVENTE MIN	3.6	0	-61.83	0	-18.789	0	45.558
N+3.45	B179	ENVOLVENTE MIN	3.75	0	-60.85	0	-18.789	0	46.747
N+3.45	B179	ENVOLVENTE MIN	3.75	0	1.79	0	0.119	0	47.74
N+3.45	B179	ENVOLVENTE MIN	7.2	0	32.15	0	0.119	0	-245.592
N+6.65	B180	ENVOLVENTE MAX	0	0	-6.31	0	1.131	0	22.005
N+6.65	B180	ENVOLVENTE MAX	3.54	0	12.6	0	1.131	0	101.374
N+6.65	B180	ENVOLVENTE MAX	7.08	0	171.1	0	1.131	0	20.931
N+6.65	B180	ENVOLVENTE MIN	0	0	-172.43	0	-3.208	0	-204.999
N+6.65	B180	ENVOLVENTE MIN	3.54	0	-12.84	0	-3.208	0	10.596
N+6.65	B180	ENVOLVENTE MIN	7.08	0	6.54	0	-3.208	0	-200.305
N+3.45	B180	ENVOLVENTE MAX	0	0	-31.47	0	-0.04	0	-5.224
N+3.45	B180	ENVOLVENTE MAX	3.54	0	0.64	0	-0.04	0	146.336
N+3.45	B180	ENVOLVENTE MAX	3.64	0	1.06	0	-0.04	0	151.871
N+3.45	B180	ENVOLVENTE MAX	3.64	0	72.63	0	21.049	0	152.185
N+3.45	B180	ENVOLVENTE MAX	7.08	0	148.53	0	21.049	0	-2.822
N+3.45	B180	ENVOLVENTE MIN	0	0	-145.08	0	-18.674	0	-237.679
N+3.45	B180	ENVOLVENTE MIN	3.54	0	-63.51	0	-18.674	0	44.568
N+3.45	B180	ENVOLVENTE MIN	3.64	0	-62.9	0	-18.674	0	45.376
N+3.45	B180	ENVOLVENTE MIN	3.64	0	0.68	0	-0.403	0	46.254
N+3.45	B180	ENVOLVENTE MIN	7.08	0	30.92	0	-0.403	0	-242.949
N+6.65	B181	ENVOLVENTE MAX	0	0	-7.11	0	1.643	0	19.347
N+6.65	B181	ENVOLVENTE MAX	3.725	0	11.06	0	1.643	0	79.911
N+6.65	B181	ENVOLVENTE MAX	7.45	0	128.96	0	1.643	0	20.523
N+6.65	B181	ENVOLVENTE MIN	0	0	-129.58	0	-1.669	0	-162.014
N+6.65	B181	ENVOLVENTE MIN	3.725	0	-11.48	0	-1.669	0	11.973
N+6.65	B181	ENVOLVENTE MIN	7.45	0	6.81	0	-1.669	0	-159.7
N+3.45	B181	ENVOLVENTE MAX	0	0	-35.67	0	-0.628	0	-14.873
N+3.45	B181	ENVOLVENTE MAX	3.725	0	-1.4	0	-0.628	0	162.632
N+3.45	B181	ENVOLVENTE MAX	3.83	0	-0.96	0	-0.628	0	168.614
N+3.45	B181	ENVOLVENTE MAX	3.83	0	71.82	0	22.695	0	168.872
N+3.45	B181	ENVOLVENTE MAX	7.45	0	156.22	0	22.695	0	-13.24
N+3.45	B181	ENVOLVENTE MIN	0	0	-153.24	0	-20.036	0	-251.427
N+3.45	B181	ENVOLVENTE MIN	3.725	0	-63.05	0	-20.036	0	49.548
N+3.45	B181	ENVOLVENTE MIN	3.83	0	-62.4	0	-20.036	0	50.461
N+3.45	B181	ENVOLVENTE MIN	3.83	0	3.16	0	-0.83	0	51.263
N+3.45	B181	ENVOLVENTE MIN	7.45	0	35.46	0	-0.83	0	-254.947
N+6.65	B182	ENVOLVENTE MAX	0	0	-6.52	0	2.071	0	20.609
N+6.65	B182	ENVOLVENTE MAX	3.475	0	12.04	0	2.071	0	101.47
N+6.65	B182	ENVOLVENTE MAX	6.95	0	165.89	0	2.071	0	21.502
N+6.65	B182	ENVOLVENTE MIN	0	0	-171.33	0	-1.5	0	-200.945
N+6.65	B182	ENVOLVENTE MIN	3.475	0	-14.24	0	-1.5	0	9.618
N+6.65	B182	ENVOLVENTE MIN	6.95	0	5.86	0	-1.5	0	-182.043
N+3.45	B182	ENVOLVENTE MAX	0	0	-31.64	0	0.364	0	-5.46
N+3.45	B182	ENVOLVENTE MAX	3.475	0	-0.24	0	0.364	0	148.753
N+3.45	B182	ENVOLVENTE MAX	3.58	0	0.21	0	0.364	0	155.106
N+3.45	B182	ENVOLVENTE MAX	3.58	0	68.8	0	24.486	0	153.753
N+3.45	B182	ENVOLVENTE MAX	6.95	0	142.13	0	24.486	0	3.149
N+3.45	B182	ENVOLVENTE MIN	0	0	-148.13	0	-18.191	0	-243.368
N+3.45	B182	ENVOLVENTE MIN	3.475	0	-68.56	0	-18.191	0	44.577
N+3.45	B182	ENVOLVENTE MIN	3.58	0	-67.91	0	-18.191	0	45.419
N+3.45	B182	ENVOLVENTE MIN	3.58	0	0.03	0	-2.011	0	45.646
N+3.45	B182	ENVOLVENTE MIN	6.95	0	29.47	0	-2.011	0	-218.53
N+6.65	B184	ENVOLVENTE MAX	0	0	25.51	0	1.746	0	62.239
N+6.65	B184	ENVOLVENTE MAX	1.925	0	35.79	0	1.746	0	16.36
N+6.65	B184	ENVOLVENTE MAX	3.85	0	99.18	0	1.746	0	63.258
N+6.65	B184	ENVOLVENTE MIN	0	0	-99.97	0	-1.574	0	-119.46
N+6.65	B184	ENVOLVENTE MIN	1.925	0	-36.45	0	-1.574	0	3.061
N+6.65	B184	ENVOLVENTE MIN	3.85	0	-26.04	0	-1.574	0	-117.944
N+3.45	B184	ENVOLVENTE MAX	0	0	46.46	0	1.571	0	97.691
N+3.45	B184	ENVOLVENTE MAX	1.925	0	58.65	0	1.571	0	-1.753
N+3.45	B184	ENVOLVENTE MAX	3.85	0	81.92	0	1.571	0	99.586

N+3.45	B184	ENVOLVENTE MIN	0	0	-83.68	0	-1.618	0	-146.639
N+3.45	B184	ENVOLVENTE MIN	1.925	0	-59.97	0	-1.618	0	-6.58
N+3.45	B184	ENVOLVENTE MIN	3.85	0	-47.35	0	-1.618	0	-143.435
N+6.65	B185	ENVOLVENTE MAX	0	0	-7.07	0	2.858	0	18.819
N+6.65	B185	ENVOLVENTE MAX	3.54	0	13.73	0	2.858	0	104.553
N+6.65	B185	ENVOLVENTE MAX	7.08	0	174.63	0	2.858	0	21.84
N+6.65	B185	ENVOLVENTE MIN	0	0	-168.9	0	-1.315	0	-189.329
N+6.65	B185	ENVOLVENTE MIN	3.54	0	-12.24	0	-1.315	0	10.393
N+6.65	B185	ENVOLVENTE MIN	7.08	0	6.67	0	-1.315	0	-209.618
N+3.45	B185	ENVOLVENTE MAX	0	0	-30.61	0	0.141	0	-1.039
N+3.45	B185	ENVOLVENTE MAX	3.54	0	1.85	0	0.141	0	150.693
N+3.45	B185	ENVOLVENTE MAX	3.69	0	2.5	0	0.141	0	158.255
N+3.45	B185	ENVOLVENTE MAX	3.69	0	78.57	0	23.494	0	159.758
N+3.45	B185	ENVOLVENTE MAX	7.08	0	154.49	0	23.494	0	-8.595
N+3.45	B185	ENVOLVENTE MIN	0	0	-141.68	0	-22.074	0	-220.565
N+3.45	B185	ENVOLVENTE MIN	3.54	0	-58.97	0	-22.074	0	43.717
N+3.45	B185	ENVOLVENTE MIN	3.69	0	-57.99	0	-22.074	0	44.45
N+3.45	B185	ENVOLVENTE MIN	3.69	0	3.93	0	-4.048	0	45.682
N+3.45	B185	ENVOLVENTE MIN	7.08	0	33.6	0	-4.048	0	-250.411
N+6.65	B186	ENVOLVENTE MAX	0	0	-6.96	0	0.804	0	20.734
N+6.65	B186	ENVOLVENTE MAX	3.54	0	11.95	0	0.804	0	114.304
N+6.65	B186	ENVOLVENTE MAX	7.08	0	162.28	0	0.804	0	24.144
N+6.65	B186	ENVOLVENTE MIN	0	0	-181.25	0	-2.732	0	-223.305
N+6.65	B186	ENVOLVENTE MIN	3.54	0	-18.64	0	-2.732	0	11.616
N+6.65	B186	ENVOLVENTE MIN	7.08	0	5.94	0	-2.732	0	-156.138
N+3.45	B186	ENVOLVENTE MAX	0	0	-34.58	0	1.643	0	-12.251
N+3.45	B186	ENVOLVENTE MAX	3.54	0	-2.12	0	1.643	0	160.355
N+3.45	B186	ENVOLVENTE MAX	3.69	0	-1.47	0	1.643	0	169.958
N+3.45	B186	ENVOLVENTE MAX	3.69	0	70.99	0	28.304	0	168.985
N+3.45	B186	ENVOLVENTE MAX	7.08	0	145.7	0	28.304	0	8.483
N+3.45	B186	ENVOLVENTE MIN	0	0	-155.28	0	-20.881	0	-256.17
N+3.45	B186	ENVOLVENTE MIN	3.54	0	-71.51	0	-20.881	0	46.445
N+3.45	B186	ENVOLVENTE MIN	3.69	0	-70.52	0	-20.881	0	47.683
N+3.45	B186	ENVOLVENTE MIN	3.69	0	0.1	0	-4.466	0	48.143
N+3.45	B186	ENVOLVENTE MIN	7.08	0	29.76	0	-4.466	0	-217.597
N+3.45	B188	ENVOLVENTE MAX	0	0	38.92	0	11.527	0	3.209
N+3.45	B188	ENVOLVENTE MAX	0.35	0	40.73	0	11.527	0	0.183
N+3.45	B188	ENVOLVENTE MAX	0.7	0	42.55	0	11.527	0	-1.199
N+3.45	B188	ENVOLVENTE MIN	0	0	1.5	0	-19.128	0	-1.268
N+3.45	B188	ENVOLVENTE MIN	0.35	0	2.86	0	-19.128	0	-12.945
N+3.45	B188	ENVOLVENTE MIN	0.7	0	4.23	0	-19.128	0	-27.379
N+3.45	B189	ENVOLVENTE MAX	0	0	10.3	0	3.216	0	57.494
N+3.45	B189	ENVOLVENTE MAX	3.15	0	23.94	0	3.216	0	6.462
N+3.45	B189	ENVOLVENTE MAX	6.3	0	40.27	0	3.216	0	41
N+3.45	B189	ENVOLVENTE MIN	0	0	-33.26	0	-1.956	0	-77.902
N+3.45	B189	ENVOLVENTE MIN	3.15	0	-18.33	0	-1.956	0	0.533
N+3.45	B189	ENVOLVENTE MIN	6.3	0	-6.08	0	-1.956	0	-96.78
N+6.65	B190	ENVOLVENTE MAX	0	0	-4.66	0	1.178	0	29.508
N+6.65	B190	ENVOLVENTE MAX	3.54	0	19.31	0	1.178	0	109.054
N+6.65	B190	ENVOLVENTE MAX	7.08	0	172.28	0	1.178	0	22.537
N+6.65	B190	ENVOLVENTE MIN	0	0	-154.05	0	-2.535	0	-149.277
N+6.65	B190	ENVOLVENTE MIN	3.54	0	-12.55	0	-2.535	0	11.061
N+6.65	B190	ENVOLVENTE MIN	7.08	0	6.07	0	-2.535	0	-212.021
N+3.45	B190	ENVOLVENTE MAX	0	0	-27.87	0	27.519	0	-0.306
N+3.45	B190	ENVOLVENTE MAX	3.54	0	2.91	0	27.519	0	145.201
N+3.45	B190	ENVOLVENTE MAX	3.64	0	3.33	0	27.519	0	150.004
N+3.45	B190	ENVOLVENTE MAX	3.64	0	69.52	0	-2.042	0	148.945
N+3.45	B190	ENVOLVENTE MAX	7.08	0	143.3	0	-2.042	0	-5.521
N+3.45	B190	ENVOLVENTE MIN	0	0	-132.57	0	2.583	0	-200.152
N+3.45	B190	ENVOLVENTE MIN	3.54	0	-55.52	0	2.583	0	41.782
N+3.45	B190	ENVOLVENTE MIN	3.64	0	-54.91	0	2.583	0	41.72
N+3.45	B190	ENVOLVENTE MIN	3.64	0	2.44	0	-27.945	0	43.616
N+3.45	B190	ENVOLVENTE MIN	7.08	0	31.46	0	-27.945	0	-232.618
N+6.65	B191	ENVOLVENTE MAX	0	0	-7.05	0	1.852	0	20.197
N+6.65	B191	ENVOLVENTE MAX	3.6	0	11.89	0	1.852	0	99.57
N+6.65	B191	ENVOLVENTE MAX	7.2	0	164.8	0	1.852	0	22.804
N+6.65	B191	ENVOLVENTE MIN	0	0	-167.07	0	-1.579	0	-203.184
N+6.65	B191	ENVOLVENTE MIN	3.6	0	-13.07	0	-1.579	0	11.476
N+6.65	B191	ENVOLVENTE MIN	7.2	0	6.41	0	-1.579	0	-195.04
N+3.45	B191	ENVOLVENTE MAX	0	0	-27.26	0	23.209	0	1.516
N+3.45	B191	ENVOLVENTE MAX	3.6	0	4.48	0	23.209	0	128.381
N+3.45	B191	ENVOLVENTE MAX	3.75	0	5.13	0	23.209	0	135.011
N+3.45	B191	ENVOLVENTE MAX	3.75	0	64.63	0	-1.939	0	135.371
N+3.45	B191	ENVOLVENTE MAX	7.2	0	135.06	0	-1.939	0	1.328
N+3.45	B191	ENVOLVENTE MIN	0	0	-132.11	0	1.787	0	-225.228
N+3.45	B191	ENVOLVENTE MIN	3.6	0	-55.17	0	1.787	0	38.902
N+3.45	B191	ENVOLVENTE MIN	3.75	0	-54.19	0	1.787	0	40.189
N+3.45	B191	ENVOLVENTE MIN	3.75	0	-1.05	0	-25.629	0	40.698

N+3.45	B191	ENVOLVENTE MIN	7.2	0	28.08	0	-25.629	0	-225.525
N+6.65	B192	ENVOLVENTE MAX	0	0	-4	0	3.873	0	26.692
N+6.65	B192	ENVOLVENTE MAX	3.54	0	15.06	0	3.873	0	91.761
N+6.65	B192	ENVOLVENTE MAX	7.08	0	165.53	0	3.873	0	11.499
N+6.65	B192	ENVOLVENTE MIN	0	0	-160.8	0	-1	0	-188.676
N+6.65	B192	ENVOLVENTE MIN	3.54	0	-10.47	0	-1	0	7.369
N+6.65	B192	ENVOLVENTE MIN	7.08	0	8.15	0	-1	0	-205.421
N+3.45	B192	ENVOLVENTE MAX	0	0	-26.56	0	22.801	0	3.034
N+3.45	B192	ENVOLVENTE MAX	3.54	0	4.22	0	22.801	0	130.187
N+3.45	B192	ENVOLVENTE MAX	3.64	0	4.64	0	22.801	0	134.983
N+3.45	B192	ENVOLVENTE MAX	3.64	0	61.88	0	-0.948	0	135.086
N+3.45	B192	ENVOLVENTE MAX	7.08	0	131.3	0	-0.948	0	7.851
N+3.45	B192	ENVOLVENTE MIN	0	0	-132.5	0	1.554	0	-225.228
N+3.45	B192	ENVOLVENTE MIN	3.54	0	-58.97	0	1.554	0	39.5
N+3.45	B192	ENVOLVENTE MIN	3.64	0	-58.36	0	1.554	0	40.439
N+3.45	B192	ENVOLVENTE MIN	3.64	0	-2.86	0	-25.039	0	40.667
N+3.45	B192	ENVOLVENTE MIN	7.08	0	26.16	0	-25.039	0	-214.948
N+6.65	B193	ENVOLVENTE MAX	0	0	-41.96	0	26.933	0	-30.188
N+6.65	B193	ENVOLVENTE MAX	3.725	0	-2.69	0	26.933	0	156.534
N+6.65	B193	ENVOLVENTE MAX	3.83	0	-2.23	0	26.933	0	161.65
N+6.65	B193	ENVOLVENTE MAX	3.83	0	58.26	0	0.44	0	161.802
N+6.65	B193	ENVOLVENTE MAX	7.45	0	151.11	0	0.44	0	-31.447
N+6.65	B193	ENVOLVENTE MIN	0	0	-149.26	0	0.683	0	-216.864
N+6.65	B193	ENVOLVENTE MIN	3.725	0	-50.25	0	0.683	0	51.049
N+6.65	B193	ENVOLVENTE MIN	3.83	0	-49.59	0	0.683	0	52.32
N+6.65	B193	ENVOLVENTE MIN	3.83	0	6.47	0	-28.524	0	52.229
N+6.65	B193	ENVOLVENTE MIN	7.45	0	43.26	0	-28.524	0	-217.151
N+3.45	B193	ENVOLVENTE MAX	0	0	-18.88	0	35.344	0	10.542
N+3.45	B193	ENVOLVENTE MAX	3.725	0	6.43	0	35.344	0	99.733
N+3.45	B193	ENVOLVENTE MAX	3.83	0	6.85	0	35.344	0	103.571
N+3.45	B193	ENVOLVENTE MAX	3.83	0	51.39	0	-2.492	0	103.36
N+3.45	B193	ENVOLVENTE MAX	7.45	0	99.51	0	-2.492	0	9.834
N+3.45	B193	ENVOLVENTE MIN	0	0	-98.11	0	3.816	0	-191.57
N+3.45	B193	ENVOLVENTE MIN	3.725	0	-47.22	0	3.816	0	33.136
N+3.45	B193	ENVOLVENTE MIN	3.83	0	-46.62	0	3.816	0	33.097
N+3.45	B193	ENVOLVENTE MIN	3.83	0	-4.27	0	-38.77	0	33.96
N+3.45	B193	ENVOLVENTE MIN	7.45	0	19.69	0	-38.77	0	-191.014
N+6.65	B194	ENVOLVENTE MAX	0	0	-8.23	0	1.437	0	11.003
N+6.65	B194	ENVOLVENTE MAX	3.475	0	10.05	0	1.437	0	91.602
N+6.65	B194	ENVOLVENTE MAX	6.95	0	154.36	0	1.437	0	26.416
N+6.65	B194	ENVOLVENTE MIN	0	0	-165.98	0	-3.192	0	-206.888
N+6.65	B194	ENVOLVENTE MIN	3.475	0	-17.29	0	-3.192	0	6.515
N+6.65	B194	ENVOLVENTE MIN	6.95	0	3.42	0	-3.192	0	-166.51
N+3.45	B194	ENVOLVENTE MAX	0	0	-24.91	0	21.844	0	8.831
N+3.45	B194	ENVOLVENTE MAX	3.475	0	5.2	0	21.844	0	132.986
N+3.45	B194	ENVOLVENTE MAX	3.58	0	5.64	0	21.844	0	138.129
N+3.45	B194	ENVOLVENTE MAX	3.58	0	61.57	0	0.602	0	137.059
N+3.45	B194	ENVOLVENTE MAX	6.95	0	129.35	0	0.602	0	7.173
N+3.45	B194	ENVOLVENTE MIN	0	0	-131.57	0	0.785	0	-219.578
N+3.45	B194	ENVOLVENTE MIN	3.475	0	-60.7	0	0.785	0	39.565
N+3.45	B194	ENVOLVENTE MIN	3.58	0	-60.06	0	0.785	0	40.747
N+3.45	B194	ENVOLVENTE MIN	3.58	0	-1.58	0	-28.306	0	40.283
N+3.45	B194	ENVOLVENTE MIN	6.95	0	26.68	0	-28.306	0	-203.173
N+6.65	B195	ENVOLVENTE MAX	0	0	26.5	0	1.507	0	64.263
N+6.65	B195	ENVOLVENTE MAX	1.925	0	36.63	0	1.507	0	16.611
N+6.65	B195	ENVOLVENTE MAX	3.85	0	97.14	0	1.507	0	63.571
N+6.65	B195	ENVOLVENTE MIN	0	0	-96.75	0	-1.87	0	-115.802
N+6.65	B195	ENVOLVENTE MIN	1.925	0	-36.23	0	-1.87	0	3.364
N+6.65	B195	ENVOLVENTE MIN	3.85	0	-26.1	0	-1.87	0	-116.634
N+3.45	B195	ENVOLVENTE MAX	0	0	51.4	0	1.78	0	101.961
N+3.45	B195	ENVOLVENTE MAX	1.925	0	58.88	0	1.78	0	-3.694
N+3.45	B195	ENVOLVENTE MAX	3.85	0	68.2	0	1.78	0	104.264
N+3.45	B195	ENVOLVENTE MIN	0	0	-70.77	0	-1.605	0	-137.801

N+3.45	B195	ENVOLVENTE MIN	1.925	0	-60.79	0	-1.605	0	**-14.408**
N+3.45	B195	ENVOLVENTE MIN	3.85	0	-52.65	0	-1.605	0	-132.756
N+6.65	B196	ENVOLVENTE MAX	0	0	-6.64	0	1.366	0	19.681
N+6.65	B196	ENVOLVENTE MAX	3.54	0	13.66	0	1.366	0	99.147
N+6.65	B196	ENVOLVENTE MAX	7.08	0	165.7	0	1.366	0	22.639
N+6.65	B196	ENVOLVENTE MIN	0	0	-160.64	0	-2.654	0	-180.696
N+6.65	B196	ENVOLVENTE MIN	3.54	0	-12.38	0	-2.654	0	10.215
N+6.65	B196	ENVOLVENTE MIN	7.08	0	6.24	0	-2.654	0	-198.628
N+3.45	B196	ENVOLVENTE MAX	0	0	-24.47	0	26.355	0	9.344
N+3.45	B196	ENVOLVENTE MAX	3.54	0	6.62	0	26.355	0	131.269
N+3.45	B196	ENVOLVENTE MAX	3.69	0	7.28	0	26.355	0	137.411
N+3.45	B196	ENVOLVENTE MAX	3.69	0	68.16	0	2.585	0	138.855
N+3.45	B196	ENVOLVENTE MAX	7.08	0	138.43	0	2.585	0	-2.887
N+3.45	B196	ENVOLVENTE MIN	0	0	-126.92	0	1.093	0	-205.269
N+3.45	B196	ENVOLVENTE MIN	3.54	0	-53.27	0	1.093	0	37.18
N+3.45	B196	ENVOLVENTE MIN	3.69	0	-52.29	0	1.093	0	38.305
N+3.45	B196	ENVOLVENTE MIN	3.69	0	1.69	0	-28.355	0	38.663
N+3.45	B196	ENVOLVENTE MIN	7.08	0	30.16	0	-28.355	0	-228.268
N+6.65	B197	ENVOLVENTE MAX	0	0	-6.63	0	2.323	0	21.339
N+6.65	B197	ENVOLVENTE MAX	3.54	0	11.99	0	2.323	0	108.463
N+6.65	B197	ENVOLVENTE MAX	7.08	0	154.22	0	2.323	0	25.106
N+6.65	B197	ENVOLVENTE MIN	0	0	-172.12	0	-0.856	0	-212.02
N+6.65	B197	ENVOLVENTE MIN	3.54	0	-18.44	0	-0.856	0	11.554
N+6.65	B197	ENVOLVENTE MIN	7.08	0	5.49	0	-0.856	0	-148.673
N+3.45	B197	ENVOLVENTE MAX	0	0	-28.03	0	25.059	0	-0.634
N+3.45	B197	ENVOLVENTE MAX	3.54	0	3.06	0	25.059	0	140.265
N+3.45	B197	ENVOLVENTE MAX	3.69	0	3.72	0	25.059	0	148.347
N+3.45	B197	ENVOLVENTE MAX	3.69	0	61.92	0	3.009	0	147.998
N+3.45	B197	ENVOLVENTE MAX	7.08	0	131.04	0	3.009	0	12.784
N+3.45	B197	ENVOLVENTE MIN	0	0	-139.85	0	-0.41	0	-239.993
N+3.45	B197	ENVOLVENTE MIN	3.54	0	-65.42	0	-0.41	0	39.83
N+3.45	B197	ENVOLVENTE MIN	3.69	0	-64.44	0	-0.41	0	41.522
N+3.45	B197	ENVOLVENTE MIN	3.69	0	-1.8	0	-33.084	0	41.355
N+3.45	B197	ENVOLVENTE MIN	7.08	0	26.68	0	-33.084	0	-199.782
N+3.45	B198	ENVOLVENTE MAX	0	0	4.67	0	1.355	0	1.235
N+3.45	B198	ENVOLVENTE MAX	0.35	0	5.35	0	1.355	0	2.922
N+3.45	B198	ENVOLVENTE MAX	0.7	0	6.03	0	1.355	0	5.525
N+3.45	B198	ENVOLVENTE MIN	0	0	-9.87	0	-3.031	0	-3.234
N+3.45	B198	ENVOLVENTE MIN	0.35	0	-8.96	0	-3.031	0	-3.381
N+3.45	B198	ENVOLVENTE MIN	0.7	0	-8.05	0	-3.031	0	-4.999
N+3.45	B199	ENVOLVENTE MAX	0	0	-0.71	0	0.248	0	12.646
N+3.45	B199	ENVOLVENTE MAX	3.15	0	6.49	0	0.248	0	5.307
N+3.45	B199	ENVOLVENTE MAX	6.3	0	14.66	0	0.248	0	-0.327
N+3.45	B199	ENVOLVENTE MIN	0	0	-9.98	0	-0.925	0	-19.267
N+3.45	B199	ENVOLVENTE MIN	3.15	0	-2.9	0	-0.925	0	-0.74
N+3.45	B199	ENVOLVENTE MIN	6.3	0	3.22	0	-0.925	0	-28.925
N+6.65	B200	ENVOLVENTE MAX	0	0	-4.19	0	0.042	0	5.986
N+6.65	B200	ENVOLVENTE MAX	3.54	0	6.07	0	0.042	0	28.256
N+6.65	B200	ENVOLVENTE MAX	7.08	0	37.18	0	0.042	0	-1.752
N+6.65	B200	ENVOLVENTE MIN	0	0	-27.71	0	-1.098	0	-21.207
N+6.65	B200	ENVOLVENTE MIN	3.54	0	-2	0	-1.098	0	4.72
N+6.65	B200	ENVOLVENTE MIN	7.08	0	5.66	0	-1.098	0	-45.93
N+3.45	B200	ENVOLVENTE MAX	0	0	-8.4	0	5.223	0	-1.018
N+3.45	B200	ENVOLVENTE MAX	3.54	0	8.9	0	5.223	0	18.048
N+3.45	B200	ENVOLVENTE MAX	3.64	0	9.2	0	5.223	0	17.79
N+3.45	B200	ENVOLVENTE MAX	3.64	0	3.76	0	-1.184	0	18.491
N+3.45	B200	ENVOLVENTE MAX	7.08	0	34.18	0	-1.184	0	-3.243
N+3.45	B200	ENVOLVENTE MIN	0	0	-29.46	0	1.143	0	-29.875
N+3.45	B200	ENVOLVENTE MIN	3.54	0	-1.47	0	1.143	0	3.37
N+3.45	B200	ENVOLVENTE MIN	3.64	0	-1.26	0	1.143	0	2.858
N+3.45	B200	ENVOLVENTE MIN	3.64	0	-3.66	0	-5.29	0	2.017
N+3.45	B200	ENVOLVENTE MIN	7.08	0	9.78	0	-5.29	0	-47.752
N+6.65	B201	ENVOLVENTE MAX	0	0	-6.1	0	0.465	0	-3.172
N+6.65	B201	ENVOLVENTE MAX	3.6	0	1.69	0	0.465	0	19.577
N+6.65	B201	ENVOLVENTE MAX	7.2	0	32.06	0	0.465	0	-0.942
N+6.65	B201	ENVOLVENTE MIN	0	0	-33.93	0	-0.269	0	-43.194
N+6.65	B201	ENVOLVENTE MIN	3.6	0	-2.66	0	-0.269	0	4.758
N+6.65	B201	ENVOLVENTE MIN	7.2	0	5.58	0	-0.269	0	-36.443
N+3.45	B201	ENVOLVENTE MAX	0	0	-9.04	0	4.662	0	-0.672
N+3.45	B201	ENVOLVENTE MAX	3.6	0	6.44	0	4.662	0	17.555
N+3.45	B201	ENVOLVENTE MAX	3.75	0	6.93	0	4.662	0	17.562
N+3.45	B201	ENVOLVENTE MAX	3.75	0	4.06	0	-1.153	0	17.605
N+3.45	B201	ENVOLVENTE MAX	7.2	0	33.73	0	-1.153	0	-0.41
N+3.45	B201	ENVOLVENTE MIN	0	0	-35.03	0	1.113	0	-50.773
N+3.45	B201	ENVOLVENTE MIN	3.6	0	-3.53	0	1.113	0	3.363
N+3.45	B201	ENVOLVENTE MIN	3.75	0	-3.21	0	1.113	0	2.856
N+3.45	B201	ENVOLVENTE MIN	3.75	0	-4.97	0	-5.144	0	2.183

N+3.45	B201	ENVOLVENTE MIN	7.2	0	8.65	0	-5.144	0	-48.261
N+6.65	B202	ENVOLVENTE MAX	0	0	-4.42	0	0.542	0	0.232
N+6.65	B202	ENVOLVENTE MAX	3.54	0	3.67	0	0.542	0	16.796
N+6.65	B202	ENVOLVENTE MAX	7.08	0	34.04	0	0.542	0	-7.823
N+6.65	B202	ENVOLVENTE MIN	0	0	-30.85	0	-0.371	0	-34.989
N+6.65	B202	ENVOLVENTE MIN	3.54	0	-0.97	0	-0.371	0	2.027
N+6.65	B202	ENVOLVENTE MIN	7.08	0	6.7	0	-0.371	0	-46.283
N+3.45	B202	ENVOLVENTE MAX	0	0	-9.03	0	4.547	0	-1.207
N+3.45	B202	ENVOLVENTE MAX	3.54	0	5.59	0	4.547	0	18.44
N+3.45	B202	ENVOLVENTE MAX	3.64	0	5.9	0	4.547	0	18.554
N+3.45	B202	ENVOLVENTE MAX	3.64	0	3.45	0	-0.708	0	18.761
N+3.45	B202	ENVOLVENTE MAX	7.08	0	30.9	0	-0.708	0	3.064
N+3.45	B202	ENVOLVENTE MIN	0	0	-34.95	0	1.105	0	-49.411
N+3.45	B202	ENVOLVENTE MIN	3.54	0	-3.87	0	1.105	0	3.447
N+3.45	B202	ENVOLVENTE MIN	3.64	0	-3.66	0	1.105	0	3.133
N+3.45	B202	ENVOLVENTE MIN	3.64	0	-7.15	0	-4.099	0	2.63
N+3.45	B202	ENVOLVENTE MIN	7.08	0	7.76	0	-4.099	0	-40.103
N+6.65	B203	ENVOLVENTE MAX	0	0	-14.26	0	5.903	0	-10.536
N+6.65	B203	ENVOLVENTE MAX	3.725	0	4.43	0	5.903	0	24.406
N+6.65	B203	ENVOLVENTE MAX	3.83	0	4.76	0	5.903	0	24.348
N+6.65	B203	ENVOLVENTE MAX	3.83	0	2.62	0	-0.836	0	24.306
N+6.65	B203	ENVOLVENTE MAX	7.45	0	38.36	0	-0.836	0	-9.284
N+6.65	B203	ENVOLVENTE MIN	0	0	-38.99	0	1.003	0	-45.353
N+6.65	B203	ENVOLVENTE MIN	3.725	0	-1.77	0	1.003	0	9.682
N+6.65	B203	ENVOLVENTE MIN	3.83	0	-1.54	0	1.003	0	9.43
N+6.65	B203	ENVOLVENTE MIN	3.83	0	-3.16	0	-6.225	0	9.054
N+6.65	B203	ENVOLVENTE MIN	7.45	0	13.87	0	-6.225	0	-44.765
N+3.45	B203	ENVOLVENTE MAX	0	0	-3.25	0	0.284	0	4.36
N+3.45	B203	ENVOLVENTE MAX	3.725	0	4.01	0	0.284	0	4.785
N+3.45	B203	ENVOLVENTE MAX	7.45	0	13.67	0	0.284	0	4.372
N+3.45	B203	ENVOLVENTE MIN	0	0	-13.58	0	-0.326	0	-30.324
N+3.45	B203	ENVOLVENTE MIN	3.725	0	-3.94	0	-0.326	0	1.028
N+3.45	B203	ENVOLVENTE MIN	7.45	0	3.3	0	-0.326	0	-30.834
N+6.65	B204	ENVOLVENTE MAX	0	0	-7.03	0	0.602	0	-8.352
N+6.65	B204	ENVOLVENTE MAX	3.475	0	0.49	0	0.602	0	19.216
N+6.65	B204	ENVOLVENTE MAX	6.95	0	28.58	0	0.602	0	1.233
N+6.65	B204	ENVOLVENTE MIN	0	0	-35.13	0	-0.227	0	-47.504
N+6.65	B204	ENVOLVENTE MIN	3.475	0	-4.74	0	-0.227	0	2.269
N+6.65	B204	ENVOLVENTE MIN	6.95	0	4.1	0	-0.227	0	-24.747
N+3.45	B204	ENVOLVENTE MAX	0	0	-8.86	0	3.588	0	0.713
N+3.45	B204	ENVOLVENTE MAX	3.475	0	6.21	0	3.588	0	20.891
N+3.45	B204	ENVOLVENTE MAX	3.58	0	6.53	0	3.588	0	20.838
N+3.45	B204	ENVOLVENTE MAX	3.58	0	3.72	0	-0.458	0	20.85
N+3.45	B204	ENVOLVENTE MAX	6.95	0	30.19	0	-0.458	0	4.479
N+3.45	B204	ENVOLVENTE MIN	0	0	-32.85	0	0.771	0	-41.803
N+3.45	B204	ENVOLVENTE MIN	3.475	0	-3.28	0	0.771	0	3.524
N+3.45	B204	ENVOLVENTE MIN	3.58	0	-3.06	0	0.771	0	3.24
N+3.45	B204	ENVOLVENTE MIN	3.58	0	-7.58	0	-4.297	0	2.608
N+3.45	B204	ENVOLVENTE MIN	6.95	0	6.84	0	-4.297	0	-36.002
N+6.65	B205	ENVOLVENTE MAX	0	0	0.23	0	0.237	0	4.342
N+6.65	B205	ENVOLVENTE MAX	1.925	0	4.57	0	0.237	0	-0.075
N+6.65	B205	ENVOLVENTE MAX	3.85	0	18.19	0	0.237	0	3.114
N+6.65	B205	ENVOLVENTE MIN	0	0	-17.1	0	-0.482	0	-22.113
N+6.65	B205	ENVOLVENTE MIN	1.925	0	-3.74	0	-0.482	0	-4.159
N+6.65	B205	ENVOLVENTE MIN	3.85	0	0.43	0	-0.482	0	-24.089
N+3.45	B205	ENVOLVENTE MAX	0	0	5.33	0	0.454	0	10.152
N+3.45	B205	ENVOLVENTE MAX	1.925	0	9.07	0	0.454	0	-2.431
N+3.45	B205	ENVOLVENTE MAX	3.85	0	13.96	0	0.454	0	11.09
N+3.45	B205	ENVOLVENTE MIN	0	0	-14.37	0	-0.421	0	-31.455
N+3.45	B205	ENVOLVENTE MIN	1.925	0	-9.38	0	-0.421	0	-11.386
N+3.45	B205	ENVOLVENTE MIN	3.85	0	-5.54	0	-0.421	0	-31.199
N+6.65	B206	ENVOLVENTE MAX	0	0	-5.51	0	0.191	0	-1.231
N+6.65	B206	ENVOLVENTE MAX	3.54	0	3.22	0	0.191	0	21.347
N+6.65	B206	ENVOLVENTE MAX	7.08	0	34.36	0	0.191	0	-2.491
N+6.65	B206	ENVOLVENTE MIN	0	0	-30.54	0	-0.812	0	-29.326
N+6.65	B206	ENVOLVENTE MIN	3.54	0	-1.66	0	-0.812	0	4.716
N+6.65	B206	ENVOLVENTE MIN	7.08	0	6.01	0	-0.812	0	-42.842
N+3.45	B206	ENVOLVENTE MAX	0	0	-7.7	0	4.189	0	2.534
N+3.45	B206	ENVOLVENTE MAX	3.54	0	9.11	0	4.189	0	20.59
N+3.45	B206	ENVOLVENTE MAX	3.69	0	9.6	0	4.189	0	20.249
N+3.45	B206	ENVOLVENTE MAX	3.69	0	6.48	0	-0.747	0	20.773
N+3.45	B206	ENVOLVENTE MAX	7.08	0	35.4	0	-0.747	0	-1.077
N+3.45	B206	ENVOLVENTE MIN	0	0	-30.71	0	0.796	0	-34.342
N+3.45	B206	ENVOLVENTE MIN	3.54	0	-2.01	0	0.796	0	2.398
N+3.45	B206	ENVOLVENTE MIN	3.69	0	-1.69	0	0.796	0	1.609
N+3.45	B206	ENVOLVENTE MIN	3.69	0	-4.51	0	-4.945	0	0.78
N+3.45	B206	ENVOLVENTE MIN	7.08	0	8.53	0	-4.945	0	-52.948
N+6.65	B207	ENVOLVENTE MAX	0	0	-5.78	0	1.101	0	-1.863

N+6.65	B207	ENVOLVENTE MAX	3.54	0	1.88	0	1.101	0	28.085
N+6.65	B207	ENVOLVENTE MAX	7.08	0	27.82	0	1.101	0	4.67
N+6.65	B207	ENVOLVENTE MIN	0	0	-37.07	0	0.005	0	-45.718
N+6.65	B207	ENVOLVENTE MIN	3.54	0	-5.78	0	0.005	0	5.053
N+6.65	B207	ENVOLVENTE MIN	7.08	0	4.43	0	0.005	0	-20.642
N+3.45	B207	ENVOLVENTE MAX	0	0	-9.56	0	4.56	0	-4.003
N+3.45	B207	ENVOLVENTE MAX	3.54	0	4.47	0	4.56	0	22.734
N+3.45	B207	ENVOLVENTE MAX	3.69	0	4.93	0	4.56	0	23.263
N+3.45	B207	ENVOLVENTE MAX	3.69	0	2.88	0	-0.098	0	23.223
N+3.45	B207	ENVOLVENTE MAX	7.08	0	27.3	0	-0.098	0	13.193
N+3.45	B207	ENVOLVENTE MIN	0	0	-37.25	0	1.062	0	-53.223
N+3.45	B207	ENVOLVENTE MIN	3.54	0	-5.3	0	1.062	0	2.872
N+3.45	B207	ENVOLVENTE MIN	3.69	0	-4.93	0	1.062	0	2.401
N+3.45	B207	ENVOLVENTE MIN	3.69	0	-11.57	0	-4.666	0	1.535
N+3.45	B207	ENVOLVENTE MIN	7.08	0	4.66	0	-4.666	0	-27.857
N+3.45	B208	ENVOLVENTE MAX	0	0	1.93	0	3.209	0	0.785
N+3.45	B208	ENVOLVENTE MAX	0.35	0	2.61	0	3.209	0	2.399
N+3.45	B208	ENVOLVENTE MAX	0.7	0	3.29	0	3.209	0	4.838
N+3.45	B208	ENVOLVENTE MIN	0	0	-8.79	0	-1.136	0	-3.337
N+3.45	B208	ENVOLVENTE MIN	0.35	0	-7.89	0	-1.136	0	-2.826
N+3.45	B208	ENVOLVENTE MIN	0.7	0	-6.98	0	-1.136	0	-3.696
N+3.45	B209	ENVOLVENTE MAX	0	0	-1.93	0	1.816	0	8.867
N+3.45	B209	ENVOLVENTE MAX	3.15	0	4.93	0	1.816	0	5.379
N+3.45	B209	ENVOLVENTE MAX	6.3	0	13.1	0	1.816	0	-2.505
N+3.45	B209	ENVOLVENTE MIN	0	0	-9.59	0	0.216	0	-18.126
N+3.45	B209	ENVOLVENTE MIN	3.15	0	-2.17	0	0.216	0	-0.844
N+3.45	B209	ENVOLVENTE MIN	6.3	0	3.95	0	0.216	0	-24.177
N+6.65	B210	ENVOLVENTE MAX	0	0	-5.1	0	2.193	0	3.703
N+6.65	B210	ENVOLVENTE MAX	3.54	0	5.61	0	2.193	0	36.091
N+6.65	B210	ENVOLVENTE MAX	7.08	0	46	0	2.193	0	-3.45
N+6.65	B210	ENVOLVENTE MIN	0	0	-36.09	0	0.15	0	-23.421
N+6.65	B210	ENVOLVENTE MIN	3.54	0	-1.51	0	0.15	0	5.277
N+6.65	B210	ENVOLVENTE MIN	7.08	0	6.44	0	0.15	0	-54.09
N+3.45	B210	ENVOLVENTE MAX	0	0	-9.5	0	-1.088	0	-1.951
N+3.45	B210	ENVOLVENTE MAX	3.54	0	11.12	0	-1.088	0	17.345
N+3.45	B210	ENVOLVENTE MAX	3.64	0	11.42	0	-1.088	0	16.737
N+3.45	B210	ENVOLVENTE MAX	3.64	0	2.62	0	4.565	0	17.487
N+3.45	B210	ENVOLVENTE MAX	7.08	0	38.42	0	4.565	0	-7.352
N+3.45	B210	ENVOLVENTE MIN	0	0	-32.34	0	-4.402	0	-28.484
N+3.45	B210	ENVOLVENTE MIN	3.54	0	-0.23	0	-4.402	0	3.877
N+3.45	B210	ENVOLVENTE MIN	3.64	0	-0.02	0	-4.402	0	3.369
N+3.45	B210	ENVOLVENTE MIN	3.64	0	-4.16	0	1.221	0	2.515
N+3.45	B210	ENVOLVENTE MIN	7.08	0	11.31	0	1.221	0	-48.253
N+6.65	B211	ENVOLVENTE MAX	0	0	-6.61	0	0.293	0	-4.478
N+6.65	B211	ENVOLVENTE MAX	3.6	0	1.47	0	0.293	0	24.741
N+6.65	B211	ENVOLVENTE MAX	7.2	0	41.18	0	0.293	0	-3.606
N+6.65	B211	ENVOLVENTE MIN	0	0	-42.3	0	-0.476	0	-52.421
N+6.65	B211	ENVOLVENTE MIN	3.6	0	-1.94	0	-0.476	0	4.771
N+6.65	B211	ENVOLVENTE MIN	7.2	0	6.46	0	-0.476	0	-48.362
N+3.45	B211	ENVOLVENTE MAX	0	0	-10.46	0	-1.199	0	-3.657
N+3.45	B211	ENVOLVENTE MAX	3.6	0	7.83	0	-1.199	0	16.779
N+3.45	B211	ENVOLVENTE MAX	3.75	0	8.32	0	-1.199	0	16.314
N+3.45	B211	ENVOLVENTE MAX	3.75	0	2.53	0	4.566	0	15.96
N+3.45	B211	ENVOLVENTE MAX	7.2	0	37.19	0	4.566	0	-4.451
N+3.45	B211	ENVOLVENTE MIN	0	0	-39.39	0	-4.31	0	-52.159
N+3.45	B211	ENVOLVENTE MIN	3.6	0	-2.34	0	-4.31	0	3.177
N+3.45	B211	ENVOLVENTE MIN	3.75	0	-2.01	0	-4.31	0	2.755
N+3.45	B211	ENVOLVENTE MIN	3.75	0	-5.91	0	1.184	0	2.634
N+3.45	B211	ENVOLVENTE MIN	7.2	0	10.15	0	1.184	0	-46.715
N+6.65	B212	ENVOLVENTE MAX	0	0	-6.15	0	0.247	0	-3.25
N+6.65	B212	ENVOLVENTE MAX	3.54	0	2.06	0	0.247	0	23.449
N+6.65	B212	ENVOLVENTE MAX	7.08	0	41.59	0	0.247	0	-4.457
N+6.65	B212	ENVOLVENTE MIN	0	0	-40.49	0	-0.515	0	-47.254
N+6.65	B212	ENVOLVENTE MIN	3.54	0	-1.48	0	-0.515	0	4.384
N+6.65	B212	ENVOLVENTE MIN	7.08	0	6.47	0	-0.515	0	-51.145
N+3.45	B212	ENVOLVENTE MAX	0	0	-9.93	0	-1.176	0	-3.074
N+3.45	B212	ENVOLVENTE MAX	3.54	0	8.02	0	-1.176	0	15.236
N+3.45	B212	ENVOLVENTE MAX	3.64	0	8.33	0	-1.176	0	14.921
N+3.45	B212	ENVOLVENTE MAX	3.64	0	2.72	0	4.662	0	14.584
N+3.45	B212	ENVOLVENTE MAX	7.08	0	36.91	0	4.662	0	-4.067
N+3.45	B212	ENVOLVENTE MIN	0	0	-37.56	0	-4.112	0	-48.732
N+3.45	B212	ENVOLVENTE MIN	3.54	0	-2.17	0	-4.112	0	2.451
N+3.45	B212	ENVOLVENTE MIN	3.64	0	-1.96	0	-4.112	0	2.154
N+3.45	B212	ENVOLVENTE MIN	3.64	0	-6.25	0	1.205	0	2.075
N+3.45	B212	ENVOLVENTE MIN	7.08	0	9.81	0	1.205	0	-48.028
N+6.65	B214	ENVOLVENTE MAX	0	0	-6.6	0	0.177	0	-4.241
N+6.65	B214	ENVOLVENTE MAX	3.475	0	1.21	0	0.177	0	26.686
N+6.65	B214	ENVOLVENTE MAX	6.95	0	38.14	0	0.177	0	-1.914

N+6.65	B214	ENVOLVENTE MIN	0	0	-42.44	0	-0.92	0	-50.777
N+6.65	B214	ENVOLVENTE MIN	3.475	0	-3.15	0	-0.92	0	4.688
N+6.65	B214	ENVOLVENTE MIN	6.95	0	5.8	0	-0.92	0	-35.861
N+3.45	B214	ENVOLVENTE MAX	0	0	-10.55	0	-1.26	0	-4.355
N+3.45	B214	ENVOLVENTE MAX	3.475	0	6	0	-1.26	0	17.836
N+3.45	B214	ENVOLVENTE MAX	3.58	0	6.33	0	-1.26	0	17.659
N+3.45	B214	ENVOLVENTE MAX	3.58	0	2.33	0	3.935	0	17.47
N+3.45	B214	ENVOLVENTE MAX	6.95	0	32.97	0	3.935	0	1.162
N+3.45	B214	ENVOLVENTE MIN	0	0	-38.96	0	-4.2	0	-51.372
N+3.45	B214	ENVOLVENTE MIN	3.475	0	-2.87	0	-4.2	0	2.257
N+3.45	B214	ENVOLVENTE MIN	3.58	0	-2.64	0	-4.2	0	2.075
N+3.45	B214	ENVOLVENTE MIN	3.58	0	-9.11	0	0.631	0	1.98
N+3.45	B214	ENVOLVENTE MIN	6.95	0	7.86	0	0.631	0	-35.99
N+6.65	B215	ENVOLVENTE MAX	0	0	-1.37	0	0.41	0	0.561
N+6.65	B215	ENVOLVENTE MAX	1.925	0	3.09	0	0.41	0	-0.94
N+6.65	B215	ENVOLVENTE MAX	3.85	0	22.58	0	0.41	0	0.367
N+6.65	B215	ENVOLVENTE MIN	0	0	-22.06	0	-0.254	0	-28.303
N+6.65	B215	ENVOLVENTE MIN	1.925	0	-2.85	0	-0.254	0	-7.313
N+6.65	B215	ENVOLVENTE MIN	3.85	0	1.48	0	-0.254	0	-29.287
N+3.45	B215	ENVOLVENTE MAX	0	0	-1.78	0	0.55	0	2.818
N+3.45	B215	ENVOLVENTE MAX	1.925	0	6.69	0	0.55	0	0.322
N+3.45	B215	ENVOLVENTE MAX	3.85	0	25.41	0	0.55	0	2.776
N+3.45	B215	ENVOLVENTE MIN	0	0	-25.38	0	-0.429	0	-35.3
N+3.45	B215	ENVOLVENTE MIN	1.925	0	-6.68	0	-0.429	0	-2.356
N+3.45	B215	ENVOLVENTE MIN	3.85	0	1.77	0	-0.429	0	-35.284
N+6.65	B216	ENVOLVENTE MAX	0	0	-6.21	0	1.186	0	-2.75
N+6.65	B216	ENVOLVENTE MAX	3.54	0	2.76	0	1.186	0	27.621
N+6.65	B216	ENVOLVENTE MAX	7.08	0	42.83	0	1.186	0	-3.806
N+6.65	B216	ENVOLVENTE MIN	0	0	-39.26	0	-0.119	0	-38.699
N+6.65	B216	ENVOLVENTE MIN	3.54	0	-1.36	0	-0.119	0	5.169
N+6.65	B216	ENVOLVENTE MIN	7.08	0	6.59	0	-0.119	0	-51.357
N+3.45	B216	ENVOLVENTE MAX	0	0	-9.06	0	-1.004	0	0.322
N+3.45	B216	ENVOLVENTE MAX	3.54	0	10.35	0	-1.004	0	19.225
N+3.45	B216	ENVOLVENTE MAX	3.69	0	10.84	0	-1.004	0	18.452
N+3.45	B216	ENVOLVENTE MAX	3.69	0	4.57	0	4.614	0	18.434
N+3.45	B216	ENVOLVENTE MAX	7.08	0	38.81	0	4.614	0	-4.456
N+3.45	B216	ENVOLVENTE MIN	0	0	-35.24	0	-3.942	0	-38.068
N+3.45	B216	ENVOLVENTE MIN	3.54	0	-1.15	0	-3.942	0	2.485
N+3.45	B216	ENVOLVENTE MIN	3.69	0	-0.82	0	-3.942	0	1.813
N+3.45	B216	ENVOLVENTE MIN	3.69	0	-4.93	0	1.129	0	1.444
N+3.45	B216	ENVOLVENTE MIN	7.08	0	9.68	0	1.129	0	-52.614
N+6.65	B217	ENVOLVENTE MAX	0	0	-6.52	0	-0.17	0	-3.447
N+6.65	B217	ENVOLVENTE MAX	3.54	0	1.43	0	-0.17	0	36.06
N+6.65	B217	ENVOLVENTE MAX	7.08	0	36.28	0	-0.17	0	2.715
N+6.65	B217	ENVOLVENTE MIN	0	0	-45.81	0	-2.218	0	-53.447
N+6.65	B217	ENVOLVENTE MIN	3.54	0	-5.34	0	-2.218	0	5.551
N+6.65	B217	ENVOLVENTE MIN	7.08	0	5.28	0	-2.218	0	-23.206
N+3.45	B217	ENVOLVENTE MAX	0	0	-11.18	0	-1.356	0	-6.015
N+3.45	B217	ENVOLVENTE MAX	3.54	0	5.32	0	-1.356	0	23.596
N+3.45	B217	ENVOLVENTE MAX	3.69	0	5.81	0	-1.356	0	23.7
N+3.45	B217	ENVOLVENTE MAX	3.69	0	1.66	0	2.89	0	23.804
N+3.45	B217	ENVOLVENTE MAX	7.08	0	30.34	0	2.89	0	8.743
N+3.45	B217	ENVOLVENTE MIN	0	0	-41.91	0	-4.42	0	-54.384
N+3.45	B217	ENVOLVENTE MIN	3.54	0	-4.08	0	-4.42	0	3.643
N+3.45	B217	ENVOLVENTE MIN	3.69	0	-3.76	0	-4.42	0	3.288
N+3.45	B217	ENVOLVENTE MIN	3.69	0	-11.97	0	0.129	0	3.118
N+3.45	B217	ENVOLVENTE MIN	7.08	0	6.39	0	0.129	0	-25.078
N+3.45	B218	ENVOLVENTE MAX	0	0	8.79	0	0.785	0	1.136
N+3.45	B218	ENVOLVENTE MAX	1.075	0	13.6	0	0.785	0	-0.507
N+3.45	B218	ENVOLVENTE MAX	2.15	0	18.78	0	0.785	0	-2.128
N+3.45	B218	ENVOLVENTE MIN	0	0	-1.93	0	-3.337	0	-3.209
N+3.45	B218	ENVOLVENTE MIN	1.075	0	0.27	0	-3.337	0	-12.71
N+3.45	B218	ENVOLVENTE MIN	2.15	0	2.46	0	-3.337	0	-29.762
N+3.45	B219	ENVOLVENTE MAX	0	0	1.47	0	3.234	0	3.07
N+3.45	B219	ENVOLVENTE MAX	0.785	0	3.07	0	3.234	0	1.456
N+3.45	B219	ENVOLVENTE MAX	1.57	0	4.67	0	3.234	0	1.355
N+3.45	B219	ENVOLVENTE MIN	0	0	-16.89	0	-1.235	0	-20.93
N+3.45	B219	ENVOLVENTE MIN	0.785	0	-13.38	0	-1.235	0	-9.217
N+3.45	B219	ENVOLVENTE MIN	1.57	0	-9.87	0	-1.235	0	-3.031
N+3.45	B220	ENVOLVENTE MAX	0	0	-3.64	0	16.207	0	-1.026
N+3.45	B220	ENVOLVENTE MAX	0.785	0	0.18	0	16.207	0	0.352
N+3.45	B220	ENVOLVENTE MAX	1.57	0	4.79	0	16.207	0	2.707
N+3.45	B220	ENVOLVENTE MIN	0	0	-56.69	0	-9.061	0	-47.173
N+3.45	B220	ENVOLVENTE MIN	0.785	0	-31.52	0	-9.061	0	-15.059
N+3.45	B220	ENVOLVENTE MIN	1.57	0	-13.47	0	-9.061	0	-1.708
N+6.65	B223	ENVOLVENTE MAX	0	0	-10.29	0	21.207	0	-11.608
N+6.65	B223	ENVOLVENTE MAX	0.785	0	-7.24	0	21.207	0	-4.724
N+6.65	B223	ENVOLVENTE MAX	1.57	0	-4.19	0	21.207	0	0.042

N+6.65	B223	ENVOLVENTE MIN	0	0	-35.85	0	-5.986	0	-50.952
N+6.65	B223	ENVOLVENTE MIN	0.785	0	-31.78	0	-5.986	0	-24.404
N+6.65	B223	ENVOLVENTE MIN	1.57	0	-27.71	0	-5.986	0	-1.098
N+3.45	B223	ENVOLVENTE MAX	0	0	-26.23	0	21.846	0	-31.068
N+3.45	B223	ENVOLVENTE MAX	0.785	0	-21.51	0	21.846	0	-12.135
N+3.45	B223	ENVOLVENTE MAX	1.57	0	-16.79	0	21.846	0	5.77
N+3.45	B223	ENVOLVENTE MIN	0	0	-97.43	0	-20.205	0	-102.394
N+3.45	B223	ENVOLVENTE MIN	0.785	0	-68.89	0	-20.205	0	-36.619
N+3.45	B223	ENVOLVENTE MIN	1.57	0	-40.36	0	-20.205	0	0.973
N+6.65	B224	ENVOLVENTE MAX	0	0	36.28	0	23.206	0	-0.17
N+6.65	B224	ENVOLVENTE MAX	1.075	0	41.85	0	23.206	0	-8.371
N+6.65	B224	ENVOLVENTE MAX	2.15	0	47.43	0	23.206	0	-20.788
N+6.65	B224	ENVOLVENTE MIN	0	0	5.28	0	-2.715	0	-2.218
N+6.65	B224	ENVOLVENTE MIN	1.075	0	9.46	0	-2.715	0	-44.216
N+6.65	B224	ENVOLVENTE MIN	2.15	0	13.64	0	-2.715	0	-92.206
N+3.45	B224	ENVOLVENTE MAX	0	0	30.34	0	25.078	0	2.89
N+3.45	B224	ENVOLVENTE MAX	1.075	0	42.96	0	25.078	0	-8.397
N+3.45	B224	ENVOLVENTE MAX	2.15	0	55.59	0	25.078	0	-25.276
N+3.45	B224	ENVOLVENTE MIN	0	0	6.39	0	-8.743	0	0.129
N+3.45	B224	ENVOLVENTE MIN	1.075	0	12.39	0	-8.743	0	-35.404
N+3.45	B224	ENVOLVENTE MIN	2.15	0	18.39	0	-8.743	0	-89.639
N+6.65	B225	ENVOLVENTE MAX	0	0	-10.54	0	4.67	0	-11.988
N+6.65	B225	ENVOLVENTE MAX	0.785	0	-7.48	0	4.67	0	-4.913
N+6.65	B225	ENVOLVENTE MAX	1.57	0	-4.43	0	4.67	0	-0.005
N+6.65	B225	ENVOLVENTE MIN	0	0	-35.96	0	-20.642	0	-51.171
N+6.65	B225	ENVOLVENTE MIN	0.785	0	-31.89	0	-20.642	0	-24.539
N+6.65	B225	ENVOLVENTE MIN	1.57	0	-27.82	0	-20.642	0	-1.101
N+3.45	B225	ENVOLVENTE MAX	0	0	-12.7	0	13.193	0	-11.621
N+3.45	B225	ENVOLVENTE MAX	0.785	0	-8.68	0	13.193	0	-3.075
N+3.45	B225	ENVOLVENTE MAX	1.57	0	-4.66	0	13.193	0	4.666
N+3.45	B225	ENVOLVENTE MIN	0	0	-42.1	0	-27.857	0	-50.94
N+3.45	B225	ENVOLVENTE MIN	0.785	0	-34.27	0	-27.857	0	-21.036
N+3.45	B225	ENVOLVENTE MIN	1.57	0	-27.3	0	-27.857	0	0.098
N+3.45	B227	ENVOLVENTE MAX	0	0	10.97	0	5.978	0	2.331
N+3.45	B227	ENVOLVENTE MAX	1.075	0	38.15	0	5.978	0	-3.285
N+3.45	B227	ENVOLVENTE MAX	2.15	0	75.24	0	5.978	0	-10.202
N+3.45	B227	ENVOLVENTE MIN	0	0	-3.14	0	-16.378	0	-2.291
N+3.45	B227	ENVOLVENTE MIN	1.075	0	3.81	0	-16.378	0	-21.774
N+3.45	B227	ENVOLVENTE MIN	2.15	0	9.05	0	-16.378	0	-82.328
N+6.65	B229	ENVOLVENTE MAX	0	0	36.09	0	3.703	0	-0.15
N+6.65	B229	ENVOLVENTE MAX	1.075	0	41.66	0	3.703	0	-8.231
N+6.65	B229	ENVOLVENTE MAX	2.15	0	47.24	0	3.703	0	-20.459
N+6.65	B229	ENVOLVENTE MIN	0	0	5.1	0	-23.421	0	-2.193
N+6.65	B229	ENVOLVENTE MIN	1.075	0	9.28	0	-23.421	0	-43.987
N+6.65	B229	ENVOLVENTE MIN	2.15	0	13.46	0	-23.421	0	-91.772
N+3.45	B229	ENVOLVENTE MAX	0	0	42.5	0	15.297	0	6.171
N+3.45	B229	ENVOLVENTE MAX	1.075	0	83.49	0	15.297	0	-19.412
N+3.45	B229	ENVOLVENTE MAX	2.15	0	124.47	0	15.297	0	-49.485
N+3.45	B229	ENVOLVENTE MIN	0	0	17.23	0	-19.051	0	1.458
N+3.45	B229	ENVOLVENTE MIN	1.075	0	24.18	0	-19.051	0	-60.287
N+3.45	B229	ENVOLVENTE MIN	2.15	0	31.13	0	-19.051	0	-173.328
N+6.65	B230	ENVOLVENTE MAX	0	0	88.3	0	12.992	0	2.415
N+6.65	B230	ENVOLVENTE MAX	1.075	0	93.87	0	12.992	0	-19.311
N+6.65	B230	ENVOLVENTE MAX	2.15	0	99.45	0	12.992	0	-43.415
N+6.65	B230	ENVOLVENTE MIN	0	0	16.15	0	-11.874	0	0.294
N+6.65	B230	ENVOLVENTE MIN	1.075	0	20.33	0	-11.874	0	-95.504
N+6.65	B230	ENVOLVENTE MIN	2.15	0	24.51	0	-11.874	0	-199.413
N+3.45	B230	ENVOLVENTE MAX	0	0	77.81	0	23.226	0	8.875
N+3.45	B230	ENVOLVENTE MAX	1.075	0	98.88	0	23.226	0	-27.751
N+3.45	B230	ENVOLVENTE MAX	2.15	0	119.95	0	23.226	0	-69.696
N+3.45	B230	ENVOLVENTE MIN	0	0	25.11	0	-23.437	0	2.694
N+3.45	B230	ENVOLVENTE MIN	1.075	0	33.98	0	-23.437	0	-83.565
N+3.45	B230	ENVOLVENTE MIN	2.15	0	42.84	0	-23.437	0	-203.709
N+6.65	B231	ENVOLVENTE MAX	0	0	81.67	0	12.391	0	0.087
N+6.65	B231	ENVOLVENTE MAX	1.075	0	87.24	0	12.391	0	-19.136
N+6.65	B231	ENVOLVENTE MAX	2.15	0	92.82	0	12.391	0	-42.763
N+6.65	B231	ENVOLVENTE MIN	0	0	15.71	0	-11.307	0	-0.002
N+6.65	B231	ENVOLVENTE MIN	1.075	0	19.89	0	-11.307	0	-90.741
N+6.65	B231	ENVOLVENTE MIN	2.15	0	24.07	0	-11.307	0	-187.523
N+3.45	B231	ENVOLVENTE MAX	0	0	74.75	0	23.84	0	8.678
N+3.45	B231	ENVOLVENTE MAX	1.075	0	95.82	0	23.84	0	-26.385
N+3.45	B231	ENVOLVENTE MAX	2.15	0	116.89	0	23.84	0	-66.899
N+3.45	B231	ENVOLVENTE MIN	0	0	23.78	0	-24.48	0	2.66
N+3.45	B231	ENVOLVENTE MIN	1.075	0	32.65	0	-24.48	0	-80.478
N+3.45	B231	ENVOLVENTE MIN	2.15	0	41.51	0	-24.48	0	-197.338
N+6.65	B232	ENVOLVENTE MAX	0	0	-21.76	0	15.08	0	-29.175
N+6.65	B232	ENVOLVENTE MAX	0.785	0	-18.71	0	15.08	0	-13.29
N+6.65	B232	ENVOLVENTE MAX	1.57	0	-15.66	0	15.08	0	1.245

N+6.65	B232	ENVOLVENTE MIN	0	0	-79.25	0	-17.068	0	-116.795
N+6.65	B232	ENVOLVENTE MIN	0.785	0	-75.18	0	-17.068	0	-56.178
N+6.65	B232	ENVOLVENTE MIN	1.57	0	-71.12	0	-17.068	0	0.193
N+3.45	B232	ENVOLVENTE MAX	0	0	-33.9	0	28.929	0	-40.052
N+3.45	B232	ENVOLVENTE MAX	0.785	0	-28.14	0	28.929	0	-15.444
N+3.45	B232	ENVOLVENTE MAX	1.57	0	-22.38	0	28.929	0	9.952
N+3.45	B232	ENVOLVENTE MIN	0	0	-94.42	0	-28.479	0	-118.496
N+3.45	B232	ENVOLVENTE MIN	0.785	0	-81.81	0	-28.479	0	-48.34
N+3.45	B232	ENVOLVENTE MIN	1.57	0	-69.21	0	-28.479	0	2.359
N+6.65	B233	ENVOLVENTE MAX	0	0	-19.97	0	13.727	0	-26.779
N+6.65	B233	ENVOLVENTE MAX	0.785	0	-16.92	0	13.727	0	-12.299
N+6.65	B233	ENVOLVENTE MAX	1.57	0	-13.87	0	13.727	0	0.298
N+6.65	B233	ENVOLVENTE MIN	0	0	-71.05	0	-16.034	0	-104.863
N+6.65	B233	ENVOLVENTE MIN	0.785	0	-66.98	0	-16.034	0	-50.685
N+6.65	B233	ENVOLVENTE MIN	1.57	0	-62.91	0	-16.034	0	-0.221
N+3.45	B233	ENVOLVENTE MAX	0	0	-33.52	0	30.883	0	-39.406
N+3.45	B233	ENVOLVENTE MAX	0.785	0	-27.77	0	30.883	0	-15.095
N+3.45	B233	ENVOLVENTE MAX	1.57	0	-22.01	0	30.883	0	9.691
N+3.45	B233	ENVOLVENTE MIN	0	0	-93.9	0	-28.936	0	-117.932
N+3.45	B233	ENVOLVENTE MIN	0.785	0	-81.29	0	-28.936	0	-48.188
N+3.45	B233	ENVOLVENTE MIN	1.57	0	-68.68	0	-28.936	0	2.372
N+6.65	B235	ENVOLVENTE MAX	0	0	85.54	0	12.509	0	0.806
N+6.65	B235	ENVOLVENTE MAX	1.075	0	91.11	0	12.509	0	-19.764
N+6.65	B235	ENVOLVENTE MAX	2.15	0	96.68	0	12.509	0	-44.176
N+6.65	B235	ENVOLVENTE MIN	0	0	16.44	0	-11.606	0	0.132
N+6.65	B235	ENVOLVENTE MIN	1.075	0	20.62	0	-11.606	0	-94.144
N+6.65	B235	ENVOLVENTE MIN	2.15	0	24.8	0	-11.606	0	-195.084
N+3.45	B235	ENVOLVENTE MAX	0	0	78.82	0	24.326	0	9.067
N+3.45	B235	ENVOLVENTE MAX	1.075	0	99.89	0	24.326	0	-27.375
N+3.45	B235	ENVOLVENTE MAX	2.15	0	120.96	0	24.326	0	-69.039
N+3.45	B235	ENVOLVENTE MIN	0	0	24.85	0	-23.585	0	2.776
N+3.45	B235	ENVOLVENTE MIN	1.075	0	33.72	0	-23.585	0	-84.465
N+3.45	B235	ENVOLVENTE MIN	2.15	0	42.58	0	-23.585	0	-205.701
N+6.65	B236	ENVOLVENTE MAX	0	0	-32.38	0	16.11	0	-41.873
N+6.65	B236	ENVOLVENTE MAX	0.785	0	-28.05	0	16.11	0	-17.986
N+6.65	B236	ENVOLVENTE MAX	1.57	0	-23.72	0	16.11	0	5.413
N+6.65	B236	ENVOLVENTE MIN	0	0	-89.51	0	-13.614	0	-122.18
N+6.65	B236	ENVOLVENTE MIN	0.785	0	-81.27	0	-13.614	0	-54.605
N+6.65	B236	ENVOLVENTE MIN	1.57	0	-73.03	0	-13.614	0	1.172
N+3.45	B236	ENVOLVENTE MAX	0	0	-27	0	27.97	0	-32.847
N+3.45	B236	ENVOLVENTE MAX	0.785	0	-22.21	0	27.97	0	-13.403
N+3.45	B236	ENVOLVENTE MAX	1.57	0	-17.43	0	27.97	0	4.06
N+3.45	B236	ENVOLVENTE MIN	0	0	-58.19	0	-39.045	0	-73.411
N+3.45	B236	ENVOLVENTE MIN	0.785	0	-49.34	0	-39.045	0	-30.711
N+3.45	B236	ENVOLVENTE MIN	1.57	0	-40.5	0	-39.045	0	0.874
N+6.65	B237	ENVOLVENTE MAX	0	0	-32.12	0	15.52	0	-41.235
N+6.65	B237	ENVOLVENTE MAX	0.785	0	-27.79	0	15.52	0	-17.554
N+6.65	B237	ENVOLVENTE MAX	1.57	0	-23.46	0	15.52	0	6.274
N+6.65	B237	ENVOLVENTE MIN	0	0	-89.96	0	-16.162	0	-122.033
N+6.65	B237	ENVOLVENTE MIN	0.785	0	-81.72	0	-16.162	0	-54.101
N+6.65	B237	ENVOLVENTE MIN	1.57	0	-73.49	0	-16.162	0	1.378
N+3.45	B237	ENVOLVENTE MAX	0	0	-27.52	0	40.573	0	-33.734
N+3.45	B237	ENVOLVENTE MAX	0.785	0	-22.73	0	40.573	0	-13.884
N+3.45	B237	ENVOLVENTE MAX	1.57	0	-17.94	0	40.573	0	3.628
N+3.45	B237	ENVOLVENTE MIN	0	0	-60.26	0	-25.945	0	-77.083
N+3.45	B237	ENVOLVENTE MIN	0.785	0	-51.41	0	-25.945	0	-32.763
N+3.45	B237	ENVOLVENTE MIN	1.57	0	-42.56	0	-25.945	0	0.686
N+6.65	B238	ENVOLVENTE MAX	0	0	60.21	0	16.795	0	-0.001
N+6.65	B238	ENVOLVENTE MAX	1.075	0	65.78	0	16.795	0	-13.79
N+6.65	B238	ENVOLVENTE MAX	2.15	0	71.35	0	16.795	0	-31.688
N+6.65	B238	ENVOLVENTE MIN	0	0	10.38	0	-8.68	0	-0.974
N+6.65	B238	ENVOLVENTE MIN	1.075	0	14.56	0	-8.68	0	-68.693
N+6.65	B238	ENVOLVENTE MIN	2.15	0	18.74	0	-8.68	0	-142.403
N+3.45	B238	ENVOLVENTE MAX	0	0	56.14	0	25.904	0	3.826
N+3.45	B238	ENVOLVENTE MAX	1.075	0	77.21	0	25.904	0	-21.289
N+3.45	B238	ENVOLVENTE MAX	2.15	0	98.28	0	25.904	0	-54.376
N+3.45	B238	ENVOLVENTE MIN	0	0	16.85	0	-23.557	0	0.558
N+3.45	B238	ENVOLVENTE MIN	1.075	0	25.72	0	-23.557	0	-65.32
N+3.45	B238	ENVOLVENTE MIN	2.15	0	34.59	0	-23.557	0	-162.171
N+6.65	B239	ENVOLVENTE MAX	0	0	61.83	0	8.069	0	0.042
N+6.65	B239	ENVOLVENTE MAX	1.075	0	67.4	0	8.069	0	-14.238
N+6.65	B239	ENVOLVENTE MAX	2.15	0	72.98	0	8.069	0	-32.572
N+6.65	B239	ENVOLVENTE MIN	0	0	10.79	0	-18.246	0	-1.034
N+6.65	B239	ENVOLVENTE MIN	1.075	0	14.97	0	-18.246	0	-70.498
N+6.65	B239	ENVOLVENTE MIN	2.15	0	19.14	0	-18.246	0	-145.953
N+3.45	B239	ENVOLVENTE MAX	0	0	58.46	0	22.953	0	4.051
N+3.45	B239	ENVOLVENTE MAX	1.075	0	79.53	0	22.953	0	-21.018
N+3.45	B239	ENVOLVENTE MAX	2.15	0	100.6	0	22.953	0	-54.134

N+3.45	B239	ENVOLVENTE MIN	0	0	16.88	0	-28.191	0	0.708
N+3.45	B239	ENVOLVENTE MIN	1.075	0	25.75	0	-28.191	0	-67.59
N+3.45	B239	ENVOLVENTE MIN	2.15	0	34.62	0	-28.191	0	-166.936
N+6.65	B240	ENVOLVENTE MAX	0	0	88.64	0	11.59	0	3.401
N+6.65	B240	ENVOLVENTE MAX	1.075	0	94.21	0	11.59	0	-19.159
N+6.65	B240	ENVOLVENTE MAX	2.15	0	99.78	0	11.59	0	-43.335
N+6.65	B240	ENVOLVENTE MIN	0	0	16.2	0	-13.487	0	0.422
N+6.65	B240	ENVOLVENTE MIN	1.075	0	20.38	0	-13.487	0	-94.881
N+6.65	B240	ENVOLVENTE MIN	2.15	0	24.55	0	-13.487	0	-199.155
N+3.45	B240	ENVOLVENTE MAX	0	0	80.71	0	22.907	0	9.034
N+3.45	B240	ENVOLVENTE MAX	1.075	0	101.78	0	22.907	0	-26.26
N+3.45	B240	ENVOLVENTE MAX	2.15	0	122.85	0	22.907	0	-67.008
N+3.45	B240	ENVOLVENTE MIN	0	0	23.99	0	-26.236	0	2.653
N+3.45	B240	ENVOLVENTE MIN	1.075	0	32.86	0	-26.236	0	-86.531
N+3.45	B240	ENVOLVENTE MIN	2.15	0	41.73	0	-26.236	0	-209.799
N+6.65	B241	ENVOLVENTE MAX	0	0	-21.7	0	17.22	0	-29.034
N+6.65	B241	ENVOLVENTE MAX	0.785	0	-18.64	0	17.22	0	-13.187
N+6.65	B241	ENVOLVENTE MAX	1.57	0	-15.59	0	17.22	0	1.76
N+6.65	B241	ENVOLVENTE MIN	0	0	-79.57	0	-14.592	0	-116.771
N+6.65	B241	ENVOLVENTE MIN	0.785	0	-75.5	0	-14.592	0	-55.908
N+6.65	B241	ENVOLVENTE MIN	1.57	0	-71.43	0	-14.592	0	0.212
N+3.45	B241	ENVOLVENTE MAX	0	0	-32.86	0	31.519	0	-37.915
N+3.45	B241	ENVOLVENTE MAX	0.785	0	-27.1	0	31.519	0	-14.128
N+3.45	B241	ENVOLVENTE MAX	1.57	0	-21.34	0	31.519	0	9.505
N+3.45	B241	ENVOLVENTE MIN	0	0	-97.87	0	-28.317	0	-124.351
N+3.45	B241	ENVOLVENTE MIN	0.785	0	-85.26	0	-28.317	0	-51.49
N+3.45	B241	ENVOLVENTE MIN	1.57	0	-72.65	0	-28.317	0	1.823
N+6.65	B242	ENVOLVENTE MAX	0	0	-15.85	0	20.293	0	-20.341
N+6.65	B242	ENVOLVENTE MAX	0.785	0	-12.79	0	20.293	0	-9.099
N+6.65	B242	ENVOLVENTE MAX	1.57	0	-9.74	0	20.293	0	0.146
N+6.65	B242	ENVOLVENTE MIN	0	0	-56.86	0	-11.36	0	-83.361
N+6.65	B242	ENVOLVENTE MIN	0.785	0	-52.8	0	-11.36	0	-40.319
N+6.65	B242	ENVOLVENTE MIN	1.57	0	-48.73	0	-11.36	0	-0.522
N+3.45	B242	ENVOLVENTE MAX	0	0	-18.79	0	38.779	0	-20.65
N+3.45	B242	ENVOLVENTE MAX	0.785	0	-14.01	0	38.779	0	-7.621
N+3.45	B242	ENVOLVENTE MAX	1.57	0	-9.22	0	38.779	0	4.22
N+3.45	B242	ENVOLVENTE MIN	0	0	-53.15	0	-27.08	0	-65.929
N+3.45	B242	ENVOLVENTE MIN	0.785	0	-44.31	0	-27.08	0	-27.836
N+3.45	B242	ENVOLVENTE MIN	1.57	0	-36.21	0	-27.08	0	0.472
N+6.65	B243	ENVOLVENTE MAX	0	0	-13.88	0	12.522	0	-17.501
N+6.65	B243	ENVOLVENTE MAX	0.785	0	-10.83	0	12.522	0	-7.802
N+6.65	B243	ENVOLVENTE MAX	1.57	0	-7.78	0	12.522	0	-0.111
N+6.65	B243	ENVOLVENTE MIN	0	0	-53.82	0	-18.133	0	-78.34
N+6.65	B243	ENVOLVENTE MIN	0.785	0	-49.75	0	-18.133	0	-37.69
N+6.65	B243	ENVOLVENTE MIN	1.57	0	-45.68	0	-18.133	0	-0.509
N+3.45	B243	ENVOLVENTE MAX	0	0	-19.95	0	28.915	0	-22.4
N+3.45	B243	ENVOLVENTE MAX	0.785	0	-15.16	0	28.915	0	-8.467
N+3.45	B243	ENVOLVENTE MAX	1.57	0	-10.38	0	28.915	0	4.287
N+3.45	B243	ENVOLVENTE MIN	0	0	-53.11	0	-39.134	0	-65.302
N+3.45	B243	ENVOLVENTE MIN	0.785	0	-44.26	0	-39.134	0	-26.983
N+3.45	B243	ENVOLVENTE MIN	1.57	0	-35.42	0	-39.134	0	0.501
N+3.45	B261	ENVOLVENTE MAX	0	0	-4.94	0	1.556	0	-4.713
N+3.45	B261	ENVOLVENTE MAX	0.785	0	-1.47	0	1.556	0	-1.947
N+3.45	B261	ENVOLVENTE MAX	1.57	0	2	0	1.556	0	-2.409
N+3.45	B261	ENVOLVENTE MIN	0	0	-26.62	0	-1.415	0	-37.298
N+3.45	B261	ENVOLVENTE MIN	0.785	0	-17.55	0	-1.415	0	-19.289
N+3.45	B261	ENVOLVENTE MIN	1.57	0	-9.84	0	-1.415	0	-10.513
N+3.45	B262	ENVOLVENTE MAX	0	0	13.1	0	1.2	0	-2.643
N+3.45	B262	ENVOLVENTE MAX	1.075	0	29.16	0	1.2	0	-4.904
N+3.45	B262	ENVOLVENTE MAX	2.15	0	46.05	0	1.2	0	-14.631
N+3.45	B262	ENVOLVENTE MIN	0	0	-0.16	0	-1.305	0	-8.967
N+3.45	B262	ENVOLVENTE MIN	1.075	0	5.57	0	-1.305	0	-28.712
N+3.45	B262	ENVOLVENTE MIN	2.15	0	11.31	0	-1.305	0	-71.667
N+3.45	B264	ENVOLVENTE MAX	0	0	10.39	0	1.188	0	-2.688
N+3.45	B264	ENVOLVENTE MAX	1.075	0	25.24	0	1.188	0	-4.385
N+3.45	B264	ENVOLVENTE MAX	2.15	0	42.13	0	1.188	0	-13.529
N+3.45	B264	ENVOLVENTE MIN	0	0	-0.7	0	-1.663	0	-8.876
N+3.45	B264	ENVOLVENTE MIN	1.075	0	5.03	0	-1.663	0	-24.398
N+3.45	B264	ENVOLVENTE MIN	2.15	0	10.77	0	-1.663	0	-63.131
N+3.45	B265	ENVOLVENTE MAX	0	0	-4.15	0	1.929	0	-3.486
N+3.45	B265	ENVOLVENTE MAX	0.785	0	-0.68	0	1.929	0	-1.336
N+3.45	B265	ENVOLVENTE MAX	1.57	0	2.79	0	1.929	0	-2.408
N+3.45	B265	ENVOLVENTE MIN	0	0	-22.95	0	-1.299	0	-32.431
N+3.45	B265	ENVOLVENTE MIN	0.785	0	-15.13	0	-1.299	0	-16.788
N+3.45	B265	ENVOLVENTE MIN	1.57	0	-7.42	0	-1.299	0	-9.805
N+3.45	B267	ENVOLVENTE MAX	0	0	10.67	0	1.215	0	-2.709
N+3.45	B267	ENVOLVENTE MAX	1.075	0	25.45	0	1.215	0	-4.306
N+3.45	B267	ENVOLVENTE MAX	2.15	0	42.34	0	1.215	0	-13.37

N+3.45	B267	ENVOLVENTE MIN	0	0	-0.78	0	-1.631	0	-8.774
N+3.45	B267	ENVOLVENTE MIN	1.075	0	4.96	0	-1.631	0	-24.523
N+3.45	B267	ENVOLVENTE MIN	2.15	0	10.69	0	-1.631	0	-63.484
N+3.45	B268	ENVOLVENTE MAX	0	0	-4.51	0	1.732	0	-3.634
N+3.45	B268	ENVOLVENTE MAX	0.785	0	-1.04	0	1.732	0	-1.199
N+3.45	B268	ENVOLVENTE MAX	1.57	0	2.43	0	1.732	0	-1.995
N+3.45	B268	ENVOLVENTE MIN	0	0	-24.41	0	-1.435	0	-33.164
N+3.45	B268	ENVOLVENTE MIN	0.785	0	-16.07	0	-1.435	0	-16.783
N+3.45	B268	ENVOLVENTE MIN	1.57	0	-8.36	0	-1.435	0	-8.647
N+3.45	B272	ENVOLVENTE MAX	0	0	11.8	0	1.169	0	-2.223
N+3.45	B272	ENVOLVENTE MAX	1.075	0	25.95	0	1.169	0	-3.235
N+3.45	B272	ENVOLVENTE MAX	2.15	0	42.84	0	1.169	0	-11.7
N+3.45	B272	ENVOLVENTE MIN	0	0	-1.33	0	-1.453	0	-8.135
N+3.45	B272	ENVOLVENTE MIN	1.075	0	4.4	0	-1.453	0	-25.019
N+3.45	B272	ENVOLVENTE MIN	2.15	0	10.13	0	-1.453	0	-63.921
N+3.45	B273	ENVOLVENTE MAX	0	0	-4.3	0	1.852	0	-2.719
N+3.45	B273	ENVOLVENTE MAX	0.785	0	-0.83	0	1.852	0	-0.448
N+3.45	B273	ENVOLVENTE MAX	1.57	0	2.64	0	1.852	0	-1.401
N+3.45	B273	ENVOLVENTE MIN	0	0	-25.63	0	-1.232	0	-35.313
N+3.45	B273	ENVOLVENTE MIN	0.785	0	-17.69	0	-1.232	0	-17.665
N+3.45	B273	ENVOLVENTE MIN	1.57	0	-9.98	0	-1.232	0	-7.754
N+3.45	B275	ENVOLVENTE MAX	0	0	12.51	0	1.081	0	-2.351
N+3.45	B275	ENVOLVENTE MAX	1.075	0	25.93	0	1.081	0	-2.498
N+3.45	B275	ENVOLVENTE MAX	2.15	0	42.77	0	1.081	0	-10.115
N+3.45	B275	ENVOLVENTE MIN	0	0	-2.12	0	-1.468	0	-8.557
N+3.45	B275	ENVOLVENTE MIN	1.075	0	3.61	0	-1.468	0	-26.134
N+3.45	B275	ENVOLVENTE MIN	2.15	0	9.35	0	-1.468	0	-64.2
N+3.45	B276	ENVOLVENTE MAX	0	0	-2.71	0	1.649	0	-0.422
N+3.45	B276	ENVOLVENTE MAX	0.785	0	0.76	0	1.649	0	0.595
N+3.45	B276	ENVOLVENTE MAX	1.57	0	4.23	0	1.649	0	-1.621
N+3.45	B276	ENVOLVENTE MIN	0	0	-25.59	0	-1.344	0	-36.804
N+3.45	B276	ENVOLVENTE MIN	0.785	0	-17.89	0	-1.344	0	-18.996
N+3.45	B276	ENVOLVENTE MIN	1.57	0	-10.18	0	-1.344	0	-9.134
N+3.45	B278	ENVOLVENTE MAX	0	0	14.31	0	1.4	0	-1.676
N+3.45	B278	ENVOLVENTE MAX	1.075	0	27.73	0	1.4	0	-2.019
N+3.45	B278	ENVOLVENTE MAX	2.15	0	44.57	0	1.4	0	-9.828
N+3.45	B278	ENVOLVENTE MIN	0	0	-1.94	0	-1.465	0	-7.151
N+3.45	B278	ENVOLVENTE MIN	1.075	0	3.79	0	-1.465	0	-27.109
N+3.45	B278	ENVOLVENTE MIN	2.15	0	9.52	0	-1.465	0	-66.665
N+3.45	B279	ENVOLVENTE MAX	0	0	-3.27	0	2.155	0	-0.869
N+3.45	B279	ENVOLVENTE MAX	0.785	0	0.2	0	2.155	0	0.592
N+3.45	B279	ENVOLVENTE MAX	1.57	0	3.67	0	2.155	0	-1.179
N+3.45	B279	ENVOLVENTE MIN	0	0	-27.77	0	-1.249	0	-40.26
N+3.45	B279	ENVOLVENTE MIN	0.785	0	-20.07	0	-1.249	0	-20.74
N+3.45	B279	ENVOLVENTE MIN	1.57	0	-12.36	0	-1.249	0	-8.885
N+6.65	B283	ENVOLVENTE MAX	0	0	84.87	0	11.433	0	-0.023
N+6.65	B283	ENVOLVENTE MAX	1.075	0	90.44	0	11.433	0	-19.97
N+6.65	B283	ENVOLVENTE MAX	2.15	0	96.02	0	11.433	0	-44.343
N+6.65	B283	ENVOLVENTE MIN	0	0	16.4	0	-12.718	0	-0.256
N+6.65	B283	ENVOLVENTE MIN	1.075	0	20.58	0	-12.718	0	-94.487
N+6.65	B283	ENVOLVENTE MIN	2.15	0	24.76	0	-12.718	0	-194.71
N+3.45	B283	ENVOLVENTE MAX	0	0	77.55	0	22.492	0	9.185
N+3.45	B283	ENVOLVENTE MAX	1.075	0	98.62	0	22.492	0	-27.165
N+3.45	B283	ENVOLVENTE MAX	2.15	0	119.69	0	22.492	0	-68.638
N+3.45	B283	ENVOLVENTE MIN	0	0	24.67	0	-27.107	0	2.774
N+3.45	B283	ENVOLVENTE MIN	1.075	0	33.54	0	-27.107	0	-82.98
N+3.45	B283	ENVOLVENTE MIN	2.15	0	42.41	0	-27.107	0	-202.848
N+3.45	B285	ENVOLVENTE MAX	0	0	10.4	0	1.218	0	-2.782
N+3.45	B285	ENVOLVENTE MAX	1.075	0	25.24	0	1.218	0	-4.441
N+3.45	B285	ENVOLVENTE MAX	2.15	0	42.13	0	1.218	0	-13.567
N+3.45	B285	ENVOLVENTE MIN	0	0	-0.72	0	-1.556	0	-9.389
N+3.45	B285	ENVOLVENTE MIN	1.075	0	5.01	0	-1.556	0	-24.919
N+3.45	B285	ENVOLVENTE MIN	2.15	0	10.75	0	-1.556	0	-63.661
N+6.65	B292	ENVOLVENTE MAX	0	0	-5.53	0	1.382	0	-4.368
N+6.65	B292	ENVOLVENTE MAX	0.785	0	-1.45	0	1.382	0	-1.293
N+6.65	B292	ENVOLVENTE MAX	1.57	0	2.63	0	1.382	0	-2.091
N+6.65	B292	ENVOLVENTE MIN	0	0	-25.16	0	-0.964	0	-35.339
N+6.65	B292	ENVOLVENTE MIN	0.785	0	-14.91	0	-0.964	0	-18.572
N+6.65	B292	ENVOLVENTE MIN	1.57	0	-6.39	0	-0.964	0	-12.129
N+6.65	B293	ENVOLVENTE MAX	0	0	-31.27	0	20.668	0	-11.795
N+6.65	B293	ENVOLVENTE MAX	1.915	0	-15.04	0	20.668	0	115.585
N+6.65	B293	ENVOLVENTE MAX	3.83	0	4.59	0	20.668	0	170.724
N+6.65	B293	ENVOLVENTE MIN	0	0	-143.04	0	-1.002	0	-95.414
N+6.65	B293	ENVOLVENTE MIN	1.915	0	-69.49	0	-1.002	0	24.238
N+6.65	B293	ENVOLVENTE MIN	3.83	0	-4.66	0	-1.002	0	42.855
N+6.65	B294	ENVOLVENTE MAX	0	0	8.09	0	1.528	0	170.987
N+6.65	B294	ENVOLVENTE MAX	1.81	0	73.29	0	1.528	0	106.862
N+6.65	B294	ENVOLVENTE MAX	3.62	0	141.8	0	1.528	0	-11.078

N+6.65	B294	ENVOLVENTE MIN	0	0	0.73	0	-21.815	0	42.715
N+6.65	B294	ENVOLVENTE MIN	1.81	0	15.75	0	-21.815	0	22.11
N+6.65	B294	ENVOLVENTE MIN	3.62	0	30.78	0	-21.815	0	-94.34
N+6.65	B296	ENVOLVENTE MAX	0	0	-0.62	0	0.898	0	42.483
N+6.65	B296	ENVOLVENTE MAX	1.65	0	40.39	0	0.898	0	28.633
N+6.65	B296	ENVOLVENTE MAX	3.3	0	81.5	0	0.898	0	-5.757
N+6.65	B296	ENVOLVENTE MIN	0	0	-8.75	0	-0.71	0	-2.137
N+6.65	B296	ENVOLVENTE MIN	1.65	0	6.22	0	-0.71	0	-6.072
N+6.65	B296	ENVOLVENTE MIN	3.3	0	20.72	0	-0.71	0	-90.796
N+3.45	B297	ENVOLVENTE MAX	0	0	-19.07	0	0.726	0	-4.642
N+3.45	B297	ENVOLVENTE MAX	1.82	0	-5.69	0	0.726	0	54.736
N+3.45	B297	ENVOLVENTE MAX	3.64	0	18.45	0	0.726	0	49.62
N+3.45	B297	ENVOLVENTE MIN	0	0	-67.16	0	-0.636	0	-41.15
N+3.45	B297	ENVOLVENTE MIN	1.82	0	-24.35	0	-0.636	0	12.636
N+3.45	B297	ENVOLVENTE MIN	3.64	0	1.21	0	-0.636	0	14.661
N+3.45	B298	ENVOLVENTE MAX	0	0	10.2	0	1.476	0	50.822
N+3.45	B298	ENVOLVENTE MAX	1.72	0	48.04	0	1.476	0	14.576
N+3.45	B298	ENVOLVENTE MAX	3.44	0	87.21	0	1.476	0	-25.302
N+3.45	B298	ENVOLVENTE MIN	0	0	-0.17	0	0.199	0	14.376
N+3.45	B298	ENVOLVENTE MIN	1.72	0	12.15	0	0.199	0	-0.469
N+3.45	B298	ENVOLVENTE MIN	3.44	0	24.46	0	0.199	0	-114.447
N+3.45	B299	ENVOLVENTE MAX	0	0	-19.04	0	0.749	0	-4.897
N+3.45	B299	ENVOLVENTE MAX	1.82	0	-5.81	0	0.749	0	54.232
N+3.45	B299	ENVOLVENTE MAX	3.64	0	17.1	0	0.749	0	51.463
N+3.45	B299	ENVOLVENTE MIN	0	0	-67.39	0	-0.749	0	-41.605
N+3.45	B299	ENVOLVENTE MIN	1.82	0	-25.15	0	-0.749	0	12.243
N+3.45	B299	ENVOLVENTE MIN	3.64	0	0.98	0	-0.749	0	14.698
N+3.45	B300	ENVOLVENTE MAX	0	0	11.2	0	-0.31	0	52.64
N+3.45	B300	ENVOLVENTE MAX	1.72	0	48.91	0	-0.31	0	14.463
N+3.45	B300	ENVOLVENTE MAX	3.44	0	87.64	0	-0.31	0	-24.59
N+3.45	B300	ENVOLVENTE MIN	0	0	0.18	0	-1.636	0	14.15
N+3.45	B300	ENVOLVENTE MIN	1.72	0	12.38	0	-1.636	0	-0.877
N+3.45	B300	ENVOLVENTE MIN	3.44	0	24.58	0	-1.636	0	-115.594
N+3.45	B301	ENVOLVENTE MAX	0	0	-24.19	0	1.203	0	-16.18
N+3.45	B301	ENVOLVENTE MAX	1.33	0	-16.02	0	1.203	0	11.839
N+3.45	B301	ENVOLVENTE MAX	2.66	0	-7.86	0	1.203	0	53.647
N+3.45	B301	ENVOLVENTE MIN	0	0	-88.68	0	-1.733	0	-115.642
N+3.45	B301	ENVOLVENTE MIN	1.33	0	-63.64	0	-1.733	0	-22.58
N+3.45	B301	ENVOLVENTE MIN	2.66	0	-38.61	0	-1.733	0	4.526
N+3.45	B302	ENVOLVENTE MAX	0	0	-3.03	0	0.155	0	55.648
N+3.45	B302	ENVOLVENTE MAX	1.335	0	5.19	0	0.155	0	85.954
N+3.45	B302	ENVOLVENTE MAX	2.67	0	21.94	0	0.155	0	72.922
N+3.45	B302	ENVOLVENTE MIN	0	0	-31.88	0	-0.095	0	5.862
N+3.45	B302	ENVOLVENTE MIN	1.335	0	-12.01	0	-0.095	0	24.332
N+3.45	B302	ENVOLVENTE MIN	2.67	0	-0.68	0	-0.095	0	12.276
N+3.45	B303	ENVOLVENTE MAX	0	0	28.32	0	1.711	0	71.315
N+3.45	B303	ENVOLVENTE MAX	1.435	0	57.17	0	1.711	0	26.366
N+3.45	B303	ENVOLVENTE MAX	2.87	0	86.02	0	1.711	0	-9.544
N+3.45	B303	ENVOLVENTE MIN	0	0	4.51	0	-1.154	0	11.002
N+3.45	B303	ENVOLVENTE MIN	1.435	0	13.79	0	-1.154	0	-10.013
N+3.45	B303	ENVOLVENTE MIN	2.87	0	23.07	0	-1.154	0	-92.762
N+3.45	B304	ENVOLVENTE MAX	0	0	-23.41	0	2.057	0	-23.712
N+3.45	B304	ENVOLVENTE MAX	1.875	0	-9.6	0	2.057	0	20.274
N+3.45	B304	ENVOLVENTE MAX	3.75	0	5.14	0	2.057	0	46.054
N+3.45	B304	ENVOLVENTE MIN	0	0	-86.3	0	0.37	0	-111.917
N+3.45	B304	ENVOLVENTE MIN	1.875	0	-42.13	0	0.37	0	0.565
N+3.45	B304	ENVOLVENTE MIN	3.75	0	-2.82	0	0.37	0	10.975
N+3.45	B305	ENVOLVENTE MAX	0	0	7.17	0	-0.3	0	46.182
N+3.45	B305	ENVOLVENTE MAX	1.725	0	43.62	0	-0.3	0	15.98
N+3.45	B305	ENVOLVENTE MAX	3.45	0	82.52	0	-0.3	0	-21.506
N+3.45	B305	ENVOLVENTE MIN	0	0	-2	0	-1.957	0	10.686
N+3.45	B305	ENVOLVENTE MIN	1.725	0	10.25	0	-1.957	0	-1.463
N+3.45	B305	ENVOLVENTE MIN	3.45	0	22.5	0	-1.957	0	-104.29
N+3.45	B306	ENVOLVENTE MAX	0	0	-22.72	0	1.117	0	-13.95
N+3.45	B306	ENVOLVENTE MAX	1.33	0	-14.56	0	1.117	0	12.087
N+3.45	B306	ENVOLVENTE MAX	2.66	0	-6.39	0	1.117	0	44.652
N+3.45	B306	ENVOLVENTE MIN	0	0	-78.8	0	-1.258	0	-100.307
N+3.45	B306	ENVOLVENTE MIN	1.33	0	-53.76	0	-1.258	0	-21.055
N+3.45	B306	ENVOLVENTE MIN	2.66	0	-28.72	0	-1.258	0	2.523
N+3.45	B308	ENVOLVENTE MAX	0	0	-23.29	0	-0.262	0	-22.591
N+3.45	B308	ENVOLVENTE MAX	1.875	0	-9.32	0	-0.262	0	20.474
N+3.45	B308	ENVOLVENTE MAX	3.75	0	6.35	0	-0.262	0	43.671
N+3.45	B308	ENVOLVENTE MIN	0	0	-85.96	0	-1.856	0	-110.639
N+3.45	B308	ENVOLVENTE MIN	1.875	0	-41.15	0	-1.856	0	0.87
N+3.45	B308	ENVOLVENTE MIN	3.75	0	-2.32	0	-1.856	0	10.374
N+3.45	B309	ENVOLVENTE MAX	0	0	5.98	0	1.788	0	43.901
N+3.45	B309	ENVOLVENTE MAX	1.725	0	42.63	0	1.788	0	15.844
N+3.45	B309	ENVOLVENTE MAX	3.45	0	81.98	0	1.788	0	-22.553

N+3.45	B309	ENVOLVENTE MIN	0	0	-2.29	0	0.19	0	10.459
N+3.45	B309	ENVOLVENTE MIN	1.725	0	10.08	0	0.19	0	-1.282
N+3.45	B309	ENVOLVENTE MIN	3.45	0	22.44	0	0.19	0	-103.187
N+3.45	B310	ENVOLVENTE MAX	0	0	-2.87	0	0.093	0	47.066
N+3.45	B310	ENVOLVENTE MAX	1.335	0	5.34	0	0.093	0	76.546
N+3.45	B310	ENVOLVENTE MAX	2.67	0	22.3	0	0.093	0	63.112
N+3.45	B310	ENVOLVENTE MIN	0	0	-31.9	0	-0.114	0	4.776
N+3.45	B310	ENVOLVENTE MIN	1.335	0	-12.03	0	-0.114	0	23.665
N+3.45	B310	ENVOLVENTE MIN	2.67	0	-0.91	0	-0.114	0	11.208
N+3.45	B311	ENVOLVENTE MAX	0	0	19.41	0	1.264	0	59.689
N+3.45	B311	ENVOLVENTE MAX	1.435	0	48.27	0	1.264	0	27.272
N+3.45	B311	ENVOLVENTE MAX	2.87	0	77.12	0	1.264	0	-7.397
N+3.45	B311	ENVOLVENTE MIN	0	0	3.28	0	-1.055	0	9.063
N+3.45	B311	ENVOLVENTE MIN	1.435	0	12.56	0	-1.055	0	-9.693
N+3.45	B311	ENVOLVENTE MIN	2.87	0	21.84	0	-1.055	0	-81.084
N+3.45	B312	ENVOLVENTE MAX	0	0	-24.02	0	0.056	0	-23.917
N+3.45	B312	ENVOLVENTE MAX	1.915	0	-9.62	0	0.056	0	23.568
N+3.45	B312	ENVOLVENTE MAX	3.83	0	7.19	0	0.056	0	46.754
N+3.45	B312	ENVOLVENTE MIN	0	0	-87.56	0	-1.039	0	-111.402
N+3.45	B312	ENVOLVENTE MIN	1.915	0	-41.29	0	-1.039	0	1.985
N+3.45	B312	ENVOLVENTE MIN	3.83	0	-2.03	0	-1.039	0	10.633
N+3.45	B313	ENVOLVENTE MAX	0	0	4.23	0	1.27	0	46.939
N+3.45	B313	ENVOLVENTE MAX	1.81	0	43.35	0	1.27	0	18.388
N+3.45	B313	ENVOLVENTE MAX	3.62	0	85.79	0	1.27	0	-24.735
N+3.45	B313	ENVOLVENTE MIN	0	0	-3.02	0	-0.126	0	10.616
N+3.45	B313	ENVOLVENTE MIN	1.81	0	10.25	0	-0.126	0	-0.103
N+3.45	B313	ENVOLVENTE MIN	3.62	0	23.53	0	-0.126	0	-109.973
N+3.45	B314	ENVOLVENTE MAX	0	0	-24.74	0	1.807	0	-25.723
N+3.45	B314	ENVOLVENTE MAX	1.915	0	-10.52	0	1.807	0	23.88
N+3.45	B314	ENVOLVENTE MAX	3.83	0	4.64	0	1.807	0	52.768
N+3.45	B314	ENVOLVENTE MIN	0	0	-89.26	0	0.238	0	-114.543
N+3.45	B314	ENVOLVENTE MIN	1.915	0	-43.68	0	0.238	0	1.996
N+3.45	B314	ENVOLVENTE MIN	3.83	0	-2.72	0	0.238	0	13.233
N+3.45	B315	ENVOLVENTE MAX	0	0	6.42	0	-0.197	0	52.839
N+3.45	B315	ENVOLVENTE MAX	1.81	0	45.91	0	-0.197	0	18.888
N+3.45	B315	ENVOLVENTE MAX	3.62	0	87.8	0	-0.197	0	-24.836
N+3.45	B315	ENVOLVENTE MIN	0	0	-1.91	0	-2.086	0	12.813
N+3.45	B315	ENVOLVENTE MIN	1.81	0	11.22	0	-2.086	0	-0.088
N+3.45	B315	ENVOLVENTE MIN	3.62	0	24.35	0	-2.086	0	-113.348
N+3.45	B316	ENVOLVENTE MAX	0	0	-23.36	0	1.141	0	-14.5
N+3.45	B316	ENVOLVENTE MAX	1.33	0	-15.2	0	1.141	0	12.383
N+3.45	B316	ENVOLVENTE MAX	2.66	0	-7.03	0	1.141	0	47.638
N+3.45	B316	ENVOLVENTE MIN	0	0	-81.41	0	-1.164	0	-103.541
N+3.45	B316	ENVOLVENTE MIN	1.33	0	-56.38	0	-1.164	0	-21.099
N+3.45	B316	ENVOLVENTE MIN	2.66	0	-31.34	0	-1.164	0	3.308
N+3.45	B317	ENVOLVENTE MAX	0	0	-3.8	0	0.126	0	50.023
N+3.45	B317	ENVOLVENTE MAX	1.335	0	4.42	0	0.126	0	82.702
N+3.45	B317	ENVOLVENTE MAX	2.67	0	20.43	0	0.126	0	72.043
N+3.45	B317	ENVOLVENTE MIN	0	0	-33.46	0	-0.096	0	5.578
N+3.45	B317	ENVOLVENTE MIN	1.335	0	-13.48	0	-0.096	0	25.161
N+3.45	B317	ENVOLVENTE MIN	2.67	0	-1.41	0	-0.096	0	14.634
N+3.45	B318	ENVOLVENTE MAX	0	0	21.03	0	1.277	0	70.435
N+3.45	B318	ENVOLVENTE MAX	1.435	0	49.88	0	1.277	0	32.342
N+3.45	B318	ENVOLVENTE MAX	2.87	0	78.73	0	1.277	0	-7.394
N+3.45	B318	ENVOLVENTE MIN	0	0	4.23	0	-1.074	0	13.032
N+3.45	B318	ENVOLVENTE MIN	1.435	0	13.51	0	-1.074	0	-4.807
N+3.45	B318	ENVOLVENTE MIN	2.87	0	22.8	0	-1.074	0	-72.908
N+3.45	B319	ENVOLVENTE MAX	0	0	-22.54	0	-0.281	0	-21.406
N+3.45	B319	ENVOLVENTE MAX	1.82	0	-9.16	0	-0.281	0	19.663
N+3.45	B319	ENVOLVENTE MAX	3.64	0	5.64	0	-0.281	0	42.306
N+3.45	B319	ENVOLVENTE MIN	0	0	-82.75	0	-1.865	0	-103.1
N+3.45	B319	ENVOLVENTE MIN	1.82	0	-39.95	0	-1.865	0	0.646
N+3.45	B319	ENVOLVENTE MIN	3.64	0	-2.74	0	-1.865	0	9.972
N+3.45	B320	ENVOLVENTE MAX	0	0	6.05	0	2.121	0	42.462
N+3.45	B320	ENVOLVENTE MAX	1.72	0	42.53	0	2.121	0	14.964
N+3.45	B320	ENVOLVENTE MAX	3.44	0	81.7	0	2.121	0	-22.226
N+3.45	B320	ENVOLVENTE MIN	0	0	-2.42	0	0.285	0	10.034
N+3.45	B320	ENVOLVENTE MIN	1.72	0	9.89	0	0.285	0	-1.531
N+3.45	B320	ENVOLVENTE MIN	3.44	0	22.2	0	0.285	0	-103.847
N+3.45	B321	ENVOLVENTE MAX	0	0	-22.49	0	1.871	0	-22.207
N+3.45	B321	ENVOLVENTE MAX	1.82	0	-9.25	0	1.871	0	19.576
N+3.45	B321	ENVOLVENTE MAX	3.64	0	4.82	0	1.871	0	43.921
N+3.45	B321	ENVOLVENTE MIN	0	0	-82.78	0	0.308	0	-103.643
N+3.45	B321	ENVOLVENTE MIN	1.82	0	-40.54	0	0.308	0	0.388
N+3.45	B321	ENVOLVENTE MIN	3.64	0	-3.08	0	0.308	0	10.254
N+3.45	B322	ENVOLVENTE MAX	0	0	7.49	0	-0.368	0	44.057
N+3.45	B322	ENVOLVENTE MAX	1.72	0	43.83	0	-0.368	0	14.101
N+3.45	B322	ENVOLVENTE MAX	3.44	0	82.56	0	-0.368	0	-21.95

N+3.45	B322	ENVOLVENTE MIN	0	0	-2	0	-2.141	0	9.963
N+3.45	B322	ENVOLVENTE MIN	1.72	0	10.2	0	-2.141	0	-2.182
N+3.45	B322	ENVOLVENTE MIN	3.44	0	22.4	0	-2.141	0	-106.708
N+3.45	B323	ENVOLVENTE MAX	0	0	-22.41	0	1.157	0	-13.467
N+3.45	B323	ENVOLVENTE MAX	1.33	0	-14.25	0	1.157	0	12.153
N+3.45	B323	ENVOLVENTE MAX	2.66	0	-6.09	0	1.157	0	43.512
N+3.45	B323	ENVOLVENTE MIN	0	0	-78.14	0	-1.212	0	-100.287
N+3.45	B323	ENVOLVENTE MIN	1.33	0	-53.1	0	-1.212	0	-22.071
N+3.45	B323	ENVOLVENTE MIN	2.66	0	-28.06	0	-1.212	0	1.692
N+3.45	B324	ENVOLVENTE MAX	0	0	-2.74	0	0.152	0	45.945
N+3.45	B324	ENVOLVENTE MAX	1.335	0	5.48	0	0.152	0	74.931
N+3.45	B324	ENVOLVENTE MAX	2.67	0	22.41	0	0.152	0	61.597
N+3.45	B324	ENVOLVENTE MIN	0	0	-32.15	0	-0.073	0	3.948
N+3.45	B324	ENVOLVENTE MIN	1.335	0	-12.29	0	-0.073	0	23.161
N+3.45	B324	ENVOLVENTE MIN	2.67	0	-1.14	0	-0.073	0	10.506
N+3.45	B325	ENVOLVENTE MAX	0	0	18.46	0	1.284	0	57.793
N+3.45	B325	ENVOLVENTE MAX	1.435	0	47.31	0	1.284	0	27.215
N+3.45	B325	ENVOLVENTE MAX	2.87	0	76.16	0	1.284	0	-6.551
N+3.45	B325	ENVOLVENTE MIN	0	0	2.87	0	-1.056	0	8.194
N+3.45	B325	ENVOLVENTE MIN	1.435	0	12.15	0	-1.056	0	-10.008
N+3.45	B325	ENVOLVENTE MIN	2.87	0	21.44	0	-1.056	0	-80.589
N+3.45	B326	ENVOLVENTE MAX	0	0	-23.26	0	-0.395	0	-21.041
N+3.45	B326	ENVOLVENTE MAX	1.79	0	-10.21	0	-0.395	0	22.73
N+3.45	B326	ENVOLVENTE MAX	3.58	0	2.85	0	-0.395	0	56.025
N+3.45	B326	ENVOLVENTE MIN	0	0	-86.83	0	-2.312	0	-105.49
N+3.45	B326	ENVOLVENTE MIN	1.79	0	-45.12	0	-2.312	0	1.864
N+3.45	B326	ENVOLVENTE MIN	3.58	0	-6.7	0	-2.312	0	13.741
N+3.45	B327	ENVOLVENTE MAX	0	0	3.25	0	0.339	0	57.85
N+3.45	B327	ENVOLVENTE MAX	1.685	0	35.21	0	0.339	0	39.339
N+3.45	B327	ENVOLVENTE MAX	3.37	0	73.1	0	0.339	0	-5.718
N+3.45	B327	ENVOLVENTE MIN	0	0	-6.29	0	-1.916	0	14.103
N+3.45	B327	ENVOLVENTE MIN	1.685	0	6.87	0	-1.916	0	4.922
N+3.45	B327	ENVOLVENTE MIN	3.37	0	18.81	0	-1.916	0	-60.818
N+3.45	B328	ENVOLVENTE MAX	0	0	-23.41	0	2.464	0	-22.749
N+3.45	B328	ENVOLVENTE MAX	1.79	0	-10.49	0	2.464	0	21.346
N+3.45	B328	ENVOLVENTE MAX	3.58	0	2.44	0	2.464	0	56.552
N+3.45	B328	ENVOLVENTE MIN	0	0	-87.23	0	0.498	0	-108.281
N+3.45	B328	ENVOLVENTE MIN	1.79	0	-46.04	0	0.498	0	1.014
N+3.45	B328	ENVOLVENTE MIN	3.58	0	-7.86	0	0.498	0	13.627
N+3.45	B329	ENVOLVENTE MAX	0	0	3.6	0	2.06	0	57.963
N+3.45	B329	ENVOLVENTE MAX	1.685	0	35.08	0	2.06	0	39.085
N+3.45	B329	ENVOLVENTE MAX	3.37	0	72.58	0	2.06	0	-4.026
N+3.45	B329	ENVOLVENTE MIN	0	0	-6.44	0	-0.104	0	13.497
N+3.45	B329	ENVOLVENTE MIN	1.685	0	6.47	0	-0.104	0	4.867
N+3.45	B329	ENVOLVENTE MIN	3.37	0	18.31	0	-0.104	0	-61.162
N+3.45	B330	ENVOLVENTE MAX	0	0	-21.82	0	0.628	0	-9.808
N+3.45	B330	ENVOLVENTE MAX	1.33	0	-13.66	0	0.628	0	15.046
N+3.45	B330	ENVOLVENTE MAX	2.66	0	-5.49	0	0.628	0	45.848
N+3.45	B330	ENVOLVENTE MIN	0	0	-78.78	0	-2.385	0	-103.446
N+3.45	B330	ENVOLVENTE MIN	1.33	0	-53.75	0	-2.385	0	-25.284
N+3.45	B330	ENVOLVENTE MIN	2.66	0	-28.71	0	-2.385	0	0.141
N+3.45	B331	ENVOLVENTE MAX	0	0	-1.4	0	0.004	0	45.411
N+3.45	B331	ENVOLVENTE MAX	1.335	0	6.82	0	0.004	0	71.558
N+3.45	B331	ENVOLVENTE MAX	2.67	0	23.9	0	0.004	0	57.799
N+3.45	B331	ENVOLVENTE MIN	0	0	-33.15	0	-0.27	0	1.486
N+3.45	B331	ENVOLVENTE MIN	1.335	0	-13.29	0	-0.27	0	22.054
N+3.45	B331	ENVOLVENTE MIN	2.67	0	-2.29	0	-0.27	0	7.851
N+3.45	B332	ENVOLVENTE MAX	0	0	18.56	0	2.3	0	57.154
N+3.45	B332	ENVOLVENTE MAX	1.435	0	47.41	0	2.3	0	29.361
N+3.45	B332	ENVOLVENTE MAX	2.87	0	76.27	0	2.3	0	-3.336
N+3.45	B332	ENVOLVENTE MIN	0	0	2.37	0	-0.621	0	6.265
N+3.45	B332	ENVOLVENTE MIN	1.435	0	11.66	0	-0.621	0	-13.002
N+3.45	B332	ENVOLVENTE MIN	2.87	0	20.94	0	-0.621	0	-85.029
N+3.45	B333	ENVOLVENTE MAX	0	0	-19.3	0	1.816	0	-5.108
N+3.45	B333	ENVOLVENTE MAX	1.845	0	-5.65	0	1.816	0	47.019
N+3.45	B333	ENVOLVENTE MAX	3.69	0	13.09	0	1.816	0	56.414
N+3.45	B333	ENVOLVENTE MIN	0	0	-76.5	0	-0.143	0	-64.631
N+3.45	B333	ENVOLVENTE MIN	1.845	0	-32.79	0	-0.143	0	7.919
N+3.45	B333	ENVOLVENTE MIN	3.69	0	-1.06	0	-0.143	0	12.688
N+3.45	B334	ENVOLVENTE MAX	0	0	12.17	0	2.562	0	55.074
N+3.45	B334	ENVOLVENTE MAX	1.695	0	48.13	0	2.562	0	16.767
N+3.45	B334	ENVOLVENTE MAX	3.39	0	86.38	0	2.562	0	-22.955
N+3.45	B334	ENVOLVENTE MIN	0	0	-1.22	0	0.09	0	12.027
N+3.45	B334	ENVOLVENTE MIN	1.695	0	10.82	0	0.09	0	-1.028
N+3.45	B334	ENVOLVENTE MIN	3.39	0	22.87	0	0.09	0	-108.082
N+3.45	B335	ENVOLVENTE MAX	0	0	-19.17	0	0.131	0	-5.852
N+3.45	B335	ENVOLVENTE MAX	1.845	0	-5.68	0	0.131	0	46.479
N+3.45	B335	ENVOLVENTE MAX	3.69	0	12.48	0	0.131	0	57.347

N+3.45	B335	ENVOLVENTE MIN	0	0	-76.19	0	-1.957	0	-64.681
N+3.45	B335	ENVOLVENTE MIN	1.845	0	-33.07	0	-1.957	0	7.47
N+3.45	B335	ENVOLVENTE MIN	3.69	0	-1.37	0	-1.957	0	12.872
N+3.45	B336	ENVOLVENTE MAX	0	0	13.03	0	-0.235	0	56.28
N+3.45	B336	ENVOLVENTE MAX	1.695	0	48.91	0	-0.235	0	16.421
N+3.45	B336	ENVOLVENTE MAX	3.39	0	86.77	0	-0.235	0	-22.509
N+3.45	B336	ENVOLVENTE MIN	0	0	-0.79	0	-2.768	0	11.944
N+3.45	B336	ENVOLVENTE MIN	1.695	0	11.15	0	-2.768	0	-1.478
N+3.45	B336	ENVOLVENTE MIN	3.39	0	23.09	0	-2.768	0	-109.539
N+3.45	B337	ENVOLVENTE MAX	0	0	-21.77	0	2.038	0	-5.994
N+3.45	B337	ENVOLVENTE MAX	1.33	0	-13.6	0	2.038	0	18.826
N+3.45	B337	ENVOLVENTE MAX	2.66	0	-5.44	0	2.038	0	50.889
N+3.45	B337	ENVOLVENTE MIN	0	0	-80.27	0	-0.681	0	-108.633
N+3.45	B337	ENVOLVENTE MIN	1.33	0	-55.23	0	-0.681	0	-28.424
N+3.45	B337	ENVOLVENTE MIN	2.66	0	-30.19	0	-0.681	0	-2.247
N+3.45	B338	ENVOLVENTE MAX	0	0	0.38	0	0.286	0	50.324
N+3.45	B338	ENVOLVENTE MAX	1.335	0	8.59	0	0.286	0	74.445
N+3.45	B338	ENVOLVENTE MAX	2.67	0	25.64	0	0.286	0	60.773
N+3.45	B338	ENVOLVENTE MIN	0	0	-34.98	0	-0.116	0	-0.506
N+3.45	B338	ENVOLVENTE MIN	1.335	0	-15.12	0	-0.116	0	22.451
N+3.45	B338	ENVOLVENTE MIN	2.67	0	-4.08	0	-0.116	0	6.638
N+3.45	B339	ENVOLVENTE MAX	0	0	20.76	0	0.651	0	61.321
N+3.45	B339	ENVOLVENTE MAX	1.435	0	49.13	0	0.651	0	33.378
N+3.45	B339	ENVOLVENTE MAX	2.87	0	77.98	0	0.651	0	1.01
N+3.45	B339	ENVOLVENTE MIN	0	0	1.88	0	-1.974	0	4.934
N+3.45	B339	ENVOLVENTE MIN	1.435	0	11.16	0	-1.974	0	-16.457
N+3.45	B339	ENVOLVENTE MIN	2.87	0	20.44	0	-1.974	0	-91.454
N+3.45	B340	ENVOLVENTE MAX	0	0	-24.1	0	-0.083	0	-23.266
N+3.45	B340	ENVOLVENTE MAX	1.845	0	-10.46	0	-0.083	0	24.741
N+3.45	B340	ENVOLVENTE MAX	3.69	0	3.19	0	-0.083	0	59.579
N+3.45	B340	ENVOLVENTE MIN	0	0	-90.29	0	-2.029	0	-112.3
N+3.45	B340	ENVOLVENTE MIN	1.845	0	-46.58	0	-2.029	0	2.681
N+3.45	B340	ENVOLVENTE MIN	3.69	0	-6.77	0	-2.029	0	13.504
N+3.45	B341	ENVOLVENTE MAX	0	0	1.81	0	0.572	0	60.961
N+3.45	B341	ENVOLVENTE MAX	1.695	0	31.26	0	0.572	0	49.41
N+3.45	B341	ENVOLVENTE MAX	3.39	0	69.52	0	0.572	0	-2.283
N+3.45	B341	ENVOLVENTE MIN	0	0	-9.67	0	-2.092	0	13.723
N+3.45	B341	ENVOLVENTE MIN	1.695	0	5.59	0	-2.092	0	9.188
N+3.45	B341	ENVOLVENTE MIN	3.39	0	17.63	0	-2.092	0	-45.659
N+3.45	B342	ENVOLVENTE MAX	0	0	-23.91	0	2.242	0	-23.822
N+3.45	B342	ENVOLVENTE MAX	1.845	0	-10.42	0	2.242	0	23.783
N+3.45	B342	ENVOLVENTE MAX	3.69	0	3.07	0	2.242	0	61.013
N+3.45	B342	ENVOLVENTE MIN	0	0	-90.48	0	0.224	0	-113.738
N+3.45	B342	ENVOLVENTE MIN	1.845	0	-47.36	0	0.224	0	2.228
N+3.45	B342	ENVOLVENTE MIN	3.69	0	-8.14	0	0.224	0	13.578
N+3.45	B343	ENVOLVENTE MAX	0	0	2.05	0	2.042	0	61.966
N+3.45	B343	ENVOLVENTE MAX	1.695	0	31.57	0	2.042	0	49.28
N+3.45	B343	ENVOLVENTE MAX	3.39	0	69.42	0	2.042	0	-0.823
N+3.45	B343	ENVOLVENTE MIN	0	0	-9.16	0	-0.443	0	13.283
N+3.45	B343	ENVOLVENTE MIN	1.695	0	5.64	0	-0.443	0	9.281
N+3.45	B343	ENVOLVENTE MIN	3.39	0	17.58	0	-0.443	0	-47.139
N+3.45	B344	ENVOLVENTE MAX	0	0	-21.92	0	0.842	0	-3.765
N+3.45	B344	ENVOLVENTE MAX	1.33	0	-13.75	0	0.842	0	21.191
N+3.45	B344	ENVOLVENTE MAX	2.66	0	-5.59	0	0.842	0	55.213
N+3.45	B344	ENVOLVENTE MIN	0	0	-83.28	0	-2.05	0	-115.181
N+3.45	B344	ENVOLVENTE MIN	1.33	0	-58.25	0	-2.05	0	-30.96
N+3.45	B344	ENVOLVENTE MIN	2.66	0	-33.21	0	-2.05	0	-2.595
N+3.45	B345	ENVOLVENTE MAX	0	0	1.36	0	0.026	0	54.305
N+3.45	B345	ENVOLVENTE MAX	1.335	0	9.58	0	0.026	0	77.91
N+3.45	B345	ENVOLVENTE MAX	2.67	0	26.64	0	0.026	0	64.456
N+3.45	B345	ENVOLVENTE MIN	0	0	-35.92	0	-0.205	0	-0.822
N+3.45	B345	ENVOLVENTE MIN	1.335	0	-16.05	0	-0.205	0	23.591
N+3.45	B345	ENVOLVENTE MIN	2.67	0	-5.03	0	-0.205	0	6.309
N+3.45	B346	ENVOLVENTE MAX	0	0	23.6	0	2.083	0	65.7
N+3.45	B346	ENVOLVENTE MAX	1.435	0	52.24	0	2.083	0	35.09
N+3.45	B346	ENVOLVENTE MAX	2.87	0	81.1	0	2.083	0	2.509
N+3.45	B346	ENVOLVENTE MIN	0	0	2.29	0	-0.769	0	4.472
N+3.45	B346	ENVOLVENTE MIN	1.435	0	11.57	0	-0.769	0	-18.914
N+3.45	B346	ENVOLVENTE MIN	2.87	0	20.86	0	-0.769	0	-98.361
N+6.65	B347	ENVOLVENTE MAX	0	0	-6.89	0	0.311	0	-4.549
N+6.65	B347	ENVOLVENTE MAX	3.725	0	1.48	0	0.311	0	27.545
N+6.65	B347	ENVOLVENTE MAX	7.45	0	43.1	0	0.311	0	-4.224
N+6.65	B347	ENVOLVENTE MIN	0	0	-43.28	0	-0.334	0	-53.222
N+6.65	B347	ENVOLVENTE MIN	3.725	0	-1.6	0	-0.334	0	5.522
N+6.65	B347	ENVOLVENTE MIN	7.45	0	6.8	0	-0.334	0	-52.569
N+3.45	B347	ENVOLVENTE MAX	0	0	-11.26	0	-1.295	0	-4.974
N+3.45	B347	ENVOLVENTE MAX	3.725	0	7.64	0	-1.295	0	19.492
N+3.45	B347	ENVOLVENTE MAX	3.83	0	7.96	0	-1.295	0	18.938

N+3.45	B347	ENVOLVENTE MAX	3.83	0	2.75	0	4.866	0	18.636
N+3.45	B347	ENVOLVENTE MAX	7.45	0	39.86	0	4.866	0	-5.419
N+3.45	B347	ENVOLVENTE MIN	0	0	-40.64	0	-4.523	0	-51.736
N+3.45	B347	ENVOLVENTE MIN	3.725	0	-1.89	0	-4.523	0	3.983
N+3.45	B347	ENVOLVENTE MIN	3.83	0	-1.66	0	-4.523	0	3.679
N+3.45	B347	ENVOLVENTE MIN	3.83	0	-6.13	0	1.188	0	3.624
N+3.45	B347	ENVOLVENTE MIN	7.45	0	10.83	0	1.188	0	-51.049

FUERZAS EN COLUMNAS

COLUMN FORCES
UNID: kN-m

Story	Column	Load	Loc	P	V2	V3	T	M2	M3
N+3.45	C39	ENVOLVENTE MAX	0	-45.83	63.95	124.25	2.531	261.659	135.031
N+3.45	C39	ENVOLVENTE MAX	1.725	-35.39	63.95	124.25	2.531	77.824	26.562
N+3.45	C39	ENVOLVENTE MAX	3.45	-24.96	63.95	124.25	2.531	64.962	84.414
N+3.45	C39	ENVOLVENTE MIN	0	-272.82	-64.01	-93	-2.585	-256.005	-136.419
N+3.45	C39	ENVOLVENTE MIN	1.725	-258.91	-64.01	-93	-2.585	-126.079	-27.855
N+3.45	C39	ENVOLVENTE MIN	3.45	-245	-64.01	-93	-2.585	-167.124	-85.611
N+3.45	C40	ENVOLVENTE MAX	0	-52.93	63.24	87.14	2.531	235.395	133.232
N+3.45	C40	ENVOLVENTE MAX	1.725	-42.5	63.24	87.14	2.531	93.994	26.307
N+3.45	C40	ENVOLVENTE MAX	3.45	-32.06	63.24	87.14	2.531	159.175	81.291
N+3.45	C40	ENVOLVENTE MIN	0	-306.58	-62.34	-138.62	-2.585	-319.234	-133.779
N+3.45	C40	ENVOLVENTE MIN	1.725	-292.67	-62.34	-138.62	-2.585	-89.043	-28.415
N+3.45	C40	ENVOLVENTE MIN	3.45	-278.76	-62.34	-138.62	-2.585	-65.434	-84.962
N+6.65	C41	ENVOLVENTE MAX	0	-41.31	19.74	62.67	3.814	155.665	27.43
N+6.65	C41	ENVOLVENTE MAX	1.6	-31.64	19.74	62.67	3.814	60.52	17.627
N+6.65	C41	ENVOLVENTE MAX	3.2	-21.96	19.74	62.67	3.814	102.492	171.118
N+6.65	C41	ENVOLVENTE MIN	0	-230.6	-100.22	-50.21	-3.794	-88.793	-149.762
N+6.65	C41	ENVOLVENTE MIN	1.6	-217.69	-100.22	-50.21	-3.794	-13.587	-6.352
N+6.65	C41	ENVOLVENTE MIN	3.2	-204.79	-100.22	-50.21	-3.794	-75.498	-35.907
N+3.45	C41	ENVOLVENTE MAX	0	-186.76	59.49	111.05	2.531	241.017	130.513
N+3.45	C41	ENVOLVENTE MAX	1.725	-176.33	59.49	111.05	2.531	91.988	34.161
N+3.45	C41	ENVOLVENTE MAX	3.45	-165.89	59.49	111.05	2.531	19.971	144.186
N+3.45	C41	ENVOLVENTE MIN	0	-732.98	-89.94	-58.89	-2.585	-213.314	-166.177
N+3.45	C41	ENVOLVENTE MIN	1.725	-719.07	-89.94	-58.89	-2.585	-154.26	-17.301
N+3.45	C41	ENVOLVENTE MIN	3.45	-705.16	-89.94	-58.89	-2.585	-172.216	-74.802
N+6.65	C42	ENVOLVENTE MAX	0	-46.33	16.7	47.03	3.814	81.634	21.336
N+6.65	C42	ENVOLVENTE MAX	1.6	-36.65	16.7	47.03	3.814	11.073	17.461
N+6.65	C42	ENVOLVENTE MAX	3.2	-26.98	16.7	47.03	3.814	77.224	176.833
N+6.65	C42	ENVOLVENTE MIN	0	-262.63	-104.05	-75.7	-3.794	-189.892	-156.315
N+6.65	C42	ENVOLVENTE MIN	1.6	-249.72	-104.05	-75.7	-3.794	-75.659	-7.533
N+6.65	C42	ENVOLVENTE MIN	3.2	-236.82	-104.05	-75.7	-3.794	-93.745	-32.305
N+3.45	C42	ENVOLVENTE MAX	0	-201.84	56.62	60.43	2.531	200.472	126.356
N+3.45	C42	ENVOLVENTE MAX	1.725	-191.41	56.62	60.43	2.531	107.121	35.964
N+3.45	C42	ENVOLVENTE MAX	3.45	-180.98	56.62	60.43	2.531	114.085	149.233
N+3.45	C42	ENVOLVENTE MIN	0	-820.77	-91.81	-105.1	-2.585	-277.517	-167.61
N+3.45	C42	ENVOLVENTE MIN	1.725	-806.86	-91.81	-105.1	-2.585	-107.117	-16.513
N+3.45	C42	ENVOLVENTE MIN	3.45	-792.95	-91.81	-105.1	-2.585	-37.032	-69.079
N+6.65	C44	ENVOLVENTE MAX	0	-81.22	56.57	67.05	6.483	194.001	70.417
N+6.65	C44	ENVOLVENTE MAX	1.6	-69.13	56.57	67.05	6.483	100.887	25.779
N+6.65	C44	ENVOLVENTE MAX	3.2	-57.03	56.57	67.05	6.483	147.503	105.321
N+6.65	C44	ENVOLVENTE MIN	0	-465.12	-51.25	-56.58	-6.449	-76.244	-60.628
N+6.65	C44	ENVOLVENTE MIN	1.6	-449	-51.25	-56.58	-6.449	0.106	-24.507
N+6.65	C44	ENVOLVENTE MIN	3.2	-432.87	-51.25	-56.58	-6.449	-63.274	-112.566
N+3.45	C44	ENVOLVENTE MAX	0	-305.76	110.35	154.22	4.302	318.735	246.059
N+3.45	C44	ENVOLVENTE MAX	1.725	-292.72	110.35	154.22	4.302	103.814	57.435
N+3.45	C44	ENVOLVENTE MAX	3.45	-279.68	110.35	154.22	4.302	-13.959	127.831
N+3.45	C44	ENVOLVENTE MIN	0	-1127.67	-108.25	-62.21	-4.395	-255.895	-246.312
N+3.45	C44	ENVOLVENTE MIN	1.725	-1110.28	-108.25	-62.21	-4.395	-199.702	-61.301
N+3.45	C44	ENVOLVENTE MIN	3.45	-1092.89	-108.25	-62.21	-4.395	-244.668	-135.31
N+6.65	C45	ENVOLVENTE MAX	0	-87.61	55	51.52	6.483	70.812	69.155
N+6.65	C45	ENVOLVENTE MAX	1.6	-75.52	55	51.52	6.483	-3.798	25.565
N+6.65	C45	ENVOLVENTE MAX	3.2	-63.42	55	51.52	6.483	61.551	100.922
N+6.65	C45	ENVOLVENTE MIN	0	-516.99	-48.76	-68.21	-6.449	-226.847	-57.328
N+6.65	C45	ENVOLVENTE MIN	1.6	-500.86	-48.76	-68.21	-6.449	-136.302	-23.725
N+6.65	C45	ENVOLVENTE MIN	3.2	-484.73	-48.76	-68.21	-6.449	-164.183	-109.068
N+3.45	C45	ENVOLVENTE MAX	0	-335.42	108.81	63.9	4.302	238.845	242.506
N+3.45	C45	ENVOLVENTE MAX	1.725	-322.37	108.81	63.9	4.302	142.403	56.6
N+3.45	C45	ENVOLVENTE MAX	3.45	-309.33	108.81	63.9	4.302	176.068	125.93
N+3.45	C45	ENVOLVENTE MIN	0	-1258.65	-106.8	-149.85	-4.395	-368.533	-243.328
N+3.45	C45	ENVOLVENTE MIN	1.725	-1241.26	-106.8	-149.85	-4.395	-123.828	-60.886
N+3.45	C45	ENVOLVENTE MIN	3.45	-1223.87	-106.8	-149.85	-4.395	-9.229	-133.682
N+6.65	C46	ENVOLVENTE MAX	0	-75.81	54.87	64.4	6.483	181.354	66.695

N+6.65	C46	ENVOLVENTE MAX	1.6	-63.72	54.87	64.4	6.483	91.769	21.415
N+6.65	C46	ENVOLVENTE MAX	3.2	-51.62	54.87	64.4	6.483	136.79	99.649
N+6.65	C46	ENVOLVENTE MIN	0	-443.19	-50.44	-51.08	-6.449	-66.976	-63.499
N+6.65	C46	ENVOLVENTE MIN	1.6	-427.06	-50.44	-51.08	-6.449	2.654	-25.304
N+6.65	C46	ENVOLVENTE MIN	3.2	-410.94	-50.44	-51.08	-6.449	-65.061	-110.622
N+3.45	C46	ENVOLVENTE MAX	0	-295.49	109.79	151.03	4.302	318.773	246.254
N+3.45	C46	ENVOLVENTE MAX	1.725	-282.45	109.79	151.03	4.302	105.362	57.324
N+3.45	C46	ENVOLVENTE MAX	3.45	-269.41	109.79	151.03	4.302	-17.838	135.48
N+3.45	C46	ENVOLVENTE MIN	0	-1089.24	-112.01	-64.99	-4.395	-263.208	-251.319
N+3.45	C46	ENVOLVENTE MIN	1.725	-1071.85	-112.01	-64.99	-4.395	-198.222	-58.56
N+3.45	C46	ENVOLVENTE MIN	3.45	-1054.47	-112.01	-64.99	-4.395	-230.87	-132.888
N+6.65	C47	ENVOLVENTE MAX	0	-85.5	51.72	46.73	6.483	61.762	65.26
N+6.65	C47	ENVOLVENTE MAX	1.6	-73.4	51.72	46.73	6.483	-6.998	23.522
N+6.65	C47	ENVOLVENTE MAX	3.2	-61.3	51.72	46.73	6.483	61.651	99.224
N+6.65	C47	ENVOLVENTE MIN	0	-499.62	-49.21	-65	-6.449	-213.696	-60.224
N+6.65	C47	ENVOLVENTE MIN	1.6	-483.49	-49.21	-65	-6.449	-128.775	-22.502
N+6.65	C47	ENVOLVENTE MIN	3.2	-467.37	-49.21	-65	-6.449	-155.124	-102.222
N+3.45	C47	ENVOLVENTE MAX	0	-326.6	108.81	65.77	4.302	244.629	243.358
N+3.45	C47	ENVOLVENTE MAX	1.725	-313.56	108.81	65.77	4.302	141.361	56.131
N+3.45	C47	ENVOLVENTE MAX	3.45	-300.52	108.81	65.77	4.302	163.283	130.69
N+3.45	C47	ENVOLVENTE MIN	0	-1217.5	-109.04	-149.13	-4.395	-372.325	-246.682
N+3.45	C47	ENVOLVENTE MIN	1.725	-1200.12	-109.04	-149.13	-4.395	-125.268	-59.049
N+3.45	C47	ENVOLVENTE MIN	3.45	-1182.73	-109.04	-149.13	-4.395	-3.4	-133.202
N+6.65	C48	ENVOLVENTE MAX	0	-159.69	32.37	120.61	6.483	231.632	56.9
N+6.65	C48	ENVOLVENTE MAX	1.6	-147.59	32.37	120.61	6.483	44.468	55.029
N+6.65	C48	ENVOLVENTE MAX	3.2	-135.5	32.37	120.61	6.483	54.119	175.776
N+6.65	C48	ENVOLVENTE MIN	0	-570.67	-76.93	-29.9	-6.449	-43.594	-76.811
N+6.65	C48	ENVOLVENTE MIN	1.6	-554.54	-76.93	-29.9	-6.449	-1.575	-3.637
N+6.65	C48	ENVOLVENTE MIN	3.2	-538.42	-76.93	-29.9	-6.449	-156.373	-53.081
N+3.45	C48	ENVOLVENTE MAX	0	-358.85	121.36	149.81	4.302	323.016	258.081
N+3.45	C48	ENVOLVENTE MAX	1.725	-345.81	121.36	149.81	4.302	108.347	53.378
N+3.45	C48	ENVOLVENTE MAX	3.45	-332.77	121.36	149.81	4.302	-21.025	115.128
N+3.45	C48	ENVOLVENTE MIN	0	-1147.26	-102.81	-67.54	-4.395	-272.338	-239.978
N+3.45	C48	ENVOLVENTE MIN	1.725	-1129.87	-102.81	-67.54	-4.395	-199.578	-67.281
N+3.45	C48	ENVOLVENTE MIN	3.45	-1112.48	-102.81	-67.54	-4.395	-217.982	-161.038
N+6.65	C49	ENVOLVENTE MAX	0	-98.95	45.07	33.06	6.483	46.531	54.251
N+6.65	C49	ENVOLVENTE MAX	1.6	-86.85	45.07	33.06	6.483	-1.271	25.463
N+6.65	C49	ENVOLVENTE MAX	3.2	-74.76	45.07	33.06	6.483	91.708	111.49
N+6.65	C49	ENVOLVENTE MIN	0	-517.23	-56.11	-97.1	-6.449	-229.803	-72.237
N+6.65	C49	ENVOLVENTE MIN	1.6	-501.1	-56.11	-97.1	-6.449	-85.99	-25.791
N+6.65	C49	ENVOLVENTE MIN	3.2	-484.97	-56.11	-97.1	-6.449	-70.045	-94.16
N+3.45	C49	ENVOLVENTE MAX	0	-344.76	106.45	70.81	4.302	255.915	240.724
N+3.45	C49	ENVOLVENTE MAX	1.725	-331.72	106.45	70.81	4.302	139.325	58.694
N+3.45	C49	ENVOLVENTE MAX	3.45	-318.68	106.45	70.81	4.302	144.524	140.557
N+3.45	C49	ENVOLVENTE MIN	0	-1250.35	-113.59	-145.45	-4.395	-374.985	-251.75
N+3.45	C49	ENVOLVENTE MIN	1.725	-1232.96	-113.59	-145.45	-4.395	-129.636	-57.401
N+3.45	C49	ENVOLVENTE MIN	3.45	-1215.58	-113.59	-145.45	-4.395	-6.074	-126.944
N+6.65	C50	ENVOLVENTE MAX	0	-158.47	74.61	121.9	6.483	228.344	75.137
N+6.65	C50	ENVOLVENTE MAX	1.6	-146.37	74.61	121.9	6.483	41.838	2.823
N+6.65	C50	ENVOLVENTE MAX	3.2	-134.28	74.61	121.9	6.483	59.452	53.275
N+6.65	C50	ENVOLVENTE MIN	0	-572.48	-33.04	-29.97	-6.449	-38.041	-60.76
N+6.65	C50	ENVOLVENTE MIN	1.6	-556.35	-33.04	-29.97	-6.449	1.372	-54.959
N+6.65	C50	ENVOLVENTE MIN	3.2	-540.22	-33.04	-29.97	-6.449	-163.335	-171.922
N+3.45	C50	ENVOLVENTE MAX	0	-358.32	101.86	162.35	4.302	357.456	237.413
N+3.45	C50	ENVOLVENTE MAX	1.725	-345.28	101.86	162.35	4.302	120.36	65.25
N+3.45	C50	ENVOLVENTE MAX	3.45	-332.23	101.86	162.35	4.302	-19.564	165.016
N+3.45	C50	ENVOLVENTE MIN	0	-1156.05	-124.65	-80.87	-4.395	-308.469	-265.416
N+3.45	C50	ENVOLVENTE MIN	1.725	-1138.66	-124.65	-80.87	-4.395	-211.927	-53.944
N+3.45	C50	ENVOLVENTE MIN	3.45	-1121.28	-124.65	-80.87	-4.395	-216.752	-114.401
N+6.65	C51	ENVOLVENTE MAX	0	-97.09	54.64	32.66	6.483	41.178	70.632
N+6.65	C51	ENVOLVENTE MAX	1.6	-84.99	54.64	32.66	6.483	-4.389	26.052
N+6.65	C51	ENVOLVENTE MAX	3.2	-72.89	54.64	32.66	6.483	96.079	96.895
N+6.65	C51	ENVOLVENTE MIN	0	-517.21	-45.97	-96.88	-6.449	-224.275	-55.945
N+6.65	C51	ENVOLVENTE MIN	1.6	-501.09	-45.97	-96.88	-6.449	-85.525	-25.23
N+6.65	C51	ENVOLVENTE MIN	3.2	-484.96	-45.97	-96.88	-6.449	-73.652	-109.938
N+3.45	C51	ENVOLVENTE MAX	0	-342.05	110.38	83.85	4.302	291.165	243.876
N+3.45	C51	ENVOLVENTE MAX	1.725	-329.01	110.38	83.85	4.302	151.36	56.291
N+3.45	C51	ENVOLVENTE MAX	3.45	-315.97	110.38	83.85	4.302	147.897	128.927
N+3.45	C51	ENVOLVENTE MIN	0	-1257.57	-108.09	-159.78	-4.395	-412.472	-244.388
N+3.45	C51	ENVOLVENTE MIN	1.725	-1240.19	-108.09	-159.78	-4.395	-141.683	-60.748
N+3.45	C51	ENVOLVENTE MIN	3.45	-1222.8	-108.09	-159.78	-4.395	-7.235	-137.327
N+6.65	C52	ENVOLVENTE MAX	0	-44.66	117.72	60.73	6.483	115.601	179.833
N+6.65	C52	ENVOLVENTE MAX	1.6	-32.56	117.72	60.73	6.483	44.925	34.663
N+6.65	C52	ENVOLVENTE MAX	3.2	-20.46	117.72	60.73	6.483	133.651	115.045
N+6.65	C52	ENVOLVENTE MIN	0	-343.82	-51.9	-64.54	-6.449	-78.849	-52.025
N+6.65	C52	ENVOLVENTE MIN	1.6	-327.69	-51.9	-64.54	-6.449	-2.079	-12.167
N+6.65	C52	ENVOLVENTE MIN	3.2	-311.57	-51.9	-64.54	-6.449	-84.712	-197.86
N+3.45	C52	ENVOLVENTE MAX	0	-145.65	146.81	146.76	4.302	371.544	286.486

N+3.45	C52	ENVOLVENTE MAX	1.725	-132.61	146.81	146.76	4.302	149.98	44.527
N+3.45	C52	ENVOLVENTE MAX	3.45	-119.57	146.81	146.76	4.302	13.39	113.843
N+3.45	C52	ENVOLVENTE MIN	0	-698.42	-102.31	-108.88	-4.395	-370.509	-239.447
N+3.45	C52	ENVOLVENTE MIN	1.725	-681.03	-102.31	-108.88	-4.395	-214.29	-74.252
N+3.45	C52	ENVOLVENTE MIN	3.45	-663.65	-102.31	-108.88	-4.395	-143.045	-220.332
N+6.65	C53	ENVOLVENTE MAX	0	-54.8	119.14	58.94	6.483	74.232	179.719
N+6.65	C53	ENVOLVENTE MAX	1.6	-42.7	119.14	58.94	6.483	0.042	32.501
N+6.65	C53	ENVOLVENTE MAX	3.2	-30.61	119.14	58.94	6.483	82.343	107.085
N+6.65	C53	ENVOLVENTE MIN	0	-391.03	-47.85	-60.34	-6.449	-137.878	-47.102
N+6.65	C53	ENVOLVENTE MIN	1.6	-374.9	-47.85	-60.34	-6.449	-68.636	-13.955
N+6.65	C53	ENVOLVENTE MIN	3.2	-358.78	-47.85	-60.34	-6.449	-141.524	-202.61
N+3.45	C53	ENVOLVENTE MAX	0	-182.88	143.99	108.23	4.302	348.716	281.378
N+3.45	C53	ENVOLVENTE MAX	1.725	-169.84	143.99	108.23	4.302	163.158	44.01
N+3.45	C53	ENVOLVENTE MAX	3.45	-156.8	143.99	108.23	4.302	79.733	112.329
N+3.45	C53	ENVOLVENTE MIN	0	-836.92	-101.03	-144.47	-4.395	-427.867	-236.534
N+3.45	C53	ENVOLVENTE MIN	1.725	-819.53	-101.03	-144.47	-4.395	-179.795	-73.267
N+3.45	C53	ENVOLVENTE MIN	3.45	-802.15	-101.03	-144.47	-4.395	-33.857	-215.686
N+6.65	C54	ENVOLVENTE MAX	0	-53.54	48.8	63.03	6.483	120.934	49.023
N+6.65	C54	ENVOLVENTE MAX	1.6	-41.44	48.8	63.03	6.483	48.695	14.034
N+6.65	C54	ENVOLVENTE MAX	3.2	-29.35	48.8	63.03	6.483	145.793	211.034
N+6.65	C54	ENVOLVENTE MIN	0	-353.52	-124.31	-69.39	-6.449	-83.339	-187.738
N+6.65	C54	ENVOLVENTE MIN	1.6	-337.4	-124.31	-69.39	-6.449	-0.923	-31.939
N+6.65	C54	ENVOLVENTE MIN	3.2	-321.27	-124.31	-69.39	-6.449	-87.844	-108.129
N+3.45	C54	ENVOLVENTE MAX	0	-157.47	101.82	156.83	4.302	399.967	237.385
N+3.45	C54	ENVOLVENTE MAX	1.725	-144.43	101.82	156.83	4.302	161.644	71.89
N+3.45	C54	ENVOLVENTE MAX	3.45	-131.39	101.82	156.83	4.302	15.999	222.677
N+3.45	C54	ENVOLVENTE MIN	0	-705.87	-149.4	-117.31	-4.395	-397.597	-293.039
N+3.45	C54	ENVOLVENTE MIN	1.725	-688.48	-149.4	-117.31	-4.395	-227.442	-45.465
N+3.45	C54	ENVOLVENTE MIN	3.45	-671.09	-149.4	-117.31	-4.395	-149.964	-114.172
N+6.65	C55	ENVOLVENTE MAX	0	-58.6	45.2	65.44	6.483	82.536	43.126
N+6.65	C55	ENVOLVENTE MAX	1.6	-46.51	45.2	65.44	6.483	-0.519	15.192
N+6.65	C55	ENVOLVENTE MAX	3.2	-34.41	45.2	65.44	6.483	88.7	210.87
N+6.65	C55	ENVOLVENTE MIN	0	-394.74	-123.58	-64.68	-6.449	-144.725	-185.762
N+6.65	C55	ENVOLVENTE MIN	1.6	-378.61	-123.58	-64.68	-6.449	-70.628	-32.419
N+6.65	C55	ENVOLVENTE MIN	3.2	-362.48	-123.58	-64.68	-6.449	-153.333	-102.687
N+3.45	C55	ENVOLVENTE MAX	0	-190.24	98.88	118.47	4.302	377.478	232.305
N+3.45	C55	ENVOLVENTE MAX	1.725	-177.2	98.88	118.47	4.302	174.257	72
N+3.45	C55	ENVOLVENTE MAX	3.45	-164.16	98.88	118.47	4.302	87.785	221.041
N+3.45	C55	ENVOLVENTE MIN	0	-844.15	-148.11	-156.01	-4.395	-458.465	-290.271
N+3.45	C55	ENVOLVENTE MIN	1.725	-826.77	-148.11	-156.01	-4.395	-190.497	-45.042
N+3.45	C55	ENVOLVENTE MIN	3.45	-809.38	-148.11	-156.01	-4.395	-39.275	-109.159
N+6.65	C56	ENVOLVENTE MAX	0	-72.86	50.41	78.55	6.483	200.409	61.579
N+6.65	C56	ENVOLVENTE MAX	1.6	-60.76	50.41	78.55	6.483	101.534	24.607
N+6.65	C56	ENVOLVENTE MAX	3.2	-48.67	50.41	78.55	6.483	177.349	115.452
N+6.65	C56	ENVOLVENTE MIN	0	-464.24	-58.32	-65.55	-6.449	-76.993	-72.923
N+6.65	C56	ENVOLVENTE MIN	1.6	-448.11	-58.32	-65.55	-6.449	11.771	-23.286
N+6.65	C56	ENVOLVENTE MIN	3.2	-431.98	-58.32	-65.55	-6.449	-95.533	-101.466
N+3.45	C56	ENVOLVENTE MAX	0	-287.73	109.24	211.86	4.302	492.355	245.647
N+3.45	C56	ENVOLVENTE MAX	1.725	-274.69	109.24	211.86	4.302	173.051	57.655
N+3.45	C56	ENVOLVENTE MAX	3.45	-261.65	109.24	211.86	4.302	1.545	137.466
N+3.45	C56	ENVOLVENTE MIN	0	-1136.37	-112.86	-125.8	-4.395	-440.43	-252.269
N+3.45	C56	ENVOLVENTE MIN	1.725	-1118.98	-112.86	-125.8	-4.395	-269.586	-58.04
N+3.45	C56	ENVOLVENTE MIN	3.45	-1101.59	-112.86	-125.8	-4.395	-246.54	-131.613
N+6.65	C57	ENVOLVENTE MAX	0	-78.84	48.21	64.09	6.483	74.093	58.698
N+6.65	C57	ENVOLVENTE MAX	1.6	-66.74	48.21	64.09	6.483	-14.21	24.469
N+6.65	C57	ENVOLVENTE MAX	3.2	-54.64	48.21	64.09	6.483	93.442	110.876
N+6.65	C57	ENVOLVENTE MIN	0	-515.84	-55.68	-78.83	-6.449	-222.806	-69.266
N+6.65	C57	ENVOLVENTE MIN	1.6	-499.71	-55.68	-78.83	-6.449	-131.688	-23.092
N+6.65	C57	ENVOLVENTE MIN	3.2	-483.58	-55.68	-78.83	-6.449	-194.984	-97.553
N+3.45	C57	ENVOLVENTE MAX	0	-317.52	107.45	124.78	4.302	417.401	241.842
N+3.45	C57	ENVOLVENTE MAX	1.725	-304.47	107.45	124.78	4.302	211.167	56.958
N+3.45	C57	ENVOLVENTE MAX	3.45	-291.43	107.45	124.78	4.302	193.721	136.208
N+3.45	C57	ENVOLVENTE MIN	0	-1266.04	-111.74	-215.07	-4.395	-556.262	-249.693
N+3.45	C57	ENVOLVENTE MIN	1.725	-1248.66	-111.74	-215.07	-4.395	-194.275	-57.401
N+3.45	C57	ENVOLVENTE MIN	3.45	-1231.27	-111.74	-215.07	-4.395	-21.075	-129.244
N+6.65	C58	ENVOLVENTE MAX	0	-34.08	96.66	74.82	3.814	140.985	143.72
N+6.65	C58	ENVOLVENTE MAX	1.6	-24.41	96.66	74.82	3.814	47.608	20.208
N+6.65	C58	ENVOLVENTE MAX	3.2	-14.73	96.66	74.82	3.814	142.464	30.136
N+6.65	C58	ENVOLVENTE MIN	0	-231.17	-7	-65.91	-3.794	-85.353	6.776
N+6.65	C58	ENVOLVENTE MIN	1.6	-218.27	-7	-65.91	-3.794	-6.234	-14.661
N+6.65	C58	ENVOLVENTE MIN	3.2	-205.36	-7	-65.91	-3.794	-115.349	-168.048
N+3.45	C58	ENVOLVENTE MAX	0	-121.95	85.06	157.61	2.531	407.705	158.757
N+3.45	C58	ENVOLVENTE MAX	1.725	-111.52	85.06	157.61	2.531	164.016	21.115
N+3.45	C58	ENVOLVENTE MAX	3.45	-101.09	85.06	157.61	2.531	23.2	34.929
N+3.45	C58	ENVOLVENTE MIN	0	-550.74	-42.57	-119.95	-2.585	-400.545	-112.165
N+3.45	C58	ENVOLVENTE MIN	1.725	-536.83	-42.57	-119.95	-2.585	-221.825	-47.819
N+3.45	C58	ENVOLVENTE MIN	3.45	-522.92	-42.57	-119.95	-2.585	-145.977	-134.928
N+6.65	C59	ENVOLVENTE MAX	0	-42.47	104.38	59.47	3.814	79.209	158.556

N+6.65	C59	ENVOLVENTE MAX	1.6	-32.79	104.38	59.47	3.814	4.302	20.991
N+6.65	C59	ENVOLVENTE MAX	3.2	-23.12	104.38	59.47	3.814	119.214	27.082
N+6.65	C59	ENVOLVENTE MIN	0	-262.84	-4.66	-82.86	-3.794	-172.038	11.175
N+6.65	C59	ENVOLVENTE MIN	1.6	-249.94	-4.66	-82.86	-3.794	-59.703	-13.202
N+6.65	C59	ENVOLVENTE MIN	3.2	-237.03	-4.66	-82.86	-3.794	-137.188	-175.475
N+3.45	C59	ENVOLVENTE MAX	0	-144.92	87.69	117.39	2.531	379.795	160.727
N+3.45	C59	ENVOLVENTE MAX	1.725	-134.48	87.69	117.39	2.531	178.873	19.656
N+3.45	C59	ENVOLVENTE MAX	3.45	-124.05	87.69	117.39	2.531	111.059	31.296
N+3.45	C59	ENVOLVENTE MIN	0	-623.25	-40.68	-163.64	-2.585	-463.418	-109.284
N+3.45	C59	ENVOLVENTE MIN	1.725	-609.34	-40.68	-163.64	-2.585	-182.709	-49.298
N+3.45	C59	ENVOLVENTE MIN	3.45	-595.43	-40.68	-163.64	-2.585	-35.108	-142.025

9. VERIFICACION DE CORTANTE

CORTANTE EN VIGAS Y COLUMNAS

PROYECTO: INSTITUCIÓN EDUCATIVA MARCELO MIRANDA
RESISTENCIA A CORTANTE PARA VIGAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3 (a)

f'c = 21.1 MPa
fy = 420 MPa
Φ Cortante = 0.75
Estribos Φ = 9.5 mm
Av = 71.00 mm^2
R= 4.50

Mn = Momentos nominales de la viga en cada extremo restringido de la luz libre.
Vg = Cortante calculado para cargas gravitacionales mayoradas.
Vm = Cortante debido a flexion en curvatura inversa.
Vu = Vm + Vg

COMDIS3 = 1.2C.M.+1.0C.V.+1.0Ex+0.3Ey
COMDIS4 = 1.2C.M.+1.0C.V.+1.0(-Ex)+0.3Ey
COMDIS5 = 1.2C.M.+1.0C.V.+1.0Ex+0.3(-Ey)
COMDIS6 = 1.2C.M.+1.0C.V.+1.0(-Ex)+0.3(-Ey)
COMDIS7 = 1.2C.M.+1.0C.V.+0.3Ex+1.0Ey
COMDIS8 = 1.2C.M.+1.0C.V.+0.3(-Ex)+1.0Ey
COMDIS9 = 1.2C.M.+1.0C.V.+0.3Ex+1.0(-Ey)
COMDIS10 = 1.2C.M.+1.0C.V.+0.3(-Ex)+1.0(-Ey)
COMDIS11 = 0.9C.M.+1.0Ex+0.3Ey
COMDIS12 = 0.9C.M.+1.0(-Ex)+0.3Ey
COMDIS13 = 0.9C.M.+1.0Ex+0.3(-Ey)
COMDIS14 = 0.9C.M.+1.0(-Ex)+0.3(-Ey)
COMDIS15 = 0.9C.M.+0.3Ex+1.0Ey
COMDIS16 = 0.9C.M.+0.3(-Ex)+1.0Ey
COMDIS17 = 0.9C.M.+0.3Ex+1.0(-Ey)
COMDIS18 = 0.9C.M.+0.3(-Ex)+1.0(-Ey)

NIVEL	VIGA	LOC.	LONG.	PROPIEDADES DEL ELEMENTO			M3						Mn (kN.m)														
													Combinaciones para resistencias nominales a momento														
	ELEMENTO			SECCION	b	d	C.M.	C.V.	SISMO X	SISMO Y	-SISMO X	-SISMO Y															
	No.	(m)	(m)		(m)	(m)	(KN.m)	(KN.m)	(KN.m)	(KN.m)	(KN.m)	(KN.m)	COMBDIS3	COMBDIS4	COMBDIS5	COMBDIS6	COMBDIS7	COMBDIS8	COMBDIS9	COMBDIS10	COMBDIS11	COMBDIS12	COMBDIS13	COMBDIS14	COMBDIS15	COMBDIS16	COMBDIS17	COMBDIS18
N+3.45	B165	0.000	8.200	V-40X45	0.40	0.40	-33.444	-99.855	25.886	49.926	25.886	49.926	130.907	81.120	90.070	105.619	115.488	214.849	265.265	218.584	253.690	307.659	426.955	588.571	613.788	612.823	746.204	967.858
	B166	8.200					-81.169	-137.579	36.737	59.541	32.625	61.822	222.849	112.951	114.997	132.669	158.024	329.802	414.769	290.556	327.768	418.167	630.972	896.951	888.994	811.426	1011.502	1391.361
N+6.65	B167	0.000	8.200	V-40X45	0.40	0.40	-33.067	-17.376	37.874	63.880	12.622	19.129	44.381	32.060	113.409	96.488	46.275	82.021	116.952	176.407	248.330	188.084	175.301	271.134	384.473	513.502	543.111	486.886
	B167	8.200					-155.317	-137.865	45.792	74.462	-2.213	-1.439	309.105	103.246	128.825	107.429	71.479	338.910	509.962	281.359	300.496	309.704	556.767	999.212	980.737	744.068	860.640	1215.841
N+6.65	B168	0.000	8.200	V-40X45	0.40	0.40	-33.034	-16.884	38.891	62.680	-8.774	-17.820	43.704	31.974	106.211	65.396	16.505	36.506	112.381	160.213	198.951	110.584	91.967	205.054	346.654	421.912	383.433	293.346
	B168	8.200					-19.119	8.435	38.895	62.680	-36.737	-59.541	1.686	60.497	97.221	25.360	99.218	49.838	85.815	182.067	167.396	146.446	200.107	197.240	332.007	431.760	404.939	441.807
N+3.45	B168	0.000	8.200	V-40X45	0.40	0.40	-168.144	-155.433	46.936	74.920	37.874	63.880	341.781	120.410	143.918	164.759	193.307	454.789	573.513	337.910	410.737	530.317	836.733	1221.733	1152.755	989.860	1290.591	1821.459
	B168	8.200					-150.378	-132.523	47.339	74.718	44.668	75.062	297.476	92.107	146.455	170.842	200.910	417.782	493.013	308.342	419.087	531.628	788.988	1090.810	1028.529	959.836	1282.583	1737.912
N+6.65	B169	0.000	8.200	V-40X45	0.40	0.40	-66.981	-71.589	39.928	64.540	13.896	22.369	138.791	30.710	117.033	105.568	71.934	180.260	230.304	182.140	274.010	254.026	329.902	505.359	536.331	571.022	689.840	782.791
	B169	8.200					-73.236	-69.376	40.347	60.071	11.097	18.954	144.288	28.815	112.217	97.013	66.256	180.918	233.366	172.771	258.458	238.433	323.802	506.092	526.141	540.356	654.279	757.462
N+3.45	B169	0.000	8.200	V-40X45	0.40	0.40	-172.632	-160.404	48.918	75.780	45.792	74.462	351.640	123.674	149.622	176.718	215.799	478.452	590.672	351.688	436.116	573.562	892.118	1272.042	1195.646	1045.074	1379.952	1942.777
	B169	8.200					-152.562	-136.568	49.427	76.634	-11.097	-18.954	303.550	98.165	132.217	96.888	41.729	311.434	498.265	274.327	285.584	260.421	490.523	951.986	953.070	705.349	775.592	1078.118
N+6.65	B170	0.000	8.200	V-40X45	0.40	0.40	-66.820	-71.182	44.703	67.093	-45.792	-74.462	136.959	28.859	105.596	27.303	97.053	61.058	218.496	152.764	179.657	157.952	236.260	337.689	465.413	413.825	448.555	531.872
	B170	8.200					-72.839	-68.784	40.443	65.366	-38.891	-62.680	142.846	30.165	101.076	35.142	75.595	81.071	226.384	150.123	178.638	150.874	232.101	368.940	471.539	407.787	441.413	526.572
N+3.45	B170	0.000	8.200	V-40X45	0.40	0.40	-175.057	-162.293	53.085	82.992	-0.003	-0.002	355.032	123.224	146.693	123.256	87.105	392.192	590.078	327.759	344.790	361.505	649.698	1156.530	1136.573	861.749	996.732	1416.281
	B170	8.200					-154.747	-138.514	54.687	83.212	12.190	19.539	306.510	92.226	152.848	136.820	108.429	360.641	503.125	301.152	368.376	386.298	622.638	1027.376	1012.517	857.111	1035.204	1382.002
N+6.65	B171	0.000	8.200	V-40X45	0.40	0.40	-31.760	-14.150	48.009	74.451	11.716	18.831	36.630	48.355	135.921	107.684	44.254	79.034	129.694	220.826	285.892	199.684	175.681	292.667	453.303	606.970	601.306	510.559
	B171	8.200					-18.273	8.784	48.005	74.458	-46.936	-74.920	2.488	71.963	116.639	25.931	125.893	63.648	102.597	217.150	198.117	177.993	251.996	240.438	396.159	515.051	487.762	545.429
N+3.45	B171	0.000	8.200	V-40X45	0.40	0.40	-97.450	-77.176	63.644	92.308	-14.281	-22.431	173.819	9.406	164.012	103.092	0.315	159.926	261.309	198.230	310.638	176.985	231.588	517.981	592.630	603.283	635.746	598.585
	B171	8.200					-80.835	-55.438	58.264	95.937	39.928	64.540	133.097	15.720	179.029	178.268	143.079	225.973	227.104	247.047	439.963	422.356	464.605	582.502	645.498	861.250	1092.391	1143.911
N+6.65	B172	0.000	8.200	V-40X45	0.40	0.40	-31.758	-14.164	51.048	79.538	1.483	2.694	35.627	51.825	141.305	99.902	15.846	59.797	132.639	226.752	276.976	157.859	123.404	273.250	457.993	592.385	535.870	404.090
	B172	8.200					-18.545	8.552	51.050	79.530	6.377	12.318	2.944	79.411	143.028	104.747	25.919	44.908	121.711	263.326	285.134	169.708	120.613	253.127	484.057	646.880	555.547	412.784
N+3.45	B172	0.000	8.200	V-40X45	0.40	0.40	-99.494	-79.819	62.057	102.715	40.347	60.071	178.574	8.210	190.154	188.859	148.718	265.160	277.346	251.890	467.770	452.763	522.047	682.699	718.838	905.455	1175.610	1264.996
	B172	8.200					-82.387	-57.854	67.522	99.128	48.918	75.780	135.105	23.387	196.077	193.719	166.064	244.310	242.000	278.261	482.202	468.951	515.915	629.154	707.080	954.720	1204.184	1265.607
N+6.65	B173	0.000	8.200	V-40X45	0.40	0.40	-33.059	-16.454	56.813	89.462	14.857	23.088	37.536	57.939	162.478	129.844	53.120	88.948	147.744	264.401	342.553	238.550	203.152	336.075	533.720	726.388	717.163	599.676
	B173	8.200					-19.372	7.398	56.836	89.446	0.171	0.335	2.745	85.602	157.710	107.764	6.857	32.683	131.127	284.836	300.718	152.178	89.040	253.692	519.160	682.275	549.739	362.640
N+3.45	B173	0.000	8.200	V-40X45	0.40	0.40	-176.687	-162.802	72.444	114.464	12.769	19.699	351.097	96.631	205.548	177.910	119.485	409.912	575.485	369.006	478.447	462.434	705.781	1181.277	1196.738	1071.069	1272.162	1602.990
	B173	8.200					-157.510	-139.806	72.852	114.326	-0.171	-0.335	305.007	69.521	201.688	157.280	71.874	333.500	490.834	324.856	437.511	367.443	550.480	992.391	1035.577	945.690	1080.944	1280.981
N+6.65	B174	0.000	8.200	V-40X45	0.40	0.40	-31.557	-13.051	60.323	95.876	-12.769	-19.699	31.123	65.116	164.113	99.979	23.765	32.895	145.598	266.054	304.389	160.756	111.505	264.488	519.131	666.811	568.434	397.796
	B174	8.200					-18.335	8.157	60.143	95.993	-49.427	-76.634	5.920	87.968	152.072	49.129	128.766	56.355	132.141	277.136	263.987	209.054	258.715	278.951	508.305	660.254	601.928	605.456
N+3.45	B174	0.000	8.200	V-40X45	0.40	0.40	-87.110	-72.337	66.364	100.407	44.703	67.093	155.428	4.852	194.451	190.463	155.600	249.981	247.274	252.972	475.047	456.191	508.515	635.137	685.680	913.890	1181.593	1242.798
	B174	8.200					-73.913	-55.680	62.000	103.328	-2.672	-1.906	123.709	17.968	177.007	129.145	23.576	137.215	214.363	228.839	355.941	223.334	228.399	453.604	580.062	695.404	731.459	635.872
N+3.45	B175	0.000	8.200	V-20X45	0.20	0.40	-13.751	-10.626	10.058	19.375	-11.615	-15.150	23.600	0.838	27.853	9.842	23.788	7.464	36.004	32.632	49.050	39.656	46.185	55.482	89.381	100.100	112.478	112.061
	B175	8.200					-9.807	-4.865	9.938	19.511	-40.443	-65.366	13.124	5.740	18.092	30.681	110.598	62.833	27.554	39.170	81.157	163.215	204.286	117.069	101.151	178.050	313.805	432.903
N+3.45	B176	0.000	0.700	V-40X45	0.40	0.40	0.955	0.605	1.237	1.326	53.085	82.992	2.114	5.797	20.140	73.260	147.550	104.335	17.693	53.213	137.172	259.827	288.875	163.866	122.249	278.025	499.553	645.232
	B176	0.700					-11.689	-9.575	4.281	4.674	17.070	25.677	22.339	5.032	15.316	29.874	51.461	55.291	37.234	31.425	63.375	102.079	127.413	114.791	96.994	132.263	214.096	281.883
N+3.45	B177	0.000	6.300	V-40X45	0.40	0.40	-9.235	-0.485	54.279	38.932	0.713	0.350	3.090	62.396	104.249	47.715	6.052	24.326	92.452	190.131	175.780	74.880	64.809	175.613	345.127	424.898	311.925	216.698
	B177	6.300					-25.429	-5.944	51.620	37.109	13.096	20.892	22.514	53.607	103.356	63.770	45.184	66.387	107.843	184.868	202.264	143.651	156.898	242.073	368.803	466.488	437.372	407.659
N+6.65	B178	0.000	7.080	V-40X45	0.40	0.40	-21.138	-80.642	38.859	28.465	54.687	83.212	95.475	47.940	92.796	113.702	173.249	212.169	190.711	187.141	277.701	369.553	474.924	505.414	502.342	616.055	842.028	1064.192
	B178	7.080					-26.212	-120.231	37.308	27.328	-16.590	-24.916	141.573	102.002	66.750	20.105	6.563	138.791	288.063	194.058	110.916	80.736	223.618	505.131	569.764	376.635	297.203	470.736
N+3.45	B178	0.000	7.080	V-40X45	0.40	0.40	-73.066	-70.389	46.423	35.950	-17.070	-25.677	145.355	31.193	86.152	30.054	11.780	127.218	226.768	131.048	144.536	91.234	200.484	418.187	441.371	335.434	337.109	432.320
	B178	7.080					-88.804	-81.470	55.664	38.123	-54.687	-83.212	173.123	37.274	87.220	15.889	107.880	87.367	265.464	142.671	150.351	164.059	285.326	412.032	505.576	377.036	435.355	607.465
N+6.65	B179	0.000	7.200	V-40X45	0.40	0.40	-26.122	-113.402	35.536	26.039	48.009	74.451	135.116	91.559	84.314	104.808	168.191	250.424	279.422	228.689	260.056	368.239	529.594	648.088	646.335	651.620	841.200	1158.589
	B179	7.200					-25.022	-110.675	35.767	26.214	48.005	74.458	131.006	88.017	84.766	104.742	167.044	245.566	271.044	224.799	259.953	365.374	521.237	633.008	632.177	645.655	835.349	1142.500
N+3.45	B179	0.000	7.200	V-40X45	0.40	0.40	-84.317	-74.396	54.419	42.643	-48.009	-74.451	160.640	28.581	92.314	2.673	94.459	83.805	242.041	133.502	140.027	132.425	259.842	381.609	463.897	346.979	383.641	534.481
	B179	7.200					-84.124	-74.225	58.525	39.645	18.530	32.040	159.525	20.500	116.129	83.859	91.093	210.271	243.327	165.437	257.474	254.672	384.684	549.580	531.624	538.238	685.765	847.861
N+6.65	B180	0.000	7.080	V-40X45	0.40	0.40	-24.810	-109.517	36.342	26.640	18.908	32.475	129.437	87.898	76.617	66.722	89.788	193.048	264.696	202.908	191.485	230.400	373.142	554.210	578.456	511.050	580.050	811.344
	B180	7.080					-25.690	-105.923	36.112	26.468	19.019	25.670	126.962	83.846	75.740	64.949	82.296	181.447	257.361	196.275	186.222	217.714	350.479	531.129	561.005	493.498	554.473	767.165
N+3.45	B180	0.000	7.080	V-40X45	0.40	0.40	-81.610	-71.522	55.095	43.769	18.765	25.079	154.293	19.754	115.725	87.147	83.201	196.492	236.432	164.342	257.606	247.205	359.830	525.917	521.787	533.740	671.355	808.132
	B180	7.080					-82.141	-73.275	59.229	39.586	-18.908	-32.475	156.043	21.165	104.294	31.781	19.077	128.729	233.712	138.026	169.756	101.402	212.760	430.176	462.964	372.105	381.067	460.902
N+6.65	B181	0.000	7.450	V-40X45	0.40	0.40	-24.868	-82.608	34.194	25.113	-2.945	-2.014	103.177	59.551	65.357	33.621	21.350	118.351	200.129	145.713	124.685	101.338	198.158	382.842	420.331	335.271	320.518	432.862
	B181	7.450					-23.609	-82.105	34.216	25.185	-18.765	-25.079	101.153	59.964	60.402	12.627	21.121	88.411	195.613	136.574	95.698	68.961	166.330	338.435	397.173	286.000	243.323	350.770
N+3.45	B181	0.000	7.450	V-40X45	0.40	0.40	-89.232	-78.914	52.648	42.624	-58.264	-95.937	171.451	36.461	86.458	17.004	125.323	70.193	262.549	142.345	153.283	178.830	288.414	388.632	503.389	383.065	452.771	622.932
	B181	7.450					-89.883	-79.432	56.561	36.981	-51.048	-79.538	172.257	33.943	88.208	12.862	100.253	90.235	261.110	138.481	147.005	153.147	277.795	409.966	494.691	365.735	418.617	585.655
N+6.65	B182	0.000	6.950	V-40X45	0.40	0.40	-25.636	-106.364	35.797	26.283	-0.016	-0.005	127.420	86.000	69.236	40.017	34.025	151.141	256.958	183.597	140.737	132.763	261.312	488.509	532.072	407.977	392.284	564.656
	B182	6.950					-23.112	-96.443	34.695	25.358	62.057	102.715	114.777	71.264	87.630	122.964	207.440	259.713	236.668	214.302	291.532	428.489	575.521	615.382	591.654	682.282	947.247	1265.903
N+3.45	B182	0.000	6.950	V-40X45	0.40	0.40	-83.495	-73.489	55.958	45.755	23.042	32.087	158.198	20.525	120.164	95.625	96.261	209.274	243.440	172.461	275.165	273.745	390.382	551.238	543.987	568.976	727.444	877.640
	B182	6.950					-71.920	-64.349	56.797	36.934	16.516	29.210	135.569	11.113	110.708	76.366	79.897	180.471	203.489	146.340	239.002	225.206	331.323	468.508	458.652	486.744	616.869	736.260

PROYECTO: INSTITUCIÓN EDUCATIVA MARCELO MIRANDA
RESISTENCIA A CORTANTE PARA VIGAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3 (a)

f'c = **21.1** MPa
fy = **420** MPa
Φ Cortante = **0.75**
Estribos Φ = **9.5** mm
Av = **71** mm^2
R= **4.50**

Mn = Momentos nominales de la viga en cada extremo restringido de la luz libre.
Vg = Cortante calculado para cargas gravitacionales mayoradas.
Vm = Cortante debido a flexion en curvatura inversa.
Vu = Vm + Vg

V_g	$V_m = M_{nl} + M_{nr} / l_n$															
	COMBDIS3	COMBDIS4	COMBDIS5	COMBDIS6	COMBDIS7	COMBDIS8	COMBDIS9	COMBDIS10	COMBDIS11	COMBDIS12	COMBDIS13	COMBDIS14	COMBDIS15	COMBDIS16	COMBDIS17	COMBDIS18
(kN)	(kN)															
144.91	43.141	23.667	25.008	29.060	33.355	66.421	82.931	62.090	70.910	88.515	129.015	181.161	183.266	173.689	214.354	287.710
224.31																
28.25	43.108	16.501	29.541	24.868	14.360	51.333	76.453	55.825	66.930	60.706	89.277	154.920	166.489	153.362	171.189	207.650
257.93																
28.24	5.535	11.277	24.809	11.068	14.113	10.530	24.170	41.741	44.676	31.345	35.619	49.060	82.764	104.106	96.143	89.653
14.28																
270.29	77.958	25.917	35.411	40.927	48.075	106.411	130.064	78.811	101.198	129.505	198.259	282.018	266.010	237.768	313.802	434.070
249.83																
88.26	34.522	7.259	27.957	24.705	16.852	44.046	56.545	43.282	64.935	60.056	79.720	123.348	129.570	135.534	163.917	187.836
134.12																
276.88	79.901	27.053	34.371	33.367	31.406	96.328	132.797	76.343	88.012	101.705	168.615	271.223	262.039	213.466	262.871	368.402
254.28																
87.98	34.123	7.198	25.204	7.615	21.055	17.333	54.254	36.938	43.694	37.662	57.117	86.174	114.263	100.197	108.533	129.078
133.16																
280.28	80.676	26.274	36.529	31.717	23.846	91.809	133.317	76.696	86.972	91.195	155.163	266.330	262.084	209.617	247.797	341.254
257.45																
27.71	4.770	14.673	30.800	16.294	20.750	17.400	28.328	53.412	59.025	46.058	52.156	65.013	103.593	136.832	132.813	128.779
14.80																
141.47	37.429	3.064	41.834	34.312	17.487	47.061	59.563	54.302	91.537	73.090	84.902	134.205	150.991	178.601	210.748	212.499
125.82																
27.62	4.704	16.004	34.675	24.957	5.093	12.769	31.018	59.766	68.550	39.947	29.758	64.192	114.884	151.130	133.100	99.619
14.89																
145.22	38.253	3.853	47.101	46.656	38.388	62.131	63.335	64.653	115.850	112.404	126.581	159.982	173.892	226.851	290.219	308.610
129.08																
27.91	4.912	17.505	39.047	28.977	7.314	14.833	34.009	66.980	78.448	47.650	35.633	71.923	128.400	171.788	154.500	117.356
14.59																
282.80	80.013	20.262	49.663	40.877	23.336	90.660	130.039	84.617	111.702	101.205	153.202	265.082	272.234	245.946	286.964	351.704
261.22																
27.33	4.517	18.669	38.559	18.184	18.601	10.884	33.871	66.243	69.314	45.099	45.149	66.273	125.297	161.837	142.727	122.348
15.18																
131.29	34.041	2.783	45.300	38.977	21.851	47.219	56.297	58.757	101.340	82.869	89.868	132.773	154.359	196.255	233.299	229.106
118.63																
24.34	4.479	0.802	5.603	4.942	16.389	8.573	7.751	8.756	15.879	24.740	30.545	21.043	23.236	33.921	51.986	66.459
20.94																
43.12	34.933	15.470	50.652	147.334	284.301	228.037	78.468	120.910	286.497	517.008	594.697	398.081	313.205	586.126	1019.498	1324.450
46.75																
11.86	4.064	18.413	32.953	17.696	8.133	14.399	31.793	59.524	60.007	34.687	35.192	66.299	113.322	141.490	118.936	99.104
20.81																
161.96	33.481	21.178	22.535	18.899	25.397	49.571	67.623	53.842	54.889	63.600	98.664	142.732	151.428	140.210	160.908	216.798
181.58																
147.53	44.983	9.670	24.488	6.489	16.901	30.309	69.524	38.661	41.651	36.058	68.617	117.263	133.750	100.631	109.105	146.862
160.32																
175.47	36.961	24.941	23.483	29.104	46.561	68.887	76.454	62.984	72.223	101.891	145.949	177.930	177.571	180.177	232.854	319.596
173.88																
147.36	44.467	6.817	28.950	12.018	25.771	40.844	67.412	41.519	55.209	53.764	89.517	129.332	138.267	122.947	148.529	191.992
150.84																
172.43	36.214	24.258	21.519	18.598	24.306	52.895	73.737	56.382	53.348	63.293	102.206	153.296	160.941	141.885	160.243	222.953
171.10																
145.08	43.833	5.779	31.076	16.798	14.446	45.935	66.404	42.707	60.362	49.238	80.874	135.041	139.089	127.944	148.647	179.242
148.54																
129.58	27.427	16.042	16.880	6.208	5.701	27.753	53.120	37.891	29.582	22.859	48.925	96.816	109.732	83.392	75.683	105.186
128.97																
153.25	46.135	9.450	23.445	4.009	30.279	21.534	70.290	37.695	40.307	44.561	76.001	107.194	133.970	100.510	116.965	162.227
156.21																
171.33	34.848	22.628	22.571	23.451	34.743	59.116	71.025	57.252	62.197	80.756	120.408	158.833	161.687	156.872	192.738	263.390
165.90																
148.13	42.269	4.552	33.219	24.747	25.346	56.078	64.306	45.871	73.981	71.792	103.842	146.726	144.265	151.902	193.426	232.216
142.14																

PROYECTO: INSTITUCIÓN EDUCATIVA MARCELO MIRANDA
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CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3 (a)

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fy = **420** MPa
Φ Cortante = **0.75**
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Vg = Cortante calculado para cargas gravitacionales mayoradas.
Vm = Cortante debido a flexion en curvatura inversa.
Vu = Vm + Vg

Vu **= Vm + Vg**																Vu_{max}	S	ΦVs	ΦVc	ΦVn	ΦVn > Vu_{max}
COMBDIS3	COMBDIS4	COMBDIS5	COMBDIS6	COMBDIS7	COMBDIS8	COMBDIS9	COMBDIS10	COMBDIS11	COMBDIS12	COMBDIS13	COMBDIS14	COMBDIS15	COMBDIS16	COMBDIS17	COMBDIS18						
(kN)																(kN)	(m)	(kN)	(kN)	(kN)	
188.053	66.808	48.675	54.068	62.415	99.776	149.352	145.021	133.000	159.425	217.531	310.177	364.427	356.955	388.043	502.064	502.1	**0.10**	178.92	91.87	270.79	**OK**
224.308	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
71.356	59.609	46.041	54.409	39.228	65.693	127.786	132.278	122.755	127.636	149.982	244.197	321.409	319.851	324.551	378.839	378.8	**0.10**	178.92	91.87	270.79	**OK**
257.932	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
33.771	16.812	36.086	35.877	25.180	24.642	34.700	65.912	86.418	76.022	66.964	84.679	131.824	186.870	200.249	185.796	200.2	**0.10**	178.92	91.87	270.79	**OK**
14.280	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
348.250	103.875	61.328	76.338	89.002	154.486	236.475	208.875	180.009	230.703	327.764	480.276	548.028	503.778	551.570	747.871	747.9	**0.10**	178.92	91.87	270.79	**OK**
249.828	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
122.786	41.781	35.217	52.662	41.557	60.898	100.591	99.827	108.217	124.991	139.776	203.068	252.917	265.104	299.451	351.753	351.8	**0.10**	178.92	91.87	270.79	**OK**
134.120	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
356.785	106.955	61.424	67.737	64.773	127.733	229.125	209.140	164.355	189.717	270.320	439.838	533.261	475.505	476.338	631.273	631.3	**0.10**	178.92	91.87	270.79	**OK**
254.276	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
122.107	41.321	32.402	32.819	28.670	38.387	71.586	91.191	80.632	81.356	94.779	143.291	200.437	214.459	208.729	237.611	237.6	**0.10**	178.92	91.87	270.79	**OK**
133.156	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
360.952	106.950	62.804	68.246	55.562	115.655	225.126	210.014	163.668	178.167	246.358	421.493	528.414	471.701	457.414	589.051	589.1	**0.10**	178.92	91.87	270.79	**OK**
257.448	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
32.482	19.443	45.473	47.094	37.044	38.150	45.728	81.740	112.437	105.084	98.214	117.169	168.606	240.425	269.645	261.592	269.6	**0.10**	178.92	91.87	270.79	**OK**
14.804	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
178.897	40.493	44.898	76.146	51.799	64.548	106.624	113.865	145.839	164.627	157.992	219.107	285.197	329.593	389.350	423.248	423.2	**0.10**	178.92	91.87	270.79	**OK**
125.820	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
32.320	20.708	50.679	59.632	30.050	17.862	43.787	90.784	128.316	108.497	69.705	93.950	179.076	266.014	284.230	232.718	284.2	**0.10**	178.92	91.87	270.79	**OK**
14.888	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
183.477	42.107	50.955	93.757	85.044	100.519	125.465	127.987	180.503	228.254	238.985	286.563	333.875	400.743	517.069	598.829	598.8	**0.10**	178.92	91.87	270.79	**OK**
129.076	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
32.824	22.417	56.552	68.024	36.291	22.147	48.842	100.989	145.428	126.097	83.283	107.556	200.323	300.188	326.288	271.856	326.3	**0.10**	178.92	91.87	270.79	**OK**
14.592	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
362.813	100.275	69.925	90.540	64.213	113.997	220.699	214.656	196.319	212.907	254.407	418.284	537.315	518.180	532.910	638.668	638.7	**0.10**	178.92	91.87	270.79	**OK**
261.216	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
31.845	23.186	57.228	56.743	36.785	29.485	44.755	100.113	135.557	114.413	90.248	111.422	191.570	287.134	304.564	265.075	304.6	**0.10**	178.92	91.87	270.79	**OK**
15.176	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
165.333	36.824	48.083	84.276	60.827	69.070	103.516	115.055	160.097	184.209	172.737	222.641	287.132	350.614	429.554	462.405	462.4	**0.10**	178.92	91.87	270.79	**OK**
118.628	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
28.823	5.281	6.405	10.545	21.330	24.961	16.324	16.507	24.635	40.619	55.286	51.588	44.278	57.156	85.906	118.445	118.4	**0.10**	178.92	45.93	224.85	**OK**
20.936	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
78.057	50.403	66.122	197.986	431.635	512.339	306.505	199.378	407.407	803.505	1111.705	992.778	711.286	899.331	1605.624	2343.948	2343.9	**0.10**	178.92	91.87	270.79	**OK**
46.748	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
15.920	22.477	51.366	50.649	25.829	22.532	46.192	91.316	119.531	94.694	69.879	101.491	179.622	254.812	260.426	218.040	260.4	**0.10**	178.92	91.87	270.79	**OK**
20.808	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
195.445	54.660	43.713	41.434	44.296	74.968	117.194	121.465	108.731	118.490	162.264	241.396	294.160	291.638	301.119	377.706	377.7	**0.10**	178.92	91.87	270.79	**OK**
181.580	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
192.515	54.653	34.158	30.977	23.390	47.210	99.833	108.185	80.312	77.709	104.676	185.880	251.012	234.381	209.736	255.967	256.0	**0.10**	178.92	91.87	270.79	**OK**
160.324	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
212.433	61.902	48.425	52.588	75.665	115.448	145.341	139.438	135.208	174.114	247.839	323.879	355.501	357.748	413.031	552.450	552.4	**0.10**	178.92	91.87	270.79	**OK**
173.884	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
191.823	51.284	35.767	40.969	37.789	66.615	108.256	108.931	96.728	108.972	143.281	218.849	267.599	261.214	271.475	340.521	340.5	**0.10**	178.92	91.87	270.79	**OK**
150.844	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
208.646	60.472	45.777	40.117	42.903	77.200	126.632	130.119	109.730	116.641	165.499	255.503	314.237	302.826	302.129	383.197	383.2	**0.10**	178.92	91.87	270.79	**OK**
171.100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
188.909	49.612	36.856	47.874	31.244	60.381	112.340	109.112	103.069	109.600	130.113	215.916	274.130	267.033	276.591	327.889	327.9	**0.10**	178.92	91.87	270.79	**OK**
148.536	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
157.011	43.469	32.923	23.088	11.909	33.454	80.873	91.011	67.472	52.441	71.784	145.740	206.548	193.124	159.075	180.869	206.5	**0.10**	178.92	91.87	270.79	**OK**
128.968	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
199.383	55.586	32.895	27.454	34.288	51.813	91.824	107.985	78.002	84.868	120.562	183.196	241.165	234.480	217.475	279.191	279.2	**0.10**	178.92	91.87	270.79	**OK**
156.212	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
206.180	57.476	45.199	46.021	58.194	93.859	130.141	128.277	119.449	142.953	201.163	279.241	320.520	318.559	349.610	456.128	456.1	**0.10**	178.92	91.87	270.79	**OK**
165.896	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
190.401	46.821	37.771	57.966	50.093	81.425	120.385	110.177	119.852	145.772	175.634	250.569	290.991	296.167	345.329	425.642	425.6	**0.10**	178.92	91.87	270.79	**OK**
142.136	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						

PROYECTO: INSTITUCIÓN EDUCATIVA MARCELO MIRANDA
RESISTENCIA A CORTANTE PARA VIGAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3 (a)

f'c = 21.1 MPa
fy = 420 MPa
Φ $_{Cortante}$ = 0.75
Estribos Φ = 9.5 mm
Av = 71.00 mm^2
R= 4.50

Mn = Momentos nominales de la viga en cada extremo restringido de la luz libre.
Vg = Cortante calculado para cargas gravitacionales mayoradas.
Vm = Cortante debido a flexion en curvatura inversa.
Vu = Vm + Vg

COMDIS3 = 1.2C.M.+1.0C.V.+1.0Ex+0.3Ey
COMDIS4 = 1.2C.M.+1.0C.V.+1.0(-Ex)+0.3Ey
COMDIS5 = 1.2C.M.+1.0C.V.+1.0Ex+0.3(-Ey)
COMDIS6 = 1.2C.M.+1.0C.V.+1.0(-Ex)+0.3(-Ey)
COMDIS7 = 1.2C.M.+1.0C.V.+0.3Ex+1.0Ey
COMDIS8 = 1.2C.M.+1.0C.V.+0.3(-Ex)+1.0Ey
COMDIS9 = 1.2C.M.+1.0C.V.+0.3Ex+1.0(-Ey)
COMDIS10 = 1.2C.M.+1.0C.V.+0.3(-Ex)+1.0(-Ey)
COMDIS11 = 0.9C.M.+1.0Ex+0.3Ey
COMDIS12 = 0.9C.M.+1.0(-Ex)+0.3Ey
COMDIS13 = 0.9C.M.+1.0Ex+0.3(-Ey)
COMDIS14 = 0.9C.M.+1.0(-Ex)+0.3(-Ey)
COMDIS15 = 0.9C.M.+0.3Ex+1.0Ey
COMDIS16 = 0.9C.M.+0.3(-Ex)+1.0Ey
COMDIS17 = 0.9C.M.+0.3Ex+1.0(-Ey)
COMDIS18 = 0.9C.M.+0.3(-Ex)+1.0(-Ey)

NIVEL	VIGA	LOC.	LONG.	PROPIEDADES DEL ELEMENTO			M3						Mn (kN.m)														
													Combinaciones para resistencias nominales a momento														
	ELEMENTO			SECCION	b	d	C.M.	C.V.	SISMO X	SISMO Y	-SISMO X	-SISMO Y															
	No.	(m)	(m)		(m)	(m)	(KN.m)	(KN.m)	(KN.m)	(KN.m)	(KN.m)	(KN.m)	COMBDIS3	COMBDIS4	COMBDIS5	COMBDIS6	COMBDIS7	COMBDIS8	COMBDIS9	COMBDIS10	COMBDIS11	COMBDIS12	COMBDIS13	COMBDIS14	COMBDIS15	COMBDIS16	COMBDIS17	COMBDIS18
N+6.65	B184	0.000	3.850	V-40X45	0.40	0.40	-7.962	-40.501	56.920	41.615	67.522	99.128	34.632	22.068	131.532	141.797	189.322	167.259	102.309	202.146	352.858	403.468	430.656	371.465	430.228	713.803	947.363	1026.047
	B184	3.850					-6.838	-40.326	56.869	41.812	-23.042	-32.087	33.107	16.233	102.795	22.209	51.298	5.063	80.285	130.630	157.300	84.426	93.170	125.876	267.557	339.030	302.283	240.291
N+3.45	B184	0.000	3.850	V-40X45	0.40	0.40	-17.740	-11.694	93.190	68.223	-23.211	-32.568	7.725	92.770	172.722	51.934	52.520	0.774	143.885	299.089	270.923	124.605	115.711	229.339	540.263	665.234	490.716	352.220
	B184	3.850					-15.844	-10.578	93.525	67.733	-16.866	-29.612	4.292	94.759	174.241	58.119	42.580	1.431	142.504	303.705	276.766	122.142	104.442	230.162	544.356	675.318	492.814	338.449
N+6.65	B185	0.000	7.080	V-40X45	0.40	0.40	-25.545	-99.172	34.235	25.248	-16.516	-29.210	120.535	80.262	60.712	15.326	16.893	107.366	239.417	161.559	99.093	75.105	191.612	410.765	475.887	322.427	263.981	404.745
	B185	7.080					-23.957	-113.044	35.555	26.154	56.813	89.462	132.148	90.498	87.409	116.888	193.037	265.440	276.292	234.851	282.372	410.709	574.140	665.834	656.532	693.739	921.531	1258.722
N+3.45	B185	0.000	7.080	V-40X45	0.40	0.40	-73.743	-66.744	52.280	43.499	0.023	0.015	140.718	18.145	106.241	61.606	32.523	151.851	214.723	143.873	206.446	154.510	248.186	442.678	457.718	429.976	486.910	562.485
	B185	7.080					-87.223	-75.837	58.834	36.906	-56.836	-89.446	164.970	27.758	88.914	21.428	119.139	69.731	246.909	134.928	159.248	176.808	276.561	371.187	478.394	378.889	454.109	603.110
N+6.65	B186	0.000	7.080	V-40X45	0.40	0.40	-26.083	-120.004	36.272	26.456	72.444	114.464	141.479	97.024	93.712	139.060	239.305	306.645	296.895	256.997	325.136	494.113	676.920	743.655	718.464	788.463	1084.279	1483.010
	B186	7.080					-22.081	-81.026	36.158	26.198	22.512	35.315	97.742	53.751	76.945	68.313	87.633	157.194	192.694	162.468	190.601	217.387	316.006	430.137	450.549	454.938	545.007	702.493
N+3.45	B186	0.000	7.080	V-40X45	0.40	0.40	-90.606	-78.150	55.207	46.958	0.228	0.223	171.478	28.123	113.272	68.059	40.478	185.547	263.606	164.842	225.350	180.955	303.689	537.917	543.310	483.619	554.723	676.593
	B186	7.080					-68.324	-65.632	58.756	37.397	-72.444	-114.464	132.071	16.522	84.175	44.199	170.946	3.997	196.659	125.219	183.463	237.984	261.182	241.512	417.845	404.024	532.282	628.289
N+3.45	B188	0.000	0.700	V-40X45	0.40	0.40	0.783	0.297	1.694	0.927	-21.901	-34.247	1.675	0.796	4.190	28.287	60.103	38.965	5.623	15.439	49.270	103.082	113.368	59.097	40.007	98.261	191.338	252.865
	B188	0.700					-10.110	-7.346	3.736	6.779	-0.228	-0.223	18.196	3.588	11.197	9.070	3.786	19.472	28.516	17.770	24.646	20.899	31.537	57.474	58.859	52.717	61.313	73.311
N+3.45	B189	0.000	6.300	V-40X45	0.40	0.40	-9.440	-0.583	55.339	35.505	-18.838	-29.766	2.754	61.274	95.741	17.337	47.675	12.967	87.009	176.300	143.685	77.161	101.265	151.326	317.786	379.144	282.175	248.672
	B189	6.300					-24.194	-4.974	52.512	34.208	-72.852	-114.326	20.057	49.288	73.411	55.871	194.005	101.287	93.395	157.907	193.829	289.785	365.375	262.952	332.373	472.072	621.105	793.710
N+6.65	B190	0.000	7.080	V-40X45	0.40	0.40	-20.435	-76.855	40.230	25.565	60.323	95.876	90.733	42.293	93.638	118.356	191.246	221.425	179.871	183.441	287.982	394.470	503.121	505.545	489.580	629.312	885.555	1121.466
	B190	7.080					-26.007	-113.007	38.576	24.561	60.143	95.993	134.006	87.565	90.617	119.882	203.781	274.697	276.501	235.920	292.220	427.116	596.407	678.045	661.133	710.000	955.518	1303.699
N+3.45	B190	0.000	7.080	V-40X45	0.40	0.40	-66.022	-61.813	50.235	29.593	-60.323	-95.876	127.903	21.386	70.078	37.590	138.415	22.276	192.949	113.322	153.928	201.337	238.807	255.125	392.489	350.577	456.127	563.271
	B190	7.080					-79.558	-71.068	54.305	39.254	19.729	33.760	151.853	20.938	111.055	84.460	92.576	204.421	233.471	161.121	251.926	254.919	378.136	531.377	514.265	527.129	676.685	836.407
N+6.65	B191	0.000	7.200	V-40X45	0.40	0.40	-26.196	-107.343	36.748	23.419	20.193	34.414	129.051	85.513	74.298	64.547	93.024	194.304	261.188	197.459	187.330	231.072	377.139	550.721	567.919	500.773	576.391	814.668
	B191	7.200					-23.668	-104.149	37.030	23.586	19.199	27.897	122.749	81.428	74.148	61.885	83.642	179.264	249.330	191.190	181.401	214.362	347.787	519.026	544.987	481.650	543.931	756.693
N+3.45	B191	0.000	7.200	V-40X45	0.40	0.40	-75.581	-64.991	59.111	34.759	18.780	27.119	140.235	9.902	111.673	75.866	81.478	182.423	208.058	145.847	240.142	226.927	336.156	475.386	464.010	487.997	621.492	745.044
	B191	7.200					-75.885	-64.838	57.282	41.143	-20.193	-34.414	140.428	12.727	103.100	30.893	26.591	108.833	206.211	127.010	167.777	101.595	195.034	376.219	418.520	355.768	371.350	428.453
N+6.65	B192	0.000	7.080	V-40X45	0.40	0.40	-19.965	-102.948	37.464	23.991	-2.055	-1.435	116.981	80.879	68.395	34.214	27.487	137.792	238.737	174.886	131.583	115.080	235.488	451.723	498.283	382.719	355.425	507.186
	B192	7.080					-36.294	-101.167	37.009	23.850	-18.780	-27.119	134.906	80.343	62.280	12.807	14.320	124.369	256.924	162.492	99.016	74.454	209.480	448.877	497.768	324.518	269.750	431.760
N+3.45	B192	0.000	7.080	V-40X45	0.40	0.40	-75.285	-64.095	60.175	35.386	-62.000	-103.328	138.706	13.009	86.930	33.252	146.037	23.398	200.990	119.665	171.580	204.538	251.285	267.099	412.618	377.383	484.082	583.594
	B192	7.080					-69.255	-61.662	57.800	41.267	-10.058	-19.375	129.172	7.694	107.100	43.768	2.227	114.772	189.419	126.208	180.435	92.882	167.951	367.221	399.800	363.722	371.207	387.667
N+6.65	B193	0.000	7.450	V-40X45	0.40	0.40	-81.374	-74.509	36.795	20.843	-0.140	-0.110	162.592	47.993	64.959	35.687	39.053	177.455	259.918	133.084	134.146	138.639	290.951	511.381	484.038	344.052	398.362	603.227
	B193	7.450					-81.177	-74.837	34.091	25.070	4.281	4.674	163.002	49.857	67.242	46.270	49.358	184.173	263.487	140.643	150.208	163.375	311.331	525.763	501.099	376.041	447.860	657.625
N+3.45	B193	0.000	7.450	V-40X45	0.40	0.40	-62.975	-48.782	56.625	35.315	-1.237	-1.326	109.414	5.852	102.902	48.141	21.894	115.984	163.226	122.082	184.220	116.319	186.668	341.817	366.645	369.011	401.652	426.652
	B193	7.450					-63.073	-48.727	55.433	37.223	1.834	1.326	109.615	5.355	104.239	54.104	28.243	119.345	163.663	124.570	193.423	130.599	197.910	347.454	372.655	385.123	429.850	456.685
N+6.65	B194	0.000	6.950	V-40X45	0.40	0.40	-36.584	-101.867	36.946	23.279	51.620	37.109	136.006	76.680	81.559	96.868	134.388	203.014	264.469	204.061	238.138	313.376	436.655	569.308	595.235	581.760	734.129	978.901
	B194	6.950					-18.021	-90.552	35.805	22.768	-1.834	-1.326	102.703	67.920	65.238	32.040	23.824	120.554	207.797	155.450	123.657	102.915	205.683	395.250	439.147	346.779	323.360	446.291
N+3.45	B194	0.000	6.950	V-40X45	0.40	0.40	-70.691	-62.295	61.559	36.313	-51.620	-37.109	131.024	8.567	96.239	7.556	69.366	94.812	187.685	112.822	144.778	112.014	227.280	336.184	377.685	320.209	358.667	461.584
	B194	6.950					-66.212	-56.954	54.877	39.623	-38.859	-28.465	121.572	7.253	94.942	10.468	47.596	95.355	174.936	109.146	141.333	93.010	198.622	323.039	356.677	306.218	328.283	405.799
N+6.65	B195	0.000	3.850	V-40X45	0.40	0.40	-6.462	-37.969	58.804	37.580	-0.794	-0.580	30.151	21.539	107.930	46.183	6.603	41.436	84.783	144.480	179.929	76.883	77.833	178.609	291.330	375.579	322.001	229.206
	B195	3.850					-7.326	-37.679	58.918	37.487	46.423	35.950	30.878	25.129	120.901	101.455	100.195	87.662	95.813	180.281	274.646	247.809	241.206	259.380	372.810	562.132	648.277	621.071
N+3.45	B195	0.000	3.850	V-40X45	0.40	0.40	-14.047	-6.342	96.059	61.813	3.009	6.103	2.269	102.385	178.159	78.692	17.044	44.222	149.945	319.645	299.219	131.298	119.305	293.992	574.826	719.924	536.472	380.516
	B195	3.850					-11.373	-4.610	95.842	62.192	2.918	6.175	7.187	104.325	178.263	79.400	18.229	49.664	157.856	322.312	300.677	135.069	128.105	309.123	587.561	726.007	544.956	398.052
N+6.65	B196	0.000	7.080	V-40X45	0.40	0.40	-25.165	-94.061	35.557	22.574	55.664	38.123	114.853	68.589	80.154	98.881	135.015	181.186	230.816	193.435	237.148	309.324	407.392	507.034	543.735	565.168	718.236	927.504
	B196	7.080					-23.623	-106.425	36.867	23.440	-3.009	-6.103	125.017	85.835	66.605	32.097	23.790	141.208	252.796	178.325	126.724	110.540	237.822	470.322	517.211	381.133	346.812	509.466
N+3.45	B196	0.000	7.080	V-40X45	0.40	0.40	-65.778	-57.793	58.261	34.273	-4.016	-7.058	121.495	3.742	102.823	43.643	15.371	120.712	175.295	118.037	178.494	106.254	185.981	358.279	375.140	356.149	385.661	418.112
	B196	7.080					-78.492	-66.321	55.484	40.907	0.117	0.088	145.454	15.003	107.520	58.922	33.552	156.062	217.370	140.854	205.806	153.430	254.019	449.665	457.661	425.860	486.823	568.571
N+6.65	B197	0.000	7.080	V-40X45	0.40	0.40	-25.838	-113.134	37.427	23.888	35.767	26.214	134.230	90.641	78.496	79.207	105.006	191.062	274.441	211.867	209.474	260.808	392.181	564.762	605.133	547.818	636.979	870.996
	B197	7.080					-21.361	-76.900	37.189	23.809	-0.117	-0.088	92.682	49.808	68.404	34.613	23.688	108.205	178.534	137.444	129.175	101.171	185.468	347.535	387.136	328.956	320.566	409.913
N+3.45	B197	0.000	7.080	V-40X45	0.40	0.40	-81.852	-68.738	62.117	36.389	-35.767	-26.214	150.731	14.667	101.234	12.123	34.661	129.282	218.848	123.838	149.925	92.528	227.764	411.501	425.941	334.277	350.485	458.638
	B197	7.080					-61.625	-57.585	56.088	40.529	2.830	5.327	116.369	3.819	108.819	60.407	34.837	130.865	171.671	129.147	207.455	147.851	219.428	371.238	391.110	409.916	470.308	505.421
N+3.45	B198	0.000	0.700	V-20X45	0.20	0.40	-0.801	-0.317	1.672	0.948	58.525	39.645	0.843	5.404	18.603	68.529	110.423	50.859	15.119	47.678	118.781	204.967	189.904	94.663	105.881	234.203	396.016	463.959
	B198	0.700					-0.166	0.873	3.439	3.819	-2.675	-4.752	1.693	5.157	7.035	0.965	7.242	2.395	8.816	13.920	11.175	9.520	13.972	15.528	27.617	30.926	27.070	30.687
N+3.45	B199	0.000	6.300	V-20X45	0.20	0.40	-3.319	0.349	13.193	8.134	-3.008	-6.163	0.160	15.219	22.886	5.394	8.723	2.328	20.856	42.929	34.951	17.103	20.292	35.520	76.863	91.619	65.921	53.833
	B199	6.300					-12.110	-3.821	9.086	4.954	-58.525	-39.645	16.004	1.700	0.209	60.323	106.205	31.179	24.972	22.734	86.253	187.187	165.690	73.189	84.347	166.178	332.390	412.201
N+6.65	B200	0.000	7.080	V-20X45	0.20	0.40	-5.524	-3.620	9.225	5.776	36.342	26.640	7.814	8.587	26.698	49.714	72.559	43.470	27.211	52.888	100.774	143.690	140.114	97.846	117.514	205.511	302.279	342.120
	B200	7.080					-11.320	-20.216	7.105	4.435	36.112	26.468	31.925	13.761	22.750	49.444	77.814	68.262	60.424	55.439	98.588	156.345	178.762	161.230	160.279	211.775	325.124	412.890
N+3.45	B200	0.000	7.080	V-20X45	0.20	0.40	-11.823	-6.065	7.550	6.909	-36.342	-26.640	18.114	0.615	6.117	32.764	66.184	13.309	25.896	18.549	55.699	110.184	99.721	49.702	69.347	109.091	202.497	247.611
	B200	7.080					-18.218	-12.737	11.441	5.706	2.734	5.086	31.676	2.393	20.382	12.823	15.565	39.670	45.788	27.141	43.385	42.821	70.333	102.315	94.583	90.159	117.334	150.760
N+6.65	B201	0.000	7.200	V-20X45	0.20	0.40	-11.114	-18.661	5.721	3.697	2.889	6.080	30.480	15.658	11.610	10.709	17.364	42.030	55.528	33.936	31.301	43.256	77.468	115.591	110.409	86.801	105.738	162.423
	B201	7.200					-9.057	-15.984	6.042	3.891	59.229	39.586	25.250	8.326	26.942	74.378	116.827	76.400	49.572	61.250	137.764	226.364	231.692	164.047	166.441	277.014	454.104	550.879
N+3.45	B201	0.000	7.200	V-20X45	0.20	0.40	-18.185	-13.256	12.580	10.382	-55.095	-43.769	31.590	4.693	10.317	50.257	102.550	19.202	48.245	33.953	86.706	170.342	155.246	84.612	122.471	175.654	314.529	386.624
	B201	7.200					-17.240	-12.467	13.100	6.687	-59.229	-39.586	29.798	4.323	6.606	58.015	103.751	16.304	45.416	31.602	90.085	180.020	153.004	78.010	118.122	178.212	327.323	394.238
N+6.65	B202	0.000	7.080	V-20X45	0.20	0.40	-8.021	-15.853	6.274	3.922	34.194	25.113	23.823	9.598	20.724	46.069	72.080	57.473	45.862	47.285	90.787	143.192	157.312	131.389	132.040	189.836	295.854	367.143
	B202	7.080					-16.979	-16.193	6.345	3.712	34.216	25.185	34.910	9.981	20.609	46.594	74.667	68.724	59.559	47.917	92.499	149.823	174.755	158.843	149.932	194.944	310.246	399.837
N+3.45	B202	0.000	7.080	V-20X45	0.20	0.40	-17.868	-13.095	11.843	10.102	-34.194	-25.113	31.231	3.906	15.041	25.570	58.945	2.966	46.430	29.340	56.916	93.384	85.974	60.304	103.930	118.607	184.808	218.365
	B202	7.080					-13.714	-8.240	13.270	7.121	2.889	5.146	21.273	5.157	24.030	13.996	13.684	30.196	36.958	34.241	47.886	39.653	57.113	83.995	91.875	101.595	115.408	129.487
N+6.65	B203	0.000	7.450	V-20X45	0.20	0.40	-19.259	-13.902	5.286	5.038	2.942	6.197	35.502	10.081	12.448	12.732	18.289	46.009	56.298	28.593	34.801	47.544	82.372	120.183	107.055	85.170	115.622	173.269
	B203	7.450					-18.927	-13.783	6.691	3.530	-2.889	-5.146	34.773	9.257	10.574	2.522	0.268	31.360	53.502	22.260	17.361	13.830	45.055	97.239	91.243	50.151	51.158	89.343

PROYECTO: INSTITUCIÓN EDUCATIVA MARCELO MIRANDA
RESISTENCIA A CORTANTE PARA VIGAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3 (a)

f'c = **21.1** MPa
fy = **420** MPa
Φ Cortante = **0.75**
Estribos Φ = **9.5** mm
Av = **71** mm^2
R= **4.50**

Mn = Momentos nominales de la viga en cada extremo restringido de la luz libre.
Vg = Cortante calculado para cargas gravitacionales mayoradas.
Vm = Cortante debido a flexion en curvatura inversa.
Vu = Vm + Vg

V_g	$V_m = M_{nl} + M_{nr} / l_n$															
	COMBDIS3	COMBDIS4	COMBDIS5	COMBDIS6	COMBDIS7	COMBDIS8	COMBDIS9	COMBDIS10	COMBDIS11	COMBDIS12	COMBDIS13	COMBDIS14	COMBDIS15	COMBDIS16	COMBDIS17	COMBDIS18
(kN)	(kN)															
93.82	17.594	9.948	60.864	42.599	62.499	44.759	47.427	86.435	132.509	126.726	136.059	129.179	181.243	273.463	324.583	328.919
92.97																
29.25	3.121	48.709	90.120	28.585	24.701	0.573	74.387	156.570	142.257	64.090	57.183	119.351	281.719	348.195	255.462	179.395
27.13																
168.90	35.690	24.119	20.921	18.674	29.651	52.656	72.840	55.990	53.879	68.618	108.157	152.062	159.946	143.526	167.445	234.953
174.63																
141.69	43.176	6.483	27.564	11.728	21.421	31.297	65.202	39.379	51.652	46.796	74.117	114.953	132.219	114.246	132.912	164.632
154.48																
181.24	33.788	21.296	24.104	29.290	46.178	65.514	69.151	59.246	72.844	100.494	140.244	165.790	165.115	175.622	230.125	308.687
162.27																
155.29	42.874	6.306	27.888	15.856	29.862	26.772	65.009	40.969	57.742	59.172	79.784	110.089	135.756	125.373	153.532	184.305
145.70																
34.33	28.387	6.263	21.981	53.368	91.270	83.482	48.770	47.441	105.593	177.115	207.006	166.530	141.238	215.682	360.930	465.967
37.96																
12.40	3.621	17.549	26.850	11.620	38.362	18.136	28.636	53.049	53.574	58.245	74.070	65.758	103.200	135.114	143.378	165.457
20.26																
154.06	31.743	18.342	26.025	33.649	55.795	70.074	64.459	59.232	81.949	116.043	155.301	167.174	162.530	189.168	260.039	342.538
172.29																
132.56	39.514	5.978	25.584	17.239	32.626	32.019	60.229	38.763	57.324	64.443	87.139	111.088	128.073	123.970	160.002	197.695
143.30																
167.06	34.972	23.186	20.618	17.560	24.537	51.884	70.905	53.979	51.213	61.866	100.684	148.576	154.570	136.448	155.600	218.245
164.81																
132.11	38.981	3.143	29.830	14.828	15.010	40.452	57.537	37.897	56.655	45.628	73.776	118.279	122.574	117.190	137.895	162.986
135.05																
160.81	35.577	22.772	18.457	6.641	5.905	37.028	70.009	47.652	32.570	26.770	62.849	127.203	140.685	99.892	88.302	132.619
165.52																
132.50	37.836	2.924	27.405	10.879	20.941	19.516	55.143	34.728	49.720	42.008	59.214	89.593	114.748	104.676	120.804	137.184
131.30																
149.26	43.704	13.134	17.745	11.001	11.867	48.541	70.256	36.742	38.168	40.539	80.843	139.214	132.233	96.657	113.587	169.242
151.11																
98.04	29.400	1.504	27.804	13.724	6.730	31.588	43.878	33.108	50.690	33.143	51.621	92.520	99.235	101.226	111.611	118.569
99.51																
165.98	34.347	20.806	21.122	18.548	22.764	46.557	67.952	51.728	52.057	59.898	92.423	138.785	148.832	133.603	152.157	205.064
154.37																
131.58	36.345	2.276	27.508	2.593	16.829	27.362	52.176	31.938	41.167	29.500	61.281	94.852	105.664	90.133	98.842	124.803
129.36																
88.58	15.852	12.122	59.437	38.348	27.740	33.532	46.908	84.353	118.071	84.336	82.867	113.763	172.504	243.561	252.020	220.851
88.87																
11.53	2.456	53.691	92.577	41.063	9.162	24.386	79.948	166.742	155.817	69.186	64.263	156.653	301.919	375.566	280.891	202.226
8.42																
160.64	33.880	21.811	20.729	18.500	22.430	45.536	68.307	52.509	51.394	59.303	91.132	138.045	149.851	133.658	150.430	202.962
165.70																
126.91	37.705	2.648	29.709	14.487	6.910	39.092	55.461	36.566	54.280	36.678	62.147	114.116	117.627	110.453	123.232	139.362
138.44																
172.11	32.050	19.837	20.749	16.076	18.177	42.269	63.980	49.338	47.832	51.127	81.589	128.856	140.151	123.838	135.247	180.919
154.23																
139.85	37.726	2.611	29.668	10.244	9.816	36.744	55.158	35.732	50.477	33.952	63.163	110.556	115.403	105.112	115.931	136.167
131.03																
4.71	3.623	15.087	36.625	99.276	168.093	76.076	34.192	87.997	185.652	306.409	291.252	157.415	190.710	378.756	604.409	706.638
2.90																
5.44	2.566	2.686	3.666	10.431	18.243	5.319	7.274	10.423	19.239	32.427	29.521	17.255	25.589	40.920	63.224	73.974
10.90																
27.71	5.613	3.157	6.984	14.005	21.239	15.781	12.378	15.300	28.158	42.378	45.039	36.593	39.236	58.939	88.616	106.640
37.18																
29.45	7.032	0.425	3.743	6.439	11.547	7.483	10.125	6.453	13.995	21.611	24.019	21.471	23.154	28.143	45.174	56.267
34.17																
33.93	7.740	3.331	5.354	11.818	18.638	16.449	14.597	13.220	23.481	37.447	42.939	38.839	38.451	50.530	77.756	99.070
32.06																
35.02	8.526	1.252	2.350	15.038	28.653	4.931	13.008	9.105	24.554	48.661	42.813	22.586	33.416	49.148	89.146	108.453
33.72																
30.86	8.296	2.765	5.838	13.088	20.727	17.824	14.890	13.447	25.888	41.386	46.902	40.993	39.827	54.348	85.607	108.330
34.04																
34.95	7.416	1.280	5.518	5.588	10.258	4.684	11.778	8.980	14.803	18.791	20.210	20.381	27.656	31.102	42.403	49.132
30.90																
38.98	9.433	2.596	3.090	2.047	2.491	10.385	14.738	6.826	7.002	8.238	17.104	29.184	26.617	18.164	22.387	35.250
38.37																

PROYECTO: INSTITUCIÓN EDUCATIVA MARCELO MIRANDA
RESISTENCIA A CORTANTE PARA VIGAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3 (a)

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Vm = Cortante debido a flexion en curvatura inversa.
Vu = Vm + Vg

Vu **= Vm + Vg**																Vu_{max}	S	ΦVs	ΦVc	ΦVn	ΦVn > Vu_{max}
COMBDIS3	COMBDIS4	COMBDIS5	COMBDIS6	COMBDIS7	COMBDIS8	COMBDIS9	COMBDIS10	COMBDIS11	COMBDIS12	COMBDIS13	COMBDIS14	COMBDIS15	COMBDIS16	COMBDIS17	COMBDIS18						
(kN)																(kN)	(m)	(kN)	(kN)	(kN)	
111.418	27.543	70.813	103.463	105.098	107.257	92.186	133.863	218.944	259.234	262.785	265.238	310.422	454.706	598.047	653.503	653.5	**0.10**	178.92	91.87	270.79	**OK**
92.972	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
32.369	51.830	138.829	118.706	53.287	25.274	74.959	230.957	298.827	206.347	121.273	176.534	401.071	629.915	603.658	434.857	629.9	**0.10**	178.92	91.87	270.79	**OK**
27.132	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
204.590	59.808	45.040	39.595	48.325	82.307	125.497	128.830	109.869	122.497	176.775	260.219	312.008	303.472	310.971	402.398	402.4	**0.10**	178.92	91.87	270.79	**OK**
174.632	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
184.868	49.660	34.048	39.292	33.149	52.718	96.499	104.581	91.030	98.448	120.913	189.070	247.172	246.466	247.159	297.544	297.5	**0.10**	178.92	91.87	270.79	**OK**
154.484	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
215.032	55.084	45.400	53.394	75.468	111.692	134.665	128.397	132.091	173.339	240.738	306.034	330.905	340.736	405.747	538.812	538.8	**0.10**	178.92	91.87	270.79	**OK**
162.272	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
198.162	49.180	34.194	43.744	45.718	56.634	91.781	105.978	98.711	116.914	138.956	189.873	245.845	261.130	278.905	337.837	337.8	**0.10**	178.92	91.87	270.79	**OK**
145.696	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
62.719	34.650	28.245	75.349	144.638	174.752	132.252	96.211	153.035	282.708	384.121	373.537	307.768	356.920	576.612	826.897	826.9	**0.10**	178.92	91.87	270.79	**OK**
37.956	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
16.025	21.170	44.399	38.470	49.982	56.497	46.771	81.684	106.622	111.819	132.315	139.828	168.958	238.313	278.491	308.835	308.8	**0.10**	178.92	91.87	270.79	**OK**
20.260	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
185.799	50.084	44.366	59.674	89.444	125.869	134.533	123.691	141.181	197.993	271.344	322.474	329.704	351.699	449.207	602.576	602.6	**0.10**	178.92	91.87	270.79	**OK**
172.288	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
172.070	45.492	31.562	42.822	49.864	64.645	92.248	98.992	96.087	121.767	151.582	198.227	239.160	252.042	283.972	357.696	357.7	**0.10**	178.92	91.87	270.79	**OK**
143.304	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
202.032	58.158	43.804	38.178	42.097	76.421	122.790	124.884	105.192	113.078	162.550	249.260	303.146	291.018	292.048	373.845	373.8	**0.10**	178.92	91.87	270.79	**OK**
164.812	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
171.089	42.124	32.973	44.657	29.837	55.462	97.990	95.434	94.552	102.284	119.404	192.055	240.852	239.763	255.084	300.880	300.9	**0.10**	178.92	91.87	270.79	**OK**
135.052	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
196.385	58.349	41.228	25.098	12.546	42.933	107.037	117.661	80.223	59.341	89.619	190.052	267.889	240.577	188.194	220.921	267.9	**0.10**	178.92	91.87	270.79	**OK**
165.524	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
170.336	40.760	30.330	38.284	31.820	40.457	74.658	89.870	84.447	91.728	101.223	148.807	204.342	219.424	225.479	257.987	258.0	**0.10**	178.92	91.87	270.79	**OK**
131.300	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
192.968	56.838	30.879	28.746	22.868	60.408	118.796	106.998	74.910	78.707	121.382	220.057	271.447	228.890	210.244	282.829	282.8	**0.10**	178.92	91.87	270.79	**OK**
151.108	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
127.440	30.904	29.308	41.528	20.454	38.317	75.465	76.985	83.798	83.834	84.765	144.141	191.754	200.461	212.837	230.180	230.2	**0.10**	178.92	91.87	270.79	**OK**
99.512	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
200.323	55.152	41.928	39.670	41.312	69.321	114.508	119.680	103.785	111.955	152.321	231.208	287.617	282.435	285.759	357.220	357.2	**0.10**	178.92	91.87	270.79	**OK**
154.368	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
167.929	38.621	29.784	30.101	19.422	44.191	79.538	84.114	73.105	70.667	90.781	156.133	200.516	195.797	188.975	223.645	223.6	**0.10**	178.92	91.87	270.79	**OK**
129.360	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
104.432	27.973	71.558	97.784	66.087	61.272	80.440	131.262	202.425	202.407	167.203	196.631	286.267	416.065	495.582	472.871	495.6	**0.10**	178.92	91.87	270.79	**OK**
88.868	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
13.988	56.147	146.268	133.640	50.224	33.548	104.335	246.691	322.559	225.003	133.449	220.916	458.572	677.485	656.457	483.116	677.5	**0.10**	178.92	91.87	270.79	**OK**
8.424	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
194.524	55.691	42.540	39.228	40.930	67.966	113.843	120.815	103.903	110.697	150.435	229.177	287.896	283.510	284.089	353.392	353.4	**0.10**	178.92	91.87	270.79	**OK**
165.700	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
164.617	40.352	32.357	44.196	21.397	46.002	94.553	92.028	90.846	90.958	98.825	176.263	231.744	228.080	233.685	262.594	262.6	**0.10**	178.92	91.87	270.79	**OK**
138.436	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
204.162	51.887	40.586	36.825	34.253	60.446	106.249	113.317	97.170	98.959	132.716	210.444	269.007	263.989	259.085	316.166	316.2	**0.10**	178.92	91.87	270.79	**OK**
154.232	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
177.578	40.337	32.279	39.913	20.060	46.560	91.902	90.890	86.210	84.429	97.115	173.719	225.959	220.515	221.043	252.098	252.1	**0.10**	178.92	91.87	270.79	**OK**
131.032	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
8.335	18.710	51.712	135.901	267.369	244.169	110.268	122.189	273.649	492.062	597.661	448.667	348.125	569.467	983.165	1311.047	1311.0	**0.10**	178.92	45.93	224.85	**OK**
2.900	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
8.002	5.251	6.351	14.097	28.674	23.561	12.593	17.697	29.662	51.666	61.948	46.776	42.844	66.509	104.144	137.198	137.2	**0.10**	178.92	45.93	224.85	**OK**
10.896	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
33.321	8.769	10.141	20.990	35.245	37.021	28.159	27.678	43.459	70.536	87.417	81.632	75.829	98.175	147.555	195.256	195.3	**0.10**	178.92	45.93	224.85	**OK**
37.180	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
36.480	7.457	4.168	10.182	17.985	19.029	17.608	16.578	20.448	35.606	45.630	45.490	44.625	51.296	73.316	101.441	101.4	**0.10**	178.92	45.93	224.85	**OK**
34.172	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
41.668	11.071	8.685	17.172	30.455	35.086	31.046	27.818	36.702	60.928	80.386	81.778	77.290	88.981	128.286	176.826	176.8	**0.10**	178.92	45.93	224.85	**OK**
32.060	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
43.546	9.778	3.603	17.388	43.691	33.584	17.940	22.113	33.659	73.216	91.474	65.399	56.002	82.564	138.294	197.599	197.6	**0.10**	178.92	45.93	224.85	**OK**
33.724	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
39.156	11.061	8.603	18.926	33.815	38.551	32.714	28.337	39.334	67.274	88.288	87.895	80.820	94.174	139.955	193.938	193.9	**0.10**	178.92	45.93	224.85	**OK**
34.040	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
42.364	8.696	6.799	11.107	15.847	14.942	16.462	20.758	23.783	33.593	39.001	40.591	48.037	58.758	73.505	91.535	91.5	**0.10**	178.92	45.93	224.85	**OK**
30.896	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
48.417	12.029	5.686	5.138	4.538	12.876	25.123	21.564	13.828	15.240	25.343	46.289	55.801	44.781	40.550	57.637	57.6	**0.10**	178.92	45.93	224.85	**OK**
38.368	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						

PROYECTO: INSTITUCIÓN EDUCATIVA MARCELO MIRANDA
RESISTENCIA A CORTANTE PARA VIGAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3 (a)

f'c = 21.1 MPa
fy = 420 MPa
Φ Cortante = 0.75
Estribos Φ = 9.5 mm
Av = 71.00 mm^2
R= 4.50

Mn = Momentos nominales de la viga en cada extremo restringido de la luz libre.
Vg = Cortante calculado para cargas gravitacionales mayoradas.
Vm = Cortante debido a flexion en curvatura inversa.
Vu = Vm + Vg

COMDIS3 = 1.2C.M.+1.0C.V.+1.0Ex+0.3Ey
COMDIS4 = 1.2C.M.+1.0C.V.+1.0(-Ex)+0.3Ey
COMDIS5 = 1.2C.M.+1.0C.V.+1.0Ex+0.3(-Ey)
COMDIS6 = 1.2C.M.+1.0C.V.+1.0(-Ex)+0.3(-Ey)
COMDIS7 = 1.2C.M.+1.0C.V.+0.3Ex+1.0Ey
COMDIS8 = 1.2C.M.+1.0C.V.+0.3(-Ex)+1.0Ey
COMDIS9 = 1.2C.M.+1.0C.V.+0.3Ex+1.0(-Ey)
COMDIS10 = 1.2C.M.+1.0C.V.+0.3(-Ex)+1.0(-Ey)
COMDIS11 = 0.9C.M.+1.0Ex+0.3Ey
COMDIS12 = 0.9C.M.+1.0(-Ex)+0.3Ey
COMDIS13 = 0.9C.M.+1.0Ex+0.3(-Ey)
COMDIS14 = 0.9C.M.+1.0(-Ex)+0.3(-Ey)
COMDIS15 = 0.9C.M.+0.3Ex+1.0Ey
COMDIS16 = 0.9C.M.+0.3(-Ex)+1.0Ey
COMDIS17 = 0.9C.M.+0.3Ex+1.0(-Ey)
COMDIS18 = 0.9C.M.+0.3(-Ex)+1.0(-Ey)

NIVEL	VIGA	LOC.	LONG.	PROPIEDADES DEL ELEMENTO			M3						Mn (kN.m)															
													Combinaciones para resistencias nominales a momento															
	ELEMENTO			SECCION	b	d	C.M.	C.V.	SISMO X	SISMO Y	-SISMO X	-SISMO Y																
	No.	(m)	(m)		(m)	(m)	(KN.m)	(KN.m)	(KN.m)	(KN.m)	(KN.m)	(KN.m)	COMBDIS3	COMBDIS4	COMBDIS5	COMBDIS6	COMBDIS7	COMBDIS8	COMBDIS9	COMBDIS10	COMBDIS11	COMBDIS12	COMBDIS13	COMBDIS14	COMBDIS15	COMBDIS16	COMBDIS17	COMBDIS18
N+3.45	B203	0.000	7.450	V-20X45	0.20	0.40	-11.475	-1.866	12.246	8.138	-2.942	-6.197	12.372	11.619	21.766	6.271	6.203	8.969	31.721	37.516	34.367	17.837	25.963	53.111	84.408	85.082	68.388	64.797
	B203	7.450					-11.660	-1.976	12.532	7.778	-56.561	-36.981	12.665	8.119	7.782	54.601	101.499	29.390	28.685	36.424	88.454	175.463	159.991	77.944	102.201	181.821	322.358	394.681
N+3.45	B204	0.000	6.950	V-20X45	0.20	0.40	-17.182	-16.803	5.858	4.181	35.797	26.283	35.841	10.990	20.918	49.044	77.937	71.217	61.917	50.200	96.213	156.744	181.847	164.948	156.331	203.408	323.606	417.017
	B204	6.950					-5.863	-11.070	5.436	3.580	34.695	25.358	16.659	4.739	19.504	45.737	71.010	49.442	32.113	40.089	88.217	139.022	144.463	106.234	107.497	176.848	284.068	342.063
N+3.45	B204	0.000	6.950	V-20X45	0.20	0.40	-15.072	-9.439	11.480	9.325	-35.797	-26.283	24.353	0.161	13.394	28.824	63.817	6.258	34.282	24.247	59.496	102.082	92.073	51.147	85.412	117.415	197.347	231.632
	B204	6.950					-11.344	-7.701	12.651	6.792	3.365	5.960	18.050	5.143	23.118	14.043	14.352	27.886	32.877	33.368	46.834	39.592	54.639	76.877	85.867	99.316	113.060	124.958
N+3.45	B205	0.000	3.850	V-20X45	0.20	0.40	-3.860	-9.665	6.564	4.174	3.465	7.216	12.560	3.875	13.302	10.915	14.423	22.967	22.631	21.339	31.613	34.134	46.727	57.042	57.798	67.921	86.256	104.217
	B205	3.850					-5.265	-9.918	6.591	4.203	56.797	36.934	14.491	0.590	27.196	71.014	108.350	60.756	28.757	50.908	131.778	208.986	200.561	121.763	128.634	252.680	419.805	486.977
N+3.45	B205	0.000	3.850	V-20X45	0.20	0.40	-8.074	-4.348	14.483	9.783	-55.958	-45.755	10.166	7.709	11.677	53.708	110.132	42.248	26.084	40.205	95.011	185.709	182.883	92.050	105.000	196.718	346.500	433.189
	B205	3.850					-7.612	-4.123	15.156	9.281	-3.465	-7.216	9.271	12.040	26.217	6.687	8.511	5.035	29.436	42.718	40.374	19.616	24.638	47.663	88.322	97.638	76.718	64.657
N+3.45	B206	0.000	7.080	V-20X45	0.20	0.40	-8.578	-11.896	5.455	3.446	-3.756	-6.484	20.748	8.305	8.725	0.321	5.827	15.394	35.162	19.151	13.113	11.978	31.477	58.765	65.058	40.854	38.626	63.246
	B206	7.080					-10.528	-18.880	5.875	3.697	56.920	41.615	29.962	12.165	26.170	72.602	117.388	84.348	58.774	64.728	135.715	227.172	242.589	183.423	180.561	280.044	456.168	567.994
N+3.45	B206	0.000	7.080	V-20X45	0.20	0.40	-11.398	-7.871	10.158	8.780	0.090	0.149	18.706	2.670	21.000	11.906	4.592	20.878	30.577	27.155	39.518	25.557	34.994	64.300	74.334	80.117	85.042	84.907
	B206	7.080					-19.170	-13.768	13.868	7.694	-56.869	-41.812	33.177	4.735	8.911	54.716	102.366	15.351	50.176	33.576	89.180	174.782	151.579	82.003	125.257	178.417	320.949	387.891
N+3.45	B207	0.000	7.080	V-20X45	0.20	0.40	-11.143	-20.216	6.828	4.460	93.190	68.223	31.773	10.227	37.911	115.821	187.793	118.441	64.501	88.441	210.942	357.399	364.022	240.346	236.545	420.761	707.446	862.081
	B207	7.080					-5.824	-3.741	8.291	5.401	93.525	67.733	8.527	11.237	40.649	115.626	182.607	95.014	38.211	92.002	211.319	345.020	328.767	186.761	207.817	420.310	684.113	798.149
N+3.45	B207	0.000	7.080	V-20X45	0.20	0.40	-20.328	-14.538	11.221	10.235	-93.190	-68.223	35.756	10.163	1.557	93.685	171.428	43.750	59.661	46.000	136.565	297.549	265.788	131.487	167.778	275.606	529.257	663.251
	B207	7.080					-5.080	-3.996	15.178	8.625	0.661	0.454	6.144	12.344	27.016	11.521	3.435	11.233	26.488	44.617	45.453	21.523	24.216	52.913	87.939	105.391	84.975	67.665
N+3.45	B208	0.000	0.700	V-20X45	0.20	0.40	-0.937	-0.585	1.254	1.246	35.555	26.154	1.348	3.199	12.396	42.952	69.333	34.270	10.434	30.402	75.519	129.186	121.815	63.349	68.317	148.830	251.102	295.470
	B208	0.700					-0.145	1.447	2.915	2.169	-0.661	-0.454	2.065	5.089	5.490	1.979	0.449	3.018	8.920	12.067	8.867	4.088	6.343	15.813	25.013	24.679	17.193	16.431
N+3.45	B209	0.000	6.300	V-20X45	0.20	0.40	-4.159	-0.525	10.178	8.107	-35.555	-26.154	2.714	8.979	10.676	31.458	67.618	25.964	16.705	32.949	61.026	112.251	113.015	59.253	74.040	133.044	214.547	265.820
	B209	6.300					-11.238	-3.083	5.924	5.615	4.175	6.985	14.878	3.751	14.117	13.457	15.551	25.034	25.638	22.645	35.523	38.972	50.903	63.080	63.903	74.751	97.116	115.947
N+3.45	B210	0.000	7.080	V-20X45	0.20	0.40	-5.798	-7.543	7.191	5.766	4.220	8.712	12.518	0.298	15.914	13.910	16.578	24.100	19.783	20.468	38.297	39.944	49.754	55.805	55.381	75.051	100.677	113.779
	B210	7.080					-11.057	-25.513	5.231	4.235	58.834	36.906	37.337	20.521	26.047	74.606	117.172	87.921	76.087	75.063	137.762	231.310	250.439	207.457	212.402	295.936	466.108	588.273
N+3.45	B210	0.000	7.080	V-20X45	0.20	0.40	-11.748	-5.766	7.154	4.892	-52.280	-43.499	17.948	2.163	1.041	54.880	102.102	33.701	27.591	22.639	81.065	177.286	163.864	78.467	85.581	158.553	316.209	399.750
	B210	7.080					-19.211	-15.262	7.652	7.620	-58.834	-36.906	36.107	12.891	1.268	55.484	98.624	5.231	60.200	35.642	79.271	170.381	139.334	79.683	136.857	169.192	301.781	370.621
N+3.45	B211	0.000	7.200	V-20X45	0.20	0.40	-11.002	-24.512	4.372	3.505	36.272	26.456	36.509	21.845	18.576	48.791	79.552	74.349	73.037	60.936	93.717	159.492	190.104	182.045	180.039	214.956	326.334	433.952
	B211	7.200					-10.380	-22.441	4.622	3.714	36.158	26.198	33.622	19.071	19.042	48.678	78.331	70.567	66.895	57.967	93.640	156.886	183.294	170.700	169.509	210.283	321.365	420.791
N+3.45	B211	0.000	7.200	V-20X45	0.20	0.40	-19.221	-15.452	11.402	7.467	-36.272	-26.456	35.486	7.899	11.325	30.825	61.570	6.249	55.054	31.759	58.514	103.619	94.484	73.511	117.734	125.950	199.733	243.012
	B211	7.200					-17.683	-14.032	8.754	8.837	4.399	7.909	32.717	5.827	20.847	18.942	20.847	44.893	50.983	33.439	51.584	56.952	83.468	115.724	109.878	109.930	145.116	184.852
N+3.45	B212	0.000	7.080	V-20X45	0.20	0.40	-10.090	-21.966	4.701	3.768	4.739	9.844	32.778	20.505	11.119	13.633	24.182	49.889	63.218	40.366	35.675	55.843	95.647	134.434	127.879	102.901	128.870	201.057
	B212	7.080					-11.355	-23.449	4.644	3.726	58.756	37.397	35.795	18.750	24.849	73.924	117.109	86.494	72.153	71.583	135.533	229.848	247.831	200.889	203.609	289.032	460.954	581.865
N+3.45	B212	0.000	7.080	V-20X45	0.20	0.40	-17.895	-14.228	10.980	6.834	-55.207	-46.958	32.806	8.255	4.611	55.254	105.366	21.401	52.331	33.821	85.629	179.915	161.724	91.237	127.642	176.977	324.691	406.407
	B212	7.080					-17.942	-14.417	8.988	9.384	-58.756	-37.397	33.324	10.144	4.620	53.584	99.822	8.990	54.732	35.355	81.910	169.770	143.296	78.837	130.554	171.615	305.161	373.243
N+3.45	B214	0.000	6.950	V-20X45	0.20	0.40	-11.151	-23.373	4.664	3.769	1.694	0.927	35.466	22.433	9.804	8.787	12.337	42.218	67.757	39.499	26.108	36.780	74.712	128.937	129.062	86.661	93.309	156.105
	B214	6.950					-8.086	-16.349	4.321	3.475	3.736	6.779	24.860	14.277	9.942	11.070	17.738	36.830	47.056	30.717	29.398	42.344	70.621	100.039	96.540	80.376	99.984	150.101
N+3.45	B214	0.000	6.950	V-20X45	0.20	0.40	-19.161	-15.490	11.011	6.259	-1.694	-0.927	35.619	6.299	19.034	7.985	5.375	37.175	53.804	28.726	34.499	26.806	57.497	107.098	102.744	78.760	88.122	120.314
	B214	6.950					-12.056	-9.512	8.790	9.375	1.899	1.095	21.401	0.414	20.418	14.819	8.157	24.168	31.621	24.752	42.745	33.419	42.634	68.973	74.424	82.716	98.785	103.025
N+3.45	B215	0.000	3.850	V-20X45	0.20	0.40	-5.574	-13.509	4.487	3.635	52.512	34.208	18.958	7.415	22.969	65.740	101.930	63.187	39.652	53.272	120.166	197.502	197.866	135.326	140.725	241.173	394.694	474.323
	B215	3.850					-5.807	-13.949	4.494	3.663	-1.899	-1.095	19.675	11.557	8.561	3.565	1.769	21.500	37.307	23.340	15.664	13.312	33.469	69.337	72.476	48.861	44.169	69.682
N+3.45	B215	0.000	3.850	V-20X45	0.20	0.40	-11.205	-8.952	10.632	7.568	-52.512	-34.208	19.531	1.929	6.377	49.730	92.754	20.665	30.099	25.927	79.372	159.029	140.386	65.950	90.285	155.182	289.868	351.895
	B215	3.850					-11.172	-9.046	10.174	8.856	0.843	0.512	19.601	1.343	21.286	12.891	5.969	21.933	30.454	26.160	41.223	28.342	37.607	65.335	73.755	81.421	90.522	91.054
N+3.45	B216	0.000	7.080	V-20X45	0.20	0.40	-8.988	-17.445	4.281	3.530	38.576	24.561	27.044	13.297	18.877	50.073	77.748	60.730	53.283	51.144	94.052	154.884	169.279	143.795	146.309	201.128	314.949	396.848
	B216	7.080					-10.471	-24.245	4.492	3.753	-0.843	-0.512	35.562	23.824	8.922	5.918	7.967	40.836	68.875	39.357	21.117	28.735	68.327	128.033	128.616	79.286	77.794	139.835
N+3.45	B216	0.000	7.080	V-20X45	0.20	0.40	-13.016	-10.413	10.334	5.673	-38.576	-24.561	23.358	3.473	7.864	35.669	65.430	4.820	35.627	24.320	59.967	111.679	92.874	50.813	87.844	120.160	207.666	244.038
	B216	7.080					-19.742	-15.613	8.844	10.658	5.131	5.141	36.628	7.181	22.754	21.505	19.916	45.909	57.624	37.478	56.296	59.766	85.113	124.797	123.121	120.225	154.555	192.773
N+3.45	B217	0.000	7.080	V-20X45	0.20	0.40	-10.909	-25.223	5.198	3.909	54.305	39.254	36.898	20.581	24.831	70.179	113.992	90.232	75.055	72.723	131.323	223.261	248.549	208.249	206.856	284.774	449.966	576.530
	B217	7.080					-6.044	-7.798	6.639	5.054	-5.438	-4.812	13.239	1.958	11.492	0.440	8.265	8.665	20.427	14.490	16.644	12.081	24.089	35.155	43.507	38.323	39.751	49.298
N+3.45	B217	0.000	7.080	V-20X45	0.20	0.40	-20.931	-16.445	11.128	5.650	-6.891	-5.075	38.713	7.810	17.134	1.342	4.221	35.500	58.162	27.085	25.207	17.598	55.296	108.462	103.655	65.307	67.365	107.426
	B217	7.080					-5.452	-4.885	10.398	10.531	0.143	0.084	8.415	6.886	23.046	13.360	2.585	11.582	22.995	34.450	42.362	22.723	22.090	47.373	72.973	90.224	81.624	64.750
N+3.45	B218	0.000	2.150	V-20X45	0.20	0.40	-0.854	-0.280	1.552	1.176	37.030	23.586	0.882	3.946	12.840	43.741	68.481	30.918	10.773	31.861	76.428	128.559	117.613	60.050	70.343	151.070	250.412	289.918
	B218	2.150					-10.154	-10.566	4.326	5.713	-0.143	-0.084	21.409	7.093	10.867	8.121	4.975	23.609	35.740	21.515	23.841	22.349	38.955	70.440	71.191	57.222	64.311	86.173
N+3.45	B219	0.000	1.570	V-20X45	0.20	0.40	-6.117	-5.014	3.490	7.528	-37.030	-23.586	11.077	3.323	1.915	32.499	65.339	16.360	19.207	17.480	50.407	109.254	100.201	46.084	59.014	102.342	195.082	245.481
	B219	1.570					-0.708	-0.189	1.675	1.057	3.324	4.924	0.596	1.905	4.134	5.726	9.172	7.204	3.920	8.304	13.206	17.906	19.635	15.290	17.136	28.458	39.135	45.662
N+3.45	B220	0.000	1.570	V-40X45	0.40	0.40	-14.463	-17.827	8.190	9.534	5.399	4.850	32.727	10.724	20.885	20.099	19.316	42.322	55.977	39.508	52.276	56.572	80.575	119.029	122.069	117.628	145.144	183.051
	B220	1.570					0.460	0.033	1.726	1.320	57.282	41.143	1.057	5.878	18.863	68.079	110.508	52.992	15.876	48.413	118.806	205.038	192.357	98.145	107.534	235.288	396.893	467.381
N+3.45	B223	0.000	1.570	V-40X45	0.40	0.40	-17.700	-18.570	3.642	2.267	-59.111	-34.759	38.850	22.079	8.816	61.525	95.587	2.633	74.759	55.355	93.521	174.986	137.641	96.454	177.514	208.009	324.228	380.892
	B223	1.570					-0.295	-0.436	0.122	0.271	-5.399	-4.850	0.745	0.701	1.106	6.102	11.117	4.846	2.247	4.044	10.222	19.666	18.955	9.642	10.323	20.709	36.787	45.384
N+3.45	B223	0.000	1.570	V-40X45	0.40	0.40	-39.688	-34.230	3.234	3.682	-3.812	-5.333	80.891	37.278	6.360	4.814	10.554	83.200	136.082	52.867	20.338	43.892	129.629	249.026	223.611	102.174	113.706	252.546
	B223	1.570					2.177	1.974	0.387	0.869	37.464	23.991	4.730	5.447	11.258	44.153	70.362	35.480	16.568	32.297	75.665	132.335	125.750	71.366	77.815	152.212	255.835	305.599
N+3.45	B224	0.000	2.150	V-40X45	0.40	0.40	-0.455	-1.045	0.147	0.195	0.236	0.115	1.545	1.048	0.432	0.599	0.811	1.945	3.038	1.876	1.426	2.165	3.719	5.884	5.983	4.407	5.095	8.023
	B224	2.150					-27.955	-36.663	3.534	2.789	-37.464	-23.991	69.238	42.339	2.895	34.833	50.739	50.050	128.390	64.825	52.919	112.220	143.790	206.384	238.135	165.233	221.434	340.193
N+6.65	B224	0.000	2.150	V-40X45	0.40	0.40	0.972	0.978	0.503	0.595	-0.236	-0.115	2.296	1.793	1.138	0.606	0.232	2.632	4.841	3.440	2.199	1.866	4.215	8.911	9.863	7.022	6.035	9.092
	B224	2.150					-40.225	-25.856	5.550	9.261	60.175	35.386	72.275	19.408	31.652	83.970	124.951	121.161	118.770	81.931	157.797	260.558	302.958	292.890	276.892	334.214	536.764	699.174
N+3.45	B225	0.000	1.570	V-40X45	0.40	0.40	-17.786	-18.642	3.352	2.224	3.778	4.850	39.092	18.272	7.409	10.131	19.289	49.467	67.505	32.873	26.606	46.939	89.806	135.943	122.921	82.472	107.886	184.536
	B225	1.570					-0.275	-0.481	0.095	0.214	3.684	5.330	0.776	0.189	1.502	5.177	9.936	7.314	1.799	3.542	9.675	17.893	19.873	12.007	9.043	19.226	34.720	44.616

PROYECTO: INSTITUCIÓN EDUCATIVA MARCELO MIRANDA
RESISTENCIA A CORTANTE PARA VIGAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3 (a)

f'c = **21.1** MPa
fy = **420** MPa
Φ Cortante = **0.75**
Estribos Φ = **9.5** mm
Av = **71** mm^2
R= **4.50**

Mn = Momentos nominales de la viga en cada extremo restringido de la luz libre.
Vg = Cortante calculado para cargas gravitacionales mayoradas.
Vm = Cortante debido a flexion en curvatura inversa.
Vu = Vm + Vg

V_g	$V_m = M_{nl} + M_{nr} / l_n$															
	COMBDIS3	COMBDIS4	COMBDIS5	COMBDIS6	COMBDIS7	COMBDIS8	COMBDIS9	COMBDIS10	COMBDIS11	COMBDIS12	COMBDIS13	COMBDIS14	COMBDIS15	COMBDIS16	COMBDIS17	COMBDIS18
(kN)	(kN)															
9.61	3.361	2.649	3.966	8.171	14.457	5.149	8.108	9.925	16.486	25.946	24.960	17.591	25.048	35.826	52.449	61.675
9.70																
35.12	7.554	2.263	5.816	13.638	21.431	17.361	13.530	12.991	26.537	42.556	46.951	39.019	37.961	54.713	87.435	109.220
28.57																
32.84	6.101	0.763	5.254	6.168	11.247	4.913	9.663	8.290	15.299	20.385	21.110	18.421	24.645	31.184	44.663	51.308
30.20																
17.10	7.026	1.160	10.519	21.280	31.889	21.746	13.348	18.766	42.439	63.148	64.231	46.443	48.424	83.273	131.445	153.557
18.18																
5.23	5.049	5.130	9.843	15.687	30.816	12.281	14.421	21.539	35.165	53.331	53.901	36.289	50.213	76.456	109.927	129.311
4.75																
30.54	7.162	2.891	4.929	10.300	17.403	14.088	13.268	11.847	21.021	33.778	38.710	34.207	34.692	45.325	69.886	89.158
34.36																
30.71	7.328	1.046	4.225	9.410	15.107	5.117	11.406	8.578	18.178	28.296	26.352	20.664	28.191	36.516	57.343	66.779
35.40																
37.06	5.692	3.032	11.096	32.690	52.316	30.149	14.507	25.486	59.641	99.212	97.852	60.326	62.763	118.795	196.548	234.496
27.82																
37.25	5.918	3.179	4.036	14.860	24.698	7.766	12.168	12.799	25.709	45.067	40.961	26.045	36.118	53.813	86.756	103.237
26.44																
6.91	4.876	11.841	25.551	64.187	99.688	53.268	27.649	60.669	120.551	190.393	183.082	113.089	133.330	247.869	383.278	445.573
5.08																
6.16	2.792	2.021	3.935	7.129	13.202	8.095	6.721	8.825	15.325	24.004	26.019	19.418	21.896	32.983	49.470	60.598
10.17																
36.09	7.042	2.941	5.927	12.502	18.891	15.822	13.541	13.493	24.867	38.313	42.400	37.184	37.822	52.399	80.054	99.160
46.01																
32.35	7.635	2.126	0.326	15.588	28.351	5.499	12.400	8.232	22.646	49.105	42.825	22.338	31.418	46.292	87.287	108.810
38.42																
42.31	9.740	5.683	5.225	13.537	21.928	20.127	19.435	16.514	26.022	43.941	51.861	48.992	48.548	59.061	89.958	118.714
41.18																
39.38	9.473	1.906	4.468	6.912	11.447	7.103	14.727	9.055	15.291	22.302	24.716	26.283	31.613	32.761	47.896	59.426
37.18																
40.50	9.685	5.544	5.080	12.367	19.956	19.263	19.120	15.812	24.182	40.352	48.514	47.362	46.820	55.358	83.309	110.582
41.60																
37.55	9.341	2.599	1.304	15.373	28.981	4.293	15.122	9.771	23.664	49.391	43.082	24.022	36.468	49.236	88.962	110.120
36.91																
42.44	8.680	5.282	2.841	2.857	4.327	11.374	16.520	10.103	7.986	11.385	20.911	32.946	32.461	24.034	27.812	44.058
38.15																
38.96	8.204	0.966	5.677	3.281	1.947	8.826	12.291	7.695	11.114	8.665	14.407	25.334	25.492	23.234	26.893	32.135
32.97																
22.06	10.035	4.928	8.190	18.001	26.935	21.997	19.989	19.899	35.281	54.757	60.087	53.159	55.377	75.334	113.990	141.300
22.57																
23.16	10.164	0.850	7.185	16.265	25.642	11.064	15.728	13.529	31.323	48.668	46.232	34.100	42.608	61.455	98.803	115.052
23.22																
39.26	8.843	5.243	3.926	7.908	12.107	14.346	17.254	12.783	16.267	25.935	33.560	38.394	38.831	39.606	55.472	75.803
42.83																
35.23	8.472	1.505	4.325	8.075	12.055	7.165	13.171	8.728	16.421	24.215	25.139	24.804	29.797	33.953	51.161	61.696
38.80																
45.81	7.081	3.183	5.130	9.974	17.268	13.969	13.486	12.318	20.899	33.240	38.508	34.379	35.362	45.635	69.169	88.394
36.29																
41.90	6.656	2.076	5.675	2.077	0.961	6.650	11.463	8.691	9.544	5.695	10.930	22.011	24.947	21.968	21.044	24.319
30.33																
6.91	10.367	5.135	11.026	24.122	34.165	25.361	21.634	24.826	46.637	70.190	72.822	60.693	65.830	96.880	146.383	174.926
18.80																
13.40	7.435	3.329	3.853	24.348	47.459	15.009	14.731	16.423	40.518	80.994	76.328	39.092	48.503	83.312	149.183	185.441
4.71																
56.68	21.518	10.574	25.318	56.165	82.691	60.710	45.766	56.000	108.969	166.631	173.842	138.327	146.244	224.788	345.247	414.288
2.54																
35.86	25.219	14.509	6.319	43.074	67.964	4.763	49.049	37.834	66.078	123.982	99.742	67.577	119.642	145.680	229.946	271.514
27.71																
97.43	54.536	27.213	11.222	31.190	51.539	75.593	97.229	54.244	61.148	112.246	162.662	204.071	191.991	162.029	235.376	355.506
40.36																
36.29	32.922	20.180	1.547	16.480	23.977	24.184	61.129	31.024	25.277	53.202	68.609	98.729	113.543	78.902	105.362	161.961
47.43																
30.33	34.684	9.861	15.252	39.337	58.224	57.578	57.494	39.708	74.417	122.058	142.871	140.373	133.374	158.715	252.465	329.426
55.59																
35.96	25.393	11.759	5.676	9.750	18.614	36.166	44.142	23.194	23.109	41.294	69.859	94.236	84.053	64.776	90.831	145.957
27.82																

PROYECTO: INSTITUCIÓN EDUCATIVA MARCELO MIRANDA
RESISTENCIA A CORTANTE PARA VIGAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3 (a)

f'c = **21.1** MPa
fy = **420** MPa
Φ Cortante = **0.75**
Estribos Φ = **9.5** mm
Av = **71** mm^2
R= **4.50**

Mn = Momentos nominales de la viga en cada extremo restringido de la luz libre.
Vg = Cortante calculado para cargas gravitacionales mayoradas.
Vm = Cortante debido a flexion en curvatura inversa.
Vu = Vm + Vg

***Vu* = Vm + Vg**																Vu_{max}	S	ΦVs	ΦVc	ΦVn	ΦVn > Vu_{max}
COMBDIS3	COMBDIS4	COMBDIS5	COMBDIS6	COMBDIS7	COMBDIS8	COMBDIS9	COMBDIS10	COMBDIS11	COMBDIS12	COMBDIS13	COMBDIS14	COMBDIS15	COMBDIS16	COMBDIS17	COMBDIS18						
(kN)																(kN)	(m)	(kN)	(kN)	(kN)	
12.969	6.010	6.616	12.137	22.627	19.605	13.257	18.033	26.411	42.432	50.907	42.552	42.639	60.874	88.275	114.124	114.1	**0.10**	178.92	45.93	224.85	**OK**
9.700	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
42.678	9.817	8.079	19.454	35.069	38.792	30.891	26.521	39.528	69.093	89.507	85.970	76.980	92.674	142.148	196.655	196.7	**0.10**	178.92	45.93	224.85	**OK**
28.572	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
38.945	6.864	6.017	11.422	17.415	16.160	14.576	17.953	23.589	35.684	41.494	39.530	43.065	55.829	75.847	95.971	96.0	**0.10**	178.92	45.93	224.85	**OK**
30.200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
24.122	8.186	11.679	31.799	53.169	53.636	35.094	32.113	61.205	105.587	127.378	110.673	94.866	131.697	214.717	285.001	285.0	**0.10**	178.92	45.93	224.85	**OK**
18.180	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
10.281	10.178	14.972	25.530	46.503	43.098	26.702	35.959	56.704	88.496	107.233	90.190	86.503	126.670	186.383	239.238	239.2	**0.10**	178.92	45.93	224.85	**OK**
4.752	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
37.706	10.054	7.820	15.229	27.703	31.491	27.356	25.115	32.868	54.799	72.488	72.917	68.899	80.016	115.211	159.044	159.0	**0.10**	178.92	45.93	224.85	**OK**
34.356	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
38.036	8.374	5.270	13.634	24.517	20.224	16.523	19.984	26.756	46.474	54.649	47.016	48.855	64.707	93.859	124.123	124.1	**0.10**	178.92	45.93	224.85	**OK**
35.400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
42.756	8.724	14.128	43.786	85.007	82.465	44.656	39.994	85.128	158.853	197.063	158.178	123.089	181.558	315.343	431.044	431.0	**0.10**	178.92	45.93	224.85	**OK**
27.824	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
43.170	9.097	7.215	18.895	39.558	32.464	19.934	24.967	38.508	70.775	86.028	67.006	62.163	89.931	140.569	189.993	190.0	**0.10**	178.92	45.93	224.85	**OK**
26.436	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
11.784	16.717	37.391	89.737	163.875	152.956	80.916	88.318	181.220	310.944	373.475	296.171	246.418	381.199	631.147	828.851	828.9	**0.10**	178.92	45.93	224.85	**OK**
5.084	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
8.952	4.813	5.956	11.065	20.331	21.297	14.816	15.546	24.150	39.329	50.022	45.437	41.314	54.879	82.454	110.068	110.1	**0.10**	178.92	45.93	224.85	**OK**
10.172	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
43.134	9.982	8.867	18.429	31.393	34.713	29.363	27.034	38.360	63.180	80.713	79.584	75.006	90.222	132.454	179.214	179.2	**0.10**	178.92	45.93	224.85	**OK**
46.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
39.983	9.761	2.452	15.914	43.939	33.850	17.899	20.632	30.878	71.752	91.930	65.162	53.755	77.710	133.578	196.096	196.1	**0.10**	178.92	45.93	224.85	**OK**
38.420	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
52.048	15.423	10.908	18.762	35.466	42.055	39.562	35.949	42.536	69.963	95.802	100.853	97.541	107.609	149.019	208.673	208.7	**0.10**	178.92	45.93	224.85	**OK**
41.176	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
48.857	11.379	6.375	11.380	18.359	18.550	21.830	23.783	24.347	37.593	47.017	50.998	57.896	64.374	80.657	107.321	107.3	**0.10**	178.92	45.93	224.85	**OK**
37.184	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
50.189	15.230	10.625	17.447	32.323	39.219	38.383	34.932	39.994	64.534	88.866	95.876	94.182	102.178	138.666	193.891	193.9	**0.10**	178.92	45.93	224.85	**OK**
41.596	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
46.893	11.939	3.903	16.676	44.354	33.274	19.415	24.893	33.434	73.054	92.473	67.104	60.490	85.704	138.198	199.082	199.1	**0.10**	178.92	45.93	224.85	**OK**
36.908	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
51.116	13.962	8.123	5.698	7.185	15.701	27.894	26.623	18.089	19.371	32.296	53.857	65.407	56.495	51.846	71.870	71.9	**0.10**	178.92	45.93	224.85	**OK**
38.148	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
47.164	9.170	6.643	8.958	5.228	10.774	21.118	19.986	18.809	19.780	23.073	39.741	50.826	48.726	50.127	59.028	59.0	**0.10**	178.92	45.93	224.85	**OK**
32.968	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
32.091	14.962	13.118	26.191	44.936	48.931	41.986	39.888	55.180	90.038	114.844	113.246	108.536	130.710	189.324	255.290	255.3	**0.10**	178.92	45.93	224.85	**OK**
22.568	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
33.320	11.014	8.035	23.450	41.907	36.707	26.792	29.257	44.852	79.991	94.900	80.332	76.708	104.063	160.258	213.854	213.9	**0.10**	178.92	45.93	224.85	**OK**
23.224	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
48.099	14.086	9.169	11.835	20.015	26.452	31.600	30.037	29.049	42.202	59.495	71.954	77.225	78.438	95.079	131.275	131.3	**0.10**	178.92	45.93	224.85	**OK**
42.832	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
43.704	9.977	5.829	12.400	20.130	19.220	20.336	21.900	25.150	40.637	49.355	49.943	54.601	63.750	85.114	112.858	112.9	**0.10**	178.92	45.93	224.85	**OK**
38.796	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
52.889	10.265	8.314	15.105	27.242	31.236	27.455	25.804	33.218	54.140	71.749	72.887	69.741	80.997	114.804	157.563	157.6	**0.10**	178.92	45.93	224.85	**OK**
36.292	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
48.556	8.732	7.751	7.752	3.038	7.611	18.113	20.154	18.235	15.239	16.625	32.941	46.958	46.915	43.011	45.362	48.6	**0.10**	178.92	45.93	224.85	**OK**
30.332	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
17.275	15.502	16.161	35.148	58.288	59.526	46.995	46.460	71.463	116.827	143.012	133.515	126.523	162.710	243.263	321.309	321.3	**0.10**	178.92	45.93	224.85	**OK**
18.796	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
20.831	10.764	7.182	28.200	71.807	62.468	29.740	31.153	56.940	121.511	157.322	115.420	87.595	131.815	232.495	334.624	334.6	**0.10**	178.92	45.93	224.85	**OK**
4.712	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
78.194	32.092	35.892	81.482	138.855	143.400	106.476	101.767	164.969	275.599	340.473	312.170	284.571	371.032	570.034	759.535	759.5	**0.10**	178.92	91.87	270.79	**OK**
2.536	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
61.075	39.729	20.829	49.394	111.038	72.728	53.812	86.882	103.912	190.060	223.724	167.320	187.219	265.321	375.626	501.459	501.5	**0.10**	178.92	91.87	270.79	**OK**
27.708	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
151.964	81.749	38.435	42.411	82.728	127.131	172.822	151.474	115.393	173.395	274.908	366.733	396.063	354.021	397.405	590.882	590.9	**0.10**	178.92	91.87	270.79	**OK**
40.360	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
69.214	53.103	21.727	18.027	40.457	48.161	85.313	92.153	56.301	78.479	121.811	167.338	212.273	192.445	184.265	267.323	267.3	**0.10**	178.92	91.87	270.79	**OK**
47.428	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
65.016	44.545	25.112	54.589	97.562	115.803	115.072	97.201	114.124	196.474	264.929	283.244	273.747	292.089	411.179	581.891	581.9	**0.10**	178.92	91.87	270.79	**OK**
55.588	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
61.353	37.152	17.435	15.426	28.365	54.780	80.308	67.336	46.303	64.403	111.153	164.095	178.289	148.829	155.607	236.788	236.8	**0.10**	178.92	91.87	270.79	**OK**
27.824	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						

PROYECTO: INSTITUCIÓN EDUCATIVA MARCELO MIRANDA
RESISTENCIA A CORTANTE PARA VIGAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3 (b)

f'c = **21.0** MPa
fy = **420** MPa
$\Phi_{Cortante}$ = **0.75**
Estribos Φ = **9.5** mm
Av = **71** mm^2
R= **4.50**

2VE = Cortante maximo obtenido de las combinaciones de carga de diseño que incluyan E, considerando E, como el doble del prescrito por el reglamento general legalmente adoptado para diseño sismico vigente.

COMDIS3 = 1.2C.M.+1.0C.V.+(2*(1.0Ex))+(2*(0.3Ey))
COMDIS4 = 1.2C.M.+1.0C.V.+(2*(1.0(-Ex)))+(2*(0.3Ey)))
COMDIS5 = 1.2C.M.+1.0C.V.+(2*(1.0Ex))+(2*(0.3(-Ey)))
COMDIS6 = 1.2C.M.+1.0C.V.+(2*(1.0(-Ex)))+(2*(0.3(-Ey)))
COMDIS7 = 1.2C.M.+1.0C.V.+(2*(0.3Ex))+(2*(1.0Ey))
COMDIS8 = 1.2C.M.+1.0C.V.+(2*(0.3(-Ex)))+(2*(1.0Ey))
COMDIS9 = 1.2C.M.+1.0C.V.+(2*(0.3Ex))+(2*(1.0(-Ey)))
COMDIS10 = 1.2C.M.+1.0C.V.+(2*(0.3(-Ex)))+(2*(1.0(-Ey)))
COMDIS11 = 0.9C.M.+(2*(1.0Ex))+(2*(0.3Ey))
COMDIS12 = 0.9C.M.+(2*(1.0(-Ex)))+(2*(0.3Ey))
COMDIS13 = 0.9C.M.+(2*(1.0Ex))+(2*(0.3(-Ey)))
COMDIS14 = 0.9C.M.+(2*(1.0(-Ex)))+(2*(0.3(-Ey)))
COMDIS15 = 0.9C.M.+(2*(0.3Ex))+(2*(1.0Ey))
COMDIS16 = 0.9C.M.+(2*(0.3(-Ex)))+(2*(1.0Ey))
COMDIS17 = 0.9C.M.+(2*(0.3Ex))+(2*(1.0(-Ey)))
COMDIS17 = 0.9C.M.+(2*(0.3(-Ex)))+(2*(1.0(-Ey)))

NIVEL	VIGA	LOC.	LONG.	PROPIEDADES DEL ELEMENTO			V2						$2V_E$ Combinaciones de carga de diseño para el doble del cortante donde se incluya E																$2V_{E max}$	S	ΦVs	ΦVc	ΦVn	ΦVn > $2V_{Emax}$
	ELEMENTO No.	(m)	(m)	SECCION	b (m)	d (m)	C.M. (KN.m)	C.V. (KN.m)	SISMO X (KN.m)	SISMO Y (KN.m)	-SISMO X (KN.m)	-SISMO Y (KN.m)	COMBDIS3	COMBDIS4	COMBDIS5	COMBDIS6	COMBDIS7	COMBDIS8	COMBDIS9	COMBDIS10	COMBDIS11	COMBDIS12	COMBDIS13	COMBDIS14	COMBDIS15	COMBDIS16	COMBDIS17	COMBDIS18	(kN)	(m)	(kN)	(kN)	(kN)	
N+3.45	B165	0	8.2	V-40X45	0.40	0.40	-23.16	-73.2	12.7	24.32	12.7	24.32	96.548	96.548	96.548	96.548	94.741	94.741	94.741	94.741	16.400	16.400	16.400	16.400	14.593	14.593	14.593	14.593	173.2	**0.10**	178.92	91.65	270.57	**OK**
	B166	8.2					54.35	99.43	20.16	29.46	15.7	32.26	171.094	170.103	171.281	170.290	172.541	172.243	173.163	172.866	55.359	54.368	55.546	54.555	56.806	56.508	57.428	57.131						
N+6.65	B167	0	8.2	V-40X45	0.40	0.40	-19.38	-3.12	18.46	31.16	15.7	32.26	20.196	20.810	20.123	20.736	18.221	18.405	17.976	18.160	11.262	11.876	11.189	11.802	9.287	9.471	9.042	9.226	215.9	**0.10**	178.92	91.65	270.57	**OK**
	B167	8.2					98.89	87.04	24.2	38.68	-15.78	-27.88	213.664	204.780	209.227	200.343	215.917	213.252	201.126	198.460	96.957	88.073	92.520	83.636	99.210	96.545	84.419	81.753						
N+6.65	B168	0	8.2	V-40X45	0.40	0.40	-19.41	-3.09	18.98	30.58	-15.78	-27.88	20.126	27.850	24.023	31.747	18.321	20.638	31.312	33.630	11.213	18.937	15.110	22.834	9.408	11.725	22.399	24.717	33.6	**0.10**	178.92	91.65	270.57	**OK**
	B168	8.2					16.02	-3.09	18.98	30.58	-20.16	-29.46	22.390	13.693	18.388	9.690	24.195	21.586	10.853	8.243	20.674	11.977	16.672	7.974	22.479	19.870	9.137	6.527						
N+3.45	B168	0	8.2	V-40X45	0.40	0.40	-102.83	-91.81	24.56	39.46	18.46	31.16	207.118	208.473	207.671	209.026	204.800	205.206	206.644	207.051	84.459	85.814	85.012	86.367	82.141	82.547	83.985	84.392	209.9	**0.10**	178.92	91.65	270.57	**OK**
	B168	8.2					96.15	84.03	24.82	38.94	23.16	39.62	207.522	207.153	207.567	207.198	209.718	209.607	209.869	209.758	94.647	94.278	94.692	94.323	96.843	96.732	96.994	96.883						
N+6.65	B169	0	8.2	V-40X45	0.40	0.40	-35.18	-28.78	19.72	32.72	23.16	39.62	64.432	63.668	63.972	63.208	62.410	62.181	60.877	60.648	25.098	24.334	24.638	23.874	23.076	22.847	21.543	21.314	116.9	**0.10**	178.92	91.65	270.57	**OK**
	B169	8.2					50.78	45.74	20.94	29.04	24.2	38.68	113.265	113.990	113.908	114.632	114.525	114.743	116.668	116.885	52.291	53.016	52.934	53.658	53.551	53.769	55.694	55.911						
N+3.45	B169	0	8.2	V-40X45	0.40	0.40	-105.03	-94.28	25.6	39.62	24.2	38.68	211.986	212.297	212.048	212.360	209.805	209.898	210.014	210.107	86.197	86.508	86.259	86.571	84.016	84.109	84.225	84.318	213.4	**0.10**	178.92	91.65	270.57	**OK**
	B169	8.2					97.39	85.88	25.88	40.18	-24.2	-38.68	211.178	200.049	205.920	194.792	213.402	210.064	195.878	192.539	96.081	84.952	90.823	79.695	98.305	94.967	80.781	77.442						
N+6.65	B170	0	8.2	V-40X45	0.40	0.40	-35.12	-28.65	22.96	33.56	-24.2	-38.68	63.454	73.934	68.270	78.750	61.806	64.950	77.859	81.003	24.268	34.748	29.084	39.564	22.620	25.764	38.673	41.817	114.6	**0.10**	178.92	91.65	270.57	**OK**
	B170	8.2					50.55	45.31	19.24	32.94	-18.98	-30.58	112.442	103.948	108.207	99.714	114.573	112.025	100.457	97.909	51.967	43.473	47.732	39.239	54.098	51.550	39.982	37.434						
N+3.45	B170	0	8.2	V-40X45	0.40	0.40	-106.39	-95.38	27.46	43.68	-18.98	-30.58	214.034	224.354	218.984	229.304	211.511	214.607	228.013	231.109	86.737	97.057	91.687	102.007	84.214	87.310	100.716	103.812	231.1	**0.10**	178.92	91.65	270.57	**OK**
	B170	8.2					98.62	86.94	29	43.44	20.12	31.94	214.624	212.651	213.858	211.884	216.871	216.279	214.315	213.723	98.098	96.125	97.332	95.358	100.345	99.753	97.789	97.197						
N+6.65	B171	0	8.2	V-40X45	0.40	0.40	-19.36	-2.8	23.42	36.32	24.82	38.94	18.406	18.095	18.232	17.920	16.400	16.306	15.817	15.724	9.798	9.487	9.624	9.312	7.792	7.698	7.209	7.116	26.1	**0.10**	178.92	91.65	270.57	**OK**
	B171	8.2					16.07	-2.8	23.42	36.32	-24.56	-39.46	24.110	13.448	19.058	8.396	26.116	22.918	9.276	6.078	22.089	11.427	17.037	6.375	24.095	20.897	7.255	4.057						
N+3.45	B171	0	8.2	V-40X45	0.40	0.40	-59.85	-43.53	34.38	45.46	-24.56	-39.46	104.679	117.777	110.341	123.438	102.956	106.885	121.827	125.756	43.194	56.292	48.856	61.953	41.471	45.400	60.342	64.271	125.8	**0.10**	178.92	91.65	270.57	**OK**
	B171	8.2					54.93	37.44	28	49.5	19.72	32.72	112.878	111.038	111.760	109.920	116.223	115.671	112.494	111.942	58.959	57.119	57.841	56.001	62.304	61.752	58.575	58.023						
N+6.65	B172	0	8.2	V-40X45	0.40	0.40	-19.32	-2.77	24.9	38.8	19.72	32.72	17.834	18.985	18.239	19.390	15.672	16.017	17.023	17.368	9.268	10.419	9.673	10.824	7.106	7.451	8.457	8.802	26.8	**0.10**	178.92	91.65	270.57	**OK**
	B172	8.2					16.1	-2.77	24.9	38.8	20.94	29.04	24.670	23.790	24.019	23.139	26.832	26.568	24.663	24.399	22.610	21.730	21.959	21.079	24.772	24.508	22.603	22.339						
N+3.45	B172	0	8.2	V-40X45	0.40	0.40	-60.98	-45.03	29.86	53.24	20.94	29.04	108.021	110.003	109.634	111.617	104.384	104.979	109.762	110.357	44.697	46.679	46.310	48.293	41.060	41.655	46.438	47.033	119.1	**0.10**	178.92	91.65	270.57	**OK**
	B172	8.2					55.83	38.8	35.98	48.86	25.6	39.62	117.049	114.742	116.433	114.126	119.052	118.360	116.999	116.307	61.500	59.193	60.884	58.577	63.503	62.811	61.450	60.758						
N+6.65	B173	0	8.2	V-40X45	0.40	0.40	-19.38	-2.91	27.72	43.64	25.6	39.62	17.097	17.568	17.365	17.836	14.620	14.762	15.514	15.655	8.373	8.844	8.641	9.112	5.896	6.038	6.790	6.931	27.9	**0.10**	178.92	91.65	270.57	**OK**
	B173	8.2					16.04	-2.91	27.72	43.64	21.02	32.58	25.407	23.918	24.670	23.181	27.884	27.437	25.426	24.979	23.505	22.016	22.768	21.279	25.982	25.535	23.524	23.077						
N+3.45	B173	0	8.2	V-40X45	0.40	0.40	-107.56	-96.08	38	60.32	21.02	32.58	212.686	216.460	214.536	218.309	209.214	210.346	215.379	216.511	84.338	88.112	86.188	89.961	80.866	81.998	87.031	88.163	224.2	**0.10**	178.92	91.65	270.57	**OK**
	B173	8.2					100.24	88.08	38.18	59.7	-21.02	-32.58	220.832	207.677	214.680	201.525	224.180	220.233	203.673	199.727	102.680	89.525	96.528	83.373	106.028	102.081	85.521	81.575						
N+6.65	B174	0	8.2	V-40X45	0.40	0.40	-19.32	-2.59	29.38	46.8	-21.02	-32.58	16.125	27.325	21.417	32.617	13.415	16.775	31.055	34.415	7.739	18.939	13.031	24.231	5.029	8.389	22.669	26.029	34.4	**0.10**	178.92	91.65	270.57	**OK**
	B174	8.2					16.1	-2.59	29.38	46.8	-25.88	-40.18	26.379	14.099	20.580	8.300	29.089	25.405	9.760	6.076	24.139	11.859	18.340	6.060	26.849	23.165	7.520	3.836						
N+3.45	B174	0	8.2	V-40X45	0.40	0.40	-53.77	-41.73	35.32	50.18	22.96	33.56	95.060	97.806	96.168	98.914	92.748	93.572	96.442	97.266	37.199	39.945	38.307	41.053	34.887	35.711	38.581	39.405	110.3	**0.10**	178.92	91.65	270.57	**OK**
	B174	8.2					49.67	36.89	30.38	53.18	-22.96	-33.56	106.790	94.937	101.008	89.154	110.337	106.781	91.062	87.506	54.999	43.146	49.217	37.363	58.546	54.990	39.271	35.715						
N+3.45	B175	0	8.2	V-20X45	0.20	0.40	-9.78	-7.88	4.88	9.48	-22.96	-33.56	17.900	24.086	20.769	26.956	17.184	19.040	26.748	28.604	7.086	13.272	9.955	16.142	6.370	8.226	15.934	17.790	28.6	**0.10**	178.92	45.83	224.75	**OK**
	B175	8.2					8.82	6.47	4.88	9.48	-19.24	-32.94	18.770	13.410	15.942	10.582	19.486	17.878	10.059	8.451	9.654	4.294	6.826	1.466	10.370	8.762	0.943	0.665						
N+3.45	B176	0	0.7	V-40X45	0.40	0.40	16.55	14.54	9.84	14.8	27.46	43.68	37.573	41.489	39.499	43.414	38.345	39.520	44.763	45.937	18.068	21.984	19.994	23.909	18.840	20.015	25.258	26.432	47.4	**0.10**	178.92	91.65	270.57	**OK**
	B176	0.7					19.57	14.54	9.84	14.8	22.98	35.48	41.197	44.117	42.576	45.496	41.969	42.845	46.564	47.440	20.786	23.706	22.165	25.085	21.558	22.434	26.153	27.029						
N+3.45	B177	0	6.3	V-40X45	0.40	0.40	-11.04	0.87	33.62	24.14	22.98	35.48	3.298	5.662	2.542	4.906	4.772	5.482	2.252	2.962	0.856	3.220	0.100	2.464	2.330	3.040	0.190	0.520	32.2	**0.10**	178.92	91.65	270.57	**OK**
	B177	6.3					16.18	0.87	33.62	24.14	29	43.44	29.366	28.340	30.653	29.626	27.892	27.584	32.181	31.873	23.642	22.616	24.929	23.902	22.168	21.860	26.457	26.149						
N+6.65	B178	0	7.08	V-40X45	0.40	0.40	-20.29	-86.01	21.52	15.76	29	43.44	104.525	102.863	102.680	101.018	105.421	104.922	99.270	98.771	12.428	10.766	10.583	8.921	13.324	12.825	7.173	6.674	129.1	**0.10**	178.92	91.65	270.57	**OK**
	B178	7.08					21.73	97.19	21.52	15.76	-27.46	-43.68	129.099	118.214	125.136	114.252	128.203	124.938	114.994	111.729	25.390	14.505	21.427	10.543	24.494	21.229	11.285	8.020						
N+3.45	B178	0	7.08	V-40X45	0.40	0.40	-55.57	-50.53	26.78	22.2	-22.98	-35.48	109.783	120.841	113.628	124.686	110.495	113.813	123.313	126.630	42.582	53.640	46.427	57.485	43.294	46.612	56.112	59.429	136.3	**0.10**	178.92	91.65	270.57	**OK**
	B178	7.08					61.11	54.37	32.22	20.96	-29	-43.44	136.259	122.655	131.966	118.362	134.508	130.426	120.197	116.115	63.556	49.952	59.263	45.659	61.805	57.723	47.494	43.412						
N+6.65	B179	0	7.2	V-40X45	0.40	0.40	-21.52	-93.53	19.8	14.52	23.42	36.32	113.986	113.182	112.533	111.728	114.807	114.566	109.963	109.722	14.000	13.196	12.547	11.742	14.821	14.580	9.977	9.736	127.9	**0.10**	178.92	91.65	270.57	**OK**
	B179	7.2					21.21	92.77	19.8	14.52	23.42	36.32	123.590	124.394	125.043	125.848	122.769	123.010	127.613	127.854	24.457	25.261	25.910	26.715	23.636	23.877	28.480	28.721						
N+3.45	B179	0	7.2	V-40X45	0.40	0.40	-57.21	-49.19	29.62	24.92	-23.42	-36.32	109.598	121.385	113.681	125.468	110.330	113.866	123.938	127.474	43.245	55.032	47.328	59.115	43.977	47.513	57.585	61.121	133.1	**0.10**	178.92	91.65	270.57	**OK**
	B179	7.2					58.61	50.32	34.6	22	34.38	45.46	129.808	129.759	131.372	131.323	127.848	127.833	133.061	133.046	61.905	61.856	63.469	63.420	59.945	59.930	65.158	65.143						
N+6.65	B180	0	7.08	V-40X45	0.40	0.40	-20.88	-92.11	20.46	15	28.14	43.48	111.619	109.913	109.721	108.014	112.469	111.957	106.140	105.628	13.245	11.539	11.347	9.640	14.095	13.583	7.766	7.254	128.0	**0.10**	178.92	91.65	270.57	**OK**
	B180	7.08					21.13	91.09	20.46	15	28.14	43.48	121.993	123.699	123.891	125.598	121.143	121.655	127.472	127.984	24.564	26.270	26.462	28.169	23.714	24.226	30.043	30.555						
N+3.45	B180	0	7.08	V-40X45	0.40	0.40	-56.47	-48.32	30.74	26.52	28	49.5	107.485	108.094	105.953	106.562	108.141	108.324	103.035	103.217	42.224	42.833	40.692	41.301	42.880	43.063	37.774	37.956	128.1	**0.10**	178.92	91.65	270.57	**OK**
	B180	7.08					57.62	49.62	35.32	21.84	-28.14	-43.48	128.069	113.967	123.714	109.612	125.972	121.741	111.456	107.226	61.163	47.061	56.808	42.706	59.066	54.835	44.550	40.320						
N+6.65	B181	0	7.45	V-40X45	0.40	0.40	-20.36	-65.72	18.36	13.5	-28.14	-43.48	85.172	95.505	88.971	99.304	85.928	89.028	98.590	101.690	13.344	23.677	17.143	27.476	14.100	17.200	26.762	29.862	101.7	**0.10**	178.92	91.65	270.57	**OK**
	B181	7.45					20.02	65.59	18.36	13.5	-28	-49.5	94.594	84.292	90.394	80.092	93.838	90.747	79.838	76.747	22.998	12.696	18.798	8.496	22.242	19.151	8.242	5.151						
N+3.45	B181	0	7.45	V-40X45	0.40	0.40	-59.28	-51.32	27.88	24.92	-28	-49.5	114.599	127.017	119.560	131.978	115.060	118.785	131.597	135.323	45.495	57.913	50.456	62.874	45.956	49.681	62.493	66.219	135.3	**0.10**	178.92	91.65	270.57	**OK**
	B181	7.45					60.47	52.28	32.18	19.12	-24.9	-38.8	133.270	120.585	129.408	116.724	131.238	127.433	118.367	114.562	62.849	50.164	58.987	46.303	60.817	57.012	47.946	44.141						
N+6.65	B182	0	6.95	V-40X45	0.40	0.40	-20.99	-91.34	20.28	14.86	-24.9	-38.8	111.031	121.071	114.608	124.648	111.874	114.886	123.798	126.810	13.394	23.434	16.971	27.011	14.237	17.249	26.161	29.173	126.8	**0.10**	178.92	91.65	270.57	**OK**
	B182	6.95					20.26	88.49	20.28	14.86	29.86	53.24	118.299	120.428	120.858	122.987	117.456	118.095	125.985	126.624	23.731	25.860	26.290	28.419	22.888	23.527	31.417	32.056						
N+3.45	B182	0	6.95	V-40X45	0.40	0.40	-57.67	-49.33	31.84	28.94	29.86	53.24	109.529	109.969	107.909	108.349	109.980	110.112	104.580	104.712	42.898	43.338	41.278	41.718	43.349	43.481	37.949	38.081	127.0	**0.10**	178.92	91.65	270.57	**OK**
	B182	6.95					55.26	47.39	34.52	20.02	35.98	48.86	122.708	123.032	124.630	124.955	120.452	120.550	126.861	126.958	58.740	59.064	60.662	60.987	56.484	56.582	62.893	62.990						
N+6.65	B184	0	3.85	V-40X45	0.40	0.40	-11.72	-49.85	59.12	43.34	35.98	48.86	47.887	53.029	47.519	52.661	50.342	51.884	49.115	50.658	5.479	0.337	5.847	0.705	3.024	1.482	4.251	2.708	79.1	**0.10**	178.92	91.65	270.57	**OK**
	B184	3.85					11.13	49.76	59.12	43.34	-29.86	-53.24	79.143	59.370	72.704	52.931	76.688	70.756	55.226	49.294	26.044	6.271	19.605	0.168	23.589	17.657	2.127	3.805						
N+3.45	B184	0	3.85	V-40X45	0.40	0.40	-14.04	-7.75	97	70.62	-29.74	-46.5	1.666	26.499	6.142	34.307	2.438	10.887	28.465	36.914	13.628	14.537	5.820	22.345	9.524	1.075	16.503	24.952	49.1	**0.10**	178.92	91.65	270.57	**OK**
	B184	3.85					13.05	7.17	97	70.62	-29.74	-46.5	49.094	20.929	41.286	13.121	44.990	36.541	18.963	10.514	38.009	9.844	30.201	2.036	33.905	25.456	7.878	0.571						
N+6.65	B185	0	7.08	V-40X45	0.40	0.40	-21.23	-89.64	19.72	14.52	-35.98	-48.86	109.766	122.144	113.991	126.369	110.575	114.288	124.659	128.372	13.757	26.135	17.982	30.360	14.566	18.279	28.650	32.363	130.0	**0.10**	178.92	91.65	270.57	**OK**
	B185	7.08					20.78	93.56	19.72	14.52	27.72	43.64	123.846	125.624	125.788	127.565	123.037	123.571	129.508	130.042	24.052	25.830	25.994	27.771	23.243	23.777	29.714	30.248						
N+3.45	B185	0	7.08	V-40X45	0.40	0.40	-54.77	-47.48	29.08	27.6	27.72	43.64	104.902	105.204	103.832	104.135	105.132	105.223	101.568	101.658	40.991	41.293	39.921	40.224	41.221	41.312	37.657	37.747	132.8	**0.10**	178.92	91.65	270.57	**OK**
	B185	7.08					60.23	51.38	35.38	19.44	-27.72	-43.64	132.814	118.792	128.609	114.587	130.335	126.128	116.317	112.110	63.365	49.343	59.160	45.138	60.886	56.679	46.868	42.661						
N+6.65	B186	0	7.08	V-40X45	0.40	0.40	-21.57	-97.1	20.46	14.88	38	60.32	117.445	113.548	114.416	110.518	118.313	117.144	108.216	107.046	13.874	9.977	10.845	6.947	14.742	13.573	4.645	3.475	123.5	**0.10**	178.92	91.65	270.57	**OK**
	B186	7.08					20.44	86.09	20.46	14.88	30.98	48.74	116.157	118.494	118.414	120.752	115.289	115.990	122.813	123.514	23.935	26.272	26.192	28.530	23.067	23.768	30.591	31.292						
N+3.45	B186	0	7.08	V-40X45	0.40	0.40	-60.7	-51.53	31.08	30.12	30.98	48.74	115.455	115.478	114.214	114.236	115.605	115.611	111.467	111.474	45.715	45.738	44.474	44.496	45.865	45.871	41.727	41.734	125.3	**0.10**	178.92	91.65	270.57	**OK**
	B186	7.08					55.84	49.18	35.18	19.36	-38	-60.32	125.296	109.034	119.984	103.722	122.836	117.957	105.129	100.250	59.364	43.102	54.052	37.790	56.904	52.025	39.197	34.318						
N+3.45	B188	0	0.7	V-40X45	0.40	0.40	14.05	10.92	8.52	19.72	-38	-60.32	30.988	20.650	25.652	15.314	32.730	29.629	14.944	11.842	15.853	5.515	10.517	0.179	17.595	14.494	0.191	3.293	36.4	**0.10**	178.92	91.65	270.57	**OK**
	B188	0.7					17.07	10.92	8.52	19.72	-30.98	-48.74	34.612	25.834	30.048	21.270	36.354	33.721	21.141	18.508	18.571	9.793	14.007	5.229	20.313	17.680	5.100	2.467						
N+3.45	B189	0	6.3	V-40X45	0.40	0.40	-11.27	0.7	34.24	22.12	-30.98	-48.74	3.740	18.234	8.464	22.958	5.626	9.974	21.372	25.720	1.059	15.553	5.783	20.277	2.945	7.293	18.691	23.039	28.9	**0.10**	178.92	91.65	270.57	**OK**
	B189	6.3					15.95	0.7	34.24	22.12	-38.18	-59.7	28.924	12.830	23.469	7.376	27.038	22.210	8.856	4.028	23.439	7.345	17.984	1.891	21.553	16.725	3.371	1.457						
N+6.65	B190	0	7.08	V-40X45	0.40	0.40	-19.9	-81.36	22.26	14.16	29.38	46.8	99.349	97.767	97.173	95.591	100.609	100.135	93.356	92.881	12.019	10.437	9.843	8.261	13.279	12.805	6.026	5.551	129.7	**0.10**	178.92	91.65	270.57	**OK**
	B190	7.08					21.48	91.57	22.26	14.16	29.38	46.8	123.237	124.819	125.413	126.995	121.977	122.451	129.230	129.705	25.223	26.805	27.399	28.981	23.963	24.437	31.216	31.691						
N+3.45	B190	0	7.08	V-40X45	0.40	0.40	-50.77	-44.77	30.66	16.62	-29.38	-46.8	97.773	111.115	102.001	115.343	99.957	103.959	114.050	118.053	37.772	51.114	42.000	55.342	39.956	43.958	54.049	58.052	128.0	**0.10**	178.92	91.65	270.57	**OK**
	B190	7.08					55.5	47.94	29.72	24.16	35.32	50.18	122.755	124.000	124.490	125.734	121.890	122.264	127.672	128.046	58.165	59.410	59.900	61.144	57.300	57.674	63.082	63.456						
N+6.65	B191	0	7.2	V-40X45	0.40	0.40	-21.39	-88.37	20.5	13.06	29.36	46.64	108.612	106.643	106.373	104.404	109.769	109.178	102.307	101.716	13.825	11.856	11.586	9.617	14.982	14.391	7.520	6.929	124.6	**0.10**	178.92	91.65	270.57	**OK**
	B191	7.2					20.69	87.49	20.5	13.06	29.36	46.64	117.744	119.713	119.983	121.952	116.587	117.178	124.049	124.640	24.047	26.016	26.286	28.255	22.890	23.481	30.352	30.943						
N+3.45	B191	0	7.2	V-40X45	0.40	0.40	-52.09	-43.5	33.74	18.34	30.38	53.18	97.288	98.034	94.965	95.712	99.683	99.907	91.941	92.165	38.161	38.907	35.838	36.585	40.556	40.780	32.814	33.038	117.3	**0.10**	178.92	91.65	270.57	**OK**
	B191	7.2					53.37	44.38	32.2	25.72	-29.36	-46.64	117.294	103.614	112.470	98.790	116.286	112.182	100.206	96.102	56.903	43.223	52.079	38.399	55.895	51.791	39.815	35.711						
N+6.65	B192	0	7.08	V-40X45	0.40	0.40	-18.38	-86.72	21.04	13.52	-29.36	-46.64	103.199	114.399	107.210	118.410	104.369	107.729	117.738	121.098	10.965	22.165	14.976	26.176	12.135	15.495	25.504	28.864	121.1	**0.10**	178.92	91.65	270.57	**OK**
	B192	7.08					22.99	86.21	21.04	13.52	-30.38	-53.18	119.375	107.948	114.928	103.502	118.205	114.777	103.383	99.955	26.268	14.841	21.821	10.395	25.098	21.670	10.276	6.848						
N+3.45	B192	0	7.08	V-40X45	0.40	0.40	-52.39	-43.52	35.4	19.3	-30.38	-53.18	97.235	111.852	102.067	116.684	99.739	104.124	115.846	120.231	37.998	52.615	42.830	57.447	40.502	44.887	56.609	60.994	120.2	**0.10**	178.92	91.65	270.57	**OK**
	B192	7.08					51.47	43.46	32.56	25.88	-4.88	-9.48	114.185	105.865	111.828	103.508	113.146	110.650	105.288	102.792	55.284	46.964	52.927	44.607	54.245	51.749	46.387	43.891						
N+6.65	B193	0	7.45	V-40X45	0.40	0.40	-60.12	-48.2	21.02	10.96	-4.88	-9.48	114.942	120.698	116.305	122.060	116.507	118.234	121.049	122.776	48.706	54.462	50.069	55.824	50.271	51.998	54.813	56.540	126.8	**0.10**	178.92	91.65	270.57	**OK**
	B193	7.45					60.67	48.94	18.02	15.58	9.84	14.8	126.787	124.969	126.735	124.917	126.408	125.862	126.234	125.689	59.646	57.828	59.594	57.776	59.267	58.721	59.093	58.548						

PROYECTO: INSTITUCIÓN EDUCATIVA MARCELO MIRANDA
RESISTENCIA A CORTANTE PARA VIGAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3 (b)

f'c = **21.0** MPa
fy = **420** MPa
$\Phi_{Cortante}$ = **0.75**
Estribos Φ = **9.5** mm
Av = **71** mm^2
R= **4.50**

2VE = Cortante maximo obtenido de las combinaciones de carga de diseño que incluyan E, considerando E, como el doble del prescrito por el reglamento general legalmente adoptado para diseño sismico vigente.

COMDIS3 = 1.2C.M.+1.0C.V.+(2*(1.0Ex))+(2*(0.3Ey))
COMDIS4 = 1.2C.M.+1.0C.V.+(2*(1.0(-Ex)))+(2*(0.3Ey)))
COMDIS5 = 1.2C.M.+1.0C.V.+(2*(1.0Ex))+(2*(0.3(-Ey)))
COMDIS6 = 1.2C.M.+1.0C.V.+(2*(1.0(-Ex)))+(2*(0.3(-Ey)))
COMDIS7 = 1.2C.M.+1.0C.V.+(2*(0.3Ex))+(2*(1.0Ey))
COMDIS8 = 1.2C.M.+1.0C.V.+(2*(0.3(-Ex)))+(2*(1.0Ey))
COMDIS9 = 1.2C.M.+1.0C.V.+(2*(0.3Ex))+(2*(1.0(-Ey)))
COMDIS10 = 1.2C.M.+1.0C.V.+(2*(0.3(-Ex)))+(2*(1.0(-Ey)))
COMDIS11 = 0.9C.M.+(2*(1.0Ex))+(2*(0.3Ey))
COMDIS12 = 0.9C.M.+(2*(1.0(-Ex)))+(2*(0.3Ey))
COMDIS13 = 0.9C.M.+(2*(1.0Ex))+(2*(0.3(-Ey)))
COMDIS14 = 0.9C.M.+(2*(1.0(-Ex)))+(2*(0.3(-Ey)))
COMDIS15 = 0.9C.M.+(2*(0.3Ex))+(2*(1.0Ey))
COMDIS16 = 0.9C.M.+(2*(0.3(-Ex)))+(2*(1.0Ey))
COMDIS17 = 0.9C.M.+(2*(0.3Ex))+(2*(1.0(-Ey)))
COMDIS17 = 0.9C.M.+(2*(0.3(-Ex)))+(2*(1.0(-Ey)))

NIVEL	VIGA	LOC.	LONG.	PROPIEDADES DEL ELEMENTO			V2						$2V_E$ Combinaciones de carga de diseño para el doble del cortante donde se incluya E																$2V_{E max}$	S	ΦVs	ΦVc	ΦVn	$\Phi Vn > 2V_{Emax}$
	ELEMENTO No.	(m)	(m)	SECCION	b (m)	d (m)	C.M. (KN.m)	C.V. (KN.m)	SISMO X (KN.m)	SISMO Y (KN.m)	-SISMO X (KN.m)	-SISMO Y (KN.m)	COMBDIS3	COMBDIS4	COMBDIS5	COMBDIS6	COMBDIS7	COMBDIS8	COMBDIS9	COMBDIS10	COMBDIS11	COMBDIS12	COMBDIS13	COMBDIS14	COMBDIS15	COMBDIS16	COMBDIS17	COMBDIS18	(kN)	(m)	(kN)	(kN)	(kN)	
N+3.45	B193	0	7.45	V-40X45	0.40	0.40	-41.26	-30.33	30.9	18.72	-9.84	-14.8	71.727	80.781	73.962	83.015	73.622	76.338	81.071	83.787	29.019	38.073	31.254	40.307	30.914	33.630	38.363	41.079	90.1	**0.10**	178.92	91.65	270.57	**OK**
	B193	7.45					41.86	30.8	29.76	20.7	33.62	24.14	89.025	89.883	89.255	90.112	87.616	87.873	88.380	88.638	45.667	46.525	45.897	46.754	44.258	44.515	45.022	45.280						
N+6.65	B194	0	6.95	V-40X45	0.40	0.40	-22.98	-86.5	20.94	13.26	33.62	24.14	108.539	105.721	107.813	104.996	109.733	108.888	107.316	106.470	15.145	12.327	14.419	11.602	16.339	15.494	13.922	13.076	110.0	**0.10**	178.92	91.65	270.57	**OK**
	B194	6.95					17.64	83.25	20.94	13.26	-33.62	-24.14	109.955	97.831	107.462	95.338	108.761	105.123	100.450	96.812	21.413	9.289	18.920	6.796	20.219	16.581	11.908	8.270						
N+3.45	B194	0	6.95	V-40X45	0.40	0.40	-51.72	-43.45	37.14	20.44	-33.62	-24.14	95.898	111.622	98.870	114.594	98.496	103.213	108.402	113.120	36.932	52.656	39.904	55.628	39.530	44.247	49.436	54.154	114.6	**0.10**	178.92	91.65	270.57	**OK**
	B194	6.95					51.2	42.45	31.14	25.5	-21.52	-15.76	112.510	100.808	109.759	98.057	111.633	108.122	102.464	98.953	54.700	42.998	51.949	40.247	53.823	50.312	44.654	41.143						
N+6.65	B195	0	3.85	V-40X45	0.40	0.40	-11.03	-47.09	61.16	39	-21.52	-15.76	44.135	62.508	47.786	66.159	47.582	53.094	59.751	65.263	6.264	12.109	2.613	15.760	2.817	2.695	9.352	14.864	76.9	**0.10**	178.92	91.65	270.57	**OK**
	B195	3.85					11.47	46.94	61.16	39	26.78	22.2	76.895	69.255	75.775	68.135	73.448	71.156	69.715	67.423	26.514	18.874	25.394	17.754	23.067	20.775	19.334	17.042						
N+3.45	B195	0	3.85	V-40X45	0.40	0.40	-9.01	-0.45	99.68	64.42	26.78	22.2	15.184	1.016	12.369	3.831	9.699	4.839	0.317	4.543	18.337	2.137	15.522	0.678	12.852	7.992	3.470	1.390	35.1	**0.10**	178.92	91.65	270.57	**OK**
	B195	3.85					7.62	-0.45	99.68	64.42	32.22	20.96	35.140	20.149	32.242	17.251	29.655	25.158	19.997	15.500	33.304	18.313	30.406	15.415	27.819	23.322	18.161	13.664						
N+6.65	B196	0	7.08	V-40X45	0.40	0.40	-20.91	-84.72	20.46	13	32.22	20.96	104.399	101.785	103.868	101.255	105.559	104.775	103.790	103.006	13.406	10.792	12.875	10.262	14.566	13.782	12.797	12.013	118.2	**0.10**	178.92	91.65	270.57	**OK**
	B196	7.08					20.47	88.21	20.46	13	-26.78	-22.2	118.187	107.690	115.841	105.343	117.027	113.878	109.205	106.055	23.836	13.339	21.490	10.992	22.676	19.527	14.854	11.704						
N+3.45	B196	0	7.08	V-40X45	0.40	0.40	-49.88	-41.91	35.04	19.36	-26.78	-22.2	92.689	106.426	95.459	109.197	95.128	99.249	104.363	108.485	35.815	49.552	38.585	52.323	38.254	42.375	47.489	51.611	119.7	**0.10**	178.92	91.65	270.57	**OK**
	B196	7.08					54.83	45.4	30.56	26	19.8	14.52	119.720	117.329	118.955	116.564	119.011	118.294	116.460	115.743	57.871	55.480	57.106	54.715	57.162	56.445	54.611	53.894						
N+6.65	B197	0	7.08	V-40X45	0.40	0.40	-21.32	-91.58	21.08	13.48	19.8	14.52	111.581	111.865	111.512	111.796	112.763	112.848	112.532	112.617	13.605	13.889	13.536	13.820	14.787	14.872	14.556	14.641	112.8	**0.10**	178.92	91.65	270.57	**OK**
	B197	7.08					20.06	81.35	21.08	13.48	-19.8	-14.52	111.005	101.921	109.138	100.054	109.823	107.098	103.601	100.875	23.637	14.553	21.770	12.686	22.455	19.730	16.233	13.507						
N+3.45	B197	0	7.08	V-40X45	0.40	0.40	-55.53	-45.76	37.62	20.94	-19.8	-14.52	102.640	115.400	105.004	117.764	105.235	109.063	113.115	116.943	40.221	52.981	42.585	55.345	42.816	46.644	50.696	54.524	117.8	**0.10**	178.92	91.65	270.57	**OK**
	B197	7.08					51.06	43.6	30.74	25.98	34.6	22	113.435	114.293	113.170	114.028	112.695	112.952	111.810	112.068	54.517	55.375	54.252	55.110	53.777	54.034	52.892	53.150						
N+3.45	B198	0	0.7	V-20X45	0.20	0.40	-1.66	-1.7	6.04	10.54	34.6	22	1.647	4.700	0.883	5.464	0.947	0.957	1.600	3.504	0.551	6.898	1.315	7.662	1.251	3.155	3.798	5.702	10.1	**0.10**	178.92	45.83	224.75	**OK**
	B198	0.7					-0.15	-1.7	6.04	10.54	-29.62	-24.92	0.165	7.760	2.199	10.124	0.865	1.512	7.015	9.392	1.910	6.015	0.454	8.379	2.610	0.233	5.270	7.647						
N+3.45	B199	0	6.3	V-20X45	0.20	0.40	-5.41	0.66	7.06	4.14	-29.62	-24.92	3.987	12.138	5.924	14.076	4.441	6.887	10.899	13.344	3.024	11.175	4.961	13.113	3.478	5.924	9.936	12.381	14.1	**0.10**	178.92	45.83	224.75	**OK**
	B199	6.3					8.2	0.66	7.06	4.14	-34.6	-22	12.345	3.087	10.602	1.344	11.891	9.113	6.082	3.304	9.225	0.033	7.482	1.776	8.771	5.993	2.962	0.184						
N+6.65	B200	0	7.08	V-20X45	0.20	0.40	-7.69	-11.55	4.62	2.88	20.46	15	19.559	16.039	18.751	15.231	19.830	18.774	17.137	16.081	5.702	2.182	4.894	1.374	5.973	4.917	3.280	2.224	33.0	**0.10**	178.92	45.83	224.75	**OK**
	B200	7.08					9.33	16.24	4.62	2.88	20.46	15	28.655	32.175	29.463	32.983	28.384	29.440	31.077	32.133	9.616	13.136	10.424	13.944	9.345	10.401	12.038	13.094						
N+3.45	B200	0	7.08	V-20X45	0.20	0.40	-13.22	-8.49	4.68	5.6	-20.46	-15	22.941	28.527	24.314	29.901	22.798	24.474	27.375	29.051	10.485	16.071	11.858	17.445	10.342	12.018	14.919	16.595	36.7	**0.10**	178.92	45.83	224.75	**OK**
	B200	7.08					14.89	10.19	6.18	3.5	30.74	26.52	29.665	35.122	31.199	36.657	29.248	30.885	34.363	36.001	15.008	20.465	16.542	22.000	14.591	16.228	19.706	21.344						
N+6.65	B201	0	7.2	V-20X45	0.20	0.40	-8.94	-14.5	3.26	2.1	30.74	26.52	24.364	18.257	22.736	16.629	24.544	22.712	19.117	17.285	7.182	1.075	5.554	0.553	7.362	5.530	1.935	0.103	33.1	**0.10**	178.92	45.83	224.75	**OK**
	B201	7.2					8.37	13.76	3.26	2.1	35.32	21.84	24.668	31.793	25.984	33.109	24.488	26.625	28.875	31.012	8.397	15.522	9.713	16.838	8.217	10.354	12.604	14.741						
N+3.45	B201	0	7.2	V-20X45	0.20	0.40	-14.93	-10.69	6.5	6.84	-30.74	-26.52	26.706	34.981	28.930	37.205	26.653	29.135	34.066	36.549	11.537	19.812	13.761	22.036	11.484	13.966	18.897	21.380	37.2	**0.10**	178.92	45.83	224.75	**OK**
	B201	7.2					14.45	10.24	7.56	3.82	-35.32	-21.84	29.515	19.986	27.804	18.275	28.933	26.074	23.231	20.372	14.940	5.411	13.229	3.700	14.358	11.499	8.656	5.797						
N+6.65	B202	0	7.08	V-20X45	0.20	0.40	-7.25	-13.85	3.56	2.16	18.36	13.5	21.615	18.326	20.859	17.570	21.833	20.846	19.313	18.326	5.590	2.301	4.834	1.545	5.808	4.821	3.288	2.301	30.7	**0.10**	178.92	45.83	224.75	**OK**
	B202	7.08					9.78	13.94	3.56	2.16	18.36	13.5	26.611	29.900	27.367	30.656	26.393	27.380	28.913	29.900	9.737	13.026	10.493	13.782	9.519	10.506	12.039	13.026						
N+3.45	B202	0	7.08	V-20X45	0.20	0.40	-14.91	-10.66	6.16	6.92	-18.36	-13.5	26.722	32.171	28.083	33.532	26.604	28.238	31.141	32.776	11.589	17.038	12.950	18.399	11.471	13.105	16.008	17.643	33.5	**0.10**	178.92	45.83	224.75	**OK**
	B202	7.08					13.6	9.11	7.78	3.9	27.88	24.92	27.419	31.886	28.820	33.287	26.815	28.155	31.486	32.826	14.229	18.696	15.630	20.097	13.625	14.965	18.296	19.636						
N+6.65	B203	0	7.45	V-20X45	0.20	0.40	-18.42	-10.55	2.52	3.88	27.88	24.92	31.835	26.200	30.433	24.797	31.624	29.933	26.948	25.258	15.759	10.124	14.357	8.721	15.548	13.857	10.872	9.182	33.3	**0.10**	178.92	45.83	224.75	**OK**
	B203	7.45					18.2	10.33	4.14	2.9	-27.88	-24.92	33.283	26.168	31.429	24.313	33.090	30.956	26.908	24.774	17.493	10.378	15.639	8.523	17.300	15.166	11.118	8.984						
N+3.45	B203	0	7.45	V-20X45	0.20	0.40	-8.02	0.01	6.66	4.26	-27.88	-24.92	7.850	15.526	9.795	17.471	8.223	10.526	14.708	17.010	5.454	13.130	7.399	15.075	5.827	8.130	12.312	14.614	17.5	**0.10**	178.92	45.83	224.75	**OK**
	B203	7.45					8.07	0.01	6.66	4.26	-32.18	-19.12	11.458	2.827	9.899	1.268	11.085	8.495	5.889	3.300	9.027	0.396	7.468	1.163	8.654	6.064	3.458	0.869						
N+6.65	B204	0	6.95	V-20X45	0.20	0.40	-9.99	-14.46	3.24	2.24	20.28	14.86	25.579	21.792	24.737	20.951	25.734	24.598	22.930	21.794	8.122	4.335	7.280	3.494	8.277	7.141	5.473	4.337	26.4	**0.10**	178.92	45.83	224.75	**OK**
	B204	6.95					6.73	12.81	3.24	2.24	20.28	14.86	21.755	25.542	22.597	26.383	21.600	22.736	24.404	25.540	6.926	10.713	7.768	11.554	6.771	7.907	9.575	10.711						
N+3.45	B204	0	6.95	V-20X45	0.20	0.40	-14.33	-9.78	5.5	6.42	-20.28	-14.86	25.326	31.055	26.744	32.473	25.183	26.901	29.912	31.630	11.247	16.976	12.665	18.394	11.104	12.822	15.833	17.551	33.8	**0.10**	178.92	45.83	224.75	**OK**
	B204	6.95					13.06	9.08	8.38	4.82	31.84	28.94	26.936	32.149	28.544	33.757	26.382	27.946	31.742	33.306	13.938	19.151	15.546	20.759	13.384	14.948	18.744	20.308						
N+6.65	B205	0	3.85	V-20X45	0.20	0.40	-4.26	-7.49	6.84	4.36	31.84	28.94	10.791	5.236	9.153	3.597	11.177	9.510	5.715	4.048	2.023	3.532	0.385	5.171	2.409	0.742	3.053	4.720	22.6	**0.10**	178.92	45.83	224.75	**OK**
	B205	3.85					4.99	7.62	6.84	4.36	34.52	20.02	15.419	21.570	16.463	22.614	15.033	16.878	18.513	20.358	6.302	12.453	7.346	13.497	5.916	7.761	9.396	11.241						
N+3.45	B205	0	3.85	V-20X45	0.20	0.40	-4.28	-0.06	15.4	9.88	-31.84	-28.94	1.115	11.613	3.703	14.201	1.974	5.123	10.600	13.750	0.229	10.269	2.359	12.857	0.630	3.779	9.256	12.406	14.2	**0.10**	178.92	45.83	224.75	**OK**
	B205	3.85					4.04	-0.06	15.4	9.88	-31.84	-28.94	8.869	1.629	6.281	4.217	8.010	4.861	0.616	3.766	7.717	2.781	5.129	5.369	6.858	3.709	1.768	4.918						
N+6.65	B206	0	7.08	V-20X45	0.20	0.40	-8.24	-12.91	3.2	2.02	-34.52	-20.02	21.952	30.334	23.422	31.804	22.136	24.650	27.034	29.548	6.570	14.952	8.040	16.422	6.754	9.268	11.652	14.166	41.5	**0.10**	178.92	45.83	224.75	**OK**
	B206	7.08					8.79	14.88	3.2	2.02	59.12	43.34	26.274	38.700	29.028	41.455	26.090	29.818	35.272	39.000	8.757	21.183	11.511	23.938	8.573	12.301	17.755	21.483						
N+3.45	B206	0	7.08	V-20X45	0.20	0.40	-13.19	-9.3	5.44	6.72	59.12	43.34	23.471	11.542	21.030	9.101	23.272	19.693	15.134	11.556	10.214	1.715	7.773	4.156	10.015	6.436	1.877	1.701	31.2	**0.10**	178.92	45.83	224.75	**OK**
	B206	7.08					15.18	10.74	8.52	5.84	-59.12	-43.34	31.239	16.208	27.960	12.929	30.822	26.312	19.893	15.384	15.945	0.914	12.666	2.365	15.528	11.018	4.599	0.090						
N+6.65	B207	0	7.08	V-20X45	0.20	0.40	-9.26	-16.22	4.28	2.78	97	70.62	26.196	5.591	21.673	1.068	26.429	20.248	11.353	5.172	7.198	13.407	2.675	17.930	7.431	1.250	7.645	13.826	47.1	**0.10**	178.92	45.83	224.75	**OK**
	B207	7.08					7.76	11.57	4.28	2.78	97	70.62	22.018	42.623	26.541	47.146	21.785	27.966	36.861	43.042	8.120	28.725	12.643	33.248	7.887	14.068	22.963	29.144						
N+3.45	B207	0	7.08	V-20X45	0.20	0.40	-16.03	-11.26	6.06	7.92	-97	-70.62	28.621	51.524	33.857	56.760	28.332	35.203	45.785	52.656	12.552	35.455	17.788	40.691	12.263	19.134	29.716	36.587	56.8	**0.10**	178.92	45.83	224.75	**OK**
	B207	7.08					11.43	7.95	9.5	5.88	19.72	14.52	24.169	26.440	24.745	27.016	23.606	24.287	25.526	26.207	12.790	15.061	13.366	15.637	12.227	12.908	14.147	14.828						
N+3.45	B208	0	0.7	V-20X45	0.20	0.40	-1.89	-2.9	5.32	5.66	19.72	14.52	3.608	0.408	3.018	0.182	3.556	2.596	1.587	0.627	0.141	3.059	0.449	3.649	0.089	0.871	1.880	2.840	8.7	**0.10**	178.92	45.83	224.75	**OK**
	B208	0.7					-0.37	-2.9	5.32	5.66	-19.72	-14.52	1.784	7.349	3.130	8.694	1.732	3.401	6.216	7.885	1.227	4.338	0.119	5.683	1.279	0.390	3.205	4.874						
N+3.45	B209	0	6.3	V-20X45	0.20	0.40	-5.68	0.41	5.08	4.3	-19.72	-14.52	4.990	10.502	6.245	11.756	5.112	6.765	9.294	10.947	3.696	9.208	4.951	10.462	3.818	5.471	8.000	9.653	18.2	**0.10**	178.92	45.83	224.75	**OK**
	B209	6.3					7.93	0.41	5.08	4.3	29.08	27.6	11.342	16.675	12.895	18.228	11.220	12.820	16.398	17.998	8.553	13.886	10.106	15.439	8.431	10.031	13.609	15.209						
N+6.65	B210	0	7.08	V-20X45	0.20	0.40	-8.09	-16.49	3.5	2.82	29.08	27.6	25.232	19.548	23.580	17.896	25.338	23.633	19.831	18.126	6.315	0.631	4.663	1.021	6.421	4.716	0.914	0.791	42.2	**0.10**	178.92	45.83	224.75	**OK**
	B210	7.08					9.58	21.57	3.5	2.82	35.38	19.44	34.032	41.116	35.140	42.224	33.926	36.051	37.619	39.745	9.588	16.672	10.696	17.780	9.482	11.607	13.175	15.301						
N+3.45	B210	0	7.08	V-20X45	0.20	0.40	-14.05	-9.68	5.2	3.6	-29.08	-27.6	25.144	32.762	27.224	34.842	25.393	27.679	32.327	34.612	11.249	18.867	13.329	20.947	11.498	13.784	18.432	20.717	34.8	**0.10**	178.92	45.83	224.75	**OK**
	B210	7.08					15.91	12.08	3.32	5.02	-35.38	-19.44	32.244	23.644	30.614	22.014	32.509	29.929	27.073	24.493	15.391	6.791	13.761	5.161	15.656	13.076	10.220	7.640						
N+6.65	B211	0	7.2	V-20X45	0.20	0.40	-9.07	-19.64	2.5	2	20.46	14.88	29.835	25.844	28.976	24.985	29.913	28.716	27.051	25.853	7.474	3.483	6.615	2.624	7.552	6.355	4.690	3.492	35.3	**0.10**	178.92	45.83	224.75	**OK**
	B211	7.2					8.9	19.06	2.5	2	20.46	14.88	30.429	34.420	31.288	35.279	30.351	31.548	33.213	34.411	8.699	12.690	9.558	13.549	8.621	9.818	11.483	12.681						
N+3.45	B211	0	7.2	V-20X45	0.20	0.40	-16.02	-12.6	6.68	4.1	-20.46	-14.88	30.066	36.097	31.332	37.363	30.468	32.277	34.685	36.495	12.660	18.691	13.926	19.957	13.062	14.871	17.279	19.089	39.0	**0.10**	178.92	45.83	224.75	**OK**
	B211	7.2					15.24	11.81	4.28	5.86	31.08	30.12	31.440	37.395	33.057	39.013	31.686	33.472	37.077	38.863	15.058	21.013	16.675	22.631	15.304	17.090	20.695	22.481						
N+6.65	B212	0	7.08	V-20X45	0.20	0.40	-8.66	-18.82	2.64	2.12	31.08	30.12	28.484	22.164	26.617	20.297	28.565	26.669	22.343	20.447	7.066	0.746	5.199	1.121	7.147	5.251	0.925	0.971	39.2	**0.10**	178.92	45.83	224.75	**OK**
	B212	7.08					9.01	19.24	2.64	2.12	35.18	19.36	30.780	38.011	31.929	39.160	30.699	32.868	34.530	36.700	8.837	16.068	9.986	17.217	8.756	10.925	12.587	14.757						
N+3.45	B212	0	7.08	V-20X45	0.20	0.40	-15.36	-11.95	6.66	3.8	-31.08	-30.12	28.649	37.035	30.910	39.297	29.094	31.610	36.631	39.147	12.091	20.477	14.352	22.739	12.536	15.052	20.073	22.589	39.3	**0.10**	178.92	45.83	224.75	**OK**
	B212	7.08					15.13	11.72	4.42	6.3	-35.18	-19.36	31.278	22.478	29.568	20.768	31.571	28.931	25.868	23.228	15.019	6.219	13.309	4.509	15.312	12.672	9.609	6.969						
N+6.65	B214	0	6.95	V-20X45	0.20	0.40	-9.11	-19.69	2.58	2.08	8.52	19.72	29.910	28.590	28.734	27.414	29.988	29.592	26.068	25.672	7.487	6.167	6.311	4.991	7.565	7.169	3.645	3.249	32.5	**0.10**	178.92	45.83	224.75	**OK**
	B214	6.95					8.23	17.67	2.58	2.08	8.52	19.72	28.258	29.578	29.434	30.754	28.180	28.576	32.100	32.496	8.119	9.439	9.295	10.615	8.041	8.437	11.961	12.357						
N+3.45	B214	0	6.95	V-20X45	0.20	0.40	-15.92	-12.41	6.54	3.34	-8.52	-19.72	29.838	33.185	31.375	34.722	30.336	31.340	35.460	36.464	12.652	15.999	14.189	17.536	13.150	14.154	18.274	19.278	36.5	**0.10**	178.92	45.83	224.75	**OK**
	B214	6.95					13.62	10.39	4.9	7.34	34.24	22.12	28.312	34.832	29.298	35.818	28.692	30.648	31.976	33.932	13.836	20.356	14.822	21.342	14.216	16.172	17.500	19.456						
N+6.65	B215	0	3.85	V-20X45	0.20	0.40	-4.74	-10.23	4.66	3.8	34.24	22.12	14.629	8.056	13.408	6.834	14.763	12.791	10.692	8.720	2.977	3.596	1.756	4.818	3.111	1.139	0.960	2.932	17.6	**0.10**	178.92	45.83	224.75	**OK**
	B215	3.85					4.86	10.46	4.66	3.8	-34.24	-22.12	17.581	8.936	15.853	7.208	17.447	14.854	11.687	9.094	5.663	2.982	3.935	4.710	5.529	2.936	0.231	2.824						
N+3.45	B215	0	3.85	V-20X45	0.20	0.40	-9.39	-7.43	10.8	8.5	-34.24	-22.12	15.731	25.740	17.773	27.782	16.089	19.092	22.894	25.896	5.484	15.493	7.526	17.535	5.842	8.845	12.647	15.649	27.8	**0.10**	178.92	45.83	224.75	**OK**
	B215	3.85					9.38	7.48	10.8	8.5	22.26	14.16	21.703	24.249	22.080	24.627	21.345	22.109	22.603	23.367	11.409	13.955	11.786	14.333	11.051	11.815	12.309	13.073						
N+6.65	B216	0	7.08	V-20X45	0.20	0.40	-8.62	-18.07	2.48	2.06	22.26	14.16	27.726	23.330	26.919	22.523	27.791	26.472	25.102	23.783	7.070	2.674	6.263	1.867	7.135	5.816	4.446	3.127	31.5	**0.10**	178.92	45.83	224.75	**OK**
	B216	7.08					9.04	19.99	2.48	2.06	-22.26	-14.16	31.526	26.029	30.445	24.947	31.461	29.812	27.857	26.207	8.824	3.327	7.743	2.245	8.759	7.110	5.155	3.505						
N+3.45	B216	0	7.08	V-20X45	0.20	0.40	-14.4	-11.22	6.8	3.36	-22.26	-14.16	26.765	33.223	27.933	34.391	27.300	29.237	31.193	33.131	11.225	17.683	12.393	18.851	11.760	13.697	15.653	17.591	39.6	**0.10**	178.92	45.83	224.75	**OK**
	B216	7.08					15.93	12.3	4.5	7.98	29.72	24.16	32.948	38.552	34.027	39.631	33.489	35.171	37.085	38.766	15.869	21.473	16.948	22.552	16.410	18.092	20.006	21.687						
N+6.65	B217	0	7.08	V-20X45	0.20	0.40	-9.52	-21.49	3.34	2.54	29.72	24.16	32.002	26.140	30.561	24.699	32.127	30.368	27.322	25.564	7.656	1.794	6.215	0.353	7.781	6.022	2.976	1.218	32.1	**0.10**	178.92	45.83	224.75	**OK**
	B217	7.08					8.15	16.57	3.34	2.54	-30.66	-16.62	27.262	19.706	25.984	18.429	27.137	24.870	22.879	20.613	8.247	0.691	6.969	0.586	8.122	5.855	3.864	1.598						
N+3.45	B217	0	7.08	V-20X45	0.20	0.40	-17.21	-13.28	7.44	3.94	-30.66	-16.62	32.016	40.483	33.387	41.853	32.560	35.100	37.129	39.669	13.573	22.040	14.944	23.410	14.117	16.657	18.686	21.226	41.9	**0.10**	178.92	45.83	224.75	**OK**
	B217	7.08					12.49	9.59	5.22	8.16	20.5	13.06	26.282	29.678	26.609	30.004	26.739	27.758	27.828	28.847	12.945	16.341	13.272	16.667	13.402	14.421	14.491	15.510						
N+3.45	B218	0	2.15	V-20X45	0.20	0.40	1.89	2.9	5.32	5.66	20.5	13.06	6.728	10.101	7.221	10.594	6.780	7.792	8.425	9.437	3.261	6.634	3.754	7.127	3.313	4.325	4.958	5.970	16.4	**0.10**	178.92	45.83	224.75	**OK**
	B218	2.15					6.77	6.67	5.32	5.66	-20.5	-13.06	16.354	10.616	15.106	9.368	16.406	14.685	12.246	10.525	7.653	1.915	6.405	0.667	7.705	5.984	3.545	1.824						

PROYECTO: INSTITUCIÓN EDUCATIVA MARCELO MIRANDA
RESISTENCIA A CORTANTE PARA VIGAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3 (b)

f'c = **21.0** MPa
fy = **420** MPa
$\Phi_{Cortante}$ = **0.75**
Estribos Φ = **9.5** mm
Av = **71** mm^2
R= **4.50**

2VE = Cortante maximo obtenido de las combinaciones de carga de diseño que incluyan E, considerando E, como el doble del prescrito por el reglamento general legalmente adoptado para diseño sismico vigente.

COMDIS3 = 1.2C.M.+1.0C.V.+(2*(1.0Ex))+(2*(0.3Ey))
COMDIS4 = 1.2C.M.+1.0C.V.+(2*(1.0(-Ex)))+(2*(0.3Ey)))
COMDIS5 = 1.2C.M.+1.0C.V.+(2*(1.0Ex))+(2*(0.3(-Ey)))
COMDIS6 = 1.2C.M.+1.0C.V.+(2*(1.0(-Ex)))+(2*(0.3(-Ey)))
COMDIS7 = 1.2C.M.+1.0C.V.+(2*(0.3Ex))+(2*(1.0Ey))
COMDIS8 = 1.2C.M.+1.0C.V.+(2*(0.3(-Ex)))+(2*(1.0Ey))
COMDIS9 = 1.2C.M.+1.0C.V.+(2*(0.3Ex))+(2*(1.0(-Ey)))
COMDIS10 = 1.2C.M.+1.0C.V.+(2*(0.3(-Ex)))+(2*(1.0(-Ey)))
COMDIS11 = 0.9C.M.+(2*(1.0Ex))+(2*(0.3Ey))
COMDIS12 = 0.9C.M.+(2*(1.0(-Ex)))+(2*(0.3Ey))
COMDIS13 = 0.9C.M.+(2*(1.0Ex))+(2*(0.3(-Ey)))
COMDIS14 = 0.9C.M.+(2*(1.0(-Ex)))+(2*(0.3(-Ey)))
COMDIS15 = 0.9C.M.+(2*(0.3Ex))+(2*(1.0Ey))
COMDIS16 = 0.9C.M.+(2*(0.3(-Ex)))+(2*(1.0Ey))
COMDIS17 = 0.9C.M.+(2*(0.3Ex))+(2*(1.0(-Ey)))
COMDIS17 = 0.9C.M.+(2*(0.3(-Ex)))+(2*(1.0(-Ey)))

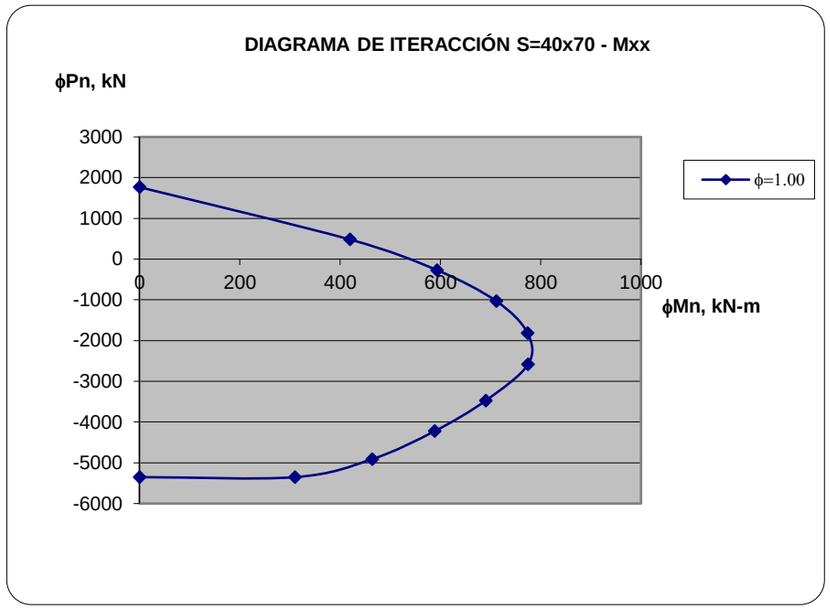
NIVEL	VIGA	LOC.	LONG.	PROPIEDADES DEL ELEMENTO			V2						$2V_E$ Combinaciones de carga de diseño para el doble del cortante donde se incluya E																$2V_{E max}$	S	ΦVs	ΦVc	ΦVn	ΦVn > $2V_{Emax}$
	ELEMENTO			SECCION	b	d	C.M.	C.V.	SISMO X	SISMO Y	-SISMO X	-SISMO Y																						
	No.	(m)	(m)		(m)	(m)	(KN.m)	(KN.m)	(KN.m)	(KN.m)	(KN.m)	(KN.m)	COMBDIS3	COMBDIS4	COMBDIS5	COMBDIS6	COMBDIS7	COMBDIS8	COMBDIS9	COMBDIS10	COMBDIS11	COMBDIS12	COMBDIS13	COMBDIS14	COMBDIS15	COMBDIS16	COMBDIS17	COMBDIS18	(kN)	(m)	(kN)	(kN)	(kN)	
N+3.45	B219	0	1.57	V-20X45	0.20	0.40	-5.23	-4.45	6.04	10.54	-20.5	-13.06	8.681	14.579	10.254	16.152	7.981	9.750	13.226	14.995	2.662	8.560	4.235	10.133	1.962	3.731	7.207	8.976	16.2	0.10	178.92	45.83	224.75	OK
	B219	1.57					-1.66	-1.7	6.04	10.54	33.74	18.34	1.647	4.508	1.127	5.028	0.947	0.900	0.786	2.633	0.551	6.706	1.071	7.226	1.251	3.098	2.984	4.831						
N+3.45	B220	0	1.57	V-40X45	0.40	0.40	-13.75	-25.11	12.62	13.68	33.74	18.34	37.894	33.200	37.583	32.890	37.729	36.321	36.693	35.285	8.659	3.965	8.348	3.655	8.494	7.086	7.458	6.050	37.9	0.10	178.92	91.65	270.57	OK
	B220	1.57					-5.26	2.36	12.62	13.68	32.2	25.72	0.236	4.116	0.567	4.918	0.071	1.235	2.605	3.910	1.018	3.334	0.215	4.136	0.853	0.453	1.823	3.128						
N+6.65	B223	0	1.57	V-40X45	0.40	0.40	-14.48	-11.55	4.62	2.88	-33.74	-18.34	27.707	36.232	29.122	37.646	27.978	30.535	32.694	35.251	11.813	20.338	13.228	21.752	12.084	14.641	16.800	19.357	37.6	0.10	178.92	91.65	270.57	OK
	B223	1.57					-7.69	-11.55	4.62	2.88	-33.74	-18.34	19.559	28.084	20.974	29.498	19.830	22.387	24.546	27.103	5.702	14.227	7.117	15.641	5.973	8.530	10.689	13.246						
N+3.45	B223	0	1.57	V-40X45	0.40	0.40	-31.91	-36.96	3.86	3.7	-32.2	-25.72	74.148	82.161	76.109	84.122	74.172	76.576	80.710	83.114	27.615	35.628	29.576	37.589	27.639	30.043	34.177	36.581	84.1	0.10	178.92	91.65	270.57	OK
	B223	1.57					-21.42	-9.16	3.86	3.7	21.04	13.52	33.760	29.942	33.105	29.287	33.784	32.639	31.602	30.457	18.174	14.356	17.519	13.701	18.198	17.053	16.016	14.871						
N+6.65	B224	0	2.15	V-40X45	0.40	0.40	8.15	16.57	3.34	2.54	21.04	13.52	27.262	31.195	27.994	31.927	27.137	28.317	29.577	30.757	8.247	12.180	8.979	12.912	8.122	9.302	10.562	11.742	38.4	0.10	178.92	91.65	270.57	OK
	B224	2.15					17.43	16.57	3.34	2.54	-21.04	-13.52	38.398	32.980	37.327	31.909	38.273	36.648	34.704	33.079	16.599	11.181	15.528	10.110	16.474	14.849	12.905	11.280						
N+3.45	B224	0	2.15	V-40X45	0.40	0.40	12.49	9.59	5.22	8.16	-21.04	-13.52	26.282	20.446	24.837	19.001	26.739	24.989	21.922	20.171	12.945	7.109	11.500	5.664	13.402	11.652	8.585	6.834	55.5	0.10	178.92	91.65	270.57	OK
	B224	2.15					25.83	15.37	5.22	8.16	35.4	19.3	48.070	54.777	48.813	55.519	48.527	50.539	51.003	53.015	24.951	31.658	25.694	32.400	25.408	27.420	27.884	29.896						
N+6.65	B225	0	1.57	V-40X45	0.40	0.40	-14.54	-11.57	4.28	2.78	35.4	19.3	27.882	20.966	26.780	19.865	28.115	26.040	24.444	22.369	11.950	5.034	10.848	3.933	12.183	10.108	8.512	6.437	28.1	0.10	178.92	91.65	270.57	OK
	B225	1.57					-7.76	-11.57	4.28	2.78	32.56	25.88	19.746	13.461	18.206	11.921	19.979	18.094	14.846	12.960	5.848	0.437	4.308	1.977	6.081	4.196	0.948	0.938						
N+3.45	B225	0	1.57	V-40X45	0.40	0.40	-20.37	-11.03	9.5	5.88	32.56	25.88	32.971	27.846	31.638	26.513	33.534	31.997	29.090	27.552	15.830	10.705	14.497	9.372	16.393	14.856	11.949	10.411	33.5	0.10	178.92	91.65	270.57	OK
	B225	1.57					-11.43	-7.95	9.5	5.88	-35.4	-19.3	19.163	29.141	20.842	30.819	19.726	22.719	25.322	28.315	7.784	17.762	9.463	19.440	8.347	11.340	13.943	16.936						
N+3.45	B227	0	2.15	V-40X45	0.40	0.40	5.31	-3.31	10.12	7.62	-35.4	-19.3	5.819	4.297	4.024	6.091	5.430	2.395	0.552	3.587	7.536	2.580	5.741	4.374	7.147	4.112	1.165	1.870	57.4	0.10	178.92	91.65	270.57	OK
	B227	2.15					16.94	34.32	10.12	7.62	-32.56	-25.88	57.405	47.920	55.172	45.687	57.016	54.171	49.572	46.726	18.003	8.518	15.770	6.285	17.614	14.769	10.170	7.324						
N+6.65	B229	0	2.15	V-40X45	0.40	0.40	8.09	16.49	3.5	2.82	21.02	10.96	27.164	31.057	27.706	31.600	27.058	28.226	28.867	30.035	8.247	12.140	8.789	12.683	8.141	9.309	9.950	11.118	42.7	0.10	178.92	91.65	270.57	OK
	B229	2.15					17.38	16.49	3.5	2.82	21.02	10.96	38.312	42.205	38.854	42.748	38.206	39.374	40.015	41.183	16.608	20.501	17.150	21.044	16.502	17.670	18.311	19.479						
N+3.45	B229	0	2.15	V-40X45	0.40	0.40	21.98	10.08	2.08	4.48	18.02	15.58	37.217	40.759	37.957	41.499	37.590	38.653	40.057	41.120	20.543	24.085	21.283	24.825	20.916	21.979	23.383	24.446	95.8	0.10	178.92	91.65	270.57	OK
	B229	2.15					37.43	49.72	2.08	4.48	-21.02	-10.96	95.397	90.264	94.368	89.234	95.770	94.230	92.339	90.799	34.448	29.315	33.419	28.285	34.821	33.281	31.390	29.850						
N+6.65	B230	0	2.15	V-40X45	0.40	0.40	18.65	41.2	1.02	0.82	-21.02	-10.96	63.861	58.964	63.076	58.178	63.830	62.361	61.212	59.743	17.066	12.169	16.281	11.383	17.035	15.566	14.417	12.948	75.0	0.10	178.92	91.65	270.57	OK
	B230	2.15					27.93	41.2	1.02	0.82	-18.02	-15.58	74.997	70.766	73.904	69.673	74.966	73.697	71.322	70.052	25.418	21.187	24.325	20.094	25.387	24.118	21.743	20.473						
N+3.45	B230	0	2.15	V-40X45	0.40	0.40	31.93	24.68	4.96	5.78	-18.02	-15.58	64.484	59.377	63.060	57.953	64.611	63.079	59.864	58.332	30.225	25.118	28.801	23.694	30.352	28.820	25.605	24.073	106.3	0.10	178.92	91.65	270.57	OK
	B230	2.15					51.64	36.24	4.96	5.78	30.9	18.72	99.696	105.460	100.558	106.323	99.823	101.552	102.699	104.428	47.964	53.728	48.826	54.591	48.091	49.820	50.967	52.696						
N+6.65	B231	0	2.15	V-40X45	0.40	0.40	17.55	37.88	0.14	0.12	30.9	18.72	58.979	65.815	60.219	67.055	58.976	61.027	63.109	65.160	15.834	22.670	17.074	23.910	15.831	17.882	19.964	22.015	78.1	0.10	178.92	91.65	270.57	OK
	B231	2.15					26.84	37.88	0.14	0.12	29.76	20.7	70.127	76.709	71.499	78.081	70.124	72.099	74.697	76.672	24.195	30.777	25.567	32.149	24.192	26.167	28.765	30.740						
N+3.45	B231	0	2.15	V-40X45	0.40	0.40	30.61	23.76	4.28	6.26	-30.9	-18.72	61.860	54.043	60.195	52.377	62.168	59.823	56.617	54.272	28.917	21.100	27.252	19.434	29.225	26.880	23.674	21.329	97.4	0.10	178.92	91.65	270.57	OK
	B231	2.15					50.32	35.32	4.28	6.26	-30.9	-18.72	97.072	89.255	95.407	87.589	97.380	95.035	91.829	89.484	46.656	38.839	44.991	37.173	46.964	44.619	41.413	39.068						
N+6.65	B232	0	1.57	V-40X45	0.40	0.40	-25.06	-30.74	1.34	0.78	-29.76	-20.7	60.462	67.373	61.894	68.805	60.549	62.623	65.323	67.396	22.204	29.115	23.636	30.547	22.291	24.365	27.065	29.138	68.8	0.10	178.92	91.65	270.57	OK
	B232	1.57					-18.28	-30.74	1.34	0.78	20.94	13.26	52.326	47.971	51.494	47.139	52.413	51.107	49.640	48.333	16.102	11.747	15.270	10.915	16.189	14.883	13.416	12.109						
N+3.45	B232	0	1.57	V-40X45	0.40	0.40	-42.62	-27.05	3.68	7.82	20.94	13.26	76.855	73.019	76.492	72.657	76.211	75.060	75.002	73.851	37.019	33.183	36.656	32.821	36.375	35.224	35.166	34.015	76.9	0.10	178.92	91.65	270.57	OK
	B232	1.57					-29.82	-20.89	3.68	7.82	-20.94	-13.26	55.335	60.806	56.740	62.211	54.691	56.332	59.375	61.017	25.499	30.970	26.904	32.375	24.855	26.496	29.539	31.181						
N+6.65	B233	0	1.57	V-40X45	0.40	0.40	-22.4	-27.6	0.32	0.22	-20.94	-13.26	54.394	59.119	55.293	60.017	54.410	55.827	57.405	58.823	20.074	24.799	20.973	25.697	20.090	21.507	23.085	24.503	60.0	0.10	178.92	91.65	270.57	OK
	B233	1.57					-15.62	-27.6	0.32	0.22	37.14	20.44	46.258	38.076	44.910	36.728	46.274	43.819	41.780	39.326	13.972	5.790	12.624	4.442	13.988	11.533	9.494	7.040						
N+3.45	B233	0	1.57	V-40X45	0.40	0.40	-42.16	-27.07	4.32	7.54	37.14	20.44	76.199	68.906	75.339	68.046	75.698	73.510	72.832	70.644	36.481	29.188	35.621	28.328	35.980	33.792	33.114	30.926	76.2	0.10	178.92	91.65	270.57	OK
	B233	1.57					-29.36	-20.9	4.32	7.54	31.14	25.5	54.669	48.709	53.472	47.512	54.168	52.380	50.177	48.389	24.961	19.001	23.764	17.804	24.460	22.672	20.469	18.681						
N+6.65	B235	0	2.15	V-40X45	0.40	0.40	18.36	39.69	0.14	0.12	31.14	25.5	61.761	68.650	63.453	70.342	61.758	63.825	67.398	69.465	16.563	23.452	18.255	25.144	16.560	18.627	22.200	24.267	72.9	0.10	178.92	91.65	270.57	OK
	B235	2.15					27.65	39.69	0.14	0.12	-37.14	-20.44	72.909	64.625	71.538	63.254	72.906	70.421	68.337	65.852	24.924	16.640	23.553	15.269	24.921	22.436	20.352	17.867						
N+3.45	B235	0	2.15	V-40X45	0.40	0.40	32.16	25.14	4.78	6.76	-37.14	-20.44	65.245	55.929	63.432	54.116	65.553	62.758	59.508	56.714	30.457	21.141	28.644	19.328	30.765	27.970	24.720	21.926	100.8	0.10	178.92	91.65	270.57	OK
	B235	2.15					51.87	36.7	4.78	6.76	-31.14	-25.5	100.457	92.475	98.306	90.324	100.765	98.370	93.596	91.201	48.196	40.214	46.045	38.063	48.504	46.109	41.335	38.940						
N+6.65	B236	0	1.57	V-40X45	0.40	0.40	-37.82	-27.58	2.1	2.7	61.16	39	72.317	59.193	69.897	56.773	72.224	68.287	64.157	60.220	33.391	20.267	30.971	17.847	33.298	29.361	25.231	21.294	72.3	0.10	178.92	91.65	270.57	OK
	B236	1.57					-28.2	-24.49	2.1	2.7	61.16	39	57.683	44.559	55.263	42.139	57.590	53.653	49.523	45.586	24.733	11.609	22.313	9.189	24.640	20.703	16.573	12.636						
N+3.45	B236	0	1.57	V-40X45	0.40	0.40	-32.26	-12.18	2.12	3.42	-61.16	-39	50.193	64.255	53.021	67.083	49.991	54.209	59.417	63.636	28.335	42.397	31.163	45.225	28.133	32.351	37.559	41.778	67.1	0.10	178.92	91.65	270.57	OK
	B236	1.57					-21.62	-9.1	2.12	3.42	-61.16	-39	34.345	48.407	37.173	51.235	34.143	38.361	43.569	47.788	18.759	32.821	21.587	35.649	18.557	22.775	27.983	32.202						
N+6.65	B237	0	1.57	V-40X45	0.40	0.40	-37.81	-27.87	1.78	3.28	99.68	64.42	72.628	50.872	68.552	46.796	72.394	65.868	58.808	52.281	33.415	11.659	29.339	7.583	33.181	26.655	19.595	13.068	72.6	0.10	178.92	91.65	270.57	OK
	B237	1.57					-28.19	-24.79	1.78	3.28	99.68	64.42	58.004	36.248	53.928	32.172	57.770	51.244	44.184	37.657	24.757	3.001	20.681	1.075	24.523	17.997	10.937	4.410						
N+3.45	B237	0	1.57	V-40X45	0.40	0.40	-33.04	-12.88	2.46	3.7	-99.68	-64.42	51.735	74.432	56.276	78.974	51.542	58.351	66.680	73.489	28.943	51.640	33.484	56.182	28.750	35.559	43.888	50.697	79.0	0.10	178.92	91.65	270.57	OK
	B237	1.57					-22.4	-9.8	2.46	3.7	-99.68	-64.42	35.887	58.584	40.428	63.126	35.694	42.503	50.832	57.641	19.367	42.064	23.908	46.606	19.174	25.983	34.312	41.121						
N+6.65	B238	0	2.15	V-40X45	0.40	0.40	12.97	27.9	2.08	1.7	20.46	13	44.040	48.124	44.793	48.877	43.980	45.206	46.492	47.717	12.249	16.333	13.002	17.086	12.189	13.415	14.701	15.926	60.0	0.10	178.92	91.65	270.57	OK
	B238	2.15					22.26	27.9	2.08	1.7	20.46	13	55.188	59.272	55.941	60.025	55.128	56.354	57.640	58.865	20.610	24.694	21.363	25.447	20.550	21.776	23.062	24.287						
N+3.45	B238	0	2.15	V-40X45	0.40	0.40	23.01	17.83	6.72	3.38	-20.46	-13	47.161	41.121	46.069	40.029	46.641	44.829	43.001	41.189	22.428	16.388	21.336	15.296	21.908	20.096	18.268	16.456	82.4	0.10	178.92	91.65	270.57	OK
	B238	2.15					42.72	29.38	6.72	3.38	-20.46	-13	82.363	76.323	81.271	75.231	81.843	80.031	78.203	76.391	40.167	34.127	39.075	33.035	39.647	37.835	36.007	34.195						
N+6.65	B239	0	2.15	V-40X45	0.40	0.40	13.49	28.53	2.18	1.74	35.04	19.36	45.318	52.621	46.493	53.795	45.250	47.441	49.166	51.356	12.741	20.044	13.916	21.218	12.673	14.864	16.589	18.779	64.9	0.10	178.92	91.65	270.57	OK
	B239	2.15					22.78	28.53	2.18	1.74	35.04	19.36	56.466	63.769	57.641	64.943	56.398	58.589	60.314	62.504	21.102	28.405	22.277	29.579	21.034	23.225	24.950	27.140						
N+3.45	B239	0	2.15	V-40X45	0.40	0.40	23.77	18.71	4.94	7.54	30.56	26	48.834	54.528	50.065	55.758	49.239	50.947	53.341	55.049	22.993	28.687	24.224	29.917	23.398	25.106	27.500	29.208	84.4	0.10	178.92	91.65	270.57	OK
	B239	2.15					43.48	30.26	4.94	7.54	-35.04	-19.36	84.036	75.152	82.243	73.359	84.441	81.776	78.463	75.798	40.732	31.848	38.939	30.055	41.137	38.472	35.159	32.494						
N+6.65	B240	0	2.15	V-40X45	0.40	0.40	18.56	41.48	0.88	0.5	-35.04	-19.36	63.981	55.999	62.657	54.675	63.922	61.527	59.508	57.114	16.933	8.951	15.609	7.627	16.874	14.479	12.460	10.066	75.1	0.10	178.92	91.65	270.57	OK
	B240	2.15					27.85	41.48	0.88	0.5	-30.56	-26	75.129	68.142	73.362	66.376	75.070	72.974	69.181	67.085	25.294	18.307	23.527	16.541	25.235	23.139	19.346	17.250						
N+3.45	B240	0	2.15	V-40X45	0.40	0.40	33.14	25.59	6.96	9.58	-30.56	-26	67.543	59.206	65.171	56.834	67.951	65.450	60.044	57.543	32.011	23.674	29.639	21.302	32.419	29.918	24.512	22.011	106.2	0.10	178.92	91.65	270.57	OK
	B240	2.15					52.85	37.15	6.96	9.58	21.08	13.48	102.755	105.893	103.015	106.153	103.163	104.104	104.030	104.971	49.750	52.888	50.010	53.148	50.158	51.099	51.025	51.966						
N+6.65	B241	0	1.57	V-40X45	0.40	0.40	-24.84	-31.1	1.08	0.78	21.08	13.48	60.616	56.172	59.769	55.325	60.663	59.329	57.840	56.507	22.064	17.620	21.217	16.773	22.111	20.777	19.288	17.955	60.7	0.10	178.92	91.65	270.57	OK
	B241	1.57					-18.05	-31.1	1.08	0.78	-21.08	-13.48	52.468	57.392	53.419	58.343	52.515	53.992	55.684	57.161	15.953	20.877	16.904	21.828	16.000	17.477	19.169	20.646						
N+3.45	B241	0	1.57	V-40X45	0.40	0.40	-44.01	-28.16	6.44	11.58	-21.08	-13.48	78.769	84.884	80.440	86.555	77.969	79.804	83.538	85.373	37.406	43.521	39.077	45.192	36.606	38.441	42.175	44.010	86.6	0.10	178.92	91.65	270.57	OK
	B241	1.57					-31.21	-22	6.44	11.58	37.62	20.94	57.249	50.320	56.625	49.696	56.449	54.371	54.369	52.291	25.886	18.957	25.262	18.333	25.086	23.008	23.006	20.928						
N+6.65	B242	0	1.57	V-40X45	0.40	0.40	-20.01	-20.53	3.64	2.34	37.62	20.94	43.577	36.026	42.337	34.786	43.779	41.514	39.646	37.381	17.044	9.493	15.804	8.253	17.246	14.981	13.113	10.848	43.8	0.10	178.92	91.65	270.57	OK
	B242	1.57					-13.23	-20.53	3.64	2.34	30.74	25.98	35.441	29.419	33.865	27.843	35.643	33.837	30.390	28.583	10.942	4.920	9.366	3.344	11.144	9.338	5.891	4.084						
N+3.45	B242	0	1.57	V-40X45	0.40	0.40	-27.87	-12.32	10.76	6.06	-37.62	-20.94	42.969	53.720	44.769	55.520	43.700	46.925	49.700	52.925	22.288	33.039	24.088	34.839	23.019	26.244	29.019	32.244	55.5	0.10	178.92	91.65	270.57	OK
	B242	1.57					-17.23	-9.24	10.76	6.06	-37.62	-20.94	27.121	37.872	28.921	39.672	27.852	31.077	33.852	37.077	12.712	23.463	14.512	25.263	13.443	16.668	19.443	22.668						
N+6.65	B243	0	1.57	V-40X45	0.40	0.40	-17.78	-20.3	3.6	2.14	-30.74	-25.98	40.693	48.324	42.568	50.199	40.920	43.210	47.169	49.459	15.059	22.690	16.934	24.565	15.286	17.576	21.535	23.825	50.2	0.10	178.92	91.65	270.57	OK
	B243	1.57					-10.99	-20.3	3.6	2.14	6.04	10.54	32.545	32.003	31.985	31.443	32.772	32.610	30.906	30.743	8.948	8.406	8.388	7.846	9.175	9.013	7.309	7.146						
N+3.45	B243	0	1.57	V-40X45	0.40	0.40	-27.97	-12.21	7.64	8.16	6.04	10.54	43.532	43.888	43.374	43.729	43.451	43.558	42.922	43.029	22.931	23.287	22.773	23.128	22.850	22.957	22.321	22.428	43.9	0.10	178.92	91.65	270.57	OK
	B243	1.57					-17.34	-9.13	7.64	8.16	-6.04	-10.54	27.696	30.736	28.943	31.983	27.615	28.527	31.771	32.683	13.364	16.404	14.611	17.651	13.283	14.195	17.439	18.351						
N+3.45	B261	0	1.57	V-20X45	0.20	0.40	-10.04	-9.1	4.08	6.98	-6.04	-10.54	19.776	22.025	20.944	23.193	19.325	20.000	23.218	23.893	7.664	9.913	8.832	11.081	7.213	7.888	11.106	11.781	23.9	0.10	178.92	45.83	224.75	OK
	B261	1.57					-2.33	-2.94	4.08	6.98	7.06	4.14	4.364	3.702	4.553	3.891	3.913	3.714	4.544	4.345	0.725	0.063	0.914	0.252	0.274	0.075	0.905	0.706						
N+3.45	B262	0	2.15	V-20X45	0.20	0.40	3.9	4.74	3.86	6.18	7.06	4.14	10.690	11.401	10.554	11.265	11.051	11.264	10.597	10.811	4.780	5.491	4.644	5.355	5.141	5.354	4.687	4.901	37.9	0.10	178.92	45.83	224.75	OK
	B262	2.15					16.65	16.3	3.86	6.18	-7.06	-4.14	37.550	35.123	36.862	34.435	37.911	37.183	35.617	34.889	16.255	13.828	15.567	13.140	16.616	15.888	14.322	13.594						
N+3.45	B264	0	2.15	V-20X45	0.20	0.40	3.31	2.73	4.18	6.12	-7.06	-4.14	8.039	5.541	7.355	4.857	8.341	7.591	6.061	5.311	4.316	1.818	3.632	1.134	4.618	3.868	2.338	1.588	35.2	0.10	178.92	45.83	224.75	OK
	B264	2.15					16.05	14.29	4.18	6.12	4.62	2.88	34.887	34.985	34.671	34.769	35.189	35.218	34.469	34.498	15.782	15.880	15.566	15.664	16.084	16.113	15.364	15.393						
N+3.45	B265	0	1.57	V-20X45	0.20	0.40	-9.36	-7.33	4.06	7.34	4.62	2.88	17.170	17.046	17.468	17.343	16.660	16.623	17.651	17.614	7.032	6.908	7.330	7.205	6.522	6.485	7.513	7.476	17.7	0.10	178.92	45.83	224.75	OK
	B265	1.57					-1.65	-1.16	4.06	7.34	-4.62	-2.88	1.748	3.677	2.430	4.359	1.238	1.817	3.509	4.088	0.093	2.022	0.775	2.704	0.417	0.162	1.854	2.433						
N+3.45	B267	0	2.15	V-20X45	0.20	0.40	3.37	2.82	4.28	6.34	-4.62	-2.88	8.238	6.260	7.623	5.645	8.558	7.965	6.509	5.916	4.407	2.429	3.792	1.814	4.727	4.134	2.678	2.085	35.4	0.10	178.92	45.83	224.75	OK
	B267	2.15					16.11	14.38	4.28	6.34	4.68	5.6	35.086	35.175	35.036	35.125	35.406	35.433	35.242	35.268	15.873	15.962	15.823	15.912	16.193	16.220	16.029	16.055						

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA
RESISTENCIA A CORTANTE PARA COLUMNAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3.2 (a) - COLUMNA S=40x70

f'c =	**21.0**	MPa	**Estribos Φ =**	**9.5**	mm
fy =	**420**	MPa	**Av =**	**71**	mm^2
$\Phi_{Cortante}$ =	**0.75**		**Cantidad de ramas =**	**3**	
bx =	**0.40**	m	**S =**	**0.20**	m
by =	**0.70**	m	**Recub. =**	**0.05**	m
Lcol =	**4.00**	m			

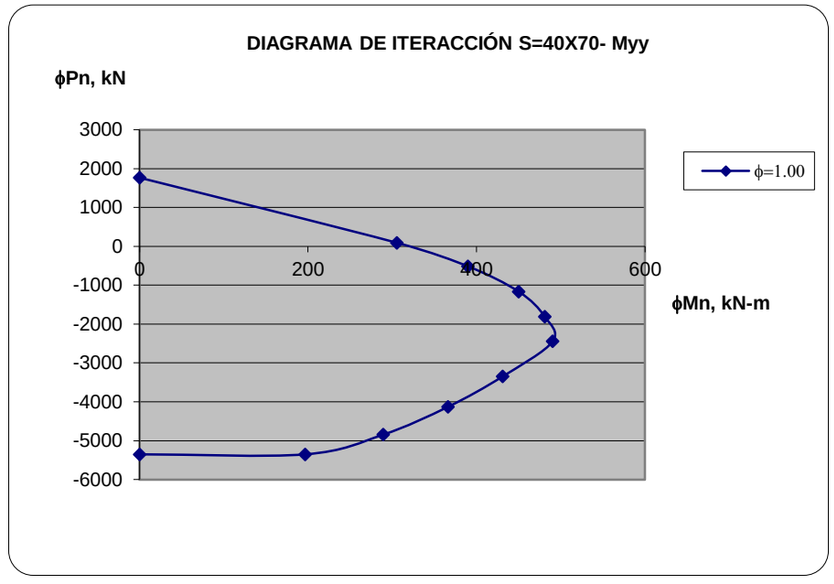
C.21.3.3.2(a) El cortante ΦVn no debe ser menor que la suma del cortante debido a flexión en curvatura inversa asociado con el desarrollo de los momentos nominales de la columna en cada extremo restringido de la longitud libre.

DATOS PARA LOS DIAGRAMAS DE ITERACCIÓN			
No.	**Curve 1**	**0. degrees**	
	P	**M3**	**M2**
1	-5352.00	0.00	0.00
2	-5352.00	310.16	0.00
3	-4909.00	464.22	0.00
4	-4223.00	588.53	0.00
5	-3471.00	690.59	0.00
6	-2584.00	774.77	0.00
7	-1811.00	773.56	0.00
8	-1032.00	711.55	0.00
9	-268.77	593.02	0.00
10	482.58	419.46	0.00
11	1766.71	0.00	0.00



P_{ua} = -674.49 **kN**
P_{ub} = -646.67 **kN**
ΦM_{na} = 686.74 **kN-m**
ΦM_{nb} = 680.31 **kN-m**
$V_{umáx}$ = 341.76 **kN**
ΦV_s = 205.48 **kN**
ΦV_c = 140.34 **kN**
ΦV_n = 345.82 **kN**
$\Phi V_n > V_{umáx}$ = OK

DATOS PARA LOS DIAGRAMAS DE ITERACCIÓN			
No.	**Curve 7**	**90. degrees**	
	P	**M3**	**M2**
1	-5352.00	0.00	0.00
2	-5352.00	0.00	196.81
3	-4846.00	0.00	289.22
4	-4129.00	0.00	366.34
5	-3351.00	0.00	430.92
6	-2446.00	0.00	490.50
7	-1810.00	0.00	481.20
8	-1167.00	0.00	450.34
9	-512.77	0.00	389.75
10	92.96	0.00	305.33
11	1766.71	0.00	0.00



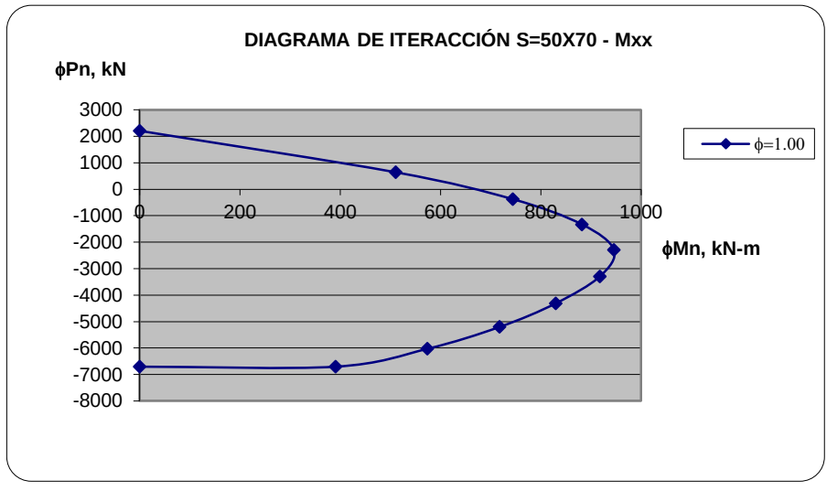
P_{ua} = -282.62 **kN**
P_{ub} = -261.76 **kN**
ΦM_{na} = 357.68 **kN-m**
ΦM_{nb} = 354.77 **kN-m**
$V_{umáx}$ = 178.11 **kN**
ΦV_s = 218.06 **kN**
ΦV_c = 148.93 **kN**
ΦV_n = 366.99 **kN**
$\Phi V_n > V_{umáx}$ = OK

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA
RESISTENCIA A CORTANTE PARA COLUMNAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3.2 (a) - COLUMNA S=50X70

f'c =	**21.0**	MPa	**Estribos Φ =**	**9.5**	mm
fy =	**420**	MPa	**Av =**	**71**	mm^2
$\Phi_{Cortante}$ =	**0.75**		**Cantidad de ramas =**	**3**	
bx =	**0.50**	m	**S =**	**0.20**	m
by =	**0.70**	m	**Recub. =**	**0.05**	m
Lcol =	**4.00**	m			

C.21.3.3.2(a) El cortante ΦVn 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.

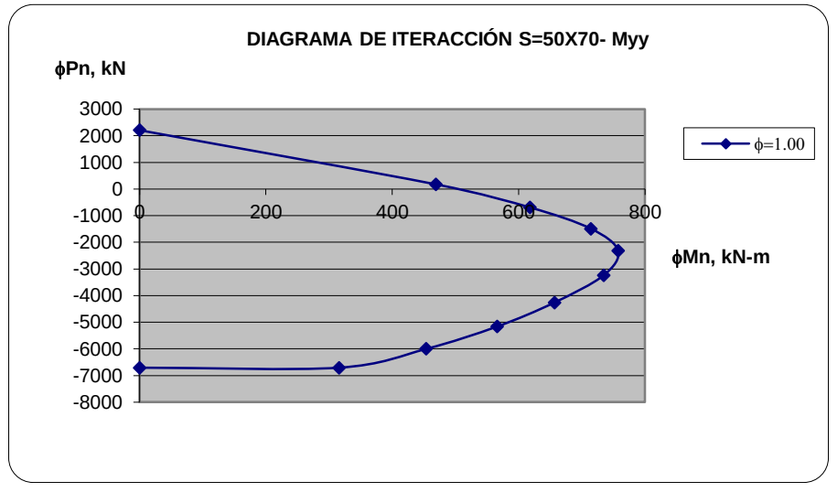
DATOS PARA LOS DIAGRAMAS DE ITERACCIÓN			
No.	**Curve 1**	**0. degrees**	
	P	**M3**	**M2**
1	-6705.00	0.00	0.00
2	-6705.00	390.84	0.00
3	-6029.00	574.13	0.00
4	-5204.00	718.00	0.00
5	-4311.00	830.17	0.00
6	-3296.00	917.92	0.00
7	-2296.00	946.10	0.00
8	-1330.00	882.47	0.00
9	-373.81	744.14	0.00
10	640.48	511.08	0.00
11	2208.38	0.00	0.00



P_{ua} =	-1049.93	**kN**
P_{ub} =	-1015.15	**kN**
ΦM_{na} =	953.48	**kN-m**
ΦM_{nb} =	953.10	**kN-m**
$V_{umáx}$ =	476.64	**kN**
ΦV_s =	211.35	**kN**
ΦV_c =	180.44	**kN**
ΦV_n =	391.79	**kN**

$\Phi V_n > V_{umáx}$ = OK

DATOS PARA LOS DIAGRAMAS DE ITERACCIÓN			
No.	**Curve 7**	**90. degrees**	
	P	**M3**	**M2**
1	-6705.00	0.00	0.00
2	-6705.00	0.00	315.78
3	-6001.00	0.00	453.61
4	-5160.00	0.00	566.14
5	-4260.00	0.00	656.76
6	-3236.00	0.00	734.80
7	-2316.00	0.00	757.47
8	-1488.00	0.00	714.43
9	-689.30	0.00	617.94
10	177.26	0.00	469.01
11	2208.38	0.00	0.00



P_{ua} =	-450.71	**kN**
P_{ub} =	-424.62	**kN**
ΦM_{na} =	741.04	**kN-m**
ΦM_{nb} =	741.72	**kN-m**
$V_{umáx}$ =	370.69	**kN**
ΦV_s =	218.06	**kN**
ΦV_c =	186.17	**kN**
ΦV_n =	404.23	**kN**

$\Phi V_n > V_{umáx}$ = OK

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA
RESISTENCIA A CORTANTE PARA COLUMNAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3.2 (b) S=40x70

f'c =	**21.0**	MPa	**Estribos Φ =**	**9.5**	mm
fy =	**420**	MPa	**Av =**	**71**	mm^2
$\Phi_{Cortante}$ =	**0.75**		**Cantidad de ramas =**	**3**	
bx =	**0.40**	m	**S =**	**0.20**	m
by =	**0.70**	m	**Ω_o=**	**3.00**	
			Recub. =	**0.05**	m

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

Para cortante V2

Ω_o*$V_{umáx}$ =	104.38	**kN**
ΦV_s =	205.48	**kN**
ΦV_c =	140.34	**kN**
ΦV_n =	345.82	**kN**
$\Phi V_n > \Omega_o$*$V_{umáx}$ =	OK	

Para cortante V3

Ω_o*$V_{umáx}$ =	163.64	**kN**
ΦV_s =	218.06	**kN**
ΦV_c =	148.93	**kN**
ΦV_n =	366.99	**kN**
$\Phi V_n > \Omega_o$*$V_{umáx}$ =	OK	

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA
RESISTENCIA A CORTANTE PARA COLUMNAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3.2 (b) S=50X70

f'c =	**21.0**	MPa	**Estribos Φ =**	**9.5**	mm
fy =	**420**	MPa	**Av =**	**71**	mm^2
$\Phi_{Cortante}$ =	**0.75**		**Cantidad de ramas =**	**3**	
bx =	**0.50**	m	**S =**	**0.20**	m
by =	**0.70**	m	**Ω_o=**	**3.00**	
			Recub. =	**0.05**	m

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

Para cortante V2

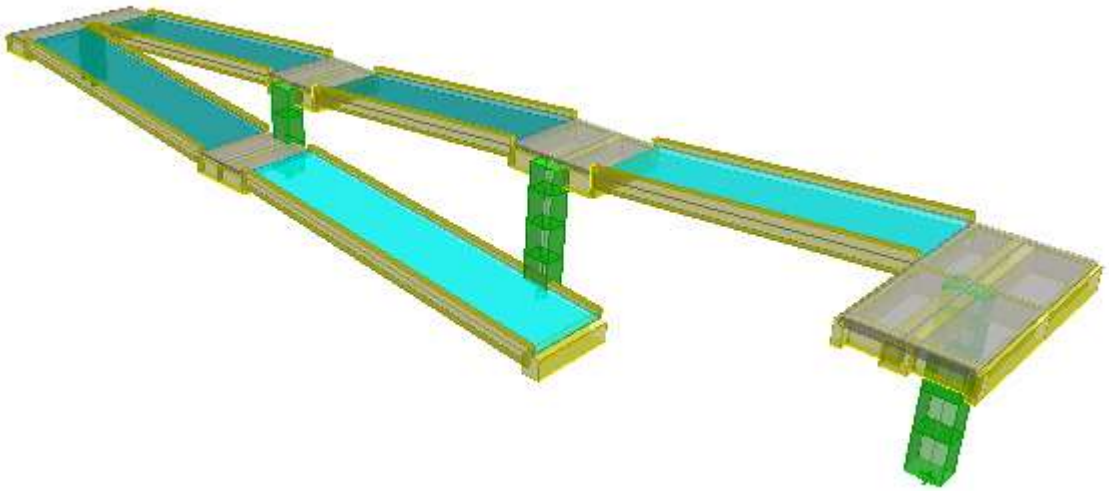
Ω_o*$V_{umáx}$ =	149.40	**kN**
ΦV_s =	211.35	**kN**
ΦV_c =	180.44	**kN**
ΦV_n =	391.79	**kN**
$\Phi V_n > \Omega_o$*$V_{umáx}$ =	OK	

Para cortante V3

Ω_o*$V_{umáx}$ =	215.07	**kN**
ΦV_s =	218.06	**kN**
ΦV_c =	186.17	**kN**
ΦV_n =	404.23	**kN**
$\Phi V_n > \Omega_o$*$V_{umáx}$ =	OK	

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA- RAMPA (IPIALES, NARIÑO)

dye16-2269



MEMORIAS DE ANÁLISIS Y DISEÑO ESTRUCTURAL

Bogotá D.C. 18 DE NOVIEMBRE DE 2016

1. DESCRIPCIÓN DEL PROYECTO

1.1. INTRODUCCIÓN

El presente documento contiene las memorias de análisis y diseño estructural correspondiente al proyecto ***INSTITUCION EDUCATIVA MARCELO MIRANDA - RAMPA*** ubicado en IPIALES (NARIÑO)

1.2. DESCRIPCIÓN ARQUITECTÓNICA

El proyecto se encuentra ubicado en un lote de 1015m² de área aproximadamente, en la cual se contempla la construcción un edificio de dos niveles y una rampa, que funcionarán como colegio.

1.3. DESCRIPCIÓN SISTEMA ESTRUCTURAL

El proyecto se soluciona mediante la construcción de una estructura aporticada en concreto, con placa maciza y vigas descolgadas. Se manejan luces que varían entre 2.00m y 6.50m en los dos sentidos de la estructura.

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:

Para la Rampa Peatonal:

- ✓ Método de análisis: ***Análisis Modal***
- ✓ Zona de amenaza sísmica: ***Alta***
- ✓ Capacidad de disipación de energía: ***Especial***
- ✓ Coeficiente de disipación de energía: $R_0 = 1.50$

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 solicitación ocasionados por las derivas presentes. Las cargas vivas de diseño son: **5.00kN/m²** para placa maciza.

Para la cimentación se siguieron las recomendaciones descritas en el respectivo estudio de suelos, que recomienda apoyar las estructuras mediante zapatas.

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 411.20.0158 de Marzo 18 de 2014 (Microzonificación Sísmica de Santiago de Cali) y en el Reglamento para Concreto Estructural ACI 318S-11.

1.4. MATERIALES

Los materiales utilizados son:

Concreto	21.1 MPa para vigas, placas, zapatas y columnas.
Concreto	14 MPa (para concreto de limpieza).
Acero	para refuerzo fy = 420 MPa para todos los diámetros.

Atentamente:

_____

EDGAR ROLANDO BARRERA
ING. ESTRUCTURAL
T.P. 15202-102710 BYC

_____

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

MEMORIAL DE RESPONSABILIDAD

IPIALES, 18 de Noviembre de 2016

Señores
PLANEACION MUNICIPAL
La Ciudad

Yo, **EDGAR ROLANDO BARRERA,** ingeniero civil con Matrícula Profesional Nº **15202-102710** de **BOYACÁ,** y Yo, **JAIR USECHE MACÍAS,** ingeniero civil con Matrícula Profesional Nº **25202-56174** de **CUNDINAMARCA** debidamente registrados en el consejo profesional de Ingeniería y Arquitectura de Boyacá y Cundinamarca, presentamos 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 INSTITUCIÓN EDUCATIVA MARCELO MIRANDA - RAMPA ubicado en IPIALES NARIÑO, declaramos que asumimos la responsabilidad por los perjuicios que causa de ellos puedan deducirse, exonerando a PLANEACION MUNICIPAL de cualquier responsabilidad.

Aceptamos y reconocemos que la revisión efectuada por PLANEACION MUNICIPAL no constituye una aprobación al Diseño Estructural, sino una verificación del cumplimiento de la **NORMA COLOMBIANA DE DISEÑO Y CONSTRUCCIÓN SISMO RESISTENTE**.

Atentamente,

EDGAR ROLANDO BARRERA
ING. ESTRUCTURAL
T.P. 15202-102710 BYC

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


REPUBLICA DE COLOMBIA
Consejo Profesional Nacional de Ingeniería y Arquitectura
MATRICULA No. 2528256174CND
INGENIERO CIVIL
DE FECHA 27/07/95
APELLIDOS
USECHE MACIAS
NOMBRES
JAIR
C.C 19,428,425
UNIV. NACIONAL - BOGOTA

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA - RAMPA

AVALUO DE CARGAS

1. PLACA MACIZA RAMPA

Placa Maciza e=0.10m	0.10x24		2.40 kN/m²
Impermeabilización	20x0.05		1.00 kN/m²
		CM	3.40 kN/m²
		CV	5.00 kN/m²
		CR	8.40 kN/m²

CU = 1.2x3.4+1.6x5 = ***12.1 kN/m²***

Espesor de placa equivalente:

e=CM/24 0.142 m

3. ANÁLISIS SÍSMICO

ANÁLISIS SÍSMICO

COMPROBACIÓN IRREGULARIDAD TORSIONAL Y DERIVAS

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA - RAMPA ANÁLISIS SÍSMICO (ESPECTRO DE DISEÑO NSR-10)

ZONA DE AMENAZA SÍSMICA
INTERMEDIA

EFECTOS LOCALES

Perfil de Suelo	**E**
Coeficiente Aa	**0.30**
Coeficiente Av	**0.25**

COEFICIENTE DE IMPORTANCIA

Grupo de Uso	**III**
Coeficiente de importancia III	**1.25**

PERIODO FUNDAMENTAL DE LA EDIFICACIÓN

$T_a = C_t h^{\alpha}$		
C_t =	**0.047**	
h =	**3.50**	m
α =	**0.90**	
T_a=	**0.15**	Seg

VARIACIÓN COEFICIENTE DE CAPACIDAD DE DISIPACIÓN DE ENERGÍA

Ro: 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

Ro	**1.50**
ϕ_a	**1.00**
ϕ_p	**1.00**
ϕ_r	**1.00**
ϕ	**1.00**
R	**1.50**

TIPO	DESCRIPCIÓN	VALOR
	N.A	ϕ_P: 1.00
	N.A	ϕ_a: 1.00
	N.A	ϕ_r: 1.00
	N.A	ϕ: 1.00

ESPECTRO DE DISEÑO (AMORTIGUAMIENTO ξ=5% DEL CRÍTICO)

Fa: Factor de ampliación de la aceleración.
Fv: Factor de ampliación de la aceleración en el rango de velocidades constantes.
Sa: Valor del espectro de aceleraciones de diseño para un periodo de vibración dado.

Aa: Coeficiente que representa la aceleración horizontal pico efectiva para diseño.
Av: Coeficiente que representa la velocidad horizontal pico efectiva para diseño.
T: Periodo de vibración del sistema elástico, en segundos.
T_C: Periodo de vibración, en segundos, correspondiente a la transición entre la zona de aceleración constante del espectro de diseño, para periodos cortos, y la parte descendiente del mismo.
T_L: Periodo de vibración, en segundos, correspondiente al inicio de la zona de desplazamiento aproximadamente constante del espectro de diseño para periodos largos.

ZONA DE AMENAZA INTERMEDIA

T_o:	0.21	Seg
T_C:	1.00	Seg
T_L:	7.20	Seg
Aa:	0.30	
Av:	0.25	
Fa:	1.20	
Fv:	3.00	

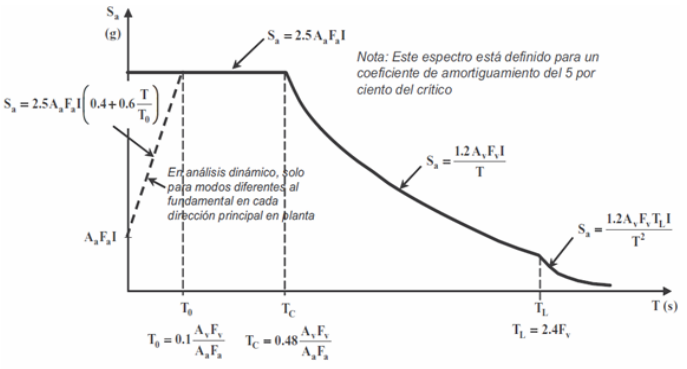
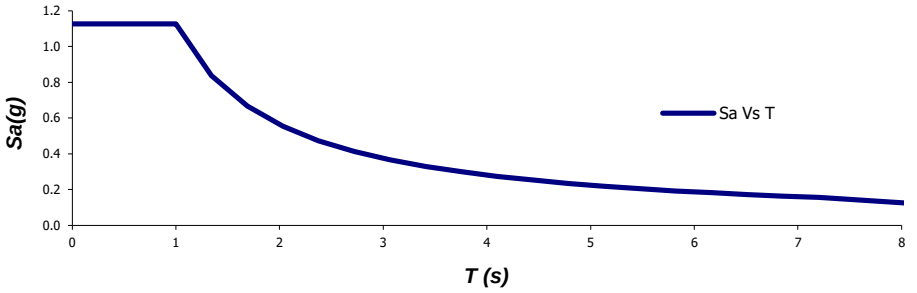


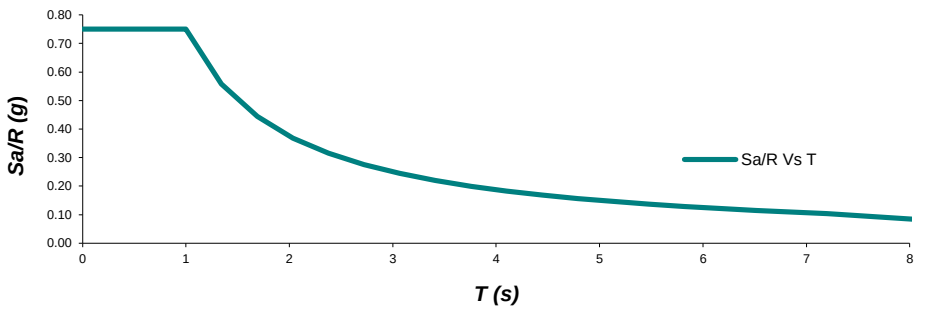
Figura A.2.6-1 — Espectro Elástico de Aceleraciones de Diseño como fracción de g

T	Sa	$Sa/R_{adoptado}$
(Seg)	**(%g)**	**(%g)**
0.00	1.125	0.750
0.05	1.125	0.750
0.10	1.125	0.750
0.16	1.125	0.750
0.21	1.125	0.750
0.41	1.125	0.750
0.60	1.125	0.750
0.80	1.125	0.750
1.00	1.125	0.750
1.34	0.837	0.558
1.69	0.666	0.444
2.03	0.553	0.369
2.38	0.473	0.315
2.72	0.413	0.276
3.07	0.367	0.245
3.41	0.330	0.220
3.76	0.300	0.200
4.10	0.274	0.183
4.44	0.253	0.169
4.79	0.235	0.157
5.13	0.219	0.146
5.48	0.205	0.137
5.82	0.193	0.129
6.17	0.182	0.122
6.51	0.173	0.115
6.86	0.164	0.109
7.20	0.156	0.104
8.20	0.120	0.080
9.20	0.096	0.064

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 rigidos 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: INSTITUCION EDUCATIVA MARCELO MIRANDA - RAMPA ANÁLISIS SÍSMICO (ESPECTRO DE UMBRAL DE DAÑO NSR-10)

ZONA DE AMENAZA SÍSMICA
INTERMEDIA

EFECTOS LOCALES

Perfil de Suelo	**E**
Coeficiente Ad	**0.30**
Coeficiente Fv	**2.90**

COEFICIENTE DE IMPORTANCIA

Grupo de Uso	**III**
Coeficiente de importancia III	**1.25**
Coeficiente de Sitio Ŝ:	**3.63**

ESPECTRO DE UMBRAL DE DAÑO (AMORTIGUAMIENTO ξ=2% DEL CRÍTICO)

Sad: Valor del espectro de aceleraciones del umbral de daño para un periodo de vibración dado.
Ad: Máxima aceleración pico efectiva para el umbral de daño.
T: Periodo de vibración del sistema elástico, en segundos.
T_{Cd}: Periodo de vibración, en segundos, correspondiente a la transición entre la zona de aceleración constante del espectro sísmico del umbral de daño, para periodos cortos, y la parte descendiente del mismo.
T_{Ld}: Periodo de vibración, en segundos, correspondiente a la transición entre la zona de desplazamiento constante del espectro sísmico del umbral de daño, para periodos largos.

Ad: **0.30**
T_{Cd}: 1.81 Seg
T_{Ld}: 8.7 Seg

T (Seg)	Sad (%g)
0.00	0.300
0.05	0.420
0.10	0.540
0.15	0.660
0.20	0.780
0.25	0.900
0.45	0.900
0.64	0.900
0.84	0.900
1.03	0.900
1.23	0.900
1.42	0.900
1.62	0.900

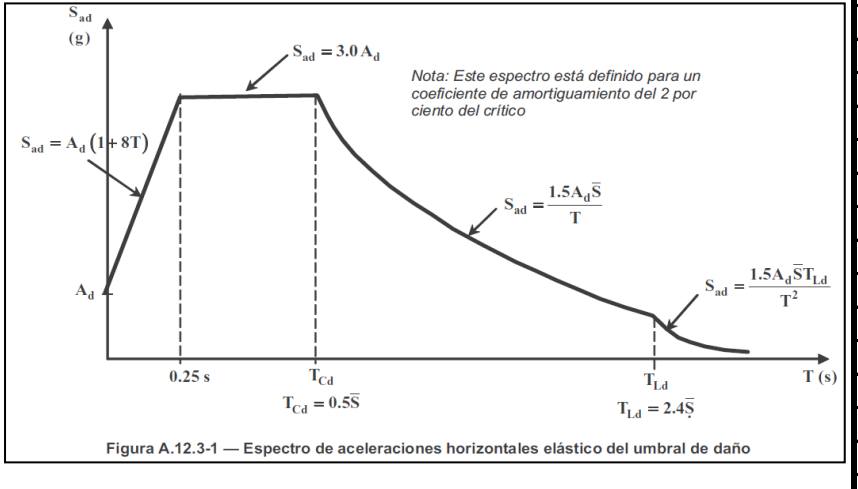
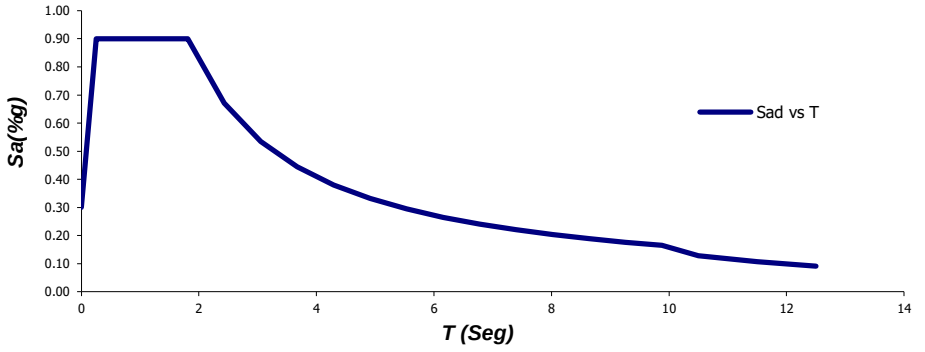


Figura A.12.3-1 — Espectro de aceleraciones horizontales elástico del umbral de daño

1.81	0.900
2.43	0.670
3.05	0.534
3.67	0.444
4.29	0.380
4.92	0.332
5.54	0.295
6.16	0.265
6.78	0.241
7.40	0.221
8.02	0.203
8.64	0.189
9.26	0.176
9.88	0.165
10.50	0.129
11.50	0.107
12.50	0.091

Espectro Del 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

Modelo Tridimensional con Diafragma Rígido: En este modelo los entrepisos se consideran diafragmas infinitamente rigidos 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.

Diseños & Estructuras

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA - RAMPA
CALCULO DEL CORTANTE BASAL DE LA ESTRUCTURA (ESPECTRO DE DISEÑO)

CALCULO DEL CORTANTE BASAL DE LA ESTRUCTURA

$H_{edificio}$ =	3.50	m		
Tipo de Perfil:	E			
Aa =	0.30	g		
Av =	0.25	g		
Fa =	1.20			
Fv =	3.00			
T_c =	1.00	Seg		
C_t =	0.047			
α =	0.90			
T_a =	0.15	Seg		
C_u =	1.20			
$C_u T_a$ =	0.17	Seg		
$T_{modelación\ estructural}$ =	0.1500	Seg		
ΔT =	3.36	%	Ok!	
$T_{adoptado}$ =	0.15	Seg		
S_a =	0.852		S_a obtenido del espectro de diseño	
g =	9.81	m/s^2		
M =	71.20	Ton	Masa obtenida del modelo	
V_s =	595.10	kN		
90% Vs =	535.59	kN	Cortante basal para comparación de acuerdo a A.5.4.5 NSR-10	

MODELO INICIAL
Response Espectrum Base Reactions

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

	F1 (kN)	F2 (kN)	Total (kN)	Factor		g corregido
$V_{s(x)}$=	401.63	158.25	431.68	1.241	12.171	Se aplica en SISMO X
$V_{s(y)}$=	158.25	267.02	310.39	1.726	16.927	Se aplica en SISMO Y

MODELO CORREGIDO
Response Espectrum Base Reactions

	F1 (kN)	F2 (kN)	Total (kN)	90% Vs (kN)
$V_{s(x)}$=	401.63	158.25	**431.68**	**535.6**
$V_{s(y)}$=	158.25	267.02	**310.39**	**535.6**

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA - RAMPA
CALCULO DEL CORTANTE BASAL DE LA ESTRUCTURA (ESPECTRO DE UMBRAL DE DAÑO)

CALCULO DEL CORTANTE BASAL DE LA ESTRUCTURA

$H_{edificio}$=	3.50	m	
Tipo de Perfil:	E		
Ad =	0.09	g	
Fv =	3.00		
C_t =	0.047		
α =	0.90		
T_a =	0.15	Seg	
C_u =	1.20		
$C_u T_a$ =	0.17	Seg	
$T_{modelación\ estructural}$ =	0.15	Seg	
ΔT =	3.36	%	Ok!
$T_{adoptado}$ =	0.1500	Seg	
S_a =	0.900		S_a obtenido del espectro de diseño
g =	9.81	m/s^2	
M =	71.20	Ton	Masa obtenida del modelo
V_s =	628.62	kN	
90% Vs =	565.76	kN	Cortante basal para comparación de acuerdo a A.5.4.5 NSR-10

MODELO INICIAL
Response Espectrum Base Reactions

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

	F1 (kN)	F2 (kN)	Total (kN)	Factor		g corregido
$V_{s(x)}$=	185.99	78.88	202.03	2.800	27.472	Se aplica en SISMO X
$V_{s(y)}$=	78.88	166.69	184.41	3.068	30.096	Se aplica en SISMO Y

MODELO CORREGIDO
Response Espectrum Base Reactions

	F1 (kN)	F2 (kN)	Total (kN)	90% Vs (kN)
$V_{s(x)}$=	185.99	78.88	**202.03**	**565.8**
$V_{s(y)}$=	78.88	166.69	**184.41**	**565.8**

4. DISEÑO DE CIMENTACIÓN

DISEÑO DE CIMENTACIÓN

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA - RAMPA

Elección de cargas y momentos para calculos de Esfuerzos y Áreas del Diseño de Cimentación

Combinaciones de carga **NSR-10**

Cargas Gravitacionales: CIMEN= 1D + 1L B.2.3-2

Cargas por Estado Limite de Servicio CIMEN2= 1D + 0.75L + 0.70*(0.75/R)Ex + 0.21*(0.75/R)Ey **B.2.3-8**

CIMEN3= 1D + 0.75L + 0.21*(0.75/R)Ex + 0.70*(0.75/R)Ey

Story	Point	Load	FX	FY	FZ	MX	MY	MZ	Load	Max (Mx:My)	COMBINACIÓN	Pumax
BASE	62	CIM1	32.490	-1.920	201.820	-193.800	85.808	8.936	CIM1	193.8		
BASE	62	CIM2 MAX	42.740	10.620	182.400	-138.955	106.318	15.238	CIM2 MAX	138.955		
BASE	62	CIM2 MIN	14.930	-14.030	179.940	-204.116	45.778	0.520	CIM2 MIN	204.116	CIM1	201.82
BASE	62	CIM3 MAX	36.970	27.670	182.930	-91.183	93.764	17.616	CIM3 MAX	93.764		
BASE	62	CIM3 MIN	20.710	-31.080	179.420	-251.888	58.333	-1.858	CIM3 MIN	251.888		
BASE	66	CIM1	-99.960	1.440	598.570	177.206	356.632	-13.130	CIM1	356.632		
BASE	66	CIM2 MAX	-42.970	41.010	534.310	234.863	362.610	14.024	CIM2 MAX	362.61		
BASE	66	CIM2 MIN	-136.980	-38.460	528.950	78.755	268.541	-37.067	CIM2 MIN	268.541	CIM1	598.57
BASE	66	CIM3 MAX	-54.050	41.380	533.560	234.376	344.360	27.795	CIM3 MAX	344.36		
BASE	66	CIM3 MIN	-125.900	-38.830	529.690	79.242	286.791	-50.838	CIM3 MIN	286.791		
BASE	73	CIM1	18.700	-0.470	227.700	-44.163	158.059	3.084	CIM1	158.059		
BASE	73	CIM2 MAX	60.690	29.610	208.470	11.151	198.566	18.027	CIM2 MAX	198.566		
BASE	73	CIM2 MIN	-24.130	-30.450	198.420	-89.419	81.061	-12.359	CIM2 MIN	89.419	CIM1	227.7
BASE	73	CIM3 MAX	48.700	36.820	206.220	19.141	182.335	29.535	CIM3 MAX	182.335		
BASE	73	CIM3 MIN	-12.130	-37.660	200.680	-97.408	97.293	-23.867	CIM3 MIN	97.408		
BASE	86	CIM1	48.76	0.95	208.21	-69.577	84.521	5.32	CIM1	84.521		
BASE	86	CIM2 MAX	52.51	13.29	191.78	-20.24	100.542	13.475	CIM2 MAX	100.542		
BASE	86	CIM2 MIN	33.2	-11.58	186.55	-101.498	48.529	-4.239	CIM2 MIN	101.498	CIM1	208.21
BASE	86	CIM3 MAX	48.71	34.27	190.93	50.681	89.942	15.287	CIM3 MAX	89.942		
BASE	86	CIM3 MIN	37	-32.57	187.41	-172.419	59.13	-6.051	CIM3 MIN	172.419		

DISEÑO VIGAS DE AMARRE

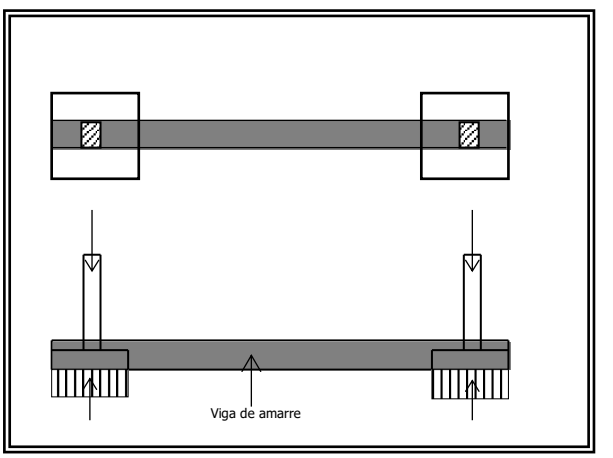
PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA - RAMPA

VIGA DE AMARRE TIPO

f'c = **21.1** MPa
fy = **420** MPa

b = **0.40** m
h = **0.40** m

Pmáx = 598.57 kN



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

Aa = ***0.20***
Paxial = 0.25*Aa*Pmáx
Paxial = *22.4* kN

DISEÑO A TENSIÓN

As = 1.7*22.446375/(0.90*420)
As = **1.01** cm^2

DISEÑO A COMPRESIÓN

P com = 1.7*22.446375
P com = *38.2* kN

Para esta carga la sección requiere cuantía mínima:

As = 0.00333*0.4*0.35
As = **4.66** cm^2

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

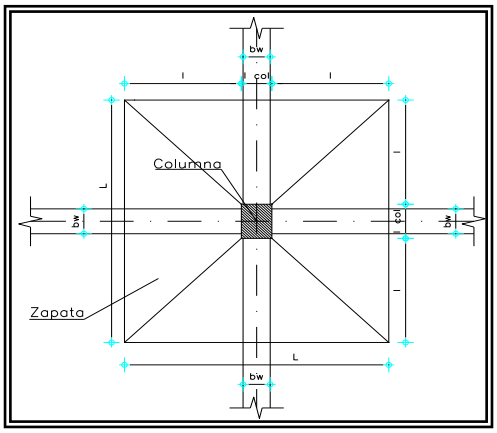
DISEÑO DE ZAPATAS RECTANGULAR

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA - RAMPA

ZAPATA TIPO 4 (2 ud). CIM1

Columna	**b =**	60	cm	**f'c =**	21.1	MPa	**σ =**	0.158	MPa
	t =	50	cm	**fy =**	420	MPa			

PREDIMENSIONAMIENTO



L =	2.600	m	
lcol =	0.500	m	
l =	1.050	m	

Cargas

Mu=	85	kN*m
Pu =	208.21	kN
Pp (10%) =	21	kN
Σ P =	229	kN

Area necesaria $= \frac{\Sigma P}{\sigma} = \frac{229.03}{0.158} =$ 1.45 m²

e =	0.41	m		L=	2.60 m
L =	1.204	m	*Aproximamos*	B=	1.30 m

Carga de diseño = $\frac{Pu}{A\ real} = \frac{208.21}{3.380} =$ 0.062 MPa

Esfuerzos

σmáx=	0.131	MPa	OK
σmin=	-0.059	MPa	OK

DISEÑO DE ZAPATA RECTANGULAR

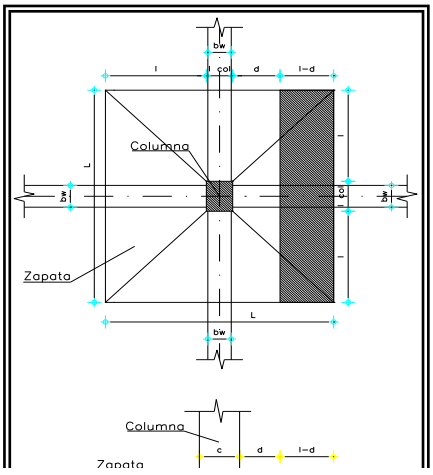
FLEXIÓN

	M borde de la columna =	99.93	kN*m
Mu =	1,7 * M borde de la columna =	169.89	kN*m

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

d=	0.33	m
Cuantia =	0.00389229	
As =	12.84	cm²/m
Armadura:	18#516c./0.15	long.
	9#529c./0.15	Transv.

CORTANTE



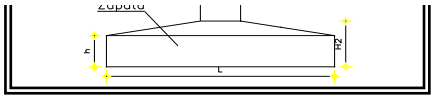
a. En una dirección (d)

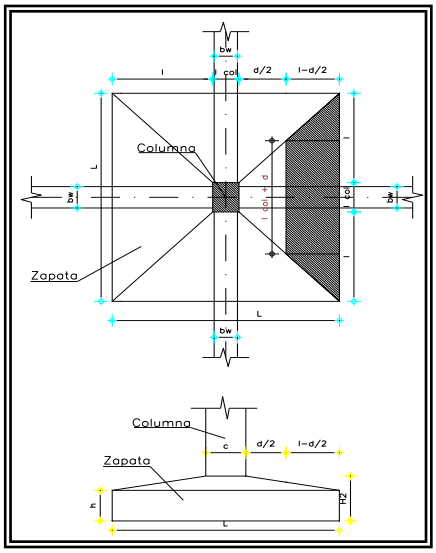
L =	2.60	m	**H =**	0.40	m
l =	1.05	m	**h =**	0.30	m
l - d =	0.72	m	**H-h =**	0.10	m

V (d) =	196.32	kN
Vu (d)=	1.7*V(d)	
Vu (d) =	333.74	kN
h´=	0.30	m

$\upsilon v = \frac{Vu}{L * h'} =$ 0.425 MPa

ϕvc = 0.57 MPa **OK**





b. En dos direcciones (d/2)

ZAPATA TIPO 4 (2 ud). CIM

L =	2.600	m	**H =**	0.40	m
d/2 =	0.165	m	**h =**	0.30	m
l - d/2 =	0.885	m	**H-h =**	0.10	m

V (d/2) =	150.0	kN
Vu (d/2) =	1.5*V(d)	
Vu (d/2) =	225.0	kN
d_1 =	0.3185	m

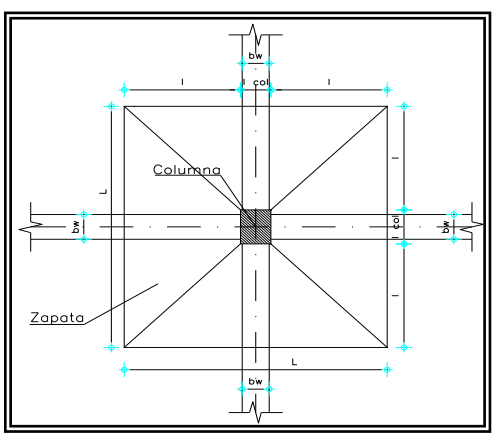
$$\nu u = \frac{Vu}{bo \times d_1} = 0.851 \text{ MPa}$$

$\phi\nu c$= 1.15 MPa **OK**

DISEÑO DE ZAPATAS RECTANGULAR
PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA - RAMPA
ZAPATA TIPO 5 (1 ud). CIM1

Columna	**b =**	60	cm	**f'c =**	21.1	MPa	**σ =**	0.158	MPa
	t =	50	cm	**fy =**	420	MPa			

PREDIMENSIONAMIENTO



L = 4.000 m
lcol = 0.500 m
l = 1.750 m

Cargas

Mu=	357	kN*m
Pu =	598.57	kN
Pp (10%) =	60	kN
Σ P =	658	kN

Area necesaria = $\frac{\Sigma P}{\sigma} = \frac{658.43}{0.158} =$ 4.17 m²

e = 0.60 m
L = 2.041 m

Aproximamos L= 4.00 m, B= 2.00 m

Carga de diseño = $\frac{Pu}{A\ real} = \frac{598.57}{8.000} =$ 0.075 MPa

Esfuerzos

σmáx=	0.156	MPa	OK
σmin=	-0.065	MPa	OK

DISEÑO DE ZAPATA RECTANGULAR

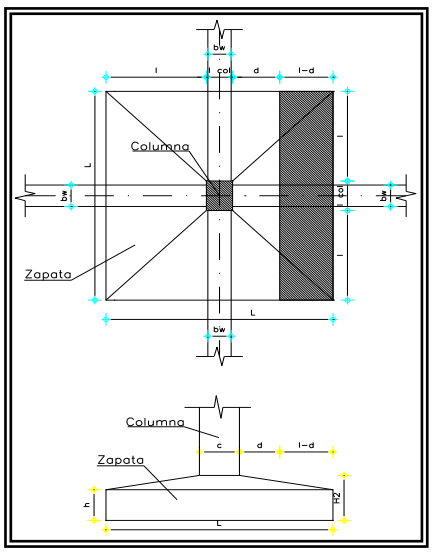
FLEXIÓN

M borde de la columna = 316.09 kN*m
Mu = 1,7 * M borde de la columna = 537.36 kN*m

Con el criterio de calcular el refuerzo por metro lineal utilizamos una altura efectiva igual a: **d=** 0.53 m

Cuantia = 0.00482852
As = 25.59 cm²/m
Armadura: 36#623c./0.11 long.
18#643c./0.11 Transv.

CORTANTE



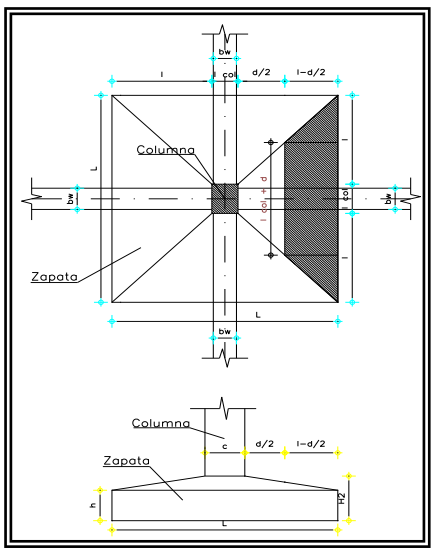
a. En una dirección (d)

L =	4.00	m	**H =**	0.60	m
l =	1.75	m	**h =**	0.30	m
l - d =	1.22	m	**H-h =**	0.30	m

V (d) = 596.37 kN
Vu (d)= 1.7*V(d)
Vu (d) = 1013.83 kN
h´= 0.45 m

$\upsilon\nu = \frac{Vu}{L * h'} =$ 0.569 MPa

ϕvc = 0.57 MPa **OK**



b. En dos direcciones (d/2)

ZAPATA TIPO 5 (1 ud). CIM

L =	4.000	m	**H =**	0.60	m
d/2 =	0.265	m	**h =**	0.30	m
l - d/2 =	1.485	m	**H-h =**	0.30	m

V (d/2) =	429.1	kN
Vu (d/2) =	1.5*V(d)	
Vu (d/2) =	643.7	kN
d_1 =	0.49205882	m

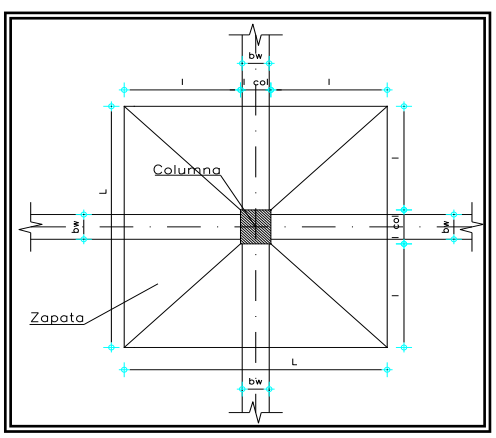
$$\nu u = \frac{Vu}{bo \times d_1} = 1.270 \text{ MPa}$$

$\phi\nu c$= 1.15 MPa

DISEÑO DE ZAPATAS RECTANGULAR
PROYECTO: INSTITUCION EDUCATIVA SAN JUAN - RAMPA
ZAPATA TIPO 6 (1 ud) - CIM1

Columna	**b =**	60	cm	**f'c =**	21.1	MPa	**σ =**	0.158	MPa
	t =	50	cm	**fy =**	420	MPa			

PREDIMENSIONAMIENTO



L = 3.000 m
lcol = 0.500 m
l = 1.250 m

Cargas

Mu=	158	kN*m
Pu =	227.70	kN
Pp (10%) =	23	kN
Σ P =	250	kN

Area necesaria = $\frac{\Sigma P}{\sigma} = \frac{250.47}{0.158} =$ 1.59 m²

e = 0.69 m
L = 1.259 m

Aproximamos L= 3.00 m, B= 1.50 m

Carga de diseño = $\frac{Pu}{A\ real} = \frac{227.7}{4.500} =$ 0.051 MPa

Esfuerzos

σmáx=	0.133	MPa	OK
σmin=	-0.099	MPa	OK

DISEÑO DE ZAPATA RECTANGULAR

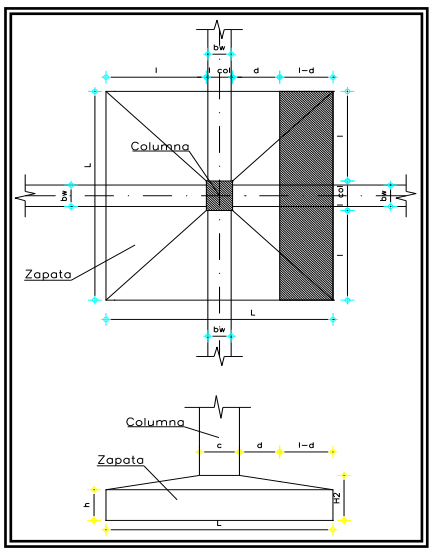
FLEXIÓN

M borde de la columna = 149.13 kN*m
Mu = 1,7 * M borde de la columna = 253.52 kN*m

Con el criterio de calcular el refuerzo por metro lineal utilizamos una altura efectiva igual a: **d=** 0.33 m

Cuantia = 0.00596017
As = 19.67 cm²/m
Armadura: 30#518c./0.1 long.
15#533c./0.1 Transv.

CORTANTE



a. En una dirección (d)

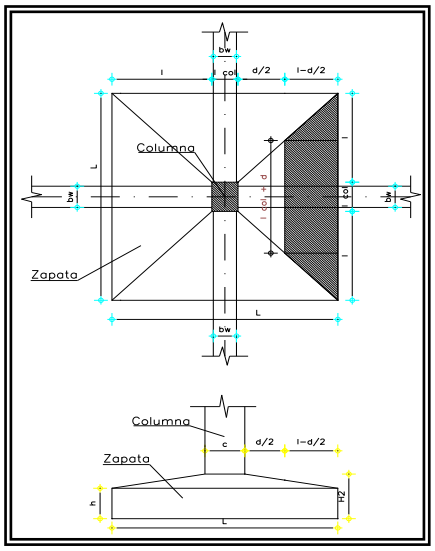
L =	3.00	m
l =	1.25	m
l - d =	0.92	m

H =	0.40	m
h =	0.30	m
H-h =	0.10	m

V (d) =	268.79	kN
Vu (d)=	1.7*V(d)	
Vu (d) =	456.94	kN
h´ =	0.31	m

$\upsilon\nu = \frac{Vu}{L * h'} =$ 0.497 MPa

ϕvc = 0.57 MPa **OK**



b. En dos direcciones (d/2)

ZAPATA TIPO 6 (1 ud) - C

L =	3.000	m	**H =**	0.40	m
d/2 =	0.165	m	**h =**	0.30	m
l - d/2 =	1.085	m	**H-h =**	0.10	m

V (d/2) =	189.1	kN
Vu (d/2) =	1.5*V(d)	
Vu (d/2) =	283.7	kN
d_1 =	0.32041667	m

$$\nu u = \frac{Vu}{bo \times d_1} = 1.067 \text{ MPa}$$

$\phi\nu c$= 1.15 MPa **OK**

5. DISEÑO DE VIGAS Y COLUMNAS

DISEÑO DE VIGAS Y COLUMNAS

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA-RAMPA

VR-101/BASE

B=0.40 H=0.45 L=1.90		
Mu=-9.38 As =4.34 As(r)=5.23		Mu=-3.47 As =5.79 As(r)=5.23
	Mu=3.24 As =6.50 As(r)=5.23	
Vu=-14.29	Vu=-8.85	Vu=7.28

VR-102/N+0.81

B=0.15 H=0.45 L=1.95		
Mu=-35.66 As =2.97 As(r)=2.51		Mu=-0.69 As =3.96 As(r)=1.96
	Mu=0.00 As =3.96 As(r)=1.96	
Vu=-30.45	Vu=-22.26	Vu=-15.52

VR-103/N+0.81

B=0.40 H=0.45 L=1.88		
Mu=-585.28 As =15.52 As(r)=999.99		Mu=-0.00 As =15.52 As(r)=5.23
	Mu=0.00 As =15.52 As(r)=5.23	
Vu=-500.29	Vu=-244.06	Vu=-226.45

VR-104/N+0.81

B=0.15 H=0.45 L=1.95		
Mu=-0.28 As =2.97 As(r)=1.96		Mu=-29.69 As =3.96 As(r)=2.07
	Mu=0.00 As =3.96 As(r)=1.96	
Vu=7.33	Vu=14.58	Vu=21.82

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA-RAMPA

VR-101A/N+1.58

B=0.15 H=0.45 L=1.57			B=0.15 H=0.45 L=7.16			B=0.15 H=0.45 L=0.69		
Mu=-8.32 As =7.76 As(r)=1.96		Mu=-31.63 As =7.76 As(r)=2.21	Mu=-145.60 As =7.76 As(r)=12.00		Mu=-582.41 As =7.76 As(r)=999.99	Mu=-562.60 As =7.76 As(r)=999.99		Mu=-673.51 As =7.76 As(r)=999.99
Mu=0.00 As =7.76 As(r)=1.96			Mu=145.60 As =7.76 As(r)=12.00			Mu=168.38 As =7.76 As(r)=13.42		
Vu=5.02	Vu=14.14	Vu=25.82	Vu=25.82	Vu=76.36	Vu=126.91	Vu=113.40	Vu=114.34	Vu=115.28

B=0.15 H=0.45 L=0.57			B=0.15 H=0.45 L=8.70			B=0.15 H=0.45 L=0.94		
Mu=-342.26 As =7.76 As(r)=999.99		Mu=-251.75 As =7.76 As(r)=999.99	Mu=-232.37 As =7.76 As(r)=999.99		Mu=-58.09 As =7.76 As(r)=4.24	Mu=-2.24 As =7.76 As(r)=1.96		Mu=-0.99 As =7.76 As(r)=1.96
Mu=85.56 As =7.76 As(r)=6.57			Mu=58.09 As =7.76 As(r)=4.24			Mu=1.04 As =7.76 As(r)=1.96		
Vu=-111.17	Vu=-110.37	Vu=-109.58	Vu=-87.38	Vu=-25.74	Vu=35.89	Vu=-2.24	Vu=-1.18	Vu=2.03

VR-102A/N+1.58

B=0.15 H=0.45 L=1.51			B=0.15 H=0.45 L=7.38			B=0.15 H=0.45 L=0.84		
Mu=-1.44 As =7.76 As(r)=1.96		Mu=-28.39 As =7.76 As(r)=1.97	Mu=-164.68 As =7.76 As(r)=13.19		Mu=-658.74 As =7.76 As(r)=999.99	Mu=-678.55 As =7.76 As(r)=999.99		Mu=-842.05 As =7.76 As(r)=999.99
Mu=0.00 As =7.76 As(r)=1.96			Mu=164.68 As =7.76 As(r)=13.19			Mu=210.51 As =7.76 As(r)=999.99		
Vu=12.78	Vu=22.93	Vu=31.77	Vu=36.82	Vu=89.90	Vu=136.65	Vu=167.62	Vu=168.56	Vu=169.50

B=0.15 H=0.45 L=0.72			B=0.15 H=0.45 L=8.70			B=0.15 H=0.45 L=0.92		
Mu=-149.68 As =7.76 As(r)=12.25		Mu=-92.76 As =7.76 As(r)=7.77	Mu=-112.14 As =7.76 As(r)=9.92		Mu=-63.63 As =7.76 As(r)=4.69	Mu=-14.20 As =7.76 As(r)=1.96		Mu=-0.00 As =7.76 As(r)=1.96
Mu=37.42 As =7.76 As(r)=4.35			Mu=48.08 As =7.76 As(r)=3.45			Mu=0.00 As =7.76 As(r)=1.96		
Vu=-70.21	Vu=-69.41	Vu=-68.62	Vu=-67.13	Vu=-5.77	Vu=56.14	Vu=-16.04	Vu=-14.98	Vu=-13.92

VR-105/N+1.58

B=0.40 H=0.45 L=1.88			B=0.40 H=0.45 L=1.88		
Mu=-0.00 As =11.52 As(r)=5.23		Mu=-180.01 As =13.46 As(r)=13.35	Mu=-117.92 As =13.46 As(r)=8.40		Mu=-0.41 As =13.46 As(r)=5.23
Mu=0.00 As =6.50 As(r)=5.23			Mu=0.00 As =6.50 As(r)=5.23		
Vu=67.94	Vu=80.89	Vu=171.45	Vu=-126.93	Vu=-50.15	Vu=-37.20

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA-RAMPA

VR-106/N+1.58

B=0.15 H=0.45 L=2.08			B=0.15 H=0.45 L=2.08		
Mu=-6.75 As =3.96 As(r)=1.96		Mu=-21.73 As =3.96 As(r)=1.96	Mu=-21.73 As =3.96 As(r)=1.96		Mu=-1.57 As =3.96 As(r)=1.96
	Mu=0.00 As =3.96 As(r)=1.96			Mu=0.00 As =3.96 As(r)=1.96	
Vu=-2.41	Vu=6.97	Vu=-5.76	Vu=-5.76	Vu=-10.29	Vu=-2.03

VR-201/N+2.34

B=0.15 H=0.45 L=1.95		
Mu=-3.58 As =2.97 As(r)=1.96		Mu=-14.33 As =3.96 As(r)=1.96
	Mu=3.58 As =3.96 As(r)=1.96	
Vu=-2.33	Vu=5.57	Vu=12.81

VR-202/N+2.34

B=0.40 H=0.45 L=1.88		
Mu=-0.00 As =24.66 As(r)=5.23		Mu=-335.71 As =24.66 As(r)=28.73
	Mu=0.00 As =9.66 As(r)=5.23	
Vu=122.08	Vu=139.68	Vu=304.88

VR-203/N+2.34

B=0.15 H=0.45 L=1.95		
Mu=-6.45 As =2.97 As(r)=1.96		Mu=-7.71 As =3.96 As(r)=1.96
	Mu=1.93 As =3.96 As(r)=1.96	
Vu=-7.60	Vu=1.33	Vu=8.80

VR-204/N+2.93

B=0.15 H=0.45 L=1.95		
Mu=-2.42 As =3.96 As(r)=1.96		Mu=-9.03 As =3.96 As(r)=1.96
	Mu=2.26 As =3.96 As(r)=1.96	
Vu=-5.51	Vu=3.52	Vu=12.41

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA-RAMPA

VR-205/N+2.93

B=0.40 H=0.45 L=1.88		
Mu=-0.00 As =19.90 As(r)=5.23		Mu=-275.92 As =19.90 As(r)=22.04
	Mu=0.00 As =9.66 As(r)=5.23	
Vu=97.40	Vu=117.07	Vu=249.91

VR-206/N+2.93

B=0.15 H=0.45 L=1.95		
Mu=-3.36 As =2.97 As(r)=1.96		Mu=-9.82 As =3.96 As(r)=1.96
	Mu=2.45 As =3.96 As(r)=1.96	
Vu=-5.22	Vu=4.21	Vu=12.10

VR-203A/N+3.50

B=0.15 H=0.45 L=0.93			B=0.15 H=0.45 L=0.75			B=0.15 H=0.45 L=6.23		
Mu=-0.00 As =1.94 As(r)=1.96		Mu=-28.99 As =7.76 As(r)=2.02	Mu=-106.11 As =7.76 As(r)=8.53		Mu=-28.84 As =7.76 As(r)=2.57	Mu=-30.55 As =7.76 As(r)=2.13		Mu=-20.98 As =7.76 As(r)=1.96
	Mu=0.00 As =3.96 As(r)=1.96			Mu=26.53 As =3.96 As(r)=1.96			Mu=45.21 As =3.96 As(r)=3.23	
Vu=29.84	Vu=30.89	Vu=31.94	Vu=-89.66	Vu=-88.81	Vu=-87.97	Vu=46.03	Vu=2.75	Vu=-43.03

B=0.15 H=0.45 L=0.88			B=0.15 H=0.45 L=0.97			B=0.15 H=0.45 L=6.24		
Mu=-20.74 As =7.76 As(r)=1.96		Mu=-82.96 As =7.76 As(r)=6.34	Mu=-89.87 As =7.76 As(r)=6.96		Mu=-35.57 As =7.76 As(r)=2.90	Mu=-36.33 As =7.76 As(r)=2.56		Mu=-24.64 As =10.14 As(r)=1.96
	Mu=20.74 As =3.96 As(r)=1.96			Mu=22.47 As =3.96 As(r)=1.96			Mu=40.73 As =3.96 As(r)=2.89	
Vu=61.61	Vu=62.59	Vu=63.57	Vu=-50.87	Vu=-49.81	Vu=-48.75	Vu=46.43	Vu=2.64	Vu=-42.77

B=0.15 H=0.45 L=0.84			B=0.15 H=0.45 L=0.69			B=0.15 H=0.45 L=8.70		
Mu=-24.61 As =10.14 As(r)=2.14		Mu=-85.69 As =10.14 As(r)=6.58	Mu=-133.53 As =10.14 As(r)=11.25		Mu=-64.68 As =10.14 As(r)=5.34	Mu=-64.01 As =10.14 As(r)=4.72		Mu=-89.32 As =7.76 As(r)=6.91
	Mu=21.42 As =3.96 As(r)=1.96			Mu=33.38 As =3.96 As(r)=2.34			Mu=59.28 As =3.96 As(r)=4.33	
Vu=62.03	Vu=62.97	Vu=63.91	Vu=-84.77	Vu=-83.97	Vu=-83.17	Vu=58.77	Vu=-3.67	Vu=-64.50

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA-RAMPA

B=0.15 H=0.45 L=0.94		
Mu=-21.15 As =7.76 As(r)=1.96		Mu=-0.00 As =5.82 As(r)=1.96
	Mu=0.00 As =3.96 As(r)=1.96	
Vu=-24.24	Vu=-23.18	Vu=-22.12

VR-204A/N+3.50

B=0.15 H=0.45 L=0.81			B=0.15 H=0.45 L=0.60			B=0.15 H=0.45 L=6.23		
Mu=-4.61 As =2.97 As(r)=1.96		Mu=-10.71 As =3.96 As(r)=1.96	Mu=-58.67 As =3.96 As(r)=4.28		Mu=-30.20 As =3.96 As(r)=2.30	Mu=-33.54 As =3.96 As(r)=2.35		Mu=-22.62 As =3.96 As(r)=1.96
	Mu=0.00 As =3.96 As(r)=1.96			Mu=14.67 As =3.96 As(r)=1.96			Mu=48.62 As =3.96 As(r)=3.49	
Vu=4.60	Vu=5.65	Vu=6.69	Vu=-38.18	Vu=-37.33	Vu=-36.49	Vu=46.59	Vu=5.02	Vu=-42.46

B=0.15 H=0.45 L=0.73			B=0.15 H=0.45 L=0.82			B=0.15 H=0.45 L=6.24		
Mu=-22.47 As =3.96 As(r)=1.96		Mu=-65.70 As =3.96 As(r)=4.86	Mu=-71.60 As =3.96 As(r)=5.35		Mu=-23.52 As =3.96 As(r)=1.96	Mu=-23.40 As =3.96 As(r)=1.96		Mu=-45.04 As =7.76 As(r)=3.21
	Mu=16.42 As =3.96 As(r)=1.96			Mu=17.90 As =3.96 As(r)=1.96			Mu=38.97 As =3.96 As(r)=2.75	
Vu=47.23	Vu=48.21	Vu=49.19	Vu=-48.21	Vu=-47.15	Vu=-46.09	Vu=40.59	Vu=-5.62	Vu=-48.60

B=0.15 H=0.45 L=0.69			B=0.15 H=0.45 L=0.54			B=0.15 H=0.45 L=8.55		
Mu=-45.07 As =7.76 As(r)=3.64		Mu=-100.88 As =7.76 As(r)=8.01	Mu=-114.81 As =7.76 As(r)=10.08		Mu=-63.31 As =7.76 As(r)=5.08	Mu=-63.98 As =7.76 As(r)=4.71		Mu=-69.72 As =5.70 As(r)=5.19
	Mu=25.22 As =3.96 As(r)=1.96			Mu=28.70 As =3.96 As(r)=2.00			Mu=69.10 As =3.96 As(r)=5.14	
Vu=56.59	Vu=57.54	Vu=58.48	Vu=-63.60	Vu=-62.80	Vu=-62.00	Vu=60.98	Vu=-1.58	Vu=-62.29

B=0.15 H=0.45 L=0.82		
Mu=-9.25 As =5.70 As(r)=1.96		Mu=-5.46 As =5.70 As(r)=1.96
	Mu=0.00 As =3.96 As(r)=1.96	
Vu=-4.53	Vu=-3.47	Vu=-2.41

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA-RAMPA

VR-207/N+3.50

B=0.15 H=0.45 L=2.08			B=0.15 H=0.45 L=2.08			B=0.15 H=0.45 L=0.08		
Mu=-8.54 As =3.96 As(r)=1.96		Mu=-32.89 As =3.96 As(r)=2.40	Mu=-32.89 As =3.96 As(r)=2.30		Mu=-8.22 As =3.96 As(r)=1.96	Mu=-0.22 As =3.96 As(r)=1.96		Mu=-0.00 As =2.97 As(r)=1.96
	Mu=8.54 As =3.96 As(r)=1.96			Mu=8.22 As =3.96 As(r)=1.96			Mu=0.00 As =3.96 As(r)=1.96	
Vu=10.49	Vu=18.42	Vu=-21.72	Vu=-21.72	Vu=-13.80	Vu=-6.59	Vu=-1.80	Vu=-0.90	Vu=0.00

VR-208/N+3.50

B=0.40 H=0.45 L=1.88			B=0.40 H=0.45 L=1.88			B=0.40 H=0.45 L=0.08		
Mu=-0.00 As =9.66 As(r)=5.23		Mu=-151.70 As =9.66 As(r)=11.04	Mu=-58.80 As =9.66 As(r)=5.23		Mu=-14.70 As =9.66 As(r)=5.23	Mu=-0.53 As =9.66 As(r)=5.23		Mu=-0.00 As =9.66 As(r)=5.23
	Mu=0.00 As =6.50 As(r)=5.23			Mu=14.70 As =6.50 As(r)=5.23			Mu=0.00 As =6.50 As(r)=5.23	
Vu=44.87	Vu=63.54	Vu=203.81	Vu=-46.26	Vu=-27.59	Vu=-9.36	Vu=-4.24	Vu=-2.12	Vu=0.00

VR-209/N+3.50

B=0.15 H=0.45 L=2.08			B=0.15 H=0.45 L=2.08			B=0.15 H=0.45 L=0.08		
Mu=-5.62 As =3.96 As(r)=1.96		Mu=-14.63 As =3.96 As(r)=1.96	Mu=-14.63 As =3.96 As(r)=1.96		Mu=-3.66 As =3.96 As(r)=1.96	Mu=-0.26 As =3.96 As(r)=1.96		Mu=-0.00 As =2.97 As(r)=1.96
	Mu=3.66 As =3.96 As(r)=1.96			Mu=3.66 As =3.96 As(r)=1.96			Mu=0.00 As =3.96 As(r)=1.96	
Vu=-4.60	Vu=5.17	Vu=-15.80	Vu=-15.80	Vu=-6.48	Vu=2.84	Vu=-2.12	Vu=-1.06	Vu=0.00

VR-210/N+3.50

B=0.15 H=0.45 L=0.81			B=0.15 H=0.45 L=0.60		
Mu=-0.22 As =3.96 As(r)=1.96		Mu=-6.25 As =3.96 As(r)=1.96	Mu=-2.86 As =3.96 As(r)=1.96		Mu=-4.44 As =3.96 As(r)=1.96
	Mu=0.00 As =3.96 As(r)=1.96			Mu=1.11 As =3.96 As(r)=1.96	
Vu=4.96	Vu=6.01	Vu=7.06	Vu=3.43	Vu=4.27	Vu=5.12

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA-RAMPA

Columna C'-4

Nivel	H Libre	Losa	B	H	M1	M2	P	V1	V2	Cuantia	m/mr	Col/Vig Eje ppal	Col/vig Eje sec
N+2.93					-14.77	-249.17				14/#8 (2.4%)	0.68		2.41
	2.48	.45	.50	.60			-230.61	79.04	86.12				
		1.00			-145.34	-444.71				14/#8 (2.4%)	0.97		

Columna D'-4

Nivel	H Libre	Losa	B	H	M1	M2	P	V1	V2	Cuantia	m/mr	Col/Vig Eje ppal	Col/vig Eje sec
N+2.34					79.56	-335.84				22/#7 #8 (3.2%)	0.77		2.56
	1.08	.45	.50	.60			-318.10	237.18	93.02				
					419.87	-338.38				22/#7 #8 (3.2%)	0.90		
N+0.81					-603.75	246.91				22/#7 #8 (3.2%)	0.97		8.02
	.36	.45	.50	.60			-825.39	250.70	113.86				
		1.00			-315.15	413.49				22/#7 #8 (3.2%)	0.94		

Columna E'-4

Nivel	H Libre	Losa	B	H	M1	M2	P	V1	V2	Cuantia	m/mr	Col/Vig Eje ppal	Col/vig Eje sec
N+1.58					-164.24	-74.38				12/#7 #6 (1.4%)	0.71		1.46
	1.13	.45	.50	.60			-268.97	146.33	104.77				
		1.00			-346.97	-183.37				12/#7 #6 (1.4%)	0.98		

Columna B'-4

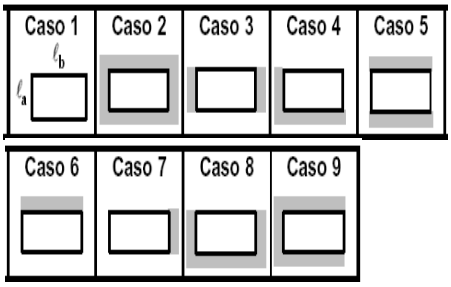
Nivel	H Libre	Losa	B	H	M1	M2	P	V1	V2	Cuantia	m/mr	Col/Vig Eje ppal	Col/vig Eje sec
N+3.50					79.64	-128.87				12/#8 (2.0%)	0.56		2.35
	3.05	.45	.50	.60			-239.66	83.57	97.31				
		1.00			-137.48	-398.19				12/#8 (2.0%)	0.97		

6. DISEÑO DE ELEMENTOS COMPLEMENTARIOS

DISEÑO DE ELEMENTOS COMPLEMENTARIOS

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA - RAMPA
DISEÑO PLACA MACIZA (EN UNA DIRECCION)

El diseño de la placa maciza se realiza de acuerdo con lo establecido en C.13.9 de las NSR - 10



Geometría de la losa

la =	**1.90**	m	fy =	**420**	MPa
lb =	**8.50**	m	f'c =	**21**	MPa
Relación m =	**0.224**				

h = l/20 (0.4+Fy/700) = 0.10 m

Espesor escogido: 0.10 m

Teniendo en cuenta que la relación m es menor de 0.5, la placa maciza trabaja en una dirección

Cargas

Peso propio de la losa	0.1x1.0x24	2.40	kN/m²
Impermeabilización	0.05x20	1.00	kN/m²
Carga Muerta Total		3.40	kN/m²
Carga Viva		5.00	kN/m²
Carga Última		12.08	kN/m²

DISEÑO A MOMENTO FLECTOR

Mu_a = **5.45** kN.m

Cuantía:	0.0027	*As =*	2.74 cm²/m	***Transversal***
Cuantía:	0.0018	*As =*	1.80 cm²/m	***Longitudinal***

Distribución de refuerzo:

Colocar 1#3 c/.20 Transversalmente superior e inferior
Colocar 1#3 c/.20 Longitudinalmente superior e inferior

REVISIÓN A CORTANTE

R= 11.48 **kN**

ϕvc = **0.573** **MPa**
ϕvu = **0.164** **MPa** **OK**

7. ANEXOS DE COMPUTADOR

ANEXOS DE COMPUTADOR

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S T O R Y D A T A

STORY	SIMILAR TO	HEIGHT	ELEVATION
N+3.50	N+2.93	0.570	3.500
N+2.93	None	0.590	2.930
N+2.34	N+2.93	0.760	2.340
N+1.58	N+2.93	0.770	1.580
N+0.81	N+2.93	0.810	0.810
BASE	None		0.000

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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
10	0.000	0.000	0.000
62	8.230	2.200	0.000
65	6.670	4.400	0.000
66	16.650	2.200	0.000
67	16.650	4.400	0.000
69	15.680	4.400	0.000
71	17.470	4.400	0.000
72	26.260	0.000	0.000
73	26.260	2.200	0.000
74	26.260	4.400	0.000
75	27.350	0.000	0.000
76	27.350	2.200	0.000
77	27.350	4.400	0.000
78	16.650	0.000	0.000
79	15.680	0.000	0.000
80	17.470	0.000	0.000
81	8.230	0.000	0.000
82	7.220	0.000	0.000
84	9.320	0.000	0.000
86	0.000	2.200	0.000
87	0.000	4.400	0.000
89	0.000	4.650	0.000
90	-1.080	0.000	0.000
91	-1.080	2.200	0.000
92	-1.080	4.650	0.000
93	0.870	0.000	0.000
94	0.870	2.200	0.000
95	0.870	4.650	0.000
96	0.870	4.400	0.000
97	-1.080	4.400	0.000
109	-1.080	2.100	0.000
110	0.000	2.100	0.000
111	0.870	2.100	0.000
112	7.220	2.100	0.000
113	8.230	2.100	0.000
114	9.320	2.100	0.000
115	15.680	2.100	0.000
116	16.650	2.100	0.000
117	17.470	2.100	0.000
118	26.260	2.100	0.000
119	27.350	2.100	0.000
120	6.670	2.300	0.000
121	15.680	2.300	0.000
122	16.650	2.300	0.000
123	17.470	2.300	0.000
124	26.260	2.300	0.000
125	27.350	2.300	0.000

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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
C8	86	86	Below
C10	62	62	Below
C12	66	66	Below
C14	73	73	Below

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B E A M C O N N E C T I V I T Y D A T A

BEAM	I END PT	J END PT
B36	66	67
B39	72	73
B40	73	74
B41	75	76
B42	76	77
B43	78	66
B46	81	62
B49	10	86
B50	86	87
B54	87	89
B56	90	91
B58	93	94
B60	94	96
B61	96	95
B62	91	97
B63	97	92
B64	97	87
B65	87	96
B66	90	10
B67	10	93
B68	82	81
B69	81	84
B70	79	78
B71	78	80
B72	72	75
B73	69	67
B74	67	71
B75	74	77
B91	109	110
B92	110	111
B93	112	113
B94	113	114
B95	115	116
B96	116	117
B97	118	119
B98	82	112
B100	84	114
B102	79	115
B104	80	117
B106	121	122
B107	122	123
B108	124	125
B110	120	65
B112	121	69
B114	123	71

B R A C E C O N N E C T I V I T Y D A T A

BRACE	I END PT	J END PT	I END STORY
D14	82	93	Below
D15	79	84	Below
D16	72	80	Below
D17	65	69	Below
D18	71	74	Below
D25	112	111	Below
D26	115	114	Below
D27	118	117	Below
D30	120	121	Below
D31	123	124	Below

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
STEEL	Iso	Steel	All	199947978.80	0.3000	1.1700E-05	76903068.77
CONC21	Iso	Concrete	All	21538110.000	0.2000	9.9000E-06	8974212.500
OTHER	Iso	None	All	199947978.80	0.3000	1.1700E-05	76903068.77
RAMPA	Iso	Concrete	All	0.010	0.2000	9.9000E-06	0.004

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
STEEL	7.8271E+00	7.6820E+01
CONC21	2.4000E+00	2.4000E+01
OTHER	7.8271E+00	7.6820E+01
RAMPA	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 ($)
STEEL	344737.894	448159.263	271447.16

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
RAMPA	No	21000.000	420000.000	420000.000	N/A

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
VIG15X45	CONC21	Rectangular		Yes
VIG40X45	CONC21	Rectangular		Yes
COL60X50	CONC21	Rectangular	Yes	

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
VIG15X45	0.4500	0.1500	0.0000	0.0000	0.0000	0.0000
VIG40X45	0.4500	0.4000	0.0000	0.0000	0.0000	0.0000
COL60X50	0.6000	0.5000	0.0000	0.0000	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 I33	MOMENTS OF INERTIA I22	SHEAR AREAS A2	SHEAR AREAS A3
VIG15X45	0.0675	0.0004	0.0011	0.0001	0.0563	0.0563
VIG40X45	0.1800	0.0045	0.0030	0.0024	0.1500	0.1500
COL60X50	0.3000	0.0124	0.0090	0.0063	0.2500	0.2500

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 S33	SECTION MODULI S22	PLASTIC MODULI Z33	PLASTIC MODULI Z22	RADIUS OF GYRATION R33	RADIUS OF GYRATION R22
VIG15X45	0.0051	0.0017	0.0076	0.0025	0.1299	0.0433
VIG40X45	0.0135	0.0120	0.0203	0.0180	0.1299	0.1155
COL60X50	0.0300	0.0250	0.0450	0.0375	0.1732	0.1443

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

FRAME SECTION NAME	TOTAL WEIGHT	TOTAL MASS
VIG15X45	205.3856	20.5386
VIG40X45	76.6800	7.6680
COL60X50	74.5200	7.4520

C O N C R E T E C O L U M N D A T A

FRAME SECTION NAME	REINF CONFIGURATION LONGIT	LATERAL	REINF SIZE/TYPE	NUM BARS 3DIR/2DIR	NUM BARS CIRCULAR	BAR COVER
COL60X50	Rectangular	Ties	#8/Design	5/6	N/A	0.0500

C O N C R E T E B E A M D A T A

FRAME SECTION NAME	TOP COVER	BOT COVER	TOP LEFT AREA	TOP RIGHT AREA	BOT LEFT AREA	BOT RIGHT AREA
VIG15X45	0.0500	0.0500	0.000	0.000	0.000	0.000
VIG40X45	0.0500	0.0500	0.000	0.000	0.000	0.000

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

SHELL SECTION	MATERIAL NAME	SHELL TYPE	LOAD DIST ONE WAY	MEMBRANE THICK	BENDING THICK	TOTAL WEIGHT	TOTAL MASS
PLACAMACIZA	CONC21	Membrane	Yes	0.1420	0.1420	87.8974	8.7897
RAMPA	RAMPA	Membrane	No	0.1420	0.1420	0.0000	28.2376

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

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		

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R E S P O N S E S P E C T R U M C A S E S

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	9.8100
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	9.8100
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	9.8100
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	9.8100
UZ	----	N/A

RESP SPEC CASE: SISUMBX

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	UMBRAL	9.8100
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	0.0500	0.0000	0.0500

RESPONSE SPECTRUM FUNCTION ASSIGNMENT DATA

DIRECTION	FUNCTION	SCALE FACT
U1	----	N/A
U2	UMBRAL	9.8100
UZ	----	N/A

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

		LIVE	Static	1.6000
COMDIS3	ADD	DEAD	Static	1.2000
		LIVE	Static	1.0000
		SISDISX	Spectra	1.0000
		SISDISY	Spectra	0.3000
COMDIS4	ADD	DEAD	Static	1.2000
		LIVE	Static	1.0000
		SISDISY	Spectra	1.0000
		SISDISX	Spectra	0.3000
COMDIS5	ADD	DEAD	Static	0.9000
		SISDISX	Spectra	1.0000
		SISDISY	Spectra	0.3000
COMDIS6	ADD	DEAD	Static	0.9000
		SISDISY	Spectra	1.0000
		SISDISX	Spectra	0.3000
ENVOLVENTE	ENVE	COMDIS1	Combo	1.0000
		COMDIS2	Combo	1.0000
		COMDIS3	Combo	1.0000
		COMDIS4	Combo	1.0000
		COMDIS5	Combo	1.0000
		COMDIS6	Combo	1.0000
CIM1	ADD	DEAD	Static	1.0000
		LIVE	Static	1.0000
CIM2	ADD	DEAD	Static	1.0000
		LIVE	Static	0.7500
		SISDISX	Spectra	0.3500
		SISDISY	Spectra	0.1166
CIM3	ADD	DEAD	Static	1.0000
		LIVE	Static	0.7500
		SISDISY	Spectra	0.3500
		SISDISX	Spectra	0.1166
COMDER1	ADD	SISDERX	Spectra	1.0000
		SISDERY	Spectra	0.3000
COMDER2	ADD	SISDERY	Spectra	1.0000
		SISDERX	Spectra	0.3000
COMDERUMB1	ADD	SISUMBX	Spectra	1.0000
		SISUMBY	Spectra	0.3000
COMDERUMB2	ADD	SISUMBY	Spectra	1.0000
		SISUMBX	Spectra	0.3000

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\diseños y estructura\desktop\ing. daniel rojas\2253 politecnico marcelo miranda\2da version\rampa\memorias\derivas.txt
DATA TYPE: Period vs Acceleration
NUMBER OF HEADER LINES = 0

PERIOD	ACCEL
0.0000	1.1250
0.0500	1.1250
0.1000	1.1250
0.1600	1.1250
0.2100	1.1250
0.4100	1.1250
0.6000	1.1250
0.8000	1.1250
1.0000	1.1250
1.3400	0.8370
1.6900	0.6660
2.0300	0.5530
2.3800	0.4730
2.7200	0.4130
3.0700	0.3670
3.4100	0.3300
3.7600	0.3000
4.1000	0.2740
4.4400	0.2530
4.7900	0.2350
5.1300	0.2190
5.4800	0.2050
5.8200	0.1930
6.1700	0.1820
6.5100	0.1730
6.8600	0.1640
7.2000	0.1560

8.2000	0.1200
9.2000	0.0960

FUNCTION NAME: DISENO

FILE NAME: c:\users\diseños y estructura\desktop\ing. daniel rojas\2253 politecnico marcelo miranda\2da version\rampa\memorias\diseño.txt
DATA TYPE: Period vs Acceleration
NUMBER OF HEADER LINES = 0

PERIOD	ACCEL
0.0000	0.7500
0.0500	0.7500
0.1000	0.7500
0.1600	0.7500
0.2100	0.7500
0.4100	0.7500
0.6000	0.7500
0.8000	0.7500
1.0000	0.7500
1.3400	0.5580
1.6900	0.4440
2.0300	0.3690
2.3800	0.3150
2.7200	0.2760
3.0700	0.2450
3.4100	0.2200
3.7600	0.2000
4.1000	0.1830
4.4400	0.1690
4.7900	0.1570
5.1300	0.1460
5.4800	0.1370
5.8200	0.1290
6.1700	0.1220
6.5100	0.1150
6.8600	0.1090
7.2000	0.1040
8.2000	0.0800
9.2000	0.0640

FUNCTION NAME: UMBRAL

FILE NAME: c:\users\diseños y estructura\desktop\ing. daniel rojas\2253 politecnico marcelo miranda\2da version\rampa\memorias\umbral.txt
DATA TYPE: Period vs Acceleration
NUMBER OF HEADER LINES = 0

PERIOD	ACCEL
0.0000	0.3000
0.0500	0.4200
0.1000	0.5400
0.1500	0.6600
0.2000	0.7800
0.2500	0.9000
0.4500	0.9000
0.6400	0.9000
0.8400	0.9000
1.0300	0.9000
1.2300	0.9000
1.4200	0.9000
1.6200	0.9000
1.8100	0.9000
2.4300	0.6700
3.0500	0.5340
3.6700	0.4440
4.2900	0.3800
4.9200	0.3320
5.5400	0.2950
6.1600	0.2650
6.7800	0.2410
7.4000	0.2210
8.0200	0.2030
8.6400	0.1890
9.2600	0.1760

9.8800	0.1650
10.5000	0.1290
11.5000	0.1070
12.5000	0.0910

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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+3.50	C8	Column	Rectangular	None	COL60X50	Conc Frame	COL60X50
N+2.93	C8	Column	Rectangular	None	COL60X50	Conc Frame	COL60X50
N+2.93	C10	Column	Rectangular	None	COL60X50	Conc Frame	COL60X50
N+2.34	C8	Column	Rectangular	None	COL60X50	Conc Frame	COL60X50
N+2.34	C10	Column	Rectangular	None	COL60X50	Conc Frame	COL60X50
N+2.34	C12	Column	Rectangular	None	COL60X50	Conc Frame	COL60X50
N+1.58	C8	Column	Rectangular	None	COL60X50	Conc Frame	COL60X50
N+1.58	C10	Column	Rectangular	None	COL60X50	Conc Frame	COL60X50
N+1.58	C12	Column	Rectangular	None	COL60X50	Conc Frame	COL60X50
N+1.58	C14	Column	Rectangular	None	COL60X50	Conc Frame	COL60X50
N+0.81	C8	Column	Rectangular	None	COL60X50	Conc Frame	COL60X50
N+0.81	C10	Column	Rectangular	None	COL60X50	Conc Frame	COL60X50
N+0.81	C12	Column	Rectangular	None	COL60X50	Conc Frame	COL60X50
N+0.81	C14	Column	Rectangular	None	COL60X50	Conc Frame	COL60X50
N+3.50	B49	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+3.50	B50	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+3.50	B54	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+3.50	B56	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+3.50	B58	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+3.50	B60	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+3.50	B61	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+3.50	B62	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+3.50	B63	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+3.50	B64	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+3.50	B65	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+3.50	B66	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+3.50	B67	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+3.50	B91	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+3.50	B92	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+2.93	B46	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+2.93	B68	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+2.93	B69	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+2.93	B93	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+2.93	B94	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+2.93	B98	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+2.93	B100	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+2.34	B43	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+2.34	B70	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+2.34	B71	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+2.34	B95	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+2.34	B96	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+2.34	B102	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+2.34	B104	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+1.58	B39	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+1.58	B40	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+1.58	B41	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+1.58	B42	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+1.58	B72	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+1.58	B75	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+1.58	B97	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+1.58	B108	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+0.81	B36	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+0.81	B73	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+0.81	B74	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+0.81	B106	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+0.81	B107	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+0.81	B112	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+0.81	B114	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
BASE	B110	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+3.50	D14	Brace	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+3.50	D25	Brace	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+2.93	D15	Brace	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+2.93	D26	Brace	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+2.34	D16	Brace	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+2.34	D27	Brace	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+1.58	D18	Brace	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+1.58	D31	Brace	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+0.81	D17	Brace	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+0.81	D30	Brace	Rectangular	None	VIG15X45	Conc Frame	VIG15X45

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

LOAD CASE	STORY LEVEL	LINE ID	LOAD TYPE	LOAD DIRECTION	ABSOLUTE DISTANCE A	ABSOLUTE DISTANCE B	LOAD A PER LENGTH	LOAD B PER LENGTH
DEAD	N+3.50	D14	Force	Gravity	0.000	6.376	3.400	3.400
DEAD	N+3.50	D25	Force	Gravity	0.000	6.376	3.400	3.400
DEAD	N+2.93	D15	Force	Gravity	0.000	6.387	3.400	3.400
DEAD	N+2.93	D26	Force	Gravity	0.000	6.387	3.400	3.400
DEAD	N+2.34	D16	Force	Gravity	0.000	8.823	3.400	3.400
DEAD	N+2.34	D27	Force	Gravity	0.000	8.823	3.400	3.400
DEAD	N+1.58	D18	Force	Gravity	0.000	8.824	3.400	3.400
DEAD	N+1.58	D31	Force	Gravity	0.000	8.824	3.400	3.400
DEAD	N+0.81	D17	Force	Gravity	0.000	9.046	3.400	3.400
DEAD	N+0.81	D30	Force	Gravity	0.000	9.046	3.400	3.400
LIVE	N+3.50	D14	Force	Gravity	0.000	6.376	5.000	5.000
LIVE	N+3.50	D25	Force	Gravity	0.000	6.376	5.000	5.000
LIVE	N+2.93	D15	Force	Gravity	0.000	6.387	5.000	5.000
LIVE	N+2.93	D26	Force	Gravity	0.000	6.387	5.000	5.000
LIVE	N+2.34	D16	Force	Gravity	0.000	8.823	5.000	5.000
LIVE	N+2.34	D27	Force	Gravity	0.000	8.823	5.000	5.000
LIVE	N+1.58	D18	Force	Gravity	0.000	8.824	5.000	5.000
LIVE	N+1.58	D31	Force	Gravity	0.000	8.824	5.000	5.000
LIVE	N+0.81	D17	Force	Gravity	0.000	9.046	5.000	5.000
LIVE	N+0.81	D30	Force	Gravity	0.000	9.046	5.000	5.000

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

CASE	STORY	AREA	AREATYPE	DIRECTION	LOAD
LIVE	N+3.50	F14	Floor	Gravity	5.0000
LIVE	N+3.50	F15	Floor	Gravity	5.0000
LIVE	N+3.50	F17	Floor	Gravity	5.0000
LIVE	N+3.50	F18	Floor	Gravity	5.0000
LIVE	N+3.50	F19	Floor	Gravity	5.0000
LIVE	N+3.50	F20	Floor	Gravity	5.0000
LIVE	N+2.93	F21	Floor	Gravity	5.0000
LIVE	N+2.93	F22	Floor	Gravity	5.0000
LIVE	N+2.34	F23	Floor	Gravity	5.0000
LIVE	N+2.34	F24	Floor	Gravity	5.0000
LIVE	N+1.58	F25	Floor	Gravity	5.0000
LIVE	N+1.58	F26	Floor	Gravity	5.0000
LIVE	N+1.58	F27	Floor	Gravity	5.0000
LIVE	N+0.81	F28	Floor	Gravity	5.0000
LIVE	N+0.81	F29	Floor	Gravity	5.0000

Diseños & Estructuras

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA - RAMPA

FUERZAS EN VIGAS

BEAM FORCES
UNID: kN-m

Story	Beam	Load	Loc	P	V2	V3	T	M2	M3
N+0.81	B36	ENVOLVENTE MAX	0	33.24	-169.03	63.89	-324.566	105.619	-192.585
N+0.81	B36	ENVOLVENTE MAX	0.1	33.24	-168.64	63.89	-324.566	109.199	-174.894
N+0.81	B36	ENVOLVENTE MAX	0.1	15.52	-86.98	28.45	-104.707	63.124	-162.724
N+0.81	B36	ENVOLVENTE MAX	1.1	15.52	-80.34	28.45	-104.707	34.714	-79.06
N+0.81	B36	ENVOLVENTE MAX	2.2	15.52	-73.05	28.45	-104.707	6.421	14.541
N+0.81	B36	ENVOLVENTE MIN	0	-33.52	-500.29	-172.69	-1023.62	-115.056	-585.281
N+0.81	B36	ENVOLVENTE MIN	0.1	-33.52	-499.77	-172.69	-1023.62	-107.756	-535.278
N+0.81	B36	ENVOLVENTE MIN	0.1	-13.68	-260.06	-28.31	-331.253	-62.644	-496.299
N+0.81	B36	ENVOLVENTE MIN	1.1	-13.68	-244.06	-28.31	-331.253	-34.375	-244.24
N+0.81	B36	ENVOLVENTE MIN	2.2	-13.68	-226.45	-28.31	-331.253	-6.237	4.722
N+1.58	B39	ENVOLVENTE MAX	0	81.48	67.94	3.75	60.474	1.979	5.708
N+1.58	B39	ENVOLVENTE MAX	1.1	81.48	80.89	3.75	60.474	7.623	-19.555
N+1.58	B39	ENVOLVENTE MAX	2.1	81.48	92.67	3.75	60.474	13.577	-44.405
N+1.58	B39	ENVOLVENTE MAX	2.1	153.58	170.27	12.61	128.639	25.415	-44.088
N+1.58	B39	ENVOLVENTE MAX	2.2	153.58	171.45	12.61	128.639	24.245	-49.269
N+1.58	B39	ENVOLVENTE MIN	0	-74.97	15.95	-6.04	15.541	-2.032	1.121
N+1.58	B39	ENVOLVENTE MIN	1.1	-74.97	22.06	-6.04	15.541	-5.151	-76.151
N+1.58	B39	ENVOLVENTE MIN	2.1	-74.97	27.62	-6.04	15.541	-8.81	-162.93
N+1.58	B39	ENVOLVENTE MIN	2.1	-144.76	50.74	-10.62	28.93	-21.933	-162.921
N+1.58	B39	ENVOLVENTE MIN	2.2	-144.76	51.29	-10.62	28.93	-20.962	-180.007
N+1.58	B40	ENVOLVENTE MAX	0	151.21	-39.74	12.37	1.602	34.492	-28.378
N+1.58	B40	ENVOLVENTE MAX	0.1	151.21	-39.18	12.37	1.602	35.517	-24.043
N+1.58	B40	ENVOLVENTE MAX	0.1	85.71	-16.87	10	6.785	20.677	-23.434
N+1.58	B40	ENVOLVENTE MAX	1.1	85.71	-11.31	10	6.785	10.684	-9.338
N+1.58	B40	ENVOLVENTE MAX	2.2	85.71	-5.2	10	6.785	0.741	1.04
N+1.58	B40	ENVOLVENTE MIN	0	-141.99	-126.93	-10.5	-54.315	-38.167	-117.921
N+1.58	B40	ENVOLVENTE MIN	0.1	-141.99	-125.76	-10.5	-54.315	-39.378	-105.286
N+1.58	B40	ENVOLVENTE MIN	0.1	-82.73	-61.93	-11.5	-8.602	-24.086	-103.322
N+1.58	B40	ENVOLVENTE MIN	1.1	-82.73	-50.15	-11.5	-8.602	-12.594	-47.281
N+1.58	B40	ENVOLVENTE MIN	2.2	-82.73	-37.2	-11.5	-8.602	-1.001	-0.407
N+1.58	B41	ENVOLVENTE MAX	0	44.23	0.29	0.3	5.46	0.12	-1.768
N+1.58	B41	ENVOLVENTE MAX	1.1	44.23	6.97	0.3	5.46	0.371	-3.248
N+1.58	B41	ENVOLVENTE MAX	2.1	44.23	15.5	0.3	5.46	0.641	-7.194
N+1.58	B41	ENVOLVENTE MAX	2.1	95.93	-1.51	7.07	1.549	2.292	-7.534
N+1.58	B41	ENVOLVENTE MAX	2.2	95.93	-1.2	7.07	1.549	1.688	-7.267
N+1.58	B41	ENVOLVENTE MIN	0	-49.41	-2.41	-0.28	1.533	-0.178	-6.751
N+1.58	B41	ENVOLVENTE MIN	1.1	-49.41	2.34	-0.28	1.533	-0.452	-9.257
N+1.58	B41	ENVOLVENTE MIN	2.1	-49.41	5.47	-0.28	1.533	-0.742	-20.495
N+1.58	B41	ENVOLVENTE MIN	2.1	-102.24	-6.61	-5.47	0.021	-1.503	-22.348
N+1.58	B41	ENVOLVENTE MIN	2.2	-102.24	-5.76	-5.47	0.021	-1.06	-21.729
N+1.58	B42	ENVOLVENTE MAX	0	95.98	-1.2	7.07	1.549	2.966	-7.267
N+1.58	B42	ENVOLVENTE MAX	0.1	95.98	-0.89	7.07	1.549	3.495	-7.029
N+1.58	B42	ENVOLVENTE MAX	0.1	55.28	-6.28	0.19	0.279	0.376	-6.953
N+1.58	B42	ENVOLVENTE MAX	1.1	55.28	-3.15	0.19	0.279	0.315	-2.135
N+1.58	B42	ENVOLVENTE MAX	2.2	55.28	0.29	0.19	0.279	0.333	0.12
N+1.58	B42	ENVOLVENTE MIN	0	-102.29	-5.76	-5.47	0.021	-3.367	-21.729
N+1.58	B42	ENVOLVENTE MIN	0.1	-102.29	-4.91	-5.47	0.021	-4.056	-21.196
N+1.58	B42	ENVOLVENTE MIN	0.1	-56.45	-18.82	-0.14	-0.993	-0.247	-22.208
N+1.58	B42	ENVOLVENTE MIN	1.1	-56.45	-10.29	-0.14	-0.993	-0.226	-7.652
N+1.58	B42	ENVOLVENTE MIN	2.2	-56.45	-2.03	-0.14	-0.993	-0.288	-1.568
N+2.34	B43	ENVOLVENTE MAX	0	30.65	122.08	4.56	2.759	2.149	8.468
N+2.34	B43	ENVOLVENTE MAX	1.1	30.65	139.68	4.56	2.759	4.786	-42.256
N+2.34	B43	ENVOLVENTE MAX	2.1	30.65	155.68	4.56	2.759	7.459	-90.479
N+2.34	B43	ENVOLVENTE MAX	2.1	84.96	304.36	-42.54	5.95	15.224	-97.027
N+2.34	B43	ENVOLVENTE MAX	2.2	84.96	304.88	-42.54	5.95	30.352	-107.42
N+2.34	B43	ENVOLVENTE MIN	0	-30.47	37.61	-2.71	-17.776	-5.001	2.722
N+2.34	B43	ENVOLVENTE MIN	1.1	-30.47	44.91	-2.71	-17.776	-9.677	-135.498
N+2.34	B43	ENVOLVENTE MIN	2.1	-30.47	51.54	-2.71	-17.776	-14.202	-283.18
N+2.34	B43	ENVOLVENTE MIN	2.1	-82.97	103.46	-234.05	-74.623	-31.644	-305.245
N+2.34	B43	ENVOLVENTE MIN	2.2	-82.97	103.85	-234.05	-74.623	-19.294	-335.708
N+2.93	B46	ENVOLVENTE MAX	0	28.23	97.4	4.25	6.21	4.754	7.577
N+2.93	B46	ENVOLVENTE MAX	1.1	28.23	117.07	4.25	6.21	7.679	-30.759
N+2.93	B46	ENVOLVENTE MAX	2.1	28.23	134.94	4.25	6.21	10.386	-68.963
N+2.93	B46	ENVOLVENTE MAX	2.1	73.12	249.39	71.15	24.004	24.303	-72.252
N+2.93	B46	ENVOLVENTE MAX	2.2	73.12	249.91	71.15	24.004	22.996	-80.577
N+2.93	B46	ENVOLVENTE MIN	0	-25.38	26.83	-2.74	-13.538	-5.833	2.209
N+2.93	B46	ENVOLVENTE MIN	1.1	-25.38	34.65	-2.74	-13.538	-10.412	-110.38
N+2.93	B46	ENVOLVENTE MIN	2.1	-25.38	41.76	-2.74	-13.538	-14.623	-236.385

N+2.93	B46	ENVOLVENTE MIN	2.1	-76.22	82.99	-19.01	-39.541	-33.203	-250.953
N+2.93	B46	ENVOLVENTE MIN	2.2	-76.22	83.38	-19.01	-39.541	-37.111	-275.917
N+3.50	B49	ENVOLVENTE MAX	0	17.68	44.87	1.96	-7.202	3.444	3.129
N+3.50	B49	ENVOLVENTE MAX	1.1	17.68	63.54	1.96	-7.202	4.241	-16.566
N+3.50	B49	ENVOLVENTE MAX	2.1	17.68	80.51	1.96	-7.202	5.39	-40.103
N+3.50	B49	ENVOLVENTE MAX	2.1	20.29	202.11	0.18	-22.769	3.651	-40.404
N+3.50	B49	ENVOLVENTE MAX	2.2	20.29	203.81	0.18	-22.769	3.642	-47.573
N+3.50	B49	ENVOLVENTE MIN	0	-15.64	12.53	-1.33	-47.963	-2.715	0.703
N+3.50	B49	ENVOLVENTE MIN	1.1	-15.64	20.1	-1.33	-47.963	-4.197	-56.498
N+3.50	B49	ENVOLVENTE MIN	2.1	-15.64	26.97	-1.33	-47.963	-5.968	-128.525
N+3.50	B49	ENVOLVENTE MIN	2.1	-18.17	67.94	-0.01	-125.083	-4.186	-131.4
N+3.50	B49	ENVOLVENTE MIN	2.2	-18.17	68.63	-0.01	-125.083	-4.194	-151.696
N+3.50	B50	ENVOLVENTE MAX	0	14.87	-18.13	2.38	-0.133	6.135	-22.828
N+3.50	B50	ENVOLVENTE MAX	1.1	14.87	-10.56	2.38	-0.133	3.607	-7.045
N+3.50	B50	ENVOLVENTE MAX	2.2	14.87	-3	2.38	-0.133	1.123	1.893
N+3.50	B50	ENVOLVENTE MIN	0	-13.36	-46.26	-2.6	-5.299	-6.237	-58.804
N+3.50	B50	ENVOLVENTE MIN	1.1	-13.36	-27.59	-2.6	-5.299	-3.463	-18.188
N+3.50	B50	ENVOLVENTE MIN	2.2	-13.36	-9.36	-2.6	-5.299	-0.733	0.399
N+3.50	B54	ENVOLVENTE MAX	0	0.74	-1.72	9.6	0	2.986	-0.215
N+3.50	B54	ENVOLVENTE MAX	0.125	0.74	-0.86	9.6	0	1.786	-0.054
N+3.50	B54	ENVOLVENTE MAX	0.25	0.74	0	9.6	0	0.587	0
N+3.50	B54	ENVOLVENTE MIN	0	-1.52	-4.24	-9.1	0	-2.836	-0.53
N+3.50	B54	ENVOLVENTE MIN	0.125	-1.52	-2.12	-9.1	0	-1.699	-0.133
N+3.50	B54	ENVOLVENTE MIN	0.25	-1.52	0	-9.1	0	-0.562	0
N+3.50	B56	ENVOLVENTE MAX	0	8.21	-0.1	0.08	-1.008	0.153	-1.155
N+3.50	B56	ENVOLVENTE MAX	1.1	8.21	5.17	0.08	-1.008	0.199	-1.969
N+3.50	B56	ENVOLVENTE MAX	2.1	8.21	13.2	0.08	-1.008	0.264	-4.633
N+3.50	B56	ENVOLVENTE MAX	2.1	9.48	-5.97	0.01	0.224	0.238	-5.539
N+3.50	B56	ENVOLVENTE MAX	2.2	9.48	-5.66	0.01	0.224	0.237	-4.957
N+3.50	B56	ENVOLVENTE MIN	0	-8.73	-4.6	-0.1	-4.61	-0.176	-5.622
N+3.50	B56	ENVOLVENTE MIN	1.1	-8.73	1.09	-0.1	-4.61	-0.205	-5.694
N+3.50	B56	ENVOLVENTE MIN	2.1	-8.73	4.21	-0.1	-4.61	-0.254	-14.656
N+3.50	B56	ENVOLVENTE MIN	2.1	-9.89	-16.65	-0.01	-0.412	-0.238	-16.253
N+3.50	B56	ENVOLVENTE MIN	2.2	-9.89	-15.8	-0.01	-0.412	-0.238	-14.63
N+3.50	B58	ENVOLVENTE MAX	0	9.8	10.49	0.13	0.301	0.31	1.186
N+3.50	B58	ENVOLVENTE MAX	1.1	9.8	18.42	0.13	0.301	0.223	-3.779
N+3.50	B58	ENVOLVENTE MAX	2.1	9.8	25.62	0.13	0.301	0.327	-10.807
N+3.50	B58	ENVOLVENTE MAX	2.1	10.67	-6.84	0.01	-1.03	0.208	-9.38
N+3.50	B58	ENVOLVENTE MAX	2.2	10.67	-6.56	0.01	-1.03	0.207	-8.71
N+3.50	B58	ENVOLVENTE MIN	0	-9.28	2.54	-0.28	-3.368	-0.484	-0.45
N+3.50	B58	ENVOLVENTE MIN	1.1	-9.28	5.61	-0.28	-3.368	-0.229	-15.162
N+3.50	B58	ENVOLVENTE MIN	2.1	-9.28	8.41	-0.28	-3.368	-0.181	-37.18
N+3.50	B58	ENVOLVENTE MIN	2.1	-10.1	-22.44	-0.01	-4.442	-0.209	-35.094
N+3.50	B58	ENVOLVENTE MIN	2.2	-10.1	-21.72	-0.01	-4.442	-0.208	-32.886
N+3.50	B60	ENVOLVENTE MAX	0	10.58	-6.56	0.08	-1.03	0.203	-8.71
N+3.50	B60	ENVOLVENTE MAX	1.1	10.58	-3.49	0.08	-1.03	0.134	-3.173
N+3.50	B60	ENVOLVENTE MAX	2.2	10.58	-0.42	0.08	-1.03	0.079	-0.633
N+3.50	B60	ENVOLVENTE MIN	0	-10	-21.72	-0.06	-4.442	-0.205	-32.886
N+3.50	B60	ENVOLVENTE MIN	1.1	-10	-13.8	-0.06	-4.442	-0.148	-13.354
N+3.50	B60	ENVOLVENTE MIN	2.2	-10	-6.59	-0.06	-4.442	-0.106	-2.537
N+3.50	B61	ENVOLVENTE MAX	0	0.82	-0.7	1.42	0	0.424	-0.087
N+3.50	B61	ENVOLVENTE MAX	0.125	0.82	-0.35	1.42	0	0.246	-0.022
N+3.50	B61	ENVOLVENTE MAX	0.25	0.82	0	1.42	0	0.071	0
N+3.50	B61	ENVOLVENTE MIN	0	-1.09	-1.8	-1.63	0	-0.474	-0.225
N+3.50	B61	ENVOLVENTE MIN	0.125	-1.09	-0.9	-1.63	0	-0.271	-0.056
N+3.50	B61	ENVOLVENTE MIN	0.25	-1.09	0	-1.63	0	-0.071	0
N+3.50	B62	ENVOLVENTE MAX	0	9.22	-5.66	0.08	0.224	0.233	-4.957
N+3.50	B62	ENVOLVENTE MAX	1.1	9.22	-2.24	0.08	0.224	0.156	-0.609
N+3.50	B62	ENVOLVENTE MAX	2.2	9.22	2.84	0.08	0.224	0.085	-0.016
N+3.50	B62	ENVOLVENTE MIN	0	-9.63	-15.8	-0.07	-0.412	-0.234	-14.63
N+3.50	B62	ENVOLVENTE MIN	1.1	-9.63	-6.48	-0.07	-0.412	-0.164	-2.842
N+3.50	B62	ENVOLVENTE MIN	2.2	-9.63	0.23	-0.07	-0.412	-0.101	-0.529
N+3.50	B63	ENVOLVENTE MAX	0	1.29	-0.78	1.41	0	0.444	-0.097
N+3.50	B63	ENVOLVENTE MAX	0.125	1.29	-0.39	1.41	0	0.269	-0.024
N+3.50	B63	ENVOLVENTE MAX	0.25	1.29	0	1.41	0	0.097	0
N+3.50	B63	ENVOLVENTE MIN	0	-1.31	-2.12	-1.38	0	-0.443	-0.265
N+3.50	B63	ENVOLVENTE MIN	0.125	-1.31	-1.06	-1.38	0	-0.271	-0.066
N+3.50	B63	ENVOLVENTE MIN	0.25	-1.31	0	-1.38	0	-0.103	0
N+3.50	B64	ENVOLVENTE MAX	0	2.79	4.96	0.11	0.082	0.303	0.412
N+3.50	B64	ENVOLVENTE MAX	0.54	2.79	6.01	0.11	0.082	0.306	-0.888
N+3.50	B64	ENVOLVENTE MAX	1.08	2.79	7.06	0.11	0.082	0.315	-2.144
N+3.50	B64	ENVOLVENTE MIN	0	-3.33	1.01	-0.12	-0.314	-0.286	-0.224
N+3.50	B64	ENVOLVENTE MIN	0.54	-3.33	1.8	-0.12	-0.314	-0.283	-2.725
N+3.50	B64	ENVOLVENTE MIN	1.08	-3.33	2.58	-0.12	-0.314	-0.287	-6.253
N+3.50	B65	ENVOLVENTE MAX	0	9.97	3.43	0.2	2.312	0.361	0.735
N+3.50	B65	ENVOLVENTE MAX	0.435	9.97	4.27	0.2	2.312	0.327	-0.285
N+3.50	B65	ENVOLVENTE MAX	0.87	9.97	5.12	0.2	2.312	0.301	-1.03
N+3.50	B65	ENVOLVENTE MIN	0	-4.35	-1.55	-0.18	0.546	-0.371	-2.857
N+3.50	B65	ENVOLVENTE MIN	0.435	-4.35	-0.92	-0.18	0.546	-0.345	-2.974

N+3.50	B65	ENVOLVENTE MIN	0.87	-4.35	-0.28	-0.18	0.546	-0.327	-4.442
N+3.50	B66	ENVOLVENTE MAX	0	3.93	4.6	0.21	5.622	0.369	-1.008
N+3.50	B66	ENVOLVENTE MAX	0.54	3.93	5.65	0.21	5.622	0.356	-1.281
N+3.50	B66	ENVOLVENTE MAX	1.08	3.93	6.69	0.21	5.622	0.359	-1.977
N+3.50	B66	ENVOLVENTE MIN	0	-4.31	0.1	-0.19	1.155	-0.382	-4.61
N+3.50	B66	ENVOLVENTE MIN	0.54	-4.31	0.89	-0.19	1.155	-0.383	-7.375
N+3.50	B66	ENVOLVENTE MIN	1.08	-4.31	1.68	-0.19	1.155	-0.401	-10.706
N+3.50	B67	ENVOLVENTE MAX	0	16.91	-10.55	0.66	3.026	0.337	-9.185
N+3.50	B67	ENVOLVENTE MAX	0.435	16.91	-9.91	0.66	3.026	0.613	-4.406
N+3.50	B67	ENVOLVENTE MAX	0.87	16.91	-9.28	0.66	3.026	0.986	0.155
N+3.50	B67	ENVOLVENTE MIN	0	-10.37	-38.18	-0.94	-0.231	-0.383	-58.669
N+3.50	B67	ENVOLVENTE MIN	0.435	-10.37	-37.33	-0.94	-0.231	-0.535	-43.437
N+3.50	B67	ENVOLVENTE MIN	0.87	-10.37	-36.49	-0.94	-0.231	-0.784	-30.205
N+2.93	B68	ENVOLVENTE MAX	0	28.51	47.23	0.37	4.445	0.987	4.628
N+2.93	B68	ENVOLVENTE MAX	0.505	28.51	48.21	0.37	4.445	0.926	-1.401
N+2.93	B68	ENVOLVENTE MAX	1.01	28.51	49.19	0.37	4.445	0.91	-7.686
N+2.93	B68	ENVOLVENTE MIN	0	-15.88	10.75	-0.49	0.559	-0.886	-22.468
N+2.93	B68	ENVOLVENTE MIN	0.505	-15.88	11.49	-0.49	0.559	-0.768	-43.356
N+2.93	B68	ENVOLVENTE MIN	1.01	-15.88	12.23	-0.49	0.559	-0.696	-65.698
N+2.93	B69	ENVOLVENTE MAX	0	33.65	-12.43	0.38	-0.361	0.592	-13.062
N+2.93	B69	ENVOLVENTE MAX	0.545	33.65	-11.64	0.38	-0.361	0.668	-5.682
N+2.93	B69	ENVOLVENTE MAX	1.09	33.65	-10.84	0.38	-0.361	0.77	1.718
N+2.93	B69	ENVOLVENTE MIN	0	-15.92	-48.21	-0.29	-3.373	-0.842	-71.599
N+2.93	B69	ENVOLVENTE MIN	0.545	-15.92	-47.15	-0.29	-3.373	-0.966	-45.615
N+2.93	B69	ENVOLVENTE MIN	1.09	-15.92	-46.09	-0.29	-3.373	-1.116	-23.517
N+2.34	B70	ENVOLVENTE MAX	0	36.62	56.59	0.44	4.594	1.017	-7.798
N+2.34	B70	ENVOLVENTE MAX	0.485	36.62	57.54	0.44	4.594	0.89	-16.149
N+2.34	B70	ENVOLVENTE MAX	0.97	36.62	58.48	0.44	4.594	0.802	-24.395
N+2.34	B70	ENVOLVENTE MIN	0	-22.05	14.23	-0.29	0.876	-0.489	-45.071
N+2.34	B70	ENVOLVENTE MIN	0.485	-22.05	14.94	-0.29	0.876	-0.437	-72.748
N+2.34	B70	ENVOLVENTE MIN	0.97	-22.05	15.64	-0.29	0.876	-0.424	-100.883
N+2.34	B71	ENVOLVENTE MAX	0	21.28	-16.19	0.44	-0.896	0.486	-31.011
N+2.34	B71	ENVOLVENTE MAX	0.41	21.28	-15.59	0.44	-0.896	0.547	-23.516
N+2.34	B71	ENVOLVENTE MAX	0.82	21.28	-14.99	0.44	-0.896	0.687	-15.434
N+2.34	B71	ENVOLVENTE MIN	0	-47.1	-63.6	-0.6	-3.874	-1	-114.81
N+2.34	B71	ENVOLVENTE MIN	0.41	-47.1	-62.8	-0.6	-3.874	-0.996	-88.899
N+2.34	B71	ENVOLVENTE MIN	0.82	-47.1	-62	-0.6	-3.874	-1.071	-63.315
N+1.58	B72	ENVOLVENTE MAX	0	14.44	-1.3	0.7	-1.768	0.503	-2.165
N+1.58	B72	ENVOLVENTE MAX	0.545	14.44	-0.51	0.7	-1.768	0.609	-1.656
N+1.58	B72	ENVOLVENTE MAX	1.09	14.44	0.29	0.7	-1.768	0.894	-1.533
N+1.58	B72	ENVOLVENTE MIN	0	-19.59	-4.53	-0.66	-6.751	-0.324	-9.247
N+1.58	B72	ENVOLVENTE MIN	0.545	-19.59	-3.47	-0.66	-6.751	-0.45	-7.065
N+1.58	B72	ENVOLVENTE MIN	1.09	-19.59	-2.41	-0.66	-6.751	-0.755	-5.46
N+0.81	B73	ENVOLVENTE MAX	0	58.1	113.4	3.55	15.999	1.539	-175.886
N+0.81	B73	ENVOLVENTE MAX	0.485	58.1	114.34	3.55	15.999	1.721	-195.123
N+0.81	B73	ENVOLVENTE MAX	0.97	58.1	115.28	3.55	15.999	3.314	-214.371
N+0.81	B73	ENVOLVENTE MIN	0	-58.05	29.44	-3.6	4.49	-1.537	-562.6
N+0.81	B73	ENVOLVENTE MIN	0.485	-58.05	30.15	-3.6	4.49	-1.696	-617.826
N+0.81	B73	ENVOLVENTE MIN	0.97	-58.05	30.86	-3.6	4.49	-3.266	-673.509
N+0.81	B74	ENVOLVENTE MAX	0	63.34	-31.35	0.65	30.54	2.918	-107.936
N+0.81	B74	ENVOLVENTE MAX	0.41	63.34	-30.76	0.65	30.54	3.188	-92.997
N+0.81	B74	ENVOLVENTE MAX	0.82	63.34	-30.16	0.65	30.54	3.46	-77.747
N+0.81	B74	ENVOLVENTE MIN	0	-48.75	-111.17	-0.7	9.718	-2.915	-342.256
N+0.81	B74	ENVOLVENTE MIN	0.41	-48.75	-110.37	-0.7	9.718	-3.167	-296.839
N+0.81	B74	ENVOLVENTE MIN	0.82	-48.75	-109.58	-0.7	9.718	-3.421	-251.749
N+1.58	B75	ENVOLVENTE MAX	0	34.8	0.27	0.68	1.568	1.096	1.397
N+1.58	B75	ENVOLVENTE MAX	0.545	34.8	1.07	0.68	1.568	0.769	1.041
N+1.58	B75	ENVOLVENTE MAX	1.09	34.8	2.03	0.68	1.568	0.537	0.279
N+1.58	B75	ENVOLVENTE MIN	0	-32.36	-2.24	-0.72	-0.12	-0.975	-2.236
N+1.58	B75	ENVOLVENTE MIN	0.545	-32.36	-1.18	-0.72	-0.12	-0.625	-1.312
N+1.58	B75	ENVOLVENTE MIN	1.09	-32.36	-0.29	-0.72	-0.12	-0.369	-0.993
N+3.50	B91	ENVOLVENTE MAX	0	6.91	29.84	0.16	1.613	0.37	4.374
N+3.50	B91	ENVOLVENTE MAX	0.54	6.91	30.89	0.16	1.613	0.445	-3.791
N+3.50	B91	ENVOLVENTE MAX	1.08	6.91	31.94	0.16	1.613	0.522	-9.931
N+3.50	B91	ENVOLVENTE MIN	0	-6.5	10.19	-0.15	0.259	-0.372	1.231
N+3.50	B91	ENVOLVENTE MIN	0.54	-6.5	10.97	-0.15	0.259	-0.452	-12.025
N+3.50	B91	ENVOLVENTE MIN	1.08	-6.5	11.76	-0.15	0.259	-0.533	-28.991
N+3.50	B92	ENVOLVENTE MAX	0	6.23	-24.68	0.6	4.471	0.767	-25.311
N+3.50	B92	ENVOLVENTE MAX	0.435	6.23	-24.04	0.6	4.471	0.548	-14.637
N+3.50	B92	ENVOLVENTE MAX	0.87	6.23	-23.41	0.6	4.471	0.377	-4.098
N+3.50	B92	ENVOLVENTE MIN	0	-27.02	-89.66	-0.71	0.581	-0.782	-106.111
N+3.50	B92	ENVOLVENTE MIN	0.435	-27.02	-88.81	-0.71	0.581	-0.514	-67.294
N+3.50	B92	ENVOLVENTE MIN	0.87	-27.02	-87.97	-0.71	0.581	-0.294	-28.845
N+2.93	B93	ENVOLVENTE MAX	0	27.15	61.61	0.76	-0.996	0.565	-1.54
N+2.93	B93	ENVOLVENTE MAX	0.505	27.15	62.59	0.76	-0.996	0.801	-8.301
N+2.93	B93	ENVOLVENTE MAX	1.01	27.15	63.57	0.76	-0.996	1.098	-15.199
N+2.93	B93	ENVOLVENTE MIN	0	-63.15	12.35	-0.71	-7.1	-0.928	-19.8
N+2.93	B93	ENVOLVENTE MIN	0.505	-63.15	13.08	-0.71	-7.1	-1.193	-51.107
N+2.93	B93	ENVOLVENTE MIN	1.01	-63.15	13.82	-0.71	-7.1	-1.517	-82.962

N+2.93	B94	ENVOLVENTE MAX	0	7.84	-10.43	0.78	7.479	1.41	-18.883
N+2.93	B94	ENVOLVENTE MAX	0.545	7.84	-9.63	0.78	7.479	1.012	-13.31
N+2.93	B94	ENVOLVENTE MAX	1.09	7.84	-8.84	0.78	7.479	0.643	-7.901
N+2.93	B94	ENVOLVENTE MIN	0	-65.08	-50.87	-0.56	1.717	-1.089	-89.87
N+2.93	B94	ENVOLVENTE MIN	0.545	-65.08	-49.81	-0.56	1.717	-0.808	-62.432
N+2.93	B94	ENVOLVENTE MIN	1.09	-65.08	-48.75	-0.56	1.717	-0.557	-35.572
N+2.34	B95	ENVOLVENTE MAX	0	15.75	62.03	0.92	-2.449	0.436	-3.576
N+2.34	B95	ENVOLVENTE MAX	0.485	15.75	62.97	0.92	-2.449	0.556	-10.736
N+2.34	B95	ENVOLVENTE MAX	0.97	15.75	63.91	0.92	-2.449	0.725	-17.897
N+2.34	B95	ENVOLVENTE MIN	0	-69.44	13.38	-0.45	-9.692	-0.806	-24.608
N+2.34	B95	ENVOLVENTE MIN	0.485	-69.44	14.08	-0.45	-9.692	-1.153	-54.92
N+2.34	B95	ENVOLVENTE MIN	0.97	-69.44	14.79	-0.45	-9.692	-1.55	-85.689
N+2.34	B96	ENVOLVENTE MAX	0	74.29	-23.03	1.22	12.373	1.873	-34.637
N+2.34	B96	ENVOLVENTE MAX	0.41	74.29	-22.43	1.22	12.373	1.435	-25.057
N+2.34	B96	ENVOLVENTE MAX	0.82	74.29	-21.83	1.22	12.373	1.038	-15.469
N+2.34	B96	ENVOLVENTE MIN	0	-4.07	-84.77	-0.84	3.608	-0.942	-133.532
N+2.34	B96	ENVOLVENTE MIN	0.41	-4.07	-83.97	-0.84	3.608	-0.66	-98.941
N+2.34	B96	ENVOLVENTE MIN	0.82	-4.07	-83.17	-0.84	3.608	-0.419	-64.677
N+1.58	B97	ENVOLVENTE MAX	0	36.99	-9.54	1.19	-0.162	1.303	-8.027
N+1.58	B97	ENVOLVENTE MAX	0.545	36.99	-8.75	1.19	-0.162	0.682	-2.933
N+1.58	B97	ENVOLVENTE MAX	1.09	36.99	-7.95	1.19	-0.162	0.285	4.111
N+1.58	B97	ENVOLVENTE MIN	0	-24.98	-24.24	-1.34	-1.971	-1.618	-21.153
N+1.58	B97	ENVOLVENTE MIN	0.545	-24.98	-23.18	-1.34	-1.971	-0.915	-8.232
N+1.58	B97	ENVOLVENTE MIN	1.09	-24.98	-22.12	-1.34	-1.971	-0.435	0.846
N+2.93	B98	ENVOLVENTE MAX	0	3.38	-0.58	0.14	0.825	0.476	0.885
N+2.93	B98	ENVOLVENTE MAX	1.05	3.38	4.21	0.14	0.825	0.478	-0.129
N+2.93	B98	ENVOLVENTE MAX	2.1	3.38	12.1	0.14	0.825	0.56	-2.382
N+2.93	B98	ENVOLVENTE MIN	0	-2.82	-5.22	-0.25	-2.318	-0.471	-3.356
N+2.93	B98	ENVOLVENTE MIN	1.05	-2.82	0.01	-0.25	-2.318	-0.354	-1.545
N+2.93	B98	ENVOLVENTE MIN	2.1	-2.82	3.16	-0.25	-2.318	-0.318	-9.817
N+2.93	B100	ENVOLVENTE MAX	0	4.81	-1.3	0.1	1.448	0.56	0.417
N+2.93	B100	ENVOLVENTE MAX	1.05	4.81	3.52	0.1	1.448	0.489	0.16
N+2.93	B100	ENVOLVENTE MAX	2.1	4.81	12.41	0.1	1.448	0.431	-2.551
N+2.93	B100	ENVOLVENTE MIN	0	-1.8	-5.51	-0.07	-0.611	-0.41	-2.423
N+2.93	B100	ENVOLVENTE MIN	1.05	-1.8	0.49	-0.07	-0.611	-0.368	-0.855
N+2.93	B100	ENVOLVENTE MIN	2.1	-1.8	3.78	-0.07	-0.611	-0.341	-9.029
N+2.34	B102	ENVOLVENTE MAX	0	4.42	-2.02	0.19	0.89	0.54	-1.144
N+2.34	B102	ENVOLVENTE MAX	1.05	4.42	1.33	0.19	0.89	0.442	-0.629
N+2.34	B102	ENVOLVENTE MAX	2.1	4.42	8.8	0.19	0.89	0.426	-2.052
N+2.34	B102	ENVOLVENTE MIN	0	-3.23	-7.6	-0.11	-0.868	-0.226	-6.448
N+2.34	B102	ENVOLVENTE MIN	1.05	-3.23	-0.58	-0.11	-0.868	-0.21	-2.776
N+2.34	B102	ENVOLVENTE MIN	2.1	-3.23	2.52	-0.11	-0.868	-0.276	-7.711
N+2.34	B104	ENVOLVENTE MAX	0	1.73	-0.17	0.14	0.284	0.399	-0.06
N+2.34	B104	ENVOLVENTE MAX	1.05	1.73	5.57	0.14	0.284	0.452	-1.224
N+2.34	B104	ENVOLVENTE MAX	2.1	1.73	12.81	0.14	0.284	0.603	-4.121
N+2.34	B104	ENVOLVENTE MIN	0	-2.49	-2.33	-0.2	-0.959	-0.24	-3.068
N+2.34	B104	ENVOLVENTE MIN	1.05	-2.49	1.09	-0.2	-0.959	-0.227	-4.681
N+2.34	B104	ENVOLVENTE MIN	2.1	-2.49	3.94	-0.2	-0.959	-0.311	-14.331
N+0.81	B106	ENVOLVENTE MAX	0	56.33	167.62	2.21	40.932	6.242	-211.679
N+0.81	B106	ENVOLVENTE MAX	0.485	56.33	168.56	2.21	40.932	5.523	-239.439
N+0.81	B106	ENVOLVENTE MAX	0.97	56.33	169.5	2.21	40.932	4.832	-267.28
N+0.81	B106	ENVOLVENTE MIN	0	-56.47	48.85	-2.23	12.693	-6.301	-678.548
N+0.81	B106	ENVOLVENTE MIN	0.485	-56.47	49.56	-2.23	12.693	-5.574	-760.071
N+0.81	B106	ENVOLVENTE MIN	0.97	-56.47	50.27	-2.23	12.693	-4.875	-842.051
N+0.81	B107	ENVOLVENTE MAX	0	35.38	-14.95	3.66	2.466	6.711	-38.455
N+0.81	B107	ENVOLVENTE MAX	0.41	35.38	-14.35	3.66	2.466	5.211	-32.379
N+0.81	B107	ENVOLVENTE MAX	0.82	35.38	-13.75	3.66	2.466	3.711	-26.336
N+0.81	B107	ENVOLVENTE MIN	0	-83.23	-70.21	-3.61	0.102	-6.584	-149.684
N+0.81	B107	ENVOLVENTE MIN	0.41	-83.23	-69.41	-3.61	0.102	-5.106	-121.061
N+0.81	B107	ENVOLVENTE MIN	0.82	-83.23	-68.62	-3.61	0.102	-3.629	-92.765
N+1.58	B108	ENVOLVENTE MAX	0	57.5	-5.49	0.44	0.136	0.88	-4.662
N+1.58	B108	ENVOLVENTE MAX	0.545	57.5	-4.7	0.44	0.136	0.806	-1.816
N+1.58	B108	ENVOLVENTE MAX	1.09	57.5	-3.9	0.44	0.136	0.805	2.122
N+1.58	B108	ENVOLVENTE MIN	0	-66.56	-16.04	-0.65	-1.339	-1.21	-14.201
N+1.58	B108	ENVOLVENTE MIN	0.545	-66.56	-14.98	-0.65	-1.339	-1.016	-5.751
N+1.58	B108	ENVOLVENTE MIN	1.09	-66.56	-13.92	-0.65	-1.339	-0.897	0.354
BASE	B110	ENVOLVENTE MAX	0	0.12	-0.88	54.79	8.318	57.291	3.244
BASE	B110	ENVOLVENTE MAX	1.05	0.12	3.2	54.79	8.318	0.38	3.237
BASE	B110	ENVOLVENTE MAX	2.1	0.12	7.28	54.79	8.318	57.282	9.212
BASE	B110	ENVOLVENTE MIN	0	-0.13	-14.29	-54.29	-1.438	-56.73	-9.377
BASE	B110	ENVOLVENTE MIN	1.05	-0.13	-8.85	-54.29	-1.438	-0.34	2.025
BASE	B110	ENVOLVENTE MIN	2.1	-0.13	-3.41	-54.29	-1.438	-57.763	-3.475
N+0.81	B112	ENVOLVENTE MAX	0	6.72	-6.75	3.19	-5.926	4.907	-8.35
N+0.81	B112	ENVOLVENTE MAX	1.05	6.72	-3.66	3.19	-5.926	1.58	-2.362
N+0.81	B112	ENVOLVENTE MAX	2.1	6.72	-0.56	3.19	-5.926	2.087	13.698
N+0.81	B112	ENVOLVENTE MIN	0	-6.74	-30.45	-3.21	-19.809	-4.952	-35.663
N+0.81	B112	ENVOLVENTE MIN	1.05	-6.74	-22.26	-3.21	-19.809	-1.598	-7.989
N+0.81	B112	ENVOLVENTE MIN	2.1	-6.74	-15.52	-3.21	-19.809	-2.077	-0.685
N+0.81	B114	ENVOLVENTE MAX	0	11.45	7.33	0.76	-6.059	2.287	1.692

N+0.81	B114	ENVOLVENTE MAX	1.05	11.45	14.58	0.76	-6.059	1.495	-3.184
N+0.81	B114	ENVOLVENTE MAX	2.1	11.45	21.82	0.76	-6.059	0.707	-9.53
N+0.81	B114	ENVOLVENTE MIN	0	-10.04	1.6	-0.76	-19.38	-2.31	-0.278
N+0.81	B114	ENVOLVENTE MIN	1.05	-10.04	4.45	-0.76	-19.38	-1.51	-10.577
N+0.81	B114	ENVOLVENTE MIN	2.1	-10.04	7.3	-0.76	-19.38	-0.714	-29.688

FUERZAS EN COLUMNAS

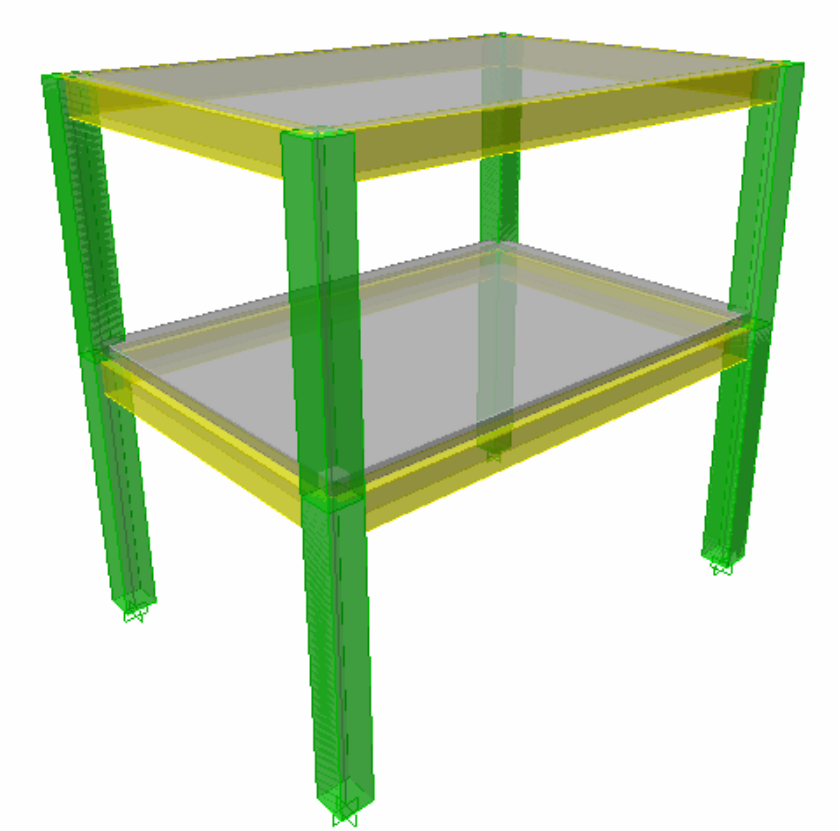
COLUMN FORCES
UNID: kN-m

Story	Column	Load	Loc	P	V2	V3	T	M2	M3
N+3.50	C8	ENVOLVENTE MAX	0	-91.81	1.16	89.36	27.497	14.835	81.728
N+3.50	C8	ENVOLVENTE MAX	0.285	-89.96	1.16	89.36	27.497	-9.648	101.097
N+3.50	C8	ENVOLVENTE MAX	0.57	-88.12	1.16	89.36	27.497	-18.937	120.467
N+3.50	C8	ENVOLVENTE MIN	0	-254.99	-77.57	-90.92	-35.578	-118.058	17.383
N+3.50	C8	ENVOLVENTE MIN	0.285	-252.53	-77.57	-90.92	-35.578	-93.261	20.777
N+3.50	C8	ENVOLVENTE MIN	0.57	-250.07	-77.57	-90.92	-35.578	-92.891	21
N+2.93	C8	ENVOLVENTE MAX	0	-95.63	3.58	92.01	27.497	68.351	46.119
N+2.93	C8	ENVOLVENTE MAX	0.295	-93.72	3.58	92.01	27.497	41.487	61.679
N+2.93	C8	ENVOLVENTE MAX	0.59	-91.81	3.58	92.01	27.497	14.835	81.728
N+2.93	C8	ENVOLVENTE MIN	0	-260.09	-79.99	-93.57	-35.578	-172.495	-0.881
N+2.93	C8	ENVOLVENTE MIN	0.295	-257.54	-79.99	-93.57	-35.578	-145.171	10.943
N+2.93	C8	ENVOLVENTE MIN	0.59	-254.99	-79.99	-93.57	-35.578	-118.058	17.383
N+2.34	C8	ENVOLVENTE MAX	0	-100.56	5.59	94.15	27.497	139.583	29.751
N+2.34	C8	ENVOLVENTE MAX	0.38	-98.09	5.59	94.15	27.497	103.919	35.756
N+2.34	C8	ENVOLVENTE MAX	0.76	-95.63	5.59	94.15	27.497	68.351	46.119
N+2.34	C8	ENVOLVENTE MIN	0	-266.66	-82	-95.71	-35.578	-244.913	-42.584
N+2.34	C8	ENVOLVENTE MIN	0.38	-263.37	-82	-95.71	-35.578	-208.656	-19.554
N+2.34	C8	ENVOLVENTE MIN	0.76	-260.09	-82	-95.71	-35.578	-172.495	-0.881
N+1.58	C8	ENVOLVENTE MAX	0	-105.55	6.79	95.38	27.497	212.901	34.633
N+1.58	C8	ENVOLVENTE MAX	0.385	-103.05	6.79	95.38	27.497	176.229	32.151
N+1.58	C8	ENVOLVENTE MAX	0.77	-100.56	6.79	95.38	27.497	139.583	29.751
N+1.58	C8	ENVOLVENTE MIN	0	-273.31	-83.2	-96.94	-35.578	-319.432	-106.3
N+1.58	C8	ENVOLVENTE MIN	0.385	-269.98	-83.2	-96.94	-35.578	-282.16	-74.401
N+1.58	C8	ENVOLVENTE MIN	0.77	-266.66	-83.2	-96.94	-35.578	-244.913	-42.584
N+0.81	C8	ENVOLVENTE MAX	0	-110.8	7.16	95.75	27.497	290.393	40.28
N+0.81	C8	ENVOLVENTE MAX	0.405	-108.17	7.16	95.75	27.497	251.642	37.442
N+0.81	C8	ENVOLVENTE MAX	0.81	-105.55	7.16	95.75	27.497	212.901	34.633
N+0.81	C8	ENVOLVENTE MIN	0	-280.31	-83.57	-97.31	-35.578	-398.189	-173.838
N+0.81	C8	ENVOLVENTE MIN	0.405	-276.81	-83.57	-97.31	-35.578	-358.806	-140.055
N+0.81	C8	ENVOLVENTE MIN	0.81	-273.31	-83.57	-97.31	-35.578	-319.432	-106.3
N+2.93	C10	ENVOLVENTE MAX	0	-87.2	23.03	81.45	22.996	-58.812	2.306
N+2.93	C10	ENVOLVENTE MAX	0.295	-85.29	23.03	81.45	22.996	-79.251	17.977
N+2.93	C10	ENVOLVENTE MAX	0.59	-83.38	23.03	81.45	22.996	-80.577	39.541
N+2.93	C10	ENVOLVENTE MIN	0	-255	-75.18	-78.36	-37.111	-274.36	-17.535
N+2.93	C10	ENVOLVENTE MIN	0.295	-252.46	-75.18	-78.36	-37.111	-275.139	-17.823
N+2.93	C10	ENVOLVENTE MIN	0.59	-249.91	-75.18	-78.36	-37.111	-275.917	-24.004
N+2.34	C10	ENVOLVENTE MAX	0	-92.13	25.15	84.09	22.996	2.373	9.623
N+2.34	C10	ENVOLVENTE MAX	0.38	-89.67	25.15	84.09	22.996	-28.65	0.588
N+2.34	C10	ENVOLVENTE MAX	0.76	-87.2	25.15	84.09	22.996	-58.812	2.306
N+2.34	C10	ENVOLVENTE MIN	0	-261.57	-77.3	-80.99	-37.111	-316.28	-64.484
N+2.34	C10	ENVOLVENTE MIN	0.38	-258.29	-77.3	-80.99	-37.111	-286.433	-35.633
N+2.34	C10	ENVOLVENTE MIN	0.76	-255	-77.3	-80.99	-37.111	-274.36	-17.535
N+1.58	C10	ENVOLVENTE MAX	0	-97.12	26.46	85.64	22.996	67.04	29.73
N+1.58	C10	ENVOLVENTE MAX	0.385	-94.62	26.46	85.64	22.996	34.655	19.628
N+1.58	C10	ENVOLVENTE MAX	0.77	-92.13	26.46	85.64	22.996	2.373	9.623
N+1.58	C10	ENVOLVENTE MIN	0	-268.22	-78.61	-82.55	-37.111	-378.564	-124.744
N+1.58	C10	ENVOLVENTE MIN	0.385	-264.9	-78.61	-82.55	-37.111	-347.37	-94.566
N+1.58	C10	ENVOLVENTE MIN	0.77	-261.57	-78.61	-82.55	-37.111	-316.28	-64.484
N+0.81	C10	ENVOLVENTE MAX	0	-102.37	26.89	86.12	22.996	135.696	51.426
N+0.81	C10	ENVOLVENTE MAX	0.405	-99.74	26.89	86.12	22.996	101.353	40.569
N+0.81	C10	ENVOLVENTE MAX	0.81	-97.12	26.89	86.12	22.996	67.04	29.73
N+0.81	C10	ENVOLVENTE MIN	0	-275.22	-79.04	-83.03	-37.111	-444.713	-188.679
N+0.81	C10	ENVOLVENTE MIN	0.405	-271.72	-79.04	-83.03	-37.111	-411.624	-156.702
N+0.81	C10	ENVOLVENTE MIN	0.81	-268.22	-79.04	-83.03	-37.111	-378.564	-124.744
N+2.34	C12	ENVOLVENTE MAX	0	-108.77	235.65	88.73	30.352	-57.295	239.65
N+2.34	C12	ENVOLVENTE MAX	0.38	-106.31	235.65	88.73	30.352	-90.113	150.71
N+2.34	C12	ENVOLVENTE MAX	0.76	-103.85	235.65	88.73	30.352	-107.42	74.623
N+2.34	C12	ENVOLVENTE MIN	0	-311.45	39.14	-90.72	-19.294	-337.033	73.649
N+2.34	C12	ENVOLVENTE MIN	0.38	-308.17	39.14	-90.72	-19.294	-336.37	42.811
N+2.34	C12	ENVOLVENTE MIN	0.76	-304.88	39.14	-90.72	-19.294	-335.708	-5.95
N+1.58	C12	ENVOLVENTE MAX	0	-113.76	237.18	91.03	30.352	12.263	419.871
N+1.58	C12	ENVOLVENTE MAX	0.385	-111.27	237.18	91.03	30.352	-22.739	329.76
N+1.58	C12	ENVOLVENTE MAX	0.77	-108.77	237.18	91.03	30.352	-57.295	239.65
N+1.58	C12	ENVOLVENTE MIN	0	-318.1	37.61	-93.02	-19.294	-401.465	103.596
N+1.58	C12	ENVOLVENTE MIN	0.385	-314.77	37.61	-93.02	-19.294	-365.696	88.907

N+1.58	C12	ENVOLVENTE MIN	0.77	-311.45	37.61	-93.02	-19.294	-337.033	73.649
N+0.81	C12	ENVOLVENTE MAX	0	-290.06	250.7	111.58	125.156	413.489	-30.975
N+0.81	C12	ENVOLVENTE MAX	0.405	-287.44	250.7	111.58	125.156	369.893	-104.221
N+0.81	C12	ENVOLVENTE MAX	0.81	-284.81	250.7	111.58	125.156	327.148	-163.115
N+0.81	C12	ENVOLVENTE MIN	0	-825.39	-84.71	-113.86	-104.66	-131.103	-537.302
N+0.81	C12	ENVOLVENTE MIN	0.405	-821.89	-84.71	-113.86	-104.66	-86.583	-548.7
N+0.81	C12	ENVOLVENTE MIN	0.81	-818.39	-84.71	-113.86	-104.66	-42.916	-603.75
N+1.58	C14	ENVOLVENTE MAX	0	-97.25	108.17	103.38	73.456	58.181	7.163
N+1.58	C14	ENVOLVENTE MAX	0.385	-94.76	108.17	103.38	73.456	22.2	-34.321
N+1.58	C14	ENVOLVENTE MAX	0.77	-92.26	108.17	103.38	73.456	3.881	-28.264
N+1.58	C14	ENVOLVENTE MIN	0	-305.04	-145.6	-102.63	-78.833	-129.398	-228.491
N+1.58	C14	ENVOLVENTE MIN	0.385	-301.71	-145.6	-102.63	-78.833	-93.703	-191.236
N+1.58	C14	ENVOLVENTE MIN	0.77	-298.39	-145.6	-102.63	-78.833	-75.671	-182.336
N+0.81	C14	ENVOLVENTE MAX	0	-102.5	108.91	104.77	73.456	140.806	95.327
N+0.81	C14	ENVOLVENTE MAX	0.405	-99.88	108.91	104.77	73.456	99.147	51.235
N+0.81	C14	ENVOLVENTE MAX	0.81	-97.25	108.91	104.77	73.456	58.181	7.163
N+0.81	C14	ENVOLVENTE MIN	0	-312.04	-146.33	-104.02	-78.833	-211.419	-346.973
N+0.81	C14	ENVOLVENTE MIN	0.405	-308.54	-146.33	-104.02	-78.833	-170.062	-287.722
N+0.81	C14	ENVOLVENTE MIN	0.81	-305.04	-146.33	-104.02	-78.833	-129.398	-228.491

PROYECTO: INSTITUCIÓN EDUCATIVA MARCELO MIRANDA-ESCALERA, IPIALES NARIÑO

dye16-2269



MEMORIAS DE ANÁLISIS Y DISEÑO ESTRUCTURAL

BOGOTÁ D.C., 18 DE NOVIEMBRE DE 2016

1. DESCRIPCIÓN DEL PROYECTO

1.1. INTRODUCCIÓN

El presente documento contiene las memorias de análisis y diseño estructural correspondiente al proyecto INSTITUCIÓN EDUCATIVA MARCELO MIRANDA-ESCALERA ubicado IPIALES NARIÑO.

1.2. DESCRIPCIÓN ARQUITECTÓNICA

El proyecto se encuentra ubicado en un lote de **1015 m²** de área aproximadamente, en la cual se contempla la construcción del INSTITUCION EDUCATIVA MARCELO MIRANDA-ESCALERA ubicado en IPIALES NARIÑO. El lote será destinado para uso Institucional.

1.3. DESCRIPCIÓN SISTEMA ESTRUCTURAL

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: ***Alta***
- ✓ Capacidad de disipación de energía: ***Especial***
- ✓ Coeficiente de disipación de energía: $R_0 = 7.00$

El coeficiente de disipación de energía no se afecta por ninguna irregularidad descrita en la norma

Por lo tanto el valor final del coeficiente R es igual a **7.00**

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 solicitación ocasionados por las

derivas presentes. Las cargas vivas de diseño son: **1.80 kN/m²** para cubierta, **5.00 kN/m²** para escaleras de acuerdo a lo establecido en las tablas 4.2.1-1 y 4.2.1-2 de la NSR-10.

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, Decreto 092 del 17 de Enero de 2011, Decreto 0340 del 13 de Febrero de 2012 y en el Reglamento para Concreto Estructural ACI 318S-08.

1.4. MATERIALES

Los materiales utilizados son:

Concreto	21.1 MPa para vigas, placas, zapatas y columnas.
Concreto	14 MPa (para concreto de limpieza).
Acero	para refuerzo fy = 420 MPa para todos los diámetros.

Atentamente:

_____

EDGAR ROLANDO BARRERA
ING. ESTRUCTURAL
T.P. 15202-102710 BYC

_____

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

MEMORIAL DE RESPONSABILIDAD

IPIALES, 18 de Noviembre de 2016

Señores
PLANEACION MUNICIPAL
La Ciudad

Yo, **EDGAR ROLANDO BARRERA,** ingeniero civil con Matrícula Profesional Nº **15202-102710** de **BOYACÁ,** y Yo, **JAIR USECHE MACÍAS,** ingeniero civil con Matrícula Profesional Nº **25202-56174** de **CUNDINAMARCA** debidamente registrados en el consejo profesional de Ingeniería y Arquitectura de Boyacá y Cundinamarca, presentamos 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 INSTITUCIÓN EDUCATIVA MARCELO MIRANDA - ESCALERA ubicado en IPIALES NARIÑO, declaramos que asumimos la responsabilidad por los perjuicios que causa de ellos puedan deducirse, exonerando a PLANEACION MUNICIPAL de cualquier responsabilidad.

Aceptamos y reconocemos que la revisión efectuada por PLANEACION MUNICIPAL no constituye una aprobación al Diseño Estructural, sino una verificación del cumplimiento de la **NORMA COLOMBIANA DE DISEÑO Y CONSTRUCCIÓN SISMO RESISTENTE**.

Atentamente,

EDGAR ROLANDO BARRERA
ING. ESTRUCTURAL
T.P. 15202-102710 BYC

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


REPUBLICA DE COLOMBIA
Consejo Profesional Nacional de Ingeniería y Arquitectura
MATRICULA No. 2528256174CND
INGENIERO CIVIL
DE FECHA 27/07/95
APELLIDOS
USECHE MACIAS
NOMBRES
JAIR
C.C 19,428,425
UNIV. NACIONAL - BOGOTA

2. AVALÚO DE CARGAS

AVALÚO DE CARGAS

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA-ESCALERA

AVALUO DE CARGAS

1. CUBIERTA LIVIANA

Teja termo-acústica			0.10 kN/m²
Correas metálicas			0.10 kN/m²
Acabados e iluminacion			0.10 kN/m²
		CM	0.30 kN/m²
Tabla 4.2.1-2 de NSR-10 (Tipo de cubierta F)		CV	0.35 kN/m²
		CR	0.65 kN/m²
Muros culata	0.90x0.15x13		1.76 kN/m

CU = 1.2x0.3+1.6x0.35 = ***0.92 kN/m²***

Espesor de placa equivalente:

e=CM/24 0.013 m

Pendiente de Cubierta α (º) = **9.72** → Equivale a 17.1%

Altitud de al cabecera municipal (m.s.n.m.) 2900

B.4.8.3 de NSR-10 (Carga de granizo) CG 0.50 kN/m²

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/m^2.
Según B.4.8.3.1 - Las cargas de granizo deben tenerse en cuenta en las regiones del país con más de 2.000 metros de altura sobre el nivel del mar o en lugares de menor altura donde la autoridad municipal o distrital así lo exija.
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/m^2.

3. ANÁLISIS SÍSMICO

ANÁLISIS MODAL
CÁLCULO DE DERIVAS MÁXIMAS

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA-ESCALERA
ANÁLISIS SÍSMICO (ESPECTRO DE DISEÑO NSR-10)

ZONA DE AMENAZA SÍSMICA
ALTA

EFECTOS LOCALES

Perfil de Suelo	**D**
Coeficiente Aa	**0.30**
Coeficiente Av	**0.25**

COEFICIENTE DE IMPORTANCIA

Grupo de Uso	**III**
Coeficiente de importancia I	**1.25**

PERIODO FUNDAMENTAL DE LA EDIFICACIÓN

$T_a = C_t h^{\alpha}$		
C_t =	**0.047**	
h =	**6.65**	m
α =	**0.90**	
T_a=	**0.26**	Seg

VARIACIÓN COEFICIENTE DE CAPACIDAD DE DISIPACIÓN DE ENERGÍA

Ro: 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

Ro	**7.00**
ϕ_a	**0.90**
ϕ_p	**1.00**
ϕ_r	**0.75**
ϕ	**1.00**
R	**4.73**

TIPO	DESCRIPCIÓN	VALOR
3P	IRREGULARIDAD DIAFRAGMA	ϕ_P: 0.90
	REDUNDANCIA	ϕ_r: 0.75

ESPECTRO DE DISEÑO (AMORTIGUAMIENTO ξ=5% DEL CRÍTICO)

Fa: Factor de ampliación de la aceleración.
Fv: Factor de ampliación de la aceleración en el rango de velocidades constantes.
Sa: Valor del espectro de aceleraciones de diseño para un periodo de vibración dado.
Aa: Coeficiente que representa la aceleración horizontal pico efectiva para diseño.
Av: Coeficiente que representa la velocidad horizontal pico efectiva para diseño.
T: Periodo de vibración del sistema elástico, en segundos.
T_C: Periodo de vibración, en segundos, correspondiente a la transición entre la zona de aceleración constante del espectro de diseño, para periodos cortos, y la parte descendiente del mismo.
T_L: Periodo de vibración, en segundos, correspondiente al inicio de la zona de desplazamiento aproximadamente constante del espectro de diseño para periodos largos.

ZONA DE AMENAZA ALTA		
T_o:	0.13	Seg
T_C:	0.63	Seg
T_L:	4.56	Seg
Aa:	0.30	
Av:	0.25	
Fa:	1.20	
Fv:	1.90	

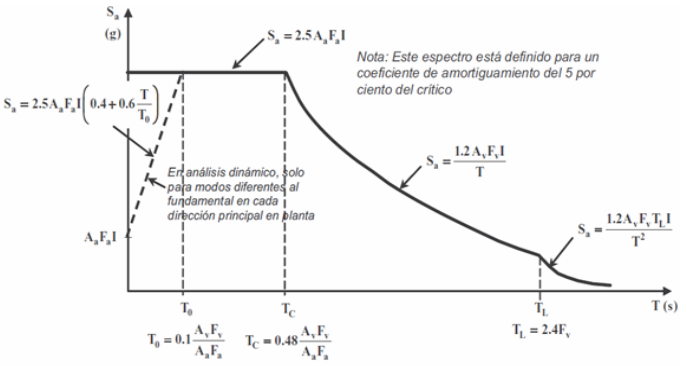
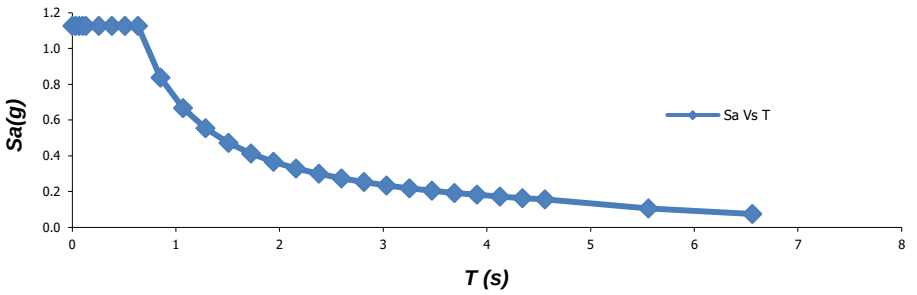


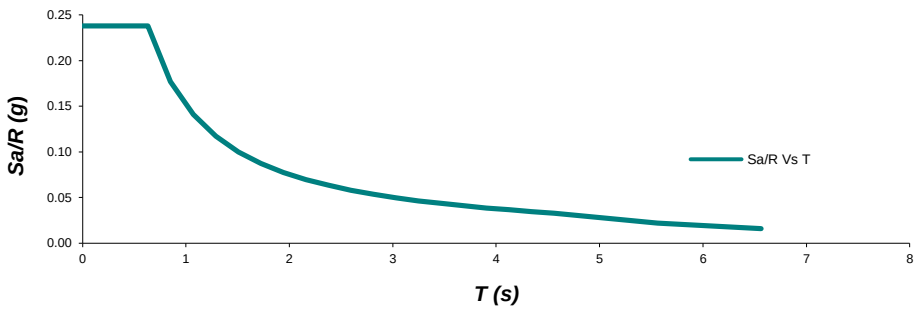
Figura A.2.6-1 — Espectro Elástico de Aceleraciones de Diseño como fracción de g

T	Sa	$Sa/R_{adoptado}$
(Seg)	**(%g)**	**(%g)**
0.00	1.125	0.238
0.03	1.125	0.238
0.07	1.125	0.238
0.10	1.125	0.238
0.13	1.125	0.238
0.26	1.125	0.238
0.38	1.125	0.238
0.51	1.125	0.238
0.63	1.125	0.238
0.85	0.837	0.177
1.07	0.666	0.141
1.29	0.553	0.117
1.51	0.473	0.100
1.72	0.413	0.087
1.94	0.367	0.078
2.16	0.330	0.070
2.38	0.300	0.063
2.60	0.274	0.058
2.81	0.253	0.054
3.03	0.235	0.050
3.25	0.219	0.046
3.47	0.205	0.043
3.69	0.193	0.041
3.91	0.182	0.039
4.12	0.173	0.037
4.34	0.164	0.035
4.56	0.156	0.033
5.56	0.105	0.022
6.56	0.075	0.016

Espectro Elástico de Diseño



Espectro Elástico de Diseño/R_{adop}



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

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 rigidos 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: INSTITUCION EDUCATIVA MARCELO MIRANDA-ESCALERA
ANÁLISIS SÍSMICO (ESPECTRO DE UMBRAL DE DAÑO NSR-10)

ZONA DE AMENAZA SÍSMICA
ALTA

EFECTOS LOCALES

Perfil de Suelo	**D**
Coeficiente Ad	**0.07**
Coeficiente Fv	**2.40**

COEFICIENTE DE IMPORTANCIA

Grupo de Uso	**III**
Coeficiente de importancia I	**1.25**
Coeficiente de Sitio Ŝ:	**3.00**

ESPECTRO DE UMBRAL DE DAÑO (AMORTIGUAMIENTO ξ=2% DEL CRÍTICO)

Sad: Valor del espectro de aceleraciones del umbral de daño para un periodo de vibración dado.
Ad: Máxima aceleración pico efectiva para el umbral de daño.
T: Periodo de vibración del sistema elástico, en segundos.
T_{Cd}: Periodo de vibración, en segundos, correspondiente a la transición entre la zona de aceleración constante del espectro sísmico del umbral de daño, para periodos cortos, y la parte descendiente del mismo.
T_{Ld}: Periodo de vibración, en segundos, correspondiente a la transición entre la zona de desplazamiento constante del espectro sísmico del umbral de daño, para periodos largos.

Ad: **0.07**
T_{Cd}: 1.50 Seg
T_{Ld}: 7.2 Seg

T (Seg)	Sad (%g)
0.00	0.070
0.05	0.098
0.10	0.126
0.15	0.154
0.20	0.182
0.25	0.210
0.41	0.210
0.56	0.210
0.72	0.210
0.88	0.210
1.03	0.210
1.19	0.210
1.34	0.210

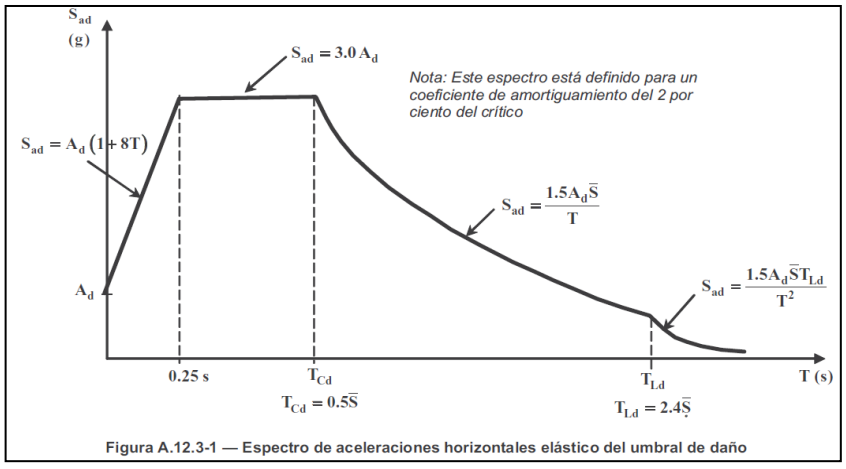
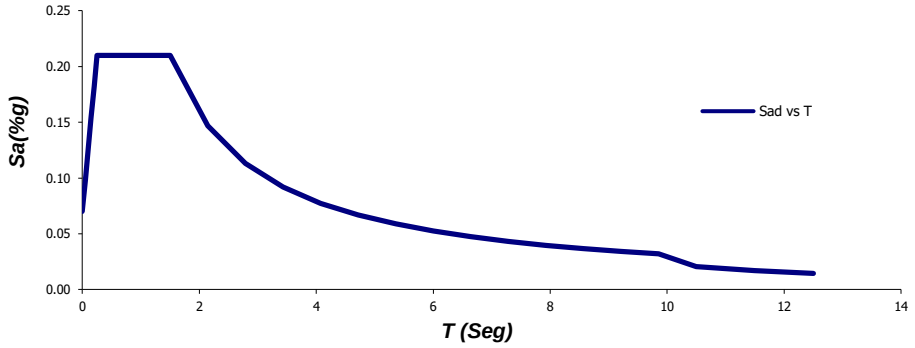


Figura A.12.3-1 — Espectro de aceleraciones horizontales elástico del umbral de daño

1.50	0.210
2.14	0.147
2.79	0.113
3.43	0.092
4.07	0.077
4.71	0.067
5.36	0.059
6.00	0.053
6.64	0.047
7.29	0.043
7.93	0.040
8.57	0.037
9.21	0.034
9.86	0.032
10.50	0.021
11.50	0.017
12.50	0.015

Espectro Del Umbral de Daño



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

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 rigidos 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: INSTITUCION EDUCATIVA MARCELO MIRANDA-ESCALERA
CALCULO DEL CORTANTE BASAL DE LA ESTRUCTURA (ESPECTRO DE DISEÑO NSR-10)

CALCULO DEL CORTANTE BASAL DE LA ESTRUCTURA

$H_{edificio}$=	6.65	m	
Tipo de Perfil:	D		
Aa =	0.30		
Av =	0.25		
Fa =	1.20		
Fv =	1.90		
T_c =	0.63	Seg	
C_t =	0.047		
α =	0.90		
T_a =	0.26	Seg	
C_u =	1.20		
$C_u T_a$ =	0.31	Seg	
$T_{modelación\ estructural}$ =	0.28	Seg	
ΔT =	8.27	%	Ok!
$T_{adoptado}$ =	0.28	Seg	
S_a =	1.125		S_a obtenido del espectro de diseño
g =	9.81	m/s^2	
M =	63.27	Ton	Masa obtenida del modelo
V_s =	698.26	kN	
90% Vs =	628.44	kN	Cortante basal para comparación de acuerdo a A.5.4.5 NSR-10

MODELO INICIAL
Response Espectrum 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
$V_{s(x)}$=	607.53	-	607.53	1.034	10.15	Se aplica en SISMO X
$V_{s(y)}$=	-	673.06	673.06	0.934	9.16	Se aplica en SISMO Y

MODELO CORREGIDO
Response Espectrum Base Reactions

	F1	F2	Total	90% Vs
$V_{s(x)}$=	607.53	-	607.53	628.44
$V_{s(y)}$=	-	673.06	673.06	628.44

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA-ESCALERA
CALCULO DEL CORTANTE BASAL DE LA ESTRUCTURA (ESPECTRO DE UMBRAL DE DAÑO NSR-10)

CALCULO DEL CORTANTE BASAL DE LA ESTRUCTURA

$H_{edificio}$=	6.65	m	
Tipo de Perfil:	D		
Ad =	0.07		
Fv =	2.40		
C_t =	0.047		
α =	0.90		
T_a =	0.26	Seg	
C_u =	1.20		
$C_u T_a$ =	0.31	Seg	
$T_{modelación\ estructural}$ =	0.28	Seg	
ΔT =	8.27	%	Ok!
$T_{adoptado}$ =	0.26	Seg	
S_a =	0.210		S_a obtenido del espectro de diseño
g =	9.81	m/s^2	
M =	63.27	Ton	Masa obtenida del modelo
V_s =	130.34	kN	

MODELO INICIAL
Response Espectrum 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	
$V_{s(x)}$=	126.06	-	126.06	1.034	10.14	Se aplica en SISMO X
$V_{s(y)}$=	-	140.35	140.35	0.929	9.11	Se aplica en SISMO Y

MODELO CORREGIDO
Response Espectrum Base Reactions

	F1	F2	Total	100% Vs
$V_{s(x)}$=	126.06	-	126.06	**130.34**
$V_{s(y)}$=	-	140.35	140.35	**130.34**

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA-ESCALERA

CÁLCULO DE DERIVAS MÁXIMAS

ALTURA DE N+6.65	**3.20**	**m**
ALTURA DE N+3.45	**3.45**	**m**
ALTURA DE BASE	**0.00**	**m**

Deriva Máxima Permitida **1.00** **%**

Nivel	Punto	COMBINACIÓN DE CARGA	DESPLAZAMIENTOS FUERZA SÍSMICA		Deriva Δ *m*	Deriva Δ *%*	Observación
			Desplazamiento X	Desplazamiento Y			
N+6.65	252	COMDER1 MAX	0.049	0.0155	0.02427	0.76	OK
N+6.65	252	COMDER1 MIN	-0.049	-0.0155	0.02427	0.76	OK
N+6.65	252	COMDER2 MAX	0.0164	0.0466	0.02190	0.68	OK
N+6.65	252	COMDER2 MIN	-0.0164	-0.0466	0.02190	0.68	OK
N+3.45	252	COMDER1 MAX	0.0257	0.0087	0.02713	0.79	OK
N+3.45	252	COMDER1 MIN	-0.0257	-0.0087	0.02713	0.79	OK
N+3.45	252	COMDER2 MAX	0.0087	0.0261	0.02751	0.80	OK
N+3.45	252	COMDER2 MIN	-0.0087	-0.0261	0.02751	0.80	OK
BASE	252	COMDER1 MAX	0	0	--	--	--
BASE	252	COMDER1 MIN	0	0	--	--	--
BASE	252	COMDER2 MAX	0	0	--	--	--
BASE	252	COMDER2 MIN	0	0	--	--	--
N+6.65	253	COMDER1 MAX	0.049	0.0155	0.02427	0.76	OK
N+6.65	253	COMDER1 MIN	-0.049	-0.0155	0.02427	0.76	OK
N+6.65	253	COMDER2 MAX	0.0164	0.0466	0.02190	0.68	OK
N+6.65	253	COMDER2 MIN	-0.0164	-0.0466	0.02190	0.68	OK
N+3.45	253	COMDER1 MAX	0.0257	0.0087	0.02713	0.79	OK
N+3.45	253	COMDER1 MIN	-0.0257	-0.0087	0.02713	0.79	OK
N+3.45	253	COMDER2 MAX	0.0087	0.0261	0.02751	0.80	OK
N+3.45	253	COMDER2 MIN	-0.0087	-0.0261	0.02751	0.80	OK
BASE	253	COMDER1 MAX	0	0	--	--	--
BASE	253	COMDER1 MIN	0	0	--	--	--
BASE	253	COMDER2 MAX	0	0	--	--	--
BASE	253	COMDER2 MIN	0	0	--	--	--
N+6.65	254	COMDER1 MAX	0.049	0.0155	0.02427	0.76	OK
N+6.65	254	COMDER1 MIN	-0.049	-0.0155	0.02427	0.76	OK
N+6.65	254	COMDER2 MAX	0.0164	0.0466	0.02190	0.68	OK
N+6.65	254	COMDER2 MIN	-0.0164	-0.0466	0.02190	0.68	OK
N+3.45	254	COMDER1 MAX	0.0257	0.0087	0.02713	0.79	OK
N+3.45	254	COMDER1 MIN	-0.0257	-0.0087	0.02713	0.79	OK
N+3.45	254	COMDER2 MAX	0.0087	0.0261	0.02751	0.80	OK
N+3.45	254	COMDER2 MIN	-0.0087	-0.0261	0.02751	0.80	OK
BASE	254	COMDER1 MAX	0	0	--	--	--
BASE	254	COMDER1 MIN	0	0	--	--	--
BASE	254	COMDER2 MAX	0	0	--	--	--
BASE	254	COMDER2 MIN	0	0	--	--	--
N+6.65	255	COMDER1 MAX	0.049	0.0155	0.02427	0.76	OK
N+6.65	255	COMDER1 MIN	-0.049	-0.0155	0.02427	0.76	OK
N+6.65	255	COMDER2 MAX	0.0164	0.0466	0.02190	0.68	OK
N+6.65	255	COMDER2 MIN	-0.0164	-0.0466	0.02190	0.68	OK
N+3.45	255	COMDER1 MAX	0.0257	0.0087	0.02713	0.79	OK
N+3.45	255	COMDER1 MIN	-0.0257	-0.0087	0.02713	0.79	OK
N+3.45	255	COMDER2 MAX	0.0087	0.0261	0.02751	0.80	OK
N+3.45	255	COMDER2 MIN	-0.0087	-0.0261	0.02751	0.80	OK
BASE	255	COMDER1 MAX	0	0	--	--	--
BASE	255	COMDER1 MIN	0	0	--	--	--
BASE	255	COMDER2 MAX	0	0	--	--	--
BASE	255	COMDER2 MIN	0	0	--	--	--

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA-ESCALERA

CÁLCULO DE DERIVAS MÁXIMAS (ESPECTRO DE UMBRAL DE DAÑO)

ALTURA DE N+6.65	3.20	m
ALTURA DE N+3.45	3.45	m
ALTURA DE BASE	0.00	m
ALTURA DE	0.00	m
ALTURA DE	0.00	m
ALTURA DE	0.00	m

Deriva Máxima Permitida **0.40** **%**

Nivel	Punto	COMBINACIÓN DE CARGA	DESPLAZAMIENTOS FUERZA SÍSMICA		Deriva Δ	Deriva Δ	Observación
			Desplazamiento X	Desplazamiento Y	*m*	*%*	
N+6.65	252	COMDERUMB1 MAX	0.01020	0.00320	0.00500	0.16	OK
N+6.65	252	COMDERUMB1 MIN	-0.01020	-0.00320	0.00500	0.16	OK
N+6.65	252	COMDERUMB2 MAX	0.00340	0.00970	0.00459	0.14	OK
N+6.65	252	COMDERUMB2 MIN	-0.00340	-0.00970	0.00459	0.14	OK
N+3.45	252	COMDERUMB1 MAX	0.00540	0.00180	0.00569	0.16	OK
N+3.45	252	COMDERUMB1 MIN	-0.00540	-0.00180	0.00569	0.16	OK
N+3.45	252	COMDERUMB2 MAX	0.00180	0.00540	0.00569	0.16	OK
N+3.45	252	COMDERUMB2 MIN	-0.00180	-0.00540	0.00569	0.16	OK
BASE	252	COMDERUMB1 MAX	0.00000	0.00000	--	--	--
BASE	252	COMDERUMB1 MIN	0.00000	0.00000	--	--	--
BASE	252	COMDERUMB2 MAX	0.00000	0.00000	--	--	--
BASE	252	COMDERUMB2 MIN	0.00000	0.00000	--	--	--
N+6.65	253	COMDERUMB1 MAX	0.01020	0.00320	0.00500	0.16	OK
N+6.65	253	COMDERUMB1 MIN	-0.01020	-0.00320	0.00500	0.16	OK
N+6.65	253	COMDERUMB2 MAX	0.00340	0.00970	0.00459	0.14	OK
N+6.65	253	COMDERUMB2 MIN	-0.00340	-0.00970	0.00459	0.14	OK
N+3.45	253	COMDERUMB1 MAX	0.00540	0.00180	0.00569	0.16	OK
N+3.45	253	COMDERUMB1 MIN	-0.00540	-0.00180	0.00569	0.16	OK
N+3.45	253	COMDERUMB2 MAX	0.00180	0.00540	0.00569	0.16	OK
N+3.45	253	COMDERUMB2 MIN	-0.00180	-0.00540	0.00569	0.16	OK
BASE	253	COMDERUMB1 MAX	0.00000	0.00000	--	--	--
BASE	253	COMDERUMB1 MIN	0.00000	0.00000	--	--	--
BASE	253	COMDERUMB2 MAX	0.00000	0.00000	--	--	--
BASE	253	COMDERUMB2 MIN	0.00000	0.00000	--	--	--
N+6.65	254	COMDERUMB1 MAX	0.01020	0.00320	0.00500	0.16	OK
N+6.65	254	COMDERUMB1 MIN	-0.01020	-0.00320	0.00500	0.16	OK
N+6.65	254	COMDERUMB2 MAX	0.00340	0.00970	0.00459	0.14	OK
N+6.65	254	COMDERUMB2 MIN	-0.00340	-0.00970	0.00459	0.14	OK
N+3.45	254	COMDERUMB1 MAX	0.00540	0.00180	0.00569	0.16	OK
N+3.45	254	COMDERUMB1 MIN	-0.00540	-0.00180	0.00569	0.16	OK
N+3.45	254	COMDERUMB2 MAX	0.00180	0.00540	0.00569	0.16	OK
N+3.45	254	COMDERUMB2 MIN	-0.00180	-0.00540	0.00569	0.16	OK
BASE	254	COMDERUMB1 MAX	0.00000	0.00000	--	--	--
BASE	254	COMDERUMB1 MIN	0.00000	0.00000	--	--	--
BASE	254	COMDERUMB2 MAX	0.00000	0.00000	--	--	--
BASE	254	COMDERUMB2 MIN	0.00000	0.00000	--	--	--
N+6.65	255	COMDERUMB1 MAX	0.01020	0.00320	0.00500	0.16	OK
N+6.65	255	COMDERUMB1 MIN	-0.01020	-0.00320	0.00500	0.16	OK
N+6.65	255	COMDERUMB2 MAX	0.00340	0.00970	0.00459	0.14	OK
N+6.65	255	COMDERUMB2 MIN	-0.00340	-0.00970	0.00459	0.14	OK
N+3.45	255	COMDERUMB1 MAX	0.00540	0.00180	0.00569	0.16	OK
N+3.45	255	COMDERUMB1 MIN	-0.00540	-0.00180	0.00569	0.16	OK
N+3.45	255	COMDERUMB2 MAX	0.00180	0.00540	0.00569	0.16	OK
N+3.45	255	COMDERUMB2 MIN	-0.00180	-0.00540	0.00569	0.16	OK
BASE	255	COMDERUMB1 MAX	0.00000	0.00000	--	--	--
BASE	255	COMDERUMB1 MIN	0.00000	0.00000	--	--	--
BASE	255	COMDERUMB2 MAX	0.00000	0.00000	--	--	--
BASE	255	COMDERUMB2 MIN	0.00000	0.00000	--	--	--

4. DISEÑO DE CIMENTACIÓN

DISEÑO DE CIMENTACIÓN

PROYECTO: INSTITUCIÓN EDUCATIVA MARCELO MIRANDA-ESCALERA
ELECCIÓN DE CARGAS PARA DISEÑO DE CIMENTACIÓN

Combinaciones de carga

		NSR-10	**F.S.**
Cargas Gravitacionales:	CIMEN= 1D + 1L	B.2.3-2	**3.00**
Cargas por Estado Límite de Servicio	CIMEN2= 1D + 0.75L + 0.70*(0.75/R)Ex + 0.21*(0.75/R)Ey	**B.2.3-8**	**1.50**
	CIMEN3= 1D + 0.75L + 0.21*(0.75/R)Ex + 0.70*(0.75/R)Ey		

Story	Point	Load	FX	FY	FZ	MX	MY	MZ	Load	COMBINACIÓN	Pumax
BASE	252	CIM1	12.490	-5.810	172.610	6.551	14.084	0.000	CIM1		
BASE	252	CIM2 MAX	16.070	-4.030	161.370	9.301	22.784	0.095	CIM2 MAX		
BASE	252	CIM2 MIN	8.620	-6.860	154.290	2.984	5.064	-0.095	CIM2 MIN	CIM1	172.6
BASE	252	CIM3 MAX	13.610	-1.190	162.520	15.668	16.907	0.123	CIM3 MAX		
BASE	252	CIM3 MIN	11.090	-9.710	153.140	-3.383	10.941	-0.123	CIM3 MIN		
BASE	253	CIM1	-12.490	-5.810	172.610	6.551	-14.084	0.000	CIM1		
BASE	253	CIM2 MAX	-8.620	-4.030	161.370	9.301	-5.064	0.095	CIM2 MAX		
BASE	253	CIM2 MIN	-16.070	-6.860	154.290	2.984	-22.784	-0.095	CIM2 MIN	CIM1	172.6
BASE	253	CIM3 MAX	-11.090	-1.190	162.520	15.668	-10.941	0.123	CIM3 MAX		
BASE	253	CIM3 MIN	-13.610	-9.710	153.140	-3.383	-16.907	-0.123	CIM3 MIN		
BASE	254	CIM1	12.490	5.810	172.610	-6.551	14.084	0.000	CIM1		
BASE	254	CIM2 MAX	16.070	6.860	161.370	-2.984	22.784	0.095	CIM2 MAX		
BASE	254	CIM2 MIN	8.620	4.030	154.290	-9.301	5.064	-0.095	CIM2 MIN	CIM1	172.6
BASE	254	CIM3 MAX	13.610	9.710	162.520	3.383	16.907	0.123	CIM3 MAX		
BASE	254	CIM3 MIN	11.090	1.190	153.140	-15.668	10.941	-0.123	CIM3 MIN		
BASE	255	CIM1	-12.490	5.810	172.610	-6.551	-14.084	0.000	CIM1		
BASE	255	CIM2 MAX	-8.620	6.860	161.370	-2.984	-5.064	0.095	CIM2 MAX		
BASE	255	CIM2 MIN	-16.070	4.030	154.290	-9.301	-22.784	-0.095	CIM2 MIN	CIM1	172.6
BASE	255	CIM3 MAX	-11.090	9.710	162.520	3.383	-10.941	0.123	CIM3 MAX		
BASE	255	CIM3 MIN	-13.610	1.190	153.140	-15.668	-16.907	-0.123	CIM3 MIN		

DISEÑO VIGAS DE AMARRE

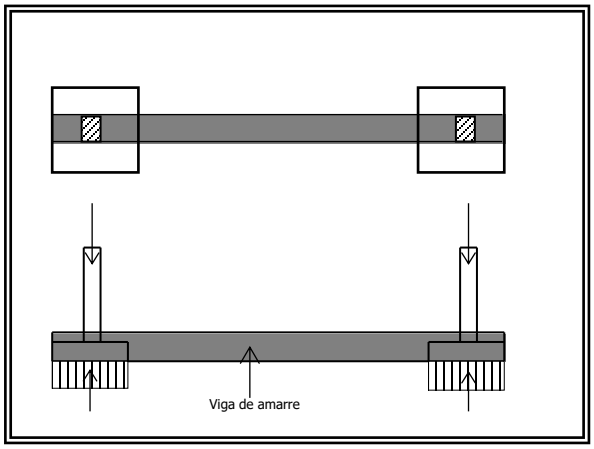
PROYECTO: INSTITUCIÓN EDUCATIVA MARCELO MIRANDA-ESCALERA

VIGA DE AMARRE TIPO

f'c = **21.1** MPa
fy = **420** MPa

b = **0.40** m
h = **0.40** m

Pmáx = 172.61 kN



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

Aa = ***0.20***
Paxial = 0.25*Aa*Pmáx
Paxial = *6.5* kN

DISEÑO A TENSIÓN

As = 1.7*6.472875/(0.90*420)
As = **0.29** cm^2

DISEÑO A COMPRESIÓN

P com = 1.7*6.472875
P com = *11.0* kN

Para esta carga la sección requiere cuantía mínima:

As = 0.00333*0.4*0.35
As = **4.66** cm^2

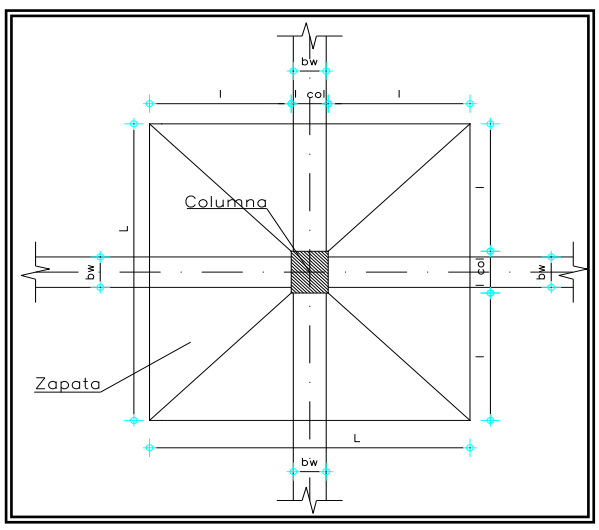
Se suministra un refuerzo constituido por 4#4 arriba y abajo (como refuerzo mínimo).

PROYECTO: INSTITUCIÓN EDUCATIVA MARCELO MIRANDA-ESCALERA

ZAPATA TIPO 7 (4 Und).

Columna	**b =**	**40**	cm	**f'c =**	**21.1**	MPa	**σ =**	**0.158**	MPa
	t =	**40**	cm	**fy =**	**420**	MPa			

PREDIMENSIONAMIENTO



L =	1.20	m	
lcol =	0.40	m	
l =	0.40	m	

Cargas

Mu=	**0.00**	kN*m
Pu =	**172.60**	kN
Pp (10%) =	17.26	kN
Σ P =	189.86	kN

Area necesaria = $\frac{\Sigma P}{\sigma} = \frac{189.86}{0.158} =$ 1.20 m²

e =	0.00	m
L =	1.10	m

Aproximamos = **1.20** m

Carga de diseño = $\frac{Pu}{A\ real} = \frac{172.6}{1.440} =$ 0.120 MPa

Esfuerzos

σmáx=	0.132	MPa	**OK**
σmin=	0.132	MPa	**OK**

DISEÑO DE ZAPATA CONCENTRICA

FLEXIÓN

M borde de la columna = 10.55 kN*m

Mu = 1,7 * M borde de la columna = 17.93 kN*m

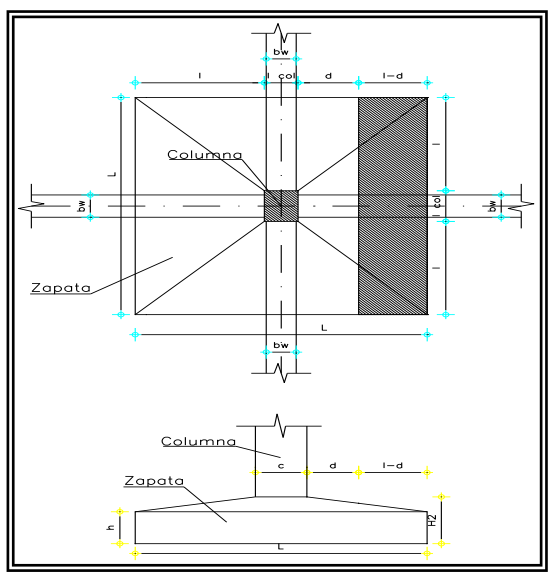
Con el criterio de calcular el refuerzo por metro lineal utilizamos una altura efectiva igual a:

d=	0.23	m
Cuantia =	0.0020	
As =	4.60	cm²/m

Armadura: **7#415c./0.20**

en ambos sentidos

CORTANTE



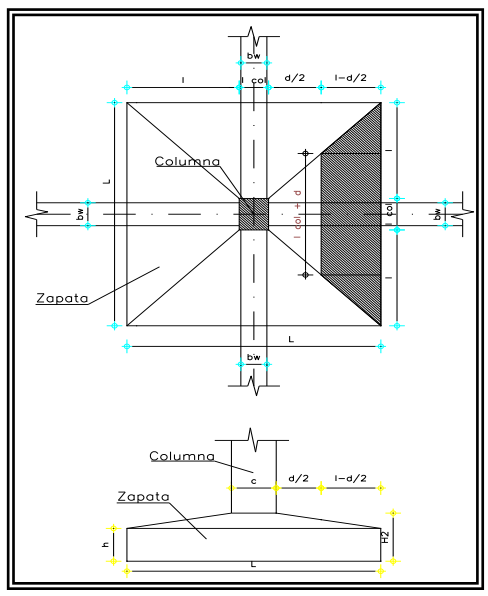
a. En una dirección (d)

L =	1.20	m	**H =**	**0.30**	m
l =	0.40	m	**h =**	**0.30**	m
l - d =	0.17	m	**H-h =**	0.00	m

V (d) =	26.90	kN
Vu (d)=	1.7*V(d)	
Vu (d) =	45.72	kN
h´=	0.23	m

$\upsilon\nu = \frac{Vu}{L * h'} =$ 0.166 MPa

ϕνc = 0.574 MPa **OK**



b. En dos direcciones (d/2)

ZAPATA TIPO 7 (4 Und).

L =	1.20	m	**H =**	**0.30**	m
d/2 =	0.12	m	**h =**	**0.30**	m
l - d/2 =	0.29	m	**H-h =**	0.00	m
V (d/2) =	34.4	kN			
Vu (d/2) =	1.5*V(d)				
Vu (d/2) =	51.6	kN			
d_1 =	0.23	m			

$$\nu u = \frac{Vu}{bo \times d_1} = 0.356 \text{ MPa}$$

$\phi\nu c$= 1.15 MPa **OK**

5. DISEÑO DE VIGAS, VIGUETAS, COLUMNAS Y PANTALLAS

DISEÑO DE VIGAS, VIGUETAS, COLUMNAS Y PANTALLAS

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA-ESCALERA

VCE-101/N+3.45

B=0.25 H=0.40 L=6.17		
Mu=-130.51 As =12.83 As(r)=11.91		Mu=-130.51 As =12.83 As(r)=11.91
	Mu=64.70 As =6.81 As(r)=5.33	
Vu=-84.01	Vu=13.36	Vu=84.01

VCE-102/N+3.45

B=0.25 H=0.40 L=6.17		
Mu=-130.51 As =12.83 As(r)=11.91		Mu=-130.51 As =12.83 As(r)=11.91
	Mu=64.70 As =6.81 As(r)=5.33	
Vu=-84.01	Vu=13.36	Vu=84.01

VCE-103/N+3.45

B=0.25 H=0.40 L=4.10		
Mu=-86.96 As =8.55 As(r)=7.39		Mu=-86.96 As =8.55 As(r)=7.39
	Mu=27.24 As =5.94 As(r)=2.85	
Vu=-63.26	Vu=24.91	Vu=63.26

VCE-104/N+3.45

B=0.25 H=0.40 L=4.10		
Mu=-86.96 As =8.55 As(r)=7.39		Mu=-86.96 As =8.55 As(r)=7.39
	Mu=27.24 As =5.94 As(r)=2.85	
Vu=-63.26	Vu=24.91	Vu=63.26

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA-ESCALERA

VCE-201/N+6.65

B=0.25 H=0.40 L=6.17		
Mu=-76.13 As =6.81 As(r)=6.37		Mu=-76.13 As =6.81 As(r)=6.37
	Mu=47.20 As =5.94 As(r)=3.81	
Vu=-71.36	Vu=8.27	Vu=71.36

VCE-202/N+6.65

B=0.25 H=0.40 L=6.17		
Mu=-76.13 As =6.81 As(r)=6.37		Mu=-76.13 As =6.81 As(r)=6.37
	Mu=47.20 As =5.94 As(r)=3.81	
Vu=-71.36	Vu=8.27	Vu=71.36

VCE-203/N+6.65

B=0.25 H=0.40 L=4.10		
Mu=-35.26 As =5.23 As(r)=2.85		Mu=-35.26 As =5.23 As(r)=2.85
	Mu=8.82 As =3.81 As(r)=2.85	
Vu=-19.73	Vu=13.25	Vu=19.73

VCE-204/N+6.65

B=0.25 H=0.40 L=4.10		
Mu=-35.26 As =5.23 As(r)=2.85		Mu=-35.26 As =5.23 As(r)=2.85
	Mu=8.82 As =3.81 As(r)=2.85	
Vu=-19.73	Vu=13.25	Vu=19.73

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA-ESCALERA

Columnas F'-3, G-3, F'-5, G-5

Nivel	H Libre	Losa	B	H	M1	M2	P	V1	V2	Cuantia	m/mr	Col/Vig Eje ppal	Col/vig Eje sec
N+6.65					76.28	4.56				16/#4 (1.3%)	0.61	1.78	2.26
	2.80	.40	.40	.40			-58.23	43.13	19.24				
					-62.90	17.15				16/#4 (1.3%)	0.52		
N+3.45					70.99	0.34				16/#4 (1.3%)	0.52	2.13	2.89
	3.05	.40	.40	.40			-162.47	48.96	45.69				
		1.00			15.48	91.80				16/#4 (1.3%)	0.75		

6. DISEÑO DE ELEMENTOS COMPLEMENTARIOS

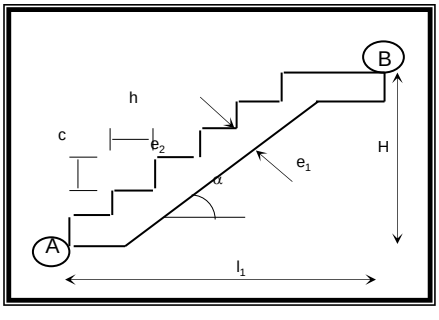
DISEÑO DE ELEMENTOS
COMPLEMENTARIOS

PROYECTO: INSTITUCION EDUCATIVA MARCELO MIRANDA

DISEÑO DE ESCALERA TIPO

Diseño Tramos Inclinados

El diseño se realiza para el tramo inclinado de la escalera mas largo; en los pisos superiores



Geometría de la losa

l_1 =	**6.52**	m	fy =	**420**	MPa
H =	**1.58**	m	f'c =	**21.1**	MPa
c =	**0.18**	cm	h =	**30**	cm

Espesor escogido: **15** **cm**
Pendiente α = h/l1 : 13.269 °

Cargas

Peso propio de la losa	0.15x100x24/cos38.21º	3.70	kN/m²
Peso propio de peldaños	1/2x(0.18x0.30)/0.28x24	0.02	kN/m²
Acabado peldaños	0.04x(0.18+0.30)/0.28x22	0.89	kN/m²
Afinado Inferior	0.02x22/cos38.21º	0.45	kN/m²
Sobrecarga		5.00	kN/m²
		14.07	**kN/m²**

CU = ***14.07*** **kN/m²**

Diseño Tramo Inclinado

Momentos en tramo A-B. M= **74.76** kN-m

Cuantía: 0.0150 Asmín = 2.4 cm²/m
As 22.51 cm²/m *Colocar #4 c/.20 longitudinalmente*
Colocar #4 c/.20 transversalmente

MODULO ESCALERAS 1.0
DISEÑO DE ESCALERAS EN CONCRETO

GRUPO 10
I.E MARCELO MIRANDA

FECHA : 2017/01/11

ESCALERAS AUTOPORTANTES

GEOMETRIA

Longitud Horizontal del Tramo Inclinado LH (m)	3
Altura Vertical Tramo Inclinado H (m)	1.58
Separac Horizontal entre las 2 escaleras SH (m)	.2
Espesor de Placa de la Escalera, h. (m)	.2
Espes Placa Descans (m)	0.2
Ancho Total Escalera (m)	4
Longitud de Huella (cm)	30
Altura Contrahuella (cm)	18

MATERIALES

F´c Concreto (kg/cm2)	210
Fy Acer Long (kg/cm2)	4200
Mód Elást Ec(kg/cm2)	1.82E5
Recubrimiento d` (cm)	5

Sobrecarga . Cargas Servicio Diametro Armad Princp

C Muerta Acab(t/m2)	0.1
Carga Viva (t/m2)	0.5

Fuerza de Restricción	65.73 t
Momento de Restricc	33.39 t-m
Fuerza Axial Máxima	111.66 t
Wu Descanso	6.65 t/m
Wu Tramo Inclinado	8.54 t/m

RESULTADOS

Diseño Descanso: Tramo Interior O-B:L= 2.1 m Diseño Descanso: Tramo Exterior B-C:L= 2 m

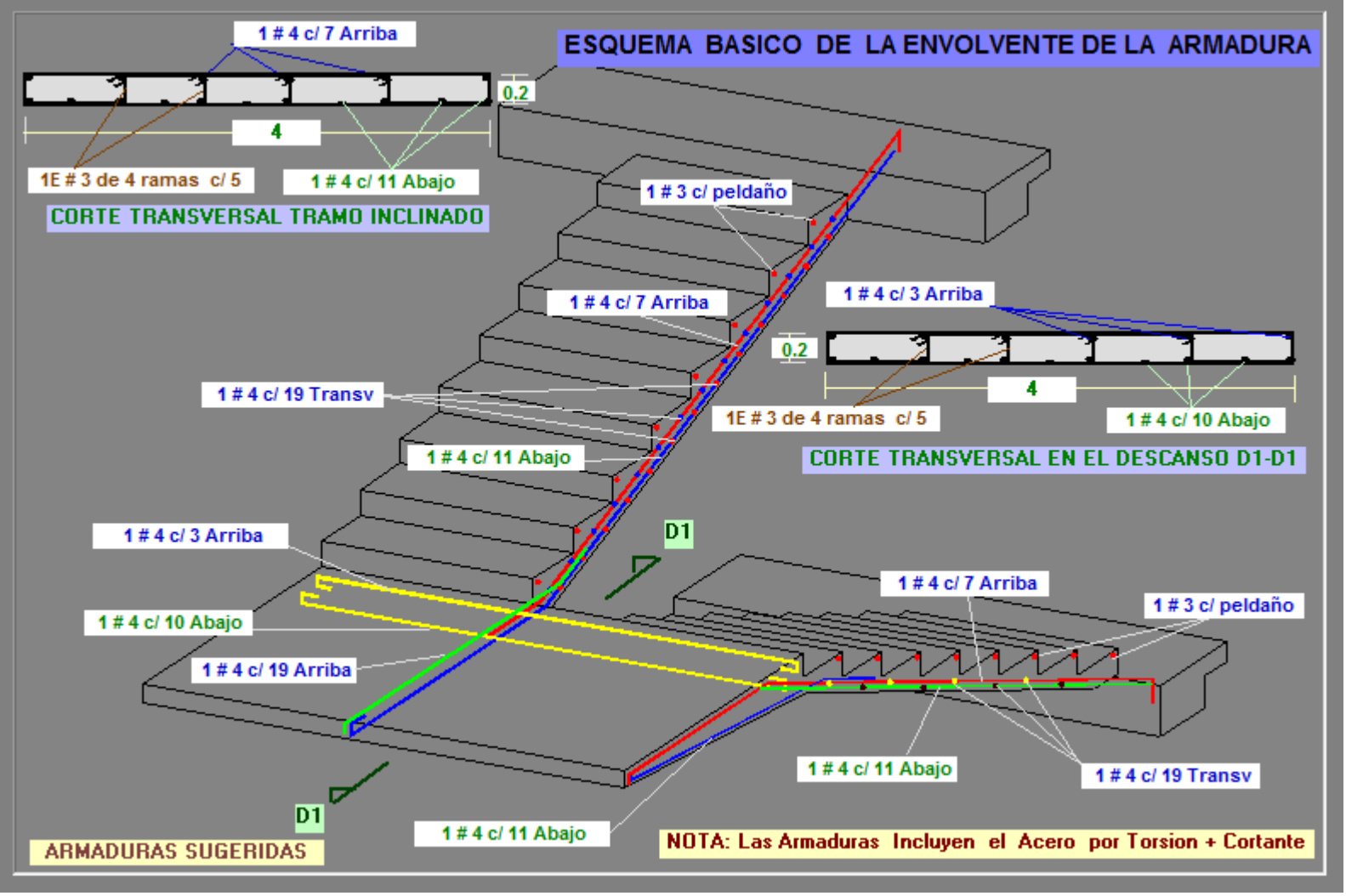
Y (m)	Momento Mu(v)(t-m)	As,A's (cm2)	Momento Mu(h)(t-m)	As,A's (cm2)	Mom Tors Tu(t-m)	Flejes Tu + Vu	As Torsión (cm2)
0	-33.39	67.94 , 0	0	26.33 , 0	0	1E#3a15	36.37
0.42	-34.14	69.76 , 0	-27.61	26.33 , 0	7.18	1E#3a15	18.73
0.84	-36.41	75.34 , 0	-55.21	26.33 , 0	14.35	1E#3a13	37.46
1.26	-40.17	85.03 , 0	-82.82	26.33 , 0	21.53	1E#3a9	56.18
1.68	-45.45	99.24 , 16.47	-110.43	26.33 , 0	28.71	1E#3a7	74.91
2.1	-52.23	116.96 , 129.38	-138.04	26.33 , 0	35.88	1E#3a5	93.64
2.1	-17.09	32.17 , 0	0	26.33 , 0	-34.17	1E#3a5	89.18
2.5	-10.94	20.08 , 0	0	26.33 , 0	-27.34	1E#3a7	71.34
2.9	-6.15	20 , 0	0	26.33 , 0	-20.5	1E#3a10	53.51
3.3	-2.73	20 , 0	0	26.33 , 0	-13.67	1E#3a15	35.67
3.7	-0.68	20 , 0	0	26.33 , 0	-6.83	1E#3a15	18.53
4.1	0	20 , 0	0	26.33 , 0	0	1E#3a15	36.37

RESULTADOS

Diseño Tramo Inclinado B-A de la Escalera. 2 Tramos Simétr.:L= 3.391 m

X (m)	Momento Mu(v)(t-m)	As,A's (cm2)	Momento Mu(h)(t-m)	As,A's (cm2)	Mom Tors Tu(t-m)	Flejes Tu + Vu	Cortante Vu (t)	As Torsión (cm2)
0	-54.51	122.97 , 18.46	-34.96	26.33 , 0	-34.78	1E#3a5	0.36	90.76
0.424	-52.35	117.29 , 13.15	-21.45	26.33 , 0	-34.78	1E#3a5	9.19	90.76
0.848	-51.39	114.77 , 11.12	-7.96	26.33 , 0	-34.78	1E#3a5	18.01	90.76
1.271	-51.64	115.41 , 11.68	5.54	26.33 , 0	-34.78	1E#3a5	26.83	90.76
1.695	-53.08	119.2 , 14.96	19.05	26.33 , 0	-34.78	1E#3a5	35.66	90.76

X (m)	Momento Mu(v)(t-m)	As,A's (cm2)	Momento Mu(h)(t-m)	As,A's (cm2)	Mom Tors Tu(t-m)	Flejes Tu + Vu	Cortante Vu (t)	As Torsión (cm2)
2.119	-55.73	126.18 , 22.48	-140.96	26.33 , 0	-34.78	1E#3a5	44.48	90.76
2.543	-59.57	26.33 , 0	-140.96	26.33 , 0	-34.78	1E#3a5	53.3	90.76
2.967	-64.62	26.33 , 0	-140.96	26.33 , 0	-34.78	1E#3a5	62.12	90.76
3.391	-70.87	26.33 , 0	-140.96	26.33 , 0	-34.78	1E#3a5	70.95	90.76


ESQUEMA BASICO DE LA ENVOLVENTE DE LA ARMADURA
1 # 4 c/ 7 Arriba
0.2
4
1E # 3 de 4 ramas c/ 5
1 # 4 c/ 11 Abajo
CORTE TRANSVERSAL TRAMO INCLINADO
1 # 3 c/ peldaño
1 # 4 c/ 7 Arriba
1 # 4 c/ 3 Arriba
0.2
4
1 # 4 c/ 19 Transv
1E # 3 de 4 ramas c/ 5
1 # 4 c/ 10 Abajo
1 # 4 c/ 11 Abajo
CORTE TRANSVERSAL EN EL DESCANSO D1-D1
1 # 4 c/ 3 Arriba
D1
1 # 4 c/ 7 Arriba
1 # 3 c/ peldaño
1 # 4 c/ 10 Abajo
1 # 4 c/ 19 Arriba
1 # 4 c/ 11 Abajo
1 # 4 c/ 19 Transv
D1
1 # 4 c/ 11 Abajo
ARMADURAS SUGERIDAS
NOTA: Las Armaduras Incluyen el Acero por Torsion + Cortante

Memorias de Cálculo

PROGRAMA DE DISENO Y CALCULO ESTRUCTURAL
ARQUIMET 2.0

Proyecto: _____ Fecha: _____

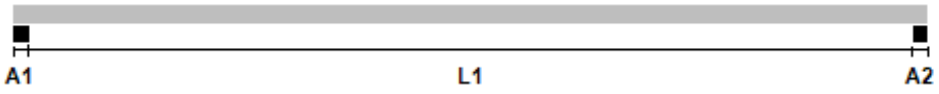
Ingeniero: _____ Firma: _____

Elementos calculados con el programa de diseño Arquimet 2.0 de ACESCO

REPORTE DE CORREAS

PHR C con atiesador 355 x 110 x 25 (2.50 mm)
con Fy = 35.15 Kgf/mm² cada 1.70 m sin arriostramiento interior.

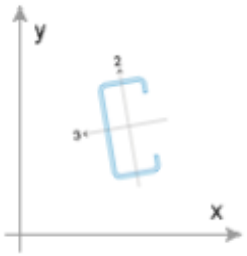
SECCION LONGITUDINAL



L1	6.00 m
A1	0.10 m
A2	0.10 m

CONFIGURACION	
TIPO DE CARGA	DISTRIBUIDA
Carga muerta	0.30 KN/m²
Peso propio correa	0.12 KN/m
Carga viva	0.50 KN/m²
Carga granizo	0.50 KN/m²
Viento compresión (Perpendicular)	0.40 KN/m²
Viento succión (Perpendicular)	0.40 KN/m²
Pendiente sección transversal	10° = 17.6330%

SECCION TRANSVERSAL



L = 1.70 m

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)	43.8606	7.5356	19.4088	6.2714
Calculado (KN.m)	1.7162E-06	5.3630E-08	11.2544	1.7056

REPORTE CORTANTE		
Ejes locales	2	3
Resistente (KN)	42.8651	93.3378
Calculado (KN)	7.3648	1.1161

REPORTE DEFLEXION		
Deflexiones máximas	Instantanea	Permanente
Admisible (m)	0.0226	0.0000
Calculado (m)	0.0026	0.0000

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

REACCIONES - EJES GLOBALES (KN-m)

Elementos calculados con el programa de diseño Arquimet 2.0 de ACESCO

APOYO 1		
Combinacion	Rx	Ry
Muerta	1.6722E-08	1.9106
Viva de Cub.	9.2297E-08	2.5925
Granizo	9.2297E-08	2.5925
Viento Comp.	-0.3601	2.0425
Viento Succion	0.3601	-2.0425
Comb. 1	-6.9166E-09	2.6749
Comb. 2	5.6480E-08	3.5890
Comb. 3	5.6480E-08	3.5890
Comb. 4	-0.1801	7.4620
Comb. 5	-0.1801	7.4620
Comb. 6	-0.1801	7.4620
Comb. 7	-0.1801	7.4620
Comb. 8	-0.3601	5.6315
Comb. 9	-0.3601	5.6315
Comb. 10	-0.3601	5.6315
Comb. 11	-0.3601	5.6315
Comb. 12	-0.3601	3.7621
Comb. 13	-0.3601	3.7621

APOYO 2		
Combinacion	Rx	Ry
Muerta	-3.5247E-08	1.9106
Viva de Cub.	-8.5322E-08	2.5925
Granizo	-8.5322E-08	2.5925
Viento Comp.	-0.3601	2.0425
Viento Succion	0.3601	-2.0425
Comb. 1	-5.8885E-08	2.6749
Comb. 2	-8.4299E-08	3.5890
Comb. 3	-8.4299E-08	3.5890
Comb. 4	-0.1801	7.4620
Comb. 5	-0.1801	7.4620
Comb. 6	-0.1801	7.4620
Comb. 7	-0.1801	7.4620
Comb. 8	-0.3601	5.6315
Comb. 9	-0.3601	5.6315
Comb. 10	-0.3601	5.6315
Comb. 11	-0.3601	5.6315
Comb. 12	-0.3601	3.7621
Comb. 13	-0.3601	3.7621

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	0.3318	1.8816	-3.8307E-08	7.6614E-07
Viva de Cub.	0.4502	2.5531	3.8307E-08	3.0646E-07
Granizo	0.4502	2.5531	3.8307E-08	3.0646E-07
Viento Comp.	0.0000	2.0740	0.0000	6.1292E-07
Viento Succion	0.0000	2.0740	0.0000	6.1292E-07
Comb. 1	0.4645	2.6343	-5.3630E-08	1.0726E-06
Comb. 2	0.6232	3.5345	-2.6815E-08	1.0726E-06
Comb. 3	0.6232	3.5345	-2.6815E-08	1.0726E-06
Comb. 4	1.1184	7.3799	1.5323E-08	1.7162E-06
Comb. 5	1.1184	7.3799	1.5323E-08	1.7162E-06
Comb. 6	1.1184	7.3799	1.5323E-08	1.7162E-06
Comb. 7	1.1184	7.3799	1.5323E-08	1.7162E-06
Comb. 8	0.6232	5.6085	-2.6815E-08	1.6855E-06
Comb. 9	0.6232	5.6085	-2.6815E-08	1.6855E-06
Comb. 10	0.6232	5.6085	-2.6815E-08	1.6855E-06
Comb. 11	0.6232	5.6085	-2.6815E-08	1.6855E-06
Comb. 12	0.2986	3.7674	-3.4477E-08	1.3024E-06
Comb. 13	0.2986	3.7674	-3.4477E-08	1.3024E-06

APOYO 2				
Combinacion	R2	R3	M2	M3
Muerta	0.3318	1.8816	-3.8307E-08	-4.5969E-07
Viva de Cub.	0.4502	2.5531	3.8307E-08	-9.1937E-07
Granizo	0.4502	2.5531	3.8307E-08	-9.1937E-07
Viento Comp.	0.0000	2.0740	0.0000	6.1292E-07
Viento Succion	0.0000	2.0740	0.0000	6.1292E-07
Comb. 1	0.4645	2.6343	-5.3630E-08	-6.4356E-07
Comb. 2	0.6232	3.5345	-2.6815E-08	-1.0113E-06
Comb. 3	0.6232	3.5345	-2.6815E-08	-1.0113E-06
Comb. 4	1.1184	7.3799	1.5323E-08	-1.7162E-06
Comb. 5	1.1184	7.3799	1.5323E-08	-1.7162E-06
Comb. 6	1.1184	7.3799	1.5323E-08	-1.7162E-06
Comb. 7	1.1184	7.3799	1.5323E-08	-1.7162E-06
Comb. 8	0.6232	5.6085	-2.6815E-08	-3.9840E-07
Comb. 9	0.6232	5.6085	-2.6815E-08	-3.9840E-07
Comb. 10	0.6232	5.6085	-2.6815E-08	-3.9840E-07
Comb. 11	0.6232	5.6085	-2.6815E-08	-3.9840E-07
Comb. 12	0.2986	3.7674	-3.4477E-08	1.9920E-07
Comb. 13	0.2986	3.7674	-3.4477E-08	1.9920E-07

7. DISEÑO DE ELEMENTOS NO ESTRUCTURALES

DISEÑO DE ELEMENTOS NO ESTRUCTURALES

PROYECTO: INSTITUCIÓN EDUCATIVA MARCELO MIRANDA-ESCALERA
DISEÑO DE ELEMENTOS NO ESTRUCTURALES

Units: kN*m

STORY DATA

Story	Height	Elevation	SimilarTo
N+6.65	3.20	6.65	None
N+3.45	3.45	3.45	None
BASE	0.00	0.00	None

CENTER MASS RIGIDITY

Story	Diaphragm	MassX	MassY	XCM	YCM	CumMassX	CumMassY
N+6.65	D1	8.6936	8.6936	3.285	2.25	8.6936	8.6936
N+3.45	D1	34.0491	34.0491	3.285	2.25	42.7428	42.7428

XCCM	YCCM	XCR	YCR
3.285	2.25	3.285	2.25
3.285	2.25	3.285	2.25

STORY SHEARS

Story	Load	Loc	P	VX	VY	T	MX	MY
N+6.65	SISDISX	Top	0	44.9	0	111.128	0	0
N+6.65	SISDISX	Bottom	0	44.9	0	111.128	0	143.681
N+6.65	SISDISY	Top	0	0	47.47	171.539	0	0
N+6.65	SISDISY	Bottom	0	0	47.47	171.539	151.91	0
N+3.45	SISDISX	Top	0	130.61	0	324.486	0	143.681
N+3.45	SISDISX	Bottom	0	130.61	0	324.486	0	585.289
N+3.45	SISDISY	Top	0	0	144.72	524.494	151.91	0
N+3.45	SISDISY	Bottom	0	0	144.72	524.494	643.188	0

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

$$a_x = \frac{C_{vx} V_s}{m_x g} \leq 2.5 A_a$$

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

$$V_s = S_a g M$$

g: 9.81 m/s^2
Sa: 0.984 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

ANALISIS DE CARGAS PARA MUROS

Espesor de muros:	0.15	m
Espesor de pañete en una cara:	0	m
Densidad de mamposteria:	13	kN/m3
Densidad mortero de pañete:	21	kN/m3
Altura Fachada:	3.20	m
Carga	6.24	kN/m
Descripción:	mamposteria reforzada, separada lateralmente de la estructura, apoyada arriba y abajo	
ap:	1.0	
Rp:	6	

ANALISIS DE CARGAS PARA ANTEPECHOS

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

Sección de vigas verticales: 0.15x0.25 m
f'c = 21.1 MPa
fy = 420 MPa

DISEÑO PARA MUROS

Story	Fx	Wx	ax	ap	Rp	Fp	M	V
N+6.65	44.90	8.69	1.968	1.0	6	2.047	2.620	3.275
N+3.45	85.71	34.05	1.968	1.0	6	2.047	2.620	3.275

	Sección Vigas V.			As. (cm2)		Separación column.		Fl. 1/4"
Story	b	d	ρ	neces.	ubicado	S max	S escogida	S estribos
N+6.65	0.15	0.21	0.00095	0.30	0.71	2.36	2.40	0.188
N+3.45	0.15	0.21	0.00095	0.30	0.71	2.36	2.40	0.188

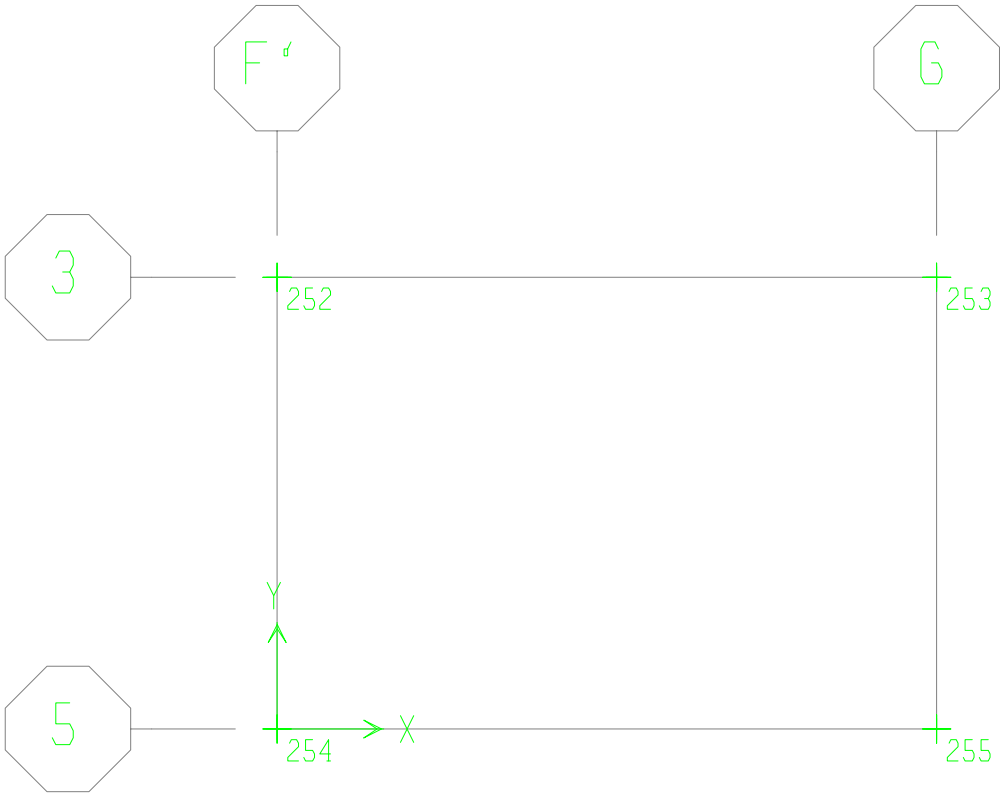
DISEÑO PARA ANTEPECHOS

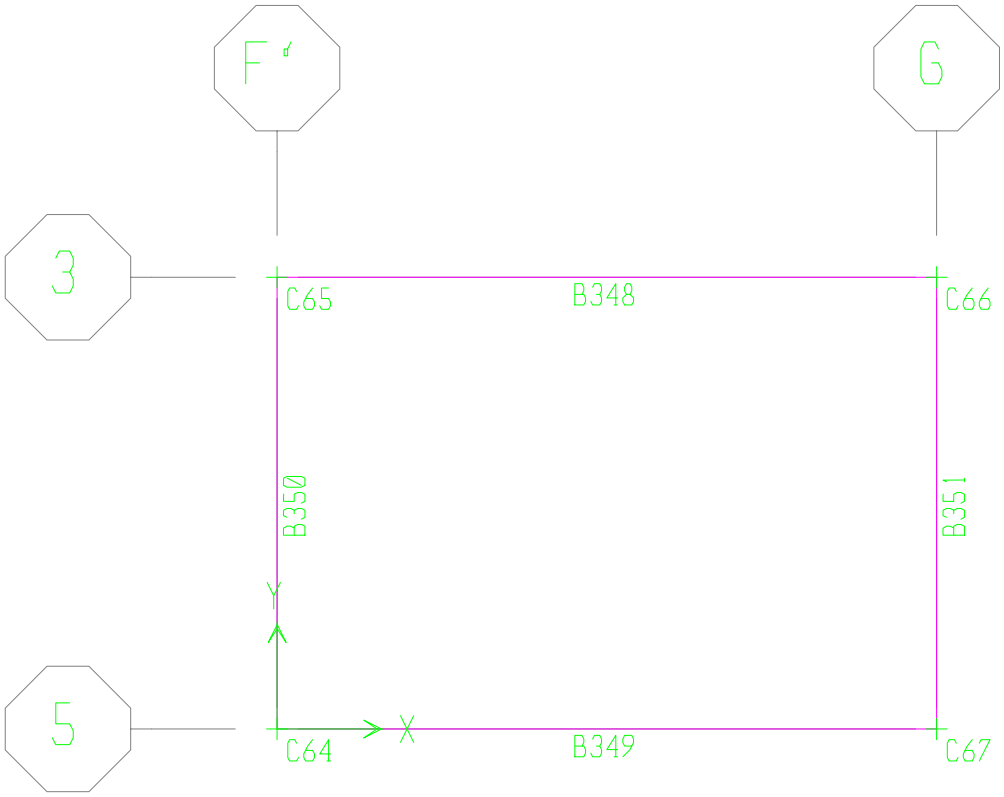
Story	Fx	Wx	ax	ap	Rp	Fp	M	V
N+6.65	44.90	8.69	1.968	2.5	6	5.117	6.550	8.187
N+3.45	85.71	34.05	1.968	2.5	6	5.117	6.550	8.187

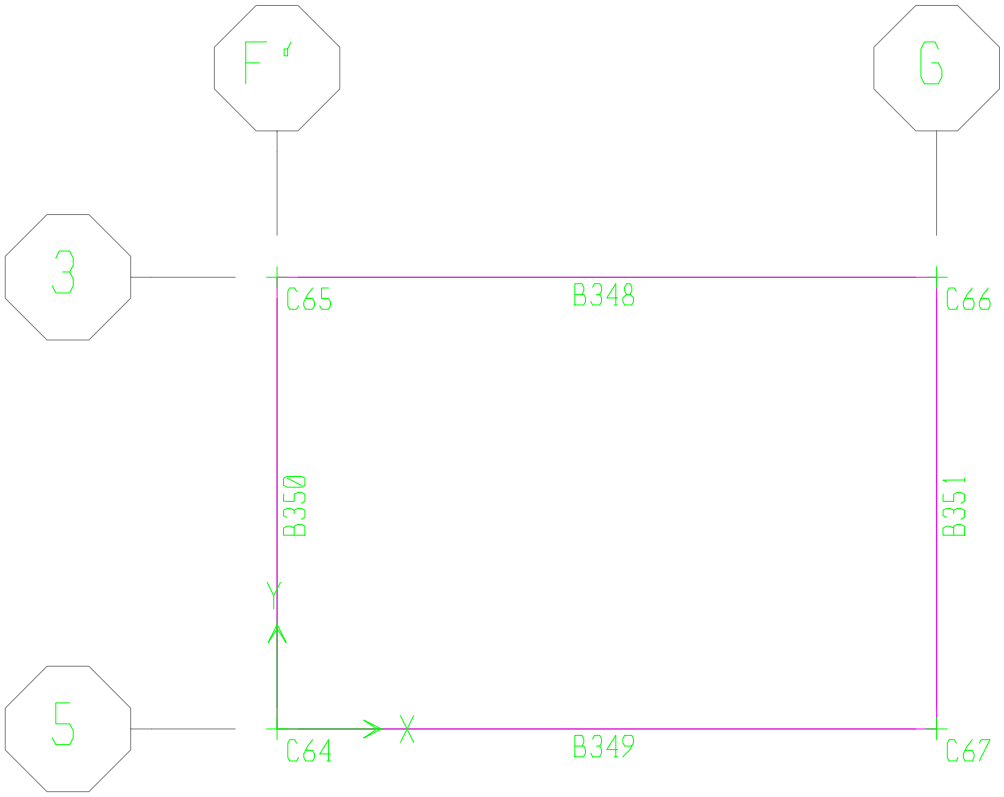
	Sección columneta			As. (cm2)		Separación column.		Fl. 1/4"
Story	b	d	ρ	neces.	ubicado	S max	S escogida	S estribos
N+6.65	0.15	0.21	0.00243	0.76	1.29	1.69	1.70	0.188
N+3.45	0.15	0.21	0.00243	0.76	1.29	1.69	1.70	0.188

8. ANEXOS DE COMPUTADOR

ANEXOS DE COMPUTADOR


F
G
3
252
253
Y
5
254
X
255


F'
G
3
C65
B348
C66
B350
B351
Y
5
X
C64
B349
C67


F
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3
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C65
B348
C66
B350
B351
Y
X
C64
B349
C67

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S T O R Y D A T A

STORY	SIMILAR TO	HEIGHT	ELEVATION
N+6.65	None	3.200	6.650
N+3.45	None	3.450	3.450
BASE	None		0.000

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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
252	0.000	4.500	0.000
253	6.570	4.500	0.000
254	0.000	0.000	0.000
255	6.570	0.000	0.000

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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
C64	254	254	Below
C65	252	252	Below
C66	253	253	Below
C67	255	255	Below

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B E A M C O N N E C T I V I T Y D A T A

BEAM	I END PT	J END PT
B348	252	253
B349	254	255
B350	254	252
B351	255	253

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

STORY	DIAPHRAGM	POINT	POINT	POINT	POINT	POINT
N+6.65	D1	252	253	254	255	
N+3.45	D1	252	253	254	255	

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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
CON21	Iso	Concrete	All	21538000.000	0.2000	9.9000E-06	8974166.667
CON28	Iso	Concrete	All	24870000.000	0.2000	9.9000E-06	10362500.000
A500	Iso	Steel	All	199900000.00	0.3000	1.1700E-05	76884615.38

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
CON21	2.4000E+00	2.4000E+01
CON28	2.4000E+00	2.4000E+01
A500	7.8271E+00	7.6820E+01

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
CON21	No	21000.000	420000.000	420000.000	N/A
CON28	No	28000.000	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
C-50X70	CON21	Rectangular	Yes	
V-20X45	CON21	Rectangular		Yes
V-50X45	CON21	Rectangular		Yes
V-40X45	CON21	Rectangular		Yes
C-40X70	CON21	Rectangular	Yes	
VIG25X40	CON21	Rectangular		Yes
VIG40X40	CON21	Rectangular		Yes
COL40X40	CON21	Rectangular	Yes	

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
C-50X70	0.5000	0.7000	0.0000	0.0000	0.0000	0.0000
V-20X45	0.4500	0.2000	0.0000	0.0000	0.0000	0.0000
V-50X45	0.4500	0.5000	0.0000	0.0000	0.0000	0.0000
V-40X45	0.4500	0.4000	0.0000	0.0000	0.0000	0.0000
C-40X70	0.4000	0.7000	0.0000	0.0000	0.0000	0.0000
VIG25X40	0.4000	0.2500	0.0000	0.0000	0.0000	0.0000
VIG40X40	0.4000	0.4000	0.0000	0.0000	0.0000	0.0000
COL40X40	0.4000	0.4000	0.0000	0.0000	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 I33	MOMENTS OF INERTIA I22	SHEAR AREAS A2	SHEAR AREAS A3
C-50X70	0.3500	0.0163	0.0073	0.0143	0.2917	0.2917
V-20X45	0.0900	0.0009	0.0015	0.0003	0.0750	0.0750
V-50X45	0.2250	0.0070	0.0038	0.0047	0.1875	0.1875
V-40X45	0.1800	0.0045	0.0030	0.0024	0.1500	0.1500
C-40X70	0.2800	0.0096	0.0037	0.0114	0.2333	0.2333
VIG25X40	0.1000	0.0013	0.0013	0.0005	0.0833	0.0833
VIG40X40	0.1600	0.0036	0.0021	0.0021	0.1333	0.1333
COL40X40	0.1600	0.0036	0.0021	0.0021	0.1333	0.1333

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 S33	SECTION MODULI S22	PLASTIC MODULI Z33	PLASTIC MODULI Z22	RADIUS OF GYRATION R33	RADIUS OF GYRATION R22
C-50X70	0.0292	0.0408	0.0438	0.0613	0.1443	0.2021
V-20X45	0.0068	0.0030	0.0101	0.0045	0.1299	0.0577
V-50X45	0.0169	0.0188	0.0253	0.0281	0.1299	0.1443
V-40X45	0.0135	0.0120	0.0203	0.0180	0.1299	0.1155
C-40X70	0.0187	0.0327	0.0280	0.0490	0.1155	0.2021
VIG25X40	0.0067	0.0042	0.0100	0.0063	0.1155	0.0722
VIG40X40	0.0107	0.0107	0.0160	0.0160	0.1155	0.1155
COL40X40	0.0107	0.0107	0.0160	0.0160	0.1155	0.1155

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

	TOTAL	TOTAL

FRAME SECTION NAME	WEIGHT	MASS
C-50X70	0.0000	0.0000
V-20X45	0.0000	0.0000
V-50X45	0.0000	0.0000
V-40X45	0.0000	0.0000
C-40X70	0.0000	0.0000
VIG25X40	106.2720	10.6272
VIG40X40	0.0000	0.0000
COL40X40	102.1440	10.2144

C O N C R E T E C O L U M N D A T A

FRAME SECTION NAME	REINF CONFIGURATION LONGIT	LATERAL	REINF SIZE/TYPE	NUM BARS 3DIR/2DIR	NUM BARS CIRCULAR	BAR COVER
C-50X70	Rectangular	Ties	#8/Design	7/5	N/A	0.0500
C-40X70	Rectangular	Ties	#8/Design	7/4	N/A	0.0500
COL40X40	Rectangular	Ties	#8/Check	4/4	N/A	0.0500

C O N C R E T E B E A M D A T A

FRAME SECTION NAME	TOP COVER	BOT COVER	TOP LEFT AREA	TOP RIGHT AREA	BOT LEFT AREA	BOT RIGHT AREA
V-20X45	0.0500	0.0500	0.000	0.000	0.000	0.000
V-50X45	0.0500	0.0500	0.000	0.000	0.000	0.000
V-40X45	0.0500	0.0500	0.000	0.000	0.000	0.000
VIG25X40	0.0500	0.0500	0.000	0.000	0.000	0.000
VIG40X40	0.0500	0.0500	0.000	0.000	0.000	0.000

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

SHELL SECTION	MATERIAL NAME	SHELL TYPE	LOAD DIST ONE WAY	MEMBRANE THICK	BENDING THICK	TOTAL WEIGHT	TOTAL MASS
CUBIERTA	CON21	Membrane	Yes	0.0130	0.0130	9.2243	0.9224
MACIZAENTRE	CON21	Membrane	No	0.1460	146.0000	0.0000	0.0000
MACIZACUB	CON21	Membrane	No	0.1920	0.1920	0.0000	0.0000
ESCALERA	CON21	Membrane	No	0.3330	0.3330	236.2835	23.6283

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

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		

R E S P O N S E S P E C T R U M C A S E S

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	14.0200
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	15.2700
UZ	----	N/A

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	14.0200
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	15.2700
UZ	----	N/A

RESP SPEC CASE: SISUMBY

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	UMBRAL	17.0900
UZ	----	N/A

RESP SPEC CASE: SISUMBX

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	UMBRAL	15.6300
U2	----	N/A
UZ	----	N/A

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
		LIVE	Static	1.6000
COMDIS3	ADD	DEAD	Static	1.2000
		LIVE	Static	1.0000
		SISDISX	Spectra	1.0000
		SISDISY	Spectra	0.3000
COMDIS4	ADD	DEAD	Static	1.2000
		LIVE	Static	1.0000
		SISDISX	Spectra	0.3000
		SISDISY	Spectra	1.0000
COMDIS5	ADD	DEAD	Static	0.9000
		SISDISX	Spectra	1.0000
		SISDISY	Spectra	0.3000
COMDIS6	ADD	DEAD	Static	0.9000
		SISDISX	Spectra	0.3000
		SISDISY	Spectra	1.0000
COMDER1	ADD	SISDERX	Spectra	1.0000
		SISDERY	Spectra	0.3000
COMDER2	ADD	SISDERX	Spectra	0.3000
		SISDERY	Spectra	1.0000
COMDERUMB1	ADD	SISUMBX	Spectra	1.0000
		SISUMBY	Spectra	0.3000
COMDERUMB2	ADD	SISUMBX	Spectra	0.3000
		SISUMBY	Spectra	1.0000
ENVOLVENTE	ENVE	COMDIS1	Combo	1.0000
		COMDIS2	Combo	1.0000
		COMDIS3	Combo	1.0000
		COMDIS4	Combo	1.0000
		COMDIS5	Combo	1.0000
		COMDIS6	Combo	1.0000
CIM1	ADD	DEAD	Static	1.0000
		LIVE	Static	1.0000
CIM2	ADD	DEAD	Static	1.0000
		LIVE	Static	0.7500
		SISDISX	Spectra	0.1110
		SISDISY	Spectra	0.0330
CIM3	ADD	DEAD	Static	1.0000
		LIVE	Static	0.7500
		SISDISX	Spectra	0.0330
		SISDISY	Spectra	0.1110

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\diseños y estructura\desktop\ing. daniel rojas\2253 politecnico marcelo miranda\2da version\escalera\modelo escalera\derivas.txt
DATA TYPE: Period vs Acceleration
NUMBER OF HEADER LINES = 0

PERIOD	ACCEL
0.0000	1.1250
0.0300	1.1250
0.0700	1.1250
0.1000	1.1250
0.1300	1.1250
0.2600	1.1250

0.3800	1.1250
0.5100	1.1250
0.6300	1.1250
0.8500	0.8370
1.0700	0.6660
1.2900	0.5530
1.5100	0.4730
1.7200	0.4130
1.9400	0.3670
2.1600	0.3300
2.3800	0.3000
2.6000	0.2740
2.8100	0.2530
3.0300	0.2350
3.2500	0.2190
3.4700	0.2050
3.6900	0.1930
3.9100	0.1820
4.1200	0.1730
4.3400	0.1640
4.5600	0.1560
5.5600	0.1050
6.5600	0.0750

FUNCTION NAME: DISENO

FILE NAME: c:\users\diseños y estructura\desktop\ing. daniel rojas\2253 politecnico marcelo miranda\2da version\escalera\modelo escalera\diseño.txt
DATA TYPE: Period vs Acceleration
NUMBER OF HEADER LINES = 0

PERIOD	ACCEL
0.0000	0.2380
0.0300	0.2380
0.0700	0.2380
0.1000	0.2380
0.1300	0.2380
0.2600	0.2380
0.3800	0.2380
0.5100	0.2380
0.6300	0.2380
0.8500	0.1770
1.0700	0.1410
1.2900	0.1170
1.5100	0.1000
1.7200	0.0870
1.9400	0.0780
2.1600	0.0700
2.3800	0.0630
2.6000	0.0580
2.8100	0.0540
3.0300	0.0500
3.2500	0.0460
3.4700	0.0430
3.6900	0.0410
3.9100	0.0390
4.1200	0.0370
4.3400	0.0350
4.5600	0.0330
5.5600	0.0220
6.5600	0.0160

FUNCTION NAME: UMBRAL

FILE NAME: c:\users\diseños y estructura\desktop\ing. daniel rojas\2253 politecnico marcelo miranda\2da version\escalera\modelo escalera\umbral.txt
DATA TYPE: Period vs Acceleration
NUMBER OF HEADER LINES = 0

PERIOD	ACCEL
0.0000	0.0700
0.0500	0.0980
0.1000	0.1260
0.1500	0.1540
0.2000	0.1820

0.2500	0.2100
0.4100	0.2100
0.5600	0.2100
0.7200	0.2100
0.8800	0.2100
1.0300	0.2100
1.1900	0.2100
1.3400	0.2100
1.5000	0.2100
2.1400	0.1470
2.7900	0.1130
3.4300	0.0920
4.0700	0.0770
4.7100	0.0670
5.3600	0.0590
6.0000	0.0530
6.6400	0.0470
7.2900	0.0430
7.9300	0.0400
8.5700	0.0370
9.2100	0.0340
9.8600	0.0320
10.5000	0.0210
11.5000	0.0170
12.5000	0.0150

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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+6.65	C64	Column	Rectangular	None	COL40X40	Conc Frame	COL40X40
N+6.65	C65	Column	Rectangular	None	COL40X40	Conc Frame	COL40X40
N+6.65	C66	Column	Rectangular	None	COL40X40	Conc Frame	COL40X40
N+6.65	C67	Column	Rectangular	None	COL40X40	Conc Frame	COL40X40
N+3.45	C64	Column	Rectangular	None	COL40X40	Conc Frame	COL40X40
N+3.45	C65	Column	Rectangular	None	COL40X40	Conc Frame	COL40X40
N+3.45	C66	Column	Rectangular	None	COL40X40	Conc Frame	COL40X40
N+3.45	C67	Column	Rectangular	None	COL40X40	Conc Frame	COL40X40
N+6.65	B348	Beam	Rectangular	None	VIG25X40	Conc Frame	VIG25X40
N+6.65	B349	Beam	Rectangular	None	VIG25X40	Conc Frame	VIG25X40
N+6.65	B350	Beam	Rectangular	None	VIG25X40	Conc Frame	VIG25X40
N+6.65	B351	Beam	Rectangular	None	VIG25X40	Conc Frame	VIG25X40
N+3.45	B348	Beam	Rectangular	None	VIG25X40	Conc Frame	VIG25X40
N+3.45	B349	Beam	Rectangular	None	VIG25X40	Conc Frame	VIG25X40
N+3.45	B350	Beam	Rectangular	None	VIG25X40	Conc Frame	VIG25X40
N+3.45	B351	Beam	Rectangular	None	VIG25X40	Conc Frame	VIG25X40

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

CASE	STORY	AREA	AREATYPE	DIRECTION	LOAD
LIVE	N+6.65	F142	Floor	Gravity	5.0000
LIVE	N+3.45	F142	Floor	Gravity	3.0000

PROYECTO: INSTITUCIÓN EDUCATIVA MARCELO MIRANDA-ESCALERA

FUERZAS EN VIGAS

BEAM FORCES
UNID: kN-m

Story	Beam	Load	Loc	P	V2	V3	T	M2	M3
N+6.65	B348	ENVOLVENTE MAX	0	0	-0.9	0	0.181	0	16.721
N+6.65	B348	ENVOLVENTE MAX	3.285	0	8.27	0	0.181	0	47.198
N+6.65	B348	ENVOLVENTE MAX	6.57	0	71.36	0	0.181	0	16.721
N+6.65	B348	ENVOLVENTE MIN	0	0	-71.36	0	-0.181	0	-76.127
N+6.65	B348	ENVOLVENTE MIN	3.285	0	-8.27	0	-0.181	0	4.629
N+6.65	B348	ENVOLVENTE MIN	6.57	0	0.9	0	-0.181	0	-76.127
N+3.45	B348	ENVOLVENTE MAX	0	0	-28.69	0	0.356	0	-6.567
N+3.45	B348	ENVOLVENTE MAX	3.285	0	13.36	0	0.356	0	64.699
N+3.45	B348	ENVOLVENTE MAX	6.57	0	84.01	0	0.356	0	-6.567
N+3.45	B348	ENVOLVENTE MIN	0	0	-84.01	0	-0.356	0	-130.512
N+3.45	B348	ENVOLVENTE MIN	3.285	0	-13.36	0	-0.356	0	34.861
N+3.45	B348	ENVOLVENTE MIN	6.57	0	28.69	0	-0.356	0	-130.512
N+6.65	B349	ENVOLVENTE MAX	0	0	-0.9	0	0.181	0	16.721
N+6.65	B349	ENVOLVENTE MAX	3.285	0	8.27	0	0.181	0	47.198
N+6.65	B349	ENVOLVENTE MAX	6.57	0	71.36	0	0.181	0	16.721
N+6.65	B349	ENVOLVENTE MIN	0	0	-71.36	0	-0.181	0	-76.127
N+6.65	B349	ENVOLVENTE MIN	3.285	0	-8.27	0	-0.181	0	4.629
N+6.65	B349	ENVOLVENTE MIN	6.57	0	0.9	0	-0.181	0	-76.127
N+3.45	B349	ENVOLVENTE MAX	0	0	-28.69	0	0.356	0	-6.567
N+3.45	B349	ENVOLVENTE MAX	3.285	0	13.36	0	0.356	0	64.699
N+3.45	B349	ENVOLVENTE MAX	6.57	0	84.01	0	0.356	0	-6.567
N+3.45	B349	ENVOLVENTE MIN	0	0	-84.01	0	-0.356	0	-130.512
N+3.45	B349	ENVOLVENTE MIN	3.285	0	-13.36	0	-0.356	0	34.861
N+3.45	B349	ENVOLVENTE MIN	6.57	0	28.69	0	-0.356	0	-130.512
N+6.65	B350	ENVOLVENTE MAX	0	0	8.39	0	0.192	0	25.96
N+6.65	B350	ENVOLVENTE MAX	2.25	0	13.25	0	0.192	0	2.521
N+6.65	B350	ENVOLVENTE MAX	4.5	0	19.73	0	0.192	0	25.96
N+6.65	B350	ENVOLVENTE MIN	0	0	-19.73	0	-0.192	0	-35.262
N+6.65	B350	ENVOLVENTE MIN	2.25	0	-13.25	0	-0.192	0	1.62
N+6.65	B350	ENVOLVENTE MIN	4.5	0	-8.39	0	-0.192	0	-35.262
N+3.45	B350	ENVOLVENTE MAX	0	0	1.84	0	0.378	0	37.574
N+3.45	B350	ENVOLVENTE MAX	2.25	0	24.91	0	0.378	0	27.241
N+3.45	B350	ENVOLVENTE MAX	4.5	0	63.26	0	0.378	0	37.574
N+3.45	B350	ENVOLVENTE MIN	0	0	-63.26	0	-0.378	0	-86.956
N+3.45	B350	ENVOLVENTE MIN	2.25	0	-24.91	0	-0.378	0	14.31
N+3.45	B350	ENVOLVENTE MIN	4.5	0	-1.84	0	-0.378	0	-86.956
N+6.65	B351	ENVOLVENTE MAX	0	0	8.39	0	0.192	0	25.96
N+6.65	B351	ENVOLVENTE MAX	2.25	0	13.25	0	0.192	0	2.521
N+6.65	B351	ENVOLVENTE MAX	4.5	0	19.73	0	0.192	0	25.96
N+6.65	B351	ENVOLVENTE MIN	0	0	-19.73	0	-0.192	0	-35.262
N+6.65	B351	ENVOLVENTE MIN	2.25	0	-13.25	0	-0.192	0	1.62
N+6.65	B351	ENVOLVENTE MIN	4.5	0	-8.39	0	-0.192	0	-35.262
N+3.45	B351	ENVOLVENTE MAX	0	0	1.84	0	0.378	0	37.574
N+3.45	B351	ENVOLVENTE MAX	2.25	0	24.91	0	0.378	0	27.241
N+3.45	B351	ENVOLVENTE MAX	4.5	0	63.26	0	0.378	0	37.574
N+3.45	B351	ENVOLVENTE MIN	0	0	-63.26	0	-0.378	0	-86.956
N+3.45	B351	ENVOLVENTE MIN	2.25	0	-24.91	0	-0.378	0	14.31
N+3.45	B351	ENVOLVENTE MIN	4.5	0	-1.84	0	-0.378	0	-86.956

FUERZAS EN COLUMNAS

COLUMN FORCES
UNID: kN-m

Story	Column	Load	Loc	P	V2	V3	T	M2	M3
N+6.65	C64	ENVOLVENTE MAX	0	-9.74	0.31	8.59	0.923	2.316	-14.65
N+6.65	C64	ENVOLVENTE MAX	1.6	-4.21	0.31	8.59	0.923	7.428	7.969
N+6.65	C64	ENVOLVENTE MAX	3.2	1.32	0.31	8.59	0.923	35.443	76.279
N+6.65	C64	ENVOLVENTE MIN	0	-92.58	-43.13	-19.24	-0.923	-27.07	-62.972
N+6.65	C64	ENVOLVENTE MIN	1.6	-85.21	-43.13	-19.24	-0.923	-15.154	-17.077
N+6.65	C64	ENVOLVENTE MIN	3.2	-77.84	-43.13	-19.24	-0.923	-26.14	-16.872
N+3.45	C64	ENVOLVENTE MAX	0	-58.68	23.35	35.09	1.129	82.946	69.185
N+3.45	C64	ENVOLVENTE MAX	1.725	-52.71	23.35	35.09	1.129	24.147	31.49
N+3.45	C64	ENVOLVENTE MAX	3.45	-46.75	23.35	35.09	1.129	62.794	70.993

N+3.45	C64	ENVOLVENTE MIN	0	-238.76	-48.96	-45.69	-1.129	-94.905	-98.059
N+3.45	C64	ENVOLVENTE MIN	1.725	-230.82	-48.96	-45.69	-1.129	-17.813	-16.198
N+3.45	C64	ENVOLVENTE MIN	3.45	-222.87	-48.96	-45.69	-1.129	-38.167	-11.535
N+6.65	C65	ENVOLVENTE MAX	0	-9.74	0.31	19.24	0.923	27.07	-14.65
N+6.65	C65	ENVOLVENTE MAX	1.6	-4.21	0.31	19.24	0.923	15.154	7.969
N+6.65	C65	ENVOLVENTE MAX	3.2	1.32	0.31	19.24	0.923	26.14	76.279
N+6.65	C65	ENVOLVENTE MIN	0	-92.58	-43.13	-8.59	-0.923	-2.316	-62.972
N+6.65	C65	ENVOLVENTE MIN	1.6	-85.21	-43.13	-8.59	-0.923	-7.428	-17.077
N+6.65	C65	ENVOLVENTE MIN	3.2	-77.84	-43.13	-8.59	-0.923	-35.443	-16.872
N+3.45	C65	ENVOLVENTE MAX	0	-58.68	23.35	45.69	1.129	94.905	69.185
N+3.45	C65	ENVOLVENTE MAX	1.725	-52.71	23.35	45.69	1.129	17.813	31.49
N+3.45	C65	ENVOLVENTE MAX	3.45	-46.75	23.35	45.69	1.129	38.167	70.993
N+3.45	C65	ENVOLVENTE MIN	0	-238.76	-48.96	-35.09	-1.129	-82.946	-98.059
N+3.45	C65	ENVOLVENTE MIN	1.725	-230.82	-48.96	-35.09	-1.129	-24.147	-16.198
N+3.45	C65	ENVOLVENTE MIN	3.45	-222.87	-48.96	-35.09	-1.129	-62.794	-11.535
N+6.65	C66	ENVOLVENTE MAX	0	-9.74	43.13	19.24	0.923	27.07	62.972
N+6.65	C66	ENVOLVENTE MAX	1.6	-4.21	43.13	19.24	0.923	15.154	17.077
N+6.65	C66	ENVOLVENTE MAX	3.2	1.32	43.13	19.24	0.923	26.14	16.872
N+6.65	C66	ENVOLVENTE MIN	0	-92.58	-0.31	-8.59	-0.923	-2.316	14.65
N+6.65	C66	ENVOLVENTE MIN	1.6	-85.21	-0.31	-8.59	-0.923	-7.428	-7.969
N+6.65	C66	ENVOLVENTE MIN	3.2	-77.84	-0.31	-8.59	-0.923	-35.443	-76.279
N+3.45	C66	ENVOLVENTE MAX	0	-58.68	48.96	45.69	1.129	94.905	98.059
N+3.45	C66	ENVOLVENTE MAX	1.725	-52.71	48.96	45.69	1.129	17.813	16.198
N+3.45	C66	ENVOLVENTE MAX	3.45	-46.75	48.96	45.69	1.129	38.167	11.535
N+3.45	C66	ENVOLVENTE MIN	0	-238.76	-23.35	-35.09	-1.129	-82.946	-69.185
N+3.45	C66	ENVOLVENTE MIN	1.725	-230.82	-23.35	-35.09	-1.129	-24.147	-31.49
N+3.45	C66	ENVOLVENTE MIN	3.45	-222.87	-23.35	-35.09	-1.129	-62.794	-70.993
N+6.65	C67	ENVOLVENTE MAX	0	-9.74	43.13	8.59	0.923	2.316	62.972
N+6.65	C67	ENVOLVENTE MAX	1.6	-4.21	43.13	8.59	0.923	7.428	17.077
N+6.65	C67	ENVOLVENTE MAX	3.2	1.32	43.13	8.59	0.923	35.443	16.872
N+6.65	C67	ENVOLVENTE MIN	0	-92.58	-0.31	-19.24	-0.923	-27.07	14.65
N+6.65	C67	ENVOLVENTE MIN	1.6	-85.21	-0.31	-19.24	-0.923	-15.154	-7.969
N+6.65	C67	ENVOLVENTE MIN	3.2	-77.84	-0.31	-19.24	-0.923	-26.14	-76.279
N+3.45	C67	ENVOLVENTE MAX	0	-58.68	48.96	35.09	1.129	82.946	98.059
N+3.45	C67	ENVOLVENTE MAX	1.725	-52.71	48.96	35.09	1.129	24.147	16.198
N+3.45	C67	ENVOLVENTE MAX	3.45	-46.75	48.96	35.09	1.129	62.794	11.535
N+3.45	C67	ENVOLVENTE MIN	0	-238.76	-23.35	-45.69	-1.129	-94.905	-69.185
N+3.45	C67	ENVOLVENTE MIN	1.725	-230.82	-23.35	-45.69	-1.129	-17.813	-31.49
N+3.45	C67	ENVOLVENTE MIN	3.45	-222.87	-23.35	-45.69	-1.129	-38.167	-70.993