PROYECTO: JORNADA ÚNICA DEL MINISTERIO DE EDUCACIÓN- MODULO 2. SEDE EDUCATIVA AGROECOL-BLOQUE A MUNICIPIO UNIÓN PANAMERICANA (CHOCÓ)

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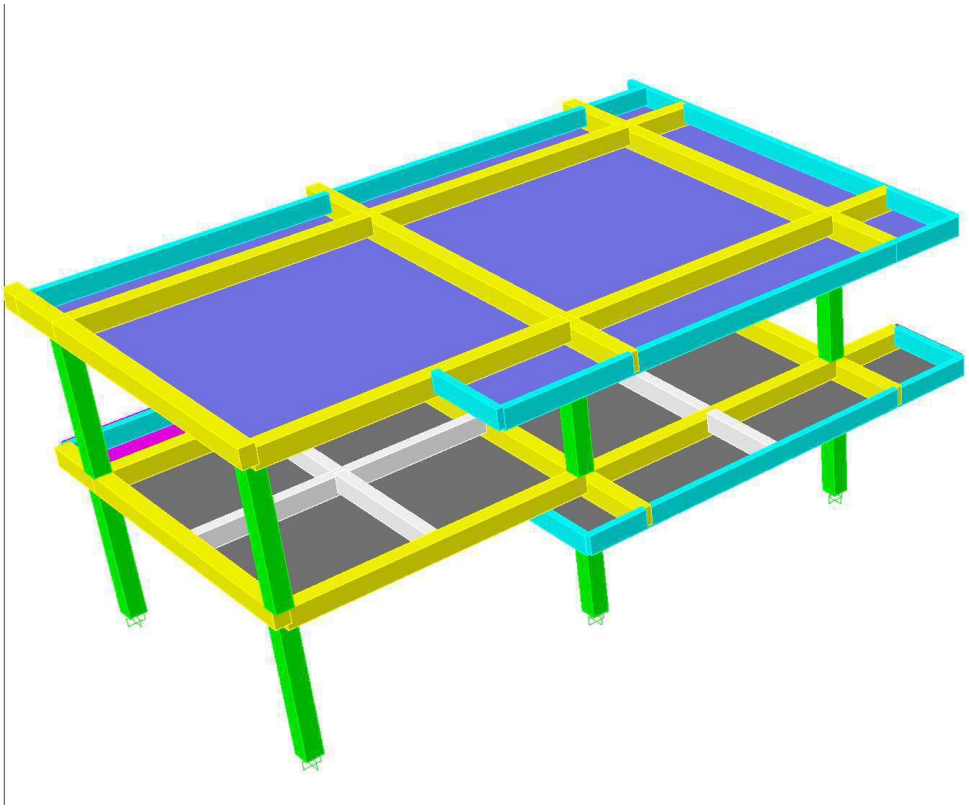

MEMORIAS DE ANÁLISIS Y DISEÑO ESTRUCTURAL

Bogotá D.C. 18 DE NOVIEMBRE 2016

1. DESCRIPCIÓN DEL PROYECTO

1.1. INTRODUCCIÓN

El presente documento contiene las memorias de análisis y diseño estructural correspondiente al proyecto **JORNADA ÚNICA DEL MINISTERIO DE EDUCACIÓN- MODULO 2. SEDE EDUCATIVA AGROECOL (1)** ubicado en el municipio **UNIÓN PANAMERICANA** en **CHOCÓ.**

1.2. DESCRIPCIÓN ARQUITECTÓNICA

El proyecto se encuentra ubicado en un lote de **1166.56 m²** de área aproximadamente, en el cual se contempla la construcción de un edificio destinado como institución educativa.

1.3. DESCRIPCIÓN SISTEMA ESTRUCTURAL

El proyecto se soluciona mediante el diseño de una estructura aporticada, utilizando para el entrepiso del nivel N:-0.05 m y N: +4.00 m placa maciza en una y dos direcciones de espesor e=0.10 m y e=0.15 m. La cubierta liviana se compone de vigas en el nivel N:+7.50m. Se manejan luces entre 3.00 m y 9.00 m 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:

- ✓ 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 se afecta por las irregularidades presentes en la geometría de cada estructura, las cuales se describen a continuación.

- ✓ Irregularidad en planta: $\phi_P =$ .90

El valor final del coeficiente R es igual a **6.30**

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 de clase y **5.00 kN/ m²** para cubiertas y corredores.

Para la cimentación se siguieron las recomendaciones descritas en el respectivo estudio de suelos, que recomienda apoyar la estructura a **-1.20 m** del nivel de la placa aérea de cimentación, apoyando las zapatas a **-1.20 m**, según lo indicado en los planos estructurales. La capacidad portante de seguridad admisible del suelo es **0.12 MPa** y el tipo de suelo es **E**.

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 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

Unión panamericana, 18 NOVIEMBRE 2016

Señores
PLANEACIÓN 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 registrado en el consejo profesional de Ingeniería y Arquitectura de Cundinamarca, presento los Cálculos y Diseños Estructurales elaborados de acuerdo a los requerimientos de la **NORMA COLOMBIANA DE DISEÑO Y CONSTRUCCIÓN SISMO RESISTENTE LEY 400 DE 1997 (MODIFICADA LEY 1229 DE 2008) Y DECRETO 926 DE MARZO DE 2010**, para el proyecto **JORNADA ÚNICA DEL MINISTERIO DE EDUCACIÓN- MODULO 2. SEDE EDUCATIVA AGROECOL,** ubicado en el municipio **UNIÓN PANAMERICANA** en **CHOCÓ** declaro que asumo la responsabilidad por los perjuicios que causa de ellos puedan deducirse, exonerando a **PLANEACIÓN MUNICIPAL** de cualquier responsabilidad.

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

Atentamente,

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JAIR USECHE MACÍAS
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REPUBLICA DE COLOMBIA
Consejo Profesional Nacional de Ingeniería y Arquitectura
MATRICULA No. 2520256174CND
INGENIERO CIVIL
DE FECHA 27/07/95
APELLIDOS
USECHE MACIAS
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UNIV. NACIONAL - BOGOTA

PROYECTO: SEDE EDUCATIVA AGROECOL UNION PANAMERICANA (CHOCO)

AVALUO DE CARGAS

1. CUBIERTA LIVIANA

Teja termo-acústica			0.10 kN/m²
Estructura metálica de soporte			0.10 kN/m²
Acabados e iluminacion			0.10 kN/m²
		CM	0.30 kN/m²
	Tabla 4.2.1-2 de NSR-10 (Caso F)	CV	0.50 kN/m²
		CR	0.80 kN/m²
Muros culata	1.37x0.15x13		2.67 kN/m

CU = 1.2x0.3+1.6x0.5 = ***1.2 kN/m²***

Espesor de placa equivalente:

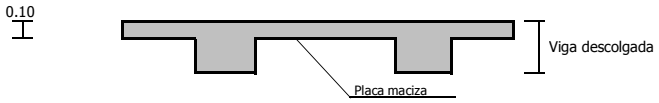
e=CM/24 0.013 m

Pendiente de Cubierta α (º) = **8.540** → Equivale a 15%

B.4.8.3 de NSR-10 (Carga de granizo) CV

Según la tabla B.4.2.1-2 - En cubiertas inclinadas con menos de 15° de pendiente en estructura metálica o de madera la carga viva asumida puede ser 1 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 0.5 kN/m^2.

2. PLACA MACIZA - ENTREPISO



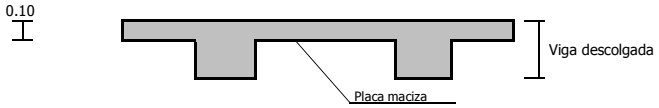
Placa maciza e=0.10m	0.10x24		2.40 kN/m²
Muros divisorios			2.00 kN/m²
Acabados	22x0.05		1.10 kN/m²
		CM	5.50 kN/m²
	Tabla 4.2.1-1	CV	2.00 kN/m²
		CR	7.50 kN/m²
Muros antepecho	1.00x0.15x13		1.95 kN/m
Muros perimetrales	3.05x0.15x13		5.95 kN/m

CU = 1.2x5.5+1.6x2 = ***9.8 kN/m²***

Espesor de placa equivalente:

e=CM/24 0.229 m

3. PLACA MACIZA - ENTREPISO



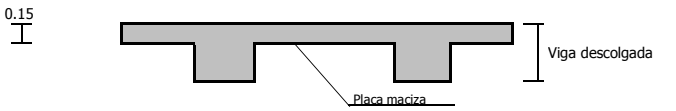
Placa maciza e=0.10m	0.10x24		2.40 kN/m²
Muros de antepecho			2.00 kN/m²
Acabados	22x0.05		1.10 kN/m²
		CM	5.50 kN/m²
	Tabla 4.2.1-2 (Caso A)	CV	5.00 kN/m²
		CR	10.50 kN/m²
Muros antepecho	1.00x0.15x13		1.95 kN/m

CU = 1.2x5.5+1.6x5 = ***14.6 kN/m²***

Espesor de placa equivalente: 0.229

e=CM/24 0.229 m

3. PLACA MACIZA - TANQUES



Placa maciza e=0.15m	0.15x24		3.60 kN/m²
Acabados	22x0.05		1.10 kN/m²
		CM	4.70 kN/m²
	Tabla 4.2.1-2 (Caso A)	CV	5.00 kN/m²
		CR	9.70 kN/m²
Muros antepecho	1.43x0.15x13		2.79 kN/m

CU = 1.2x4.7+1.6x5 = ***13.6 kN/m²***

Espesor de placa equivalente:

e=CM/24 0.196 m

PROYECTO: I.E. AGROECOL
AVALÚO DE CARGAS DE VIENTO
ANÁLISIS SIMPLIFICADO (sprfv)

Para que le 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: $\boxed{Ps = \lambda KztIPs_{10}}$

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=	UNION PANAMERICANA	1	60

Luego:

λ=	1.0
K_{zt}=	1.0
I=	1.3
P_{s10}=	**0.09**

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: PROYECTO: SEDE EDUCATIVA AGROECOL UNIÓN PANAMERICANA (CHOCÓ)

ANÁLISIS SÍSMICO (ESPECTRO DE DISEÑO NSR-10)

ZONA DE AMENAZA SÍSMICA
ALTA

EFECTOS LOCALES

Perfil de Suelo	**E**
Coeficiente Aa	**0.40**
Coeficiente Av	**0.40**

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 =	**7.50**	m
α =	**0.90**	
T_a=	**0.29**	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	**1.00**
ϕ_p	**0.90**
ϕ_r	**1.00**
ϕ	**1.00**
R	**6.30**

TIPO	DESCRIPCIÓN	VALOR
	N.A	ϕ_P: 1.00
2P	RETROCESO DE ESQUINAS	ϕ_a: 0.90
	AUSENCIA DE REDUNDANCIA	ϕ_r: 1.00
	UNIONES SOLDADAS	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 ALTA		
T_o:	0.27	Seg
T_C:	1.28	Seg
T_L:	5.76	Seg
Aa:	0.40	
Av:	0.40	
Fa:	0.90	
Fv:	2.40	

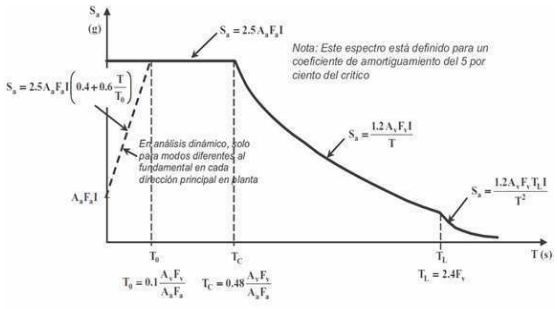
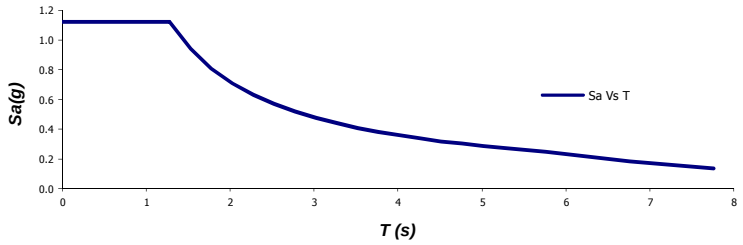


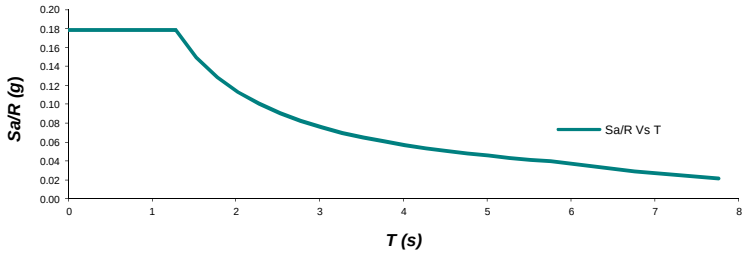
Figura A.2.6-1 — Espectro Elástico de Aceleraciones de Diseño como fracción de g

T (Seg)	Sa (%g)	Sa/$R_{adoptado}$ (%g)
0.00	1.125	0.179
0.07	1.125	0.179
0.13	1.125	0.179
0.20	1.125	0.179
0.27	1.125	0.179
0.52	1.125	0.179
0.77	1.125	0.179
1.03	1.125	0.179
1.28	1.125	0.179
1.53	0.942	0.150
1.78	0.810	0.129
2.03	0.711	0.113
2.28	0.633	0.100
2.52	0.570	0.091
2.77	0.519	0.082
3.02	0.476	0.076
3.27	0.440	0.070
3.52	0.409	0.065
3.77	0.382	0.061
4.02	0.358	0.057
4.27	0.338	0.054
4.52	0.319	0.051
4.76	0.302	0.048
5.01	0.287	0.046
5.26	0.274	0.043
5.51	0.261	0.041
5.76	0.250	0.040
6.76	0.182	0.029
7.76	0.138	0.022

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: PROYECTO: SEDE EDUCATIVA AGROECOL UNIÓN PANAMERICANA (CHOCÓ)

ANÁLISIS SÍSMICO (ESPECTRO DE UMBRAL DE DAÑO NSR-10)

ZONA DE AMENAZA SÍSMICA
ALTA

EFECTOS LOCALES

Perfil de Suelo	**E**
Coeficiente Ad	**0.10**
Coeficiente Fv	**3.50**

COEFICIENTE DE IMPORTANCIA

Grupo de Uso	**III**
Coeficiente de importancia I	**1.25**
Coeficiente de Sitio Ŝ:	**4.38**

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: **0.10**
T_{Cd}: 2.19 Seg
T_{Ld}: 10.5 Seg

T (Seg)	Sad (%g)
0.00	0.100
0.05	0.140
0.10	0.180
0.15	0.220
0.20	0.260
0.25	0.300
0.49	0.300
0.73	0.300
0.98	0.300
1.22	0.300
1.46	0.300
1.70	0.300
1.95	0.300

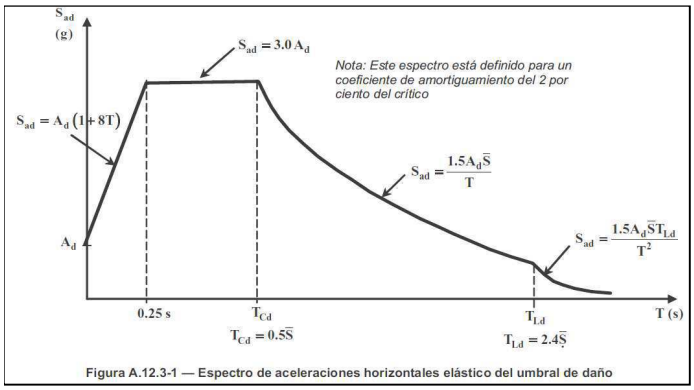
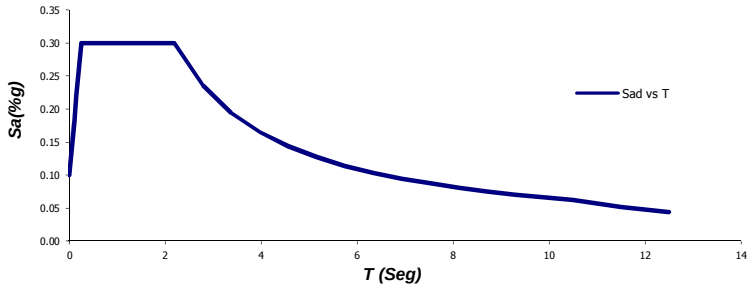


Figura A.12.3-1 — Espectro de aceleraciones horizontales elástico del umbral de daño

2.19	0.300
2.78	0.236
3.38	0.194
3.97	0.165
4.56	0.144
5.16	0.127
5.75	0.114
6.34	0.103
6.94	0.095
7.53	0.087
8.13	0.081
8.72	0.075
9.31	0.070
9.91	0.066
10.50	0.063
11.50	0.052
12.50	0.044

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.

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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: SEDE EDUCATIVA AGROECOL, UNIÓN PANAMERICANA (CHOCÓ)
CALCULO DEL CORTANTE BASAL DE LA ESTRUCTURA (ESPECTRO DE DISEÑO NSR-10)

CALCULO DEL CORTANTE BASAL DE LA ESTRUCTURA

$H_{edificio}$=	7.50	m	
Tipo de Perfil:	E		
Aa =	0.40		
Av =	0.40		
Fa =	0.90		
Fv =	2.40		
T_c =	1.28	Seg	
C_t =	0.047		
α =	0.90		
T_a =	0.29	Seg	
C_u =	1.20		
$C_u T_a$ =	0.35	Seg	
$T_{modelación\ estructural}$ =	0.30	Seg	
ΔT =	4.10	%	Ok!
$T_{adoptado}$ =	0.30	Seg	
S_a =	1.125		S_a obtenido del espectro de diseño
g =	9.81	m/s^2	
M =	165.70	Ton	Masa obtenida del modelo
V_s =	1828.71	kN	
90% Vs =	1645.84	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
$V_{s(x)}$=	1734.65	0	1734.65	0.949	9.308	Se aplica en SISMO X
$V_{s(y)}$=	0	1689.71	1689.71	0.974	9.555	Se aplica en SISMO Y

MODELO CORREGIDO
Response Espectrum Base Reactions

	F1	F2	Total	90% Vs
$V_{s(x)}$=	1734.65	0	1734.65	1645.8
$V_{s(y)}$=	0	1689.71	1689.71	1645.8

PROYECTO: SEDE EDUCATIVA AGROECOL, UNIÓN PANAMERICANA (CHOCÓ)
CALCULO DEL CORTANTE BASAL DE LA ESTRUCTURA (ESPECTRO DE UMBRAL DE DAÑO NSR-10)

CALCULO DEL CORTANTE BASAL DE LA ESTRUCTURA

$H_{edificio}$=	**7.50**	m	
Tipo de Perfil:	**E**		
Ad =	0.10		
Fv =	0.40		
C_t =	**0.047**		
α =	**0.90**		
T_a =	0.29	Seg	
C_u =	1.20		
$C_u T_a$ =	0.35	Seg	
$T_{modelación\ estructural}$ =	**0.30**	Seg	
ΔT =	4.10	%	Ok!
$T_{adoptado}$ =	0.29	Seg	
S_a =	**0.300**		S_a obtenido del espectro de diseño
g =	9.81	m/s^2	
M =	**165.70**	Ton	Masa obtenida del modelo
V_s =	**487.66**	kN	

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
$V_{s(x)}$=	462.35	0	462.35	0.949	**9.312**	Se aplica en SISMO X
$V_{s(y)}$=	0	450.23	450.23	0.975	**9.563**	Se aplica en SISMO Y

MODELO CORREGIDO
Response Espectrum Base Reactions

	F1	F2	Total	90% Vs
$V_{s(x)}$=	462.35	0	**462.35**	**438.9**
$V_{s(y)}$=	0	450.23	**450.23**	**438.9**

Diseños & Estructuras

PROYECTO: AGROECOL (CHOCO)

CÁLCULO DE DERIVAS MÁXIMAS

ALTURA DE N+7.50	3.50	m
ALTURA DE N+4.00	4.00	m
ALTURA DE BASE	0.00	m
ALTURA DE N-0.05	1.75	m
ALTURA DE N-1.80	1.70	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+7.50	10	COMDER1 MAX	0.054975	0.023025	0.02390	0.68	OK
N+7.50	10	COMDER1 MIN	-0.054975	-0.023025	0.02390	0.68	OK
N+7.50	10	COMDER2 MAX	0.0216	0.059475	0.02542	0.73	OK
N+7.50	10	COMDER2 MIN	-0.0216	-0.059475	0.02542	0.73	OK
N+4.00	10	COMDER1 MAX	0.032925	0.0138	0.03570	0.89	OK
N+4.00	10	COMDER1 MIN	-0.032925	-0.0138	0.03570	0.89	OK
N+4.00	10	COMDER2 MAX	0.0126	0.0357	0.03786	0.95	OK
N+4.00	10	COMDER2 MIN	-0.0126	-0.0357	0.03786	0.95	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+7.50	13	COMDER1 MAX	0.054975	0.017325	0.02317	0.66	OK
N+7.50	13	COMDER1 MIN	-0.054975	-0.017325	0.02317	0.66	OK
N+7.50	13	COMDER2 MAX	0.0216	0.0558	0.02486	0.71	OK
N+7.50	13	COMDER2 MIN	-0.0216	-0.0558	0.02486	0.71	OK
N+4.00	13	COMDER1 MAX	0.032925	0.0102	0.03447	0.86	OK
N+4.00	13	COMDER1 MIN	-0.032925	-0.0102	0.03447	0.86	OK
N+4.00	13	COMDER2 MAX	0.0126	0.032625	0.03497	0.87	OK
N+4.00	13	COMDER2 MIN	-0.0126	-0.032625	0.03497	0.87	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+7.50	14	COMDER1 MAX	0.054975	0.0243	0.02439	0.70	OK
N+7.50	14	COMDER1 MIN	-0.054975	-0.0243	0.02439	0.70	OK
N+7.50	14	COMDER2 MAX	0.0216	0.066225	0.02996	0.86	OK
N+7.50	14	COMDER2 MIN	-0.0216	-0.066225	0.02996	0.86	OK
N+4.00	14	COMDER1 MAX	0.032925	0.013875	0.03573	0.89	OK
N+4.00	14	COMDER1 MIN	-0.032925	-0.013875	0.03573	0.89	OK
N+4.00	14	COMDER2 MAX	0.0126	0.03765	0.03970	0.99	OK
N+4.00	14	COMDER2 MIN	-0.0126	-0.03765	0.03970	0.99	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+7.50	17	COMDER1 MAX	0.054075	0.023025	0.02349	0.67	OK
N+7.50	17	COMDER1 MIN	-0.054075	-0.023025	0.02349	0.67	OK
N+7.50	17	COMDER2 MAX	0.021525	0.059475	0.02540	0.73	OK
N+7.50	17	COMDER2 MIN	-0.021525	-0.059475	0.02540	0.73	OK
N+4.00	17	COMDER1 MAX	0.032475	0.0138	0.03529	0.88	OK
N+4.00	17	COMDER1 MIN	-0.032475	-0.0138	0.03529	0.88	OK
N+4.00	17	COMDER2 MAX	0.0126	0.0357	0.03786	0.95	OK
N+4.00	17	COMDER2 MIN	-0.0126	-0.0357	0.03786	0.95	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+7.50	18	COMDER1 MAX	0.054075	0.017325	0.02274	0.65	OK
N+7.50	18	COMDER1 MIN	-0.054075	-0.017325	0.02274	0.65	OK
N+7.50	18	COMDER2 MAX	0.021525	0.0558	0.02483	0.71	OK
N+7.50	18	COMDER2 MIN	-0.021525	-0.0558	0.02483	0.71	OK
N+4.00	18	COMDER1 MAX	0.032475	0.0102	0.03404	0.85	OK
N+4.00	18	COMDER1 MIN	-0.032475	-0.0102	0.03404	0.85	OK
N+4.00	18	COMDER2 MAX	0.0126	0.032625	0.03497	0.87	OK
N+4.00	18	COMDER2 MIN	-0.0126	-0.032625	0.03497	0.87	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+7.50	19	COMDER1 MAX	0.054075	0.0243	0.02398	0.69	OK
N+7.50	19	COMDER1 MIN	-0.054075	-0.0243	0.02398	0.69	OK
N+7.50	19	COMDER2 MAX	0.021525	0.066225	0.02994	0.86	OK
N+7.50	19	COMDER2 MIN	-0.021525	-0.066225	0.02994	0.86	OK
N+4.00	19	COMDER1 MAX	0.032475	0.013875	0.03531	0.88	OK
N+4.00	19	COMDER1 MIN	-0.032475	-0.013875	0.03531	0.88	OK
N+4.00	19	COMDER2 MAX	0.0126	0.03765	0.03970	0.99	OK
N+4.00	19	COMDER2 MIN	-0.0126	-0.03765	0.03970	0.99	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: AGROECOL (CHOCO)

CÁLCULO DE DERIVAS MÁXIMAS (ESPECTRO DE UMBRAL DE DAÑO)

ALTURA DE N+7.50	3.50	m
ALTURA DE N+4.00	4.00	m
ALTURA DE BASE	0.00	m
ALTURA DE N-0.05	1.75	m
ALTURA DE N-1.80	1.70	m
ALTURA DE BASE	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+7.50	10	COMDERUMB1 MAX	0.01890	0.00680	0.00810	0.23	OK
N+7.50	10	COMDERUMB1 MIN	-0.01890	-0.00680	0.00810	0.23	OK
N+7.50	10	COMDERUMB2 MAX	0.00690	0.01940	0.00832	0.24	OK
N+7.50	10	COMDERUMB2 MIN	-0.00690	-0.01940	0.00832	0.24	OK
N+4.00	10	COMDERUMB1 MAX	0.01130	0.00400	0.01199	0.30	OK
N+4.00	10	COMDERUMB1 MIN	-0.01130	-0.00400	0.01199	0.30	OK
N+4.00	10	COMDERUMB2 MAX	0.00400	0.01160	0.01227	0.31	OK
N+4.00	10	COMDERUMB2 MIN	-0.00400	-0.01160	0.01227	0.31	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+7.50	13	COMDERUMB1 MAX	0.01890	0.00600	0.00800	0.23	OK
N+7.50	13	COMDERUMB1 MIN	-0.01890	-0.00600	0.00800	0.23	OK
N+7.50	13	COMDERUMB2 MAX	0.00690	0.01970	0.00870	0.25	OK
N+7.50	13	COMDERUMB2 MIN	-0.00690	-0.01970	0.00870	0.25	OK
N+4.00	13	COMDERUMB1 MAX	0.01130	0.00350	0.01183	0.30	OK
N+4.00	13	COMDERUMB1 MIN	-0.01130	-0.00350	0.01183	0.30	OK
N+4.00	13	COMDERUMB2 MAX	0.00400	0.01150	0.01218	0.30	OK
N+4.00	13	COMDERUMB2 MIN	-0.00400	-0.01150	0.01218	0.30	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+7.50	14	COMDERUMB1 MAX	0.01890	0.00750	0.00829	0.24	OK
N+7.50	14	COMDERUMB1 MIN	-0.01890	-0.00750	0.00829	0.24	OK
N+7.50	14	COMDERUMB2 MAX	0.00690	0.02210	0.00993	0.28	OK
N+7.50	14	COMDERUMB2 MIN	-0.00690	-0.02210	0.00993	0.28	OK
N+4.00	14	COMDERUMB1 MAX	0.01130	0.00420	0.01206	0.30	OK
N+4.00	14	COMDERUMB1 MIN	-0.01130	-0.00420	0.01206	0.30	OK
N+4.00	14	COMDERUMB2 MAX	0.00400	0.01260	0.01322	0.33	OK
N+4.00	14	COMDERUMB2 MIN	-0.00400	-0.01260	0.01322	0.33	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+7.50	17	COMDERUMB1 MAX	0.01860	0.00680	0.00791	0.23	OK
N+7.50	17	COMDERUMB1 MIN	-0.01860	-0.00680	0.00791	0.23	OK
N+7.50	17	COMDERUMB2 MAX	0.00690	0.01940	0.00832	0.24	OK
N+7.50	17	COMDERUMB2 MIN	-0.00690	-0.01940	0.00832	0.24	OK
N+4.00	17	COMDERUMB1 MAX	0.01120	0.00400	0.01189	0.30	OK
N+4.00	17	COMDERUMB1 MIN	-0.01120	-0.00400	0.01189	0.30	OK
N+4.00	17	COMDERUMB2 MAX	0.00400	0.01160	0.01227	0.31	OK
N+4.00	17	COMDERUMB2 MIN	-0.00400	-0.01160	0.01227	0.31	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+7.50	18	COMDERUMB1 MAX	0.01860	0.00600	0.00781	0.22	OK
N+7.50	18	COMDERUMB1 MIN	-0.01860	-0.00600	0.00781	0.22	OK
N+7.50	18	COMDERUMB2 MAX	0.00690	0.01970	0.00870	0.25	OK
N+7.50	18	COMDERUMB2 MIN	-0.00690	-0.01970	0.00870	0.25	OK
N+4.00	18	COMDERUMB1 MAX	0.01120	0.00350	0.01173	0.29	OK
N+4.00	18	COMDERUMB1 MIN	-0.01120	-0.00350	0.01173	0.29	OK
N+4.00	18	COMDERUMB2 MAX	0.00400	0.01150	0.01218	0.30	OK
N+4.00	18	COMDERUMB2 MIN	-0.00400	-0.01150	0.01218	0.30	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+7.50	19	COMDERUMB1 MAX	0.01860	0.00750	0.00810	0.23	OK
N+7.50	19	COMDERUMB1 MIN	-0.01860	-0.00750	0.00810	0.23	OK
N+7.50	19	COMDERUMB2 MAX	0.00690	0.02210	0.00993	0.28	OK
N+7.50	19	COMDERUMB2 MIN	-0.00690	-0.02210	0.00993	0.28	OK
N+4.00	19	COMDERUMB1 MAX	0.01120	0.00420	0.01196	0.30	OK
N+4.00	19	COMDERUMB1 MIN	-0.01120	-0.00420	0.01196	0.30	OK
N+4.00	19	COMDERUMB2 MAX	0.00400	0.01260	0.01322	0.33	OK
N+4.00	19	COMDERUMB2 MIN	-0.00400	-0.01260	0.01322	0.33	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: AGROECOL (CHOCO)

VERIFICACIÓN IRREGULARIDAD TORSIONAL

Story	Point	Load	UX	UY	UZ	Δ_1	*Irregularidad Torsional* $1.2*(\Delta_1+\Delta_2)/2$	*Irregularidad Torsional Extrema* $1.4*(\Delta_1+\Delta_2)/2$	I.T.Extrema≥Δ1 >I.T.?	Δ1>I.T.Extrema?
			m	m	m	m				
N+7.50	14	COMDER1 MAX	0.0733	0.0324	0.0003	0.0325	0.0387	0.0451	NO	NO
N+7.50	14	COMDER1 MIN	-0.0733	-0.0324	-0.0003	0.0325	0.0387	0.0451	NO	NO
N+7.50	14	COMDER2 MAX	0.0288	0.0883	0.0004	0.0399	0.0479	0.0559	NO	NO
N+7.50	14	COMDER2 MIN	-0.0288	-0.0883	-0.0004	0.0399	0.0479	0.0559	NO	NO
N+4.00	14	COMDER1 MAX	0.0439	0.0185	0.0002	0.0476	0.0568	0.0663	NO	NO
N+4.00	14	COMDER1 MIN	-0.0439	-0.0185	-0.0002	0.0476	0.0568	0.0663	NO	NO
N+4.00	14	COMDER2 MAX	0.0168	0.0502	0.0003	0.0529	0.0635	0.0741	NO	NO
N+4.00	14	COMDER2 MIN	-0.0168	-0.0502	-0.0003	0.0529	0.0635	0.0741	NO	NO
BASE	14	COMDER1 MAX	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	14	COMDER1 MIN	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	14	COMDER2 MAX	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	14	COMDER2 MIN	0	0	0	0.0000	0.0000	0.0000	NO	NO

Story	Point	Load	UX	UY	UZ	Δ_1	*Irregularidad Torsional* $1.2*(\Delta_1+\Delta_2)/2$	*Irregularidad Torsional Extrema* $1.4*(\Delta_1+\Delta_2)/2$	I.T.Extrema≥Δ1 >I.T.?	Δ1>I.T.Extrema?
			m	m	m	m				
N+7.50	19	COMDER1 MAX	0.0721	0.0324	0.0003	0.0320	0.0374	0.0436	NO	NO
N+7.50	19	COMDER1 MIN	-0.0721	-0.0324	-0.0003	0.0320	0.0374	0.0436	NO	NO
N+7.50	19	COMDER2 MAX	0.0287	0.0883	0.0004	0.0399	0.0438	0.0511	NO	NO
N+7.50	19	COMDER2 MIN	-0.0287	-0.0883	-0.0004	0.0399	0.0438	0.0511	NO	NO
N+4.00	19	COMDER1 MAX	0.0433	0.0185	0.0002	0.0471	0.0555	0.0647	NO	NO
N+4.00	19	COMDER1 MIN	-0.0433	-0.0185	-0.0002	0.0471	0.0555	0.0647	NO	NO
N+4.00	19	COMDER2 MAX	0.0168	0.0502	0.0003	0.0529	0.0597	0.0697	NO	NO
N+4.00	19	COMDER2 MIN	-0.0168	-0.0502	-0.0003	0.0529	0.0597	0.0697	NO	NO
BASE	19	COMDER1 MAX	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	19	COMDER1 MIN	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	19	COMDER2 MAX	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	19	COMDER2 MIN	0	0	0	0.0000	0.0000	0.0000	NO	NO

Story	Point	Load	UX	UY	UZ	Δ_1	*Irregularidad Torsional* $1.2*(\Delta_1+\Delta_2)/2$	*Irregularidad Torsional Extrema* $1.4*(\Delta_1+\Delta_2)/2$	I.T.Extrema≥Δ1 >I.T.?	Δ1>I.T.Extrema?
			m	m	m	m				
N+7.50	18	COMDER1 MAX	0.0721	0.0231	0.0001	0.0303	0.0370	0.0432	NO	NO
N+7.50	18	COMDER1 MIN	-0.0721	-0.0231	-0.0001	0.0303	0.0370	0.0432	NO	NO
N+7.50	18	COMDER2 MAX	0.0287	0.0744	0.0003	0.0331	0.0402	0.0469	NO	NO
N+7.50	18	COMDER2 MIN	-0.0287	-0.0744	-0.0003	0.0331	0.0402	0.0469	NO	NO
N+4.00	18	COMDER1 MAX	0.0433	0.0136	0.0001	0.0454	0.0555	0.0647	NO	NO
N+4.00	18	COMDER1 MIN	-0.0433	-0.0136	-0.0001	0.0454	0.0555	0.0647	NO	NO
N+4.00	18	COMDER2 MAX	0.0168	0.0435	0.0003	0.0466	0.0583	0.0680	NO	NO
N+4.00	18	COMDER2 MIN	-0.0168	-0.0435	-0.0003	0.0466	0.0583	0.0680	NO	NO
BASE	18	COMDER1 MAX	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	18	COMDER1 MIN	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	18	COMDER2 MAX	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	18	COMDER2 MIN	0	0	0	0.0000	0.0000	0.0000	NO	NO

Story	Point	Load	UX	UY	UZ	Δ_1	***Irregularidad Torsional*** $1.2*(\Delta_1+\Delta_2)/2$	***Irregularidad Torsional Extrema*** $1.4*(\Delta_1+\Delta_2)/2$	I.T.Extrema≥Δ1 >I.T.?	Δ1>I.T.Extrema?
			m	m	m	m				
N+7.50	17	COMDER1 MAX	0.0721	0.0307	0.0003	0.0313	0.0379	0.0442	NO	NO
N+7.50	17	COMDER1 MIN	-0.0721	-0.0307	-0.0003	0.0313	0.0379	0.0442	NO	NO
N+7.50	17	COMDER2 MAX	0.0287	0.0793	0.0003	0.0339	0.0407	0.0474	NO	NO
N+7.50	17	COMDER2 MIN	-0.0287	-0.0793	-0.0003	0.0339	0.0407	0.0474	NO	NO
N+4.00	17	COMDER1 MAX	0.0433	0.0184	0.0002	0.0470	0.0568	0.0663	NO	NO
N+4.00	17	COMDER1 MIN	-0.0433	-0.0184	-0.0002	0.0470	0.0568	0.0663	NO	NO
N+4.00	17	COMDER2 MAX	0.0168	0.0476	0.0003	0.0505	0.0606	0.0707	NO	NO
N+4.00	17	COMDER2 MIN	-0.0168	-0.0476	-0.0003	0.0505	0.0606	0.0707	NO	NO
BASE	17	COMDER1 MAX	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	17	COMDER1 MIN	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	17	COMDER2 MAX	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	17	COMDER2 MIN	0	0	0	0.0000	0.0000	0.0000	NO	NO

Story	Point	Load	UX	UY	UZ	Δ_1	***Irregularidad Torsional*** $1.2*(\Delta_1+\Delta_2)/2$	***Irregularidad Torsional Extrema*** $1.4*(\Delta_1+\Delta_2)/2$	I.T.Extrema≥Δ1 >I.T.?	Δ1>I.T.Extrema?
			m	m	m	m				
N+7.50	10	COMDER1 MAX	0.0733	0.0307	0.0003	0.0319	0.0377	0.0439	NO	NO
N+7.50	10	COMDER1 MIN	-0.0733	-0.0307	-0.0003	0.0319	0.0377	0.0439	NO	NO
N+7.50	10	COMDER2 MAX	0.0288	0.0793	0.0003	0.0339	0.0402	0.0469	NO	NO
N+7.50	10	COMDER2 MIN	-0.0288	-0.0793	-0.0003	0.0339	0.0402	0.0469	NO	NO
N+4.00	10	COMDER1 MAX	0.0439	0.0184	0.0002	0.0476	0.0561	0.0655	NO	NO
N+4.00	10	COMDER1 MIN	-0.0439	-0.0184	-0.0002	0.0476	0.0561	0.0655	NO	NO
N+4.00	10	COMDER2 MAX	0.0168	0.0476	0.0002	0.0505	0.0583	0.0680	NO	NO
N+4.00	10	COMDER2 MIN	-0.0168	-0.0476	-0.0002	0.0505	0.0583	0.0680	NO	NO
BASE	10	COMDER1 MAX	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	10	COMDER1 MIN	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	10	COMDER2 MAX	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	10	COMDER2 MIN	0	0	0	0.0000	0.0000	0.0000	NO	NO

Story	Point	Load	UX	UY	UZ	Δ_1	***Irregularidad Torsional*** $1.2*(\Delta_1+\Delta_2)/2$	***Irregularidad Torsional Extrema*** $1.4*(\Delta_1+\Delta_2)/2$	I.T.Extrema≥Δ1 >I.T.?	Δ1>I.T.Extrema?
			m	m	m	m				
N+7.50	13	COMDER1 MAX	0.0733	0.0231	0.0001	0.0309	0.0381	0.0444	NO	NO
N+7.50	13	COMDER1 MIN	-0.0733	-0.0231	-0.0001	0.0309	0.0381	0.0444	NO	NO
N+7.50	13	COMDER2 MAX	0.0288	0.0744	0.0003	0.0331	0.0439	0.0512	NO	NO
N+7.50	13	COMDER2 MIN	-0.0288	-0.0744	-0.0003	0.0331	0.0439	0.0512	NO	NO
N+4.00	13	COMDER1 MAX	0.0439	0.0136	0.0001	0.0460	0.0562	0.0655	NO	NO
N+4.00	13	COMDER1 MIN	-0.0439	-0.0136	-0.0001	0.0460	0.0562	0.0655	NO	NO
N+4.00	13	COMDER2 MAX	0.0168	0.0435	0.0002	0.0466	0.0597	0.0697	NO	NO
N+4.00	13	COMDER2 MIN	-0.0168	-0.0435	-0.0002	0.0466	0.0597	0.0697	NO	NO
BASE	13	COMDER1 MAX	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	13	COMDER1 MIN	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	13	COMDER2 MAX	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	13	COMDER2 MIN	0	0	0	0.0000	0.0000	0.0000	NO	NO

Diseños & Estructuras

PROYECTO: I.E. AGROECOL BLOQUE A
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+7.50	D2	COMDER1 MAX	0.1234	0.0439	0.060
N+7.50	D2	COMDER1 MIN	-0.1234	-0.0439	0.060
N+7.50	D2	COMDER2 MAX	0.0374	0.1437	0.072
N+7.50	D2	COMDER2 MIN	-0.0374	-0.1437	0.072
N+4.00	D1	COMDER1 MAX	0.0674	0.0225	0.071
N+4.00	D1	COMDER1 MIN	-0.0674	-0.0225	0.071
N+4.00	D1	COMDER2 MAX	0.0204	0.0739	0.077
N+4.00	D1	COMDER2 MIN	-0.0204	-0.0739	0.077

Diseños & Estructuras

PROYECTO: I.E. AGROECOL BLOQUE A
VERIFICACIÓN DE INDICE DE ESTABILIDAD Qi

DESPLAZAMIENTO DE DIAFRAGMAS RIGIDOS

FUERZA CORTANTE DEL PISO i

PISO	Fx	Vi
	kN	kN
N+7.50	585.0	585.00
N+4.00	1309.7	1894.70

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+7.50	176.09	125.22	125.22	0.35	61.63	61.63	186.86
N+4.00	150.46	40.51	40.51	2.45	368.63	368.63	409.14

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.

Diseños & Estructuras

PROYECTO: I.E. AGROECOL BLOQUE A
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	Pi	Δcm	Vi	Qi	ESTABILIDAD
		m	kN	m	kN		Qi<0.10
N+7.50	COMDER1 MAX	3.50	186.856	0.060	585.000	0.0055	ESTABLE
N+7.50	COMDER1 MIN	3.50	186.856	0.060	585.000	0.0055	ESTABLE
N+7.50	COMDER2 MAX	3.50	186.856	0.072	585.000	0.0066	ESTABLE
N+7.50	COMDER2 MIN	3.50	186.856	0.072	585.000	0.0066	ESTABLE
N+4.00	COMDER1 MAX	4.00	409.138	0.071	1894.700	0.0038	ESTABLE
N+4.00	COMDER1 MIN	4.00	409.138	0.071	1894.700	0.0038	ESTABLE
N+4.00	COMDER2 MAX	4.00	409.138	0.077	1894.700	0.0041	ESTABLE
N+4.00	COMDER2 MIN	4.00	409.138	0.077	1894.700	0.0041	ESTABLE

4. DISEÑO DE CIMENTACIÓN

DISEÑO DE CIMENTACIÓN

PROYECTO: SEDE EDUCATIVA AGROECOL UNIÓN PANAMERICANA (CHOCÓ)
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 Limite de Servicio	CIMEN2= 1D + 0.75L + 0.70*(0.75/R)Ex + 0.21*(0.75/	**B.2.3-8**	**1.50**
	CIMEN3= 1D + 0.75L + 0.21*(0.75/R)Ex + 0.70*(0.75/		

Story	Point	Load	FX	FY	FZ	MX	MY	MZ	Load	COMBINACIÓN	Pumax
BASE	10	CIM1	16.88	19.33	242.16	-25.902	16.003	0.568	CIM1		
BASE	10	CIM2 MAX	47.58	27.8	253.93	-1.106	97.41	1.466	CIM2 MAX		
BASE	10	CIM2 MIN	-15.12	9.03	215.32	-47.751	-66.395	-0.441	CIM2 MIN	CIM1	242.2
BASE	10	CIM3 MAX	28.16	42.94	256.42	36.281	46.787	1.886	CIM3 MAX		
BASE	10	CIM3 MIN	4.29	-6.11	212.83	-85.138	-15.771	-0.861	CIM3 MIN		
BASE	13	CIM1	4.35	15.99	558.87	-23.293	2.645	0.374	CIM1		
BASE	13	CIM2 MAX	26.74	21.78	534.17	-7.86	53.268	0.966	CIM2 MAX		
BASE	13	CIM2 MIN	-19.24	9.44	521.76	-36.914	-49.203	-0.29	CIM2 MIN	CIM1	558.9
BASE	13	CIM3 MAX	12.64	34.7	545.89	23.48	21.77	1.242	CIM3 MAX		
BASE	13	CIM3 MIN	-5.15	-3.49	510.04	-68.254	-17.706	-0.567	CIM3 MIN		
BASE	14	CIM1	-10.14	3.04	587.76	-12.078	-17.163	0.568	CIM1		
BASE	14	CIM2 MAX	12.95	16.92	572.54	22.567	39.613	1.466	CIM2 MAX		
BASE	14	CIM2 MIN	-32.58	-9.42	529.78	-46.286	-72.641	-0.441	CIM2 MIN	CIM1	587.8
BASE	14	CIM3 MAX	-1.18	39.17	577.96	81.243	4.696	1.886	CIM3 MAX		
BASE	14	CIM3 MIN	-18.46	-31.67	524.36	-104.962	-37.723	-0.861	CIM3 MIN		
BASE	17	CIM1	20.37	-13.85	311.64	17.704	16.922	0.568	CIM1		
BASE	17	CIM2 MAX	51.43	-3.96	322.77	41.054	98.558	1.466	CIM2 MAX		
BASE	17	CIM2 MIN	-12.2	-23.04	280.24	-6.032	-65.283	-0.441	CIM2 MIN	CIM1	311.6
BASE	17	CIM3 MAX	31.95	11.23	324	78.483	48.412	1.886	CIM3 MAX		
BASE	17	CIM3 MIN	7.27	-38.22	279	-43.461	-15.137	-0.861	CIM3 MIN		
BASE	18	CIM1	-4.07	-15.55	533.85	18.153	-10.278	0.374	CIM1		
BASE	18	CIM2 MAX	19.2	-9.04	518.13	32.173	41.378	0.966	CIM2 MAX		
BASE	18	CIM2 MIN	-26.65	-20.97	504.93	3.519	-60.313	-0.29	CIM2 MIN	CIM1	533.9
BASE	18	CIM3 MAX	5.21	4.05	529.54	63.685	10.317	1.242	CIM3 MAX		
BASE	18	CIM3 MIN	-12.67	-34.06	493.52	-27.992	-29.251	-0.567	CIM3 MIN		
BASE	19	CIM1	-27.39	-8.96	340.17	3.555	-42.15	0.568	CIM1		
BASE	19	CIM2 MAX	-3.7	3.71	350.68	39.296	15.265	1.466	CIM2 MAX		
BASE	19	CIM2 MIN	-48.39	-22.26	307.27	-29.075	-95.132	-0.441	CIM2 MIN	CIM1	340.2
BASE	19	CIM3 MAX	-17.58	26.02	355.92	98.051	-18.963	1.886	CIM3 MAX		
BASE	19	CIM3 MIN	-34.5	-44.56	302.03	-87.83	-60.904	-0.861	CIM3 MIN		

CARGAS A CIMENTACIÓN

PROYECTO: SEDE EDUCATIVA AGROECOL UNIÓN PANAMERICANA (CHOCÓ)

Story	Point	Load	FX	FY	FZ	MX	MY	MZ
BASE	10	CIM1	16.880	19.330	242.160	-25.902	16.003	0.568
BASE	13	CIM1	4.350	15.990	558.870	-23.293	2.645	0.374
BASE	14	CIM1	-10.140	3.040	587.760	-12.078	-17.163	0.568
BASE	17	CIM1	20.370	-13.850	311.640	17.704	16.922	0.568
BASE	18	CIM1	-4.070	-15.550	533.850	18.153	-10.278	0.374
BASE	19	CIM1	-27.390	-8.960	340.170	3.555	-42.150	0.568

DISEÑO VIGAS DE AMARRE

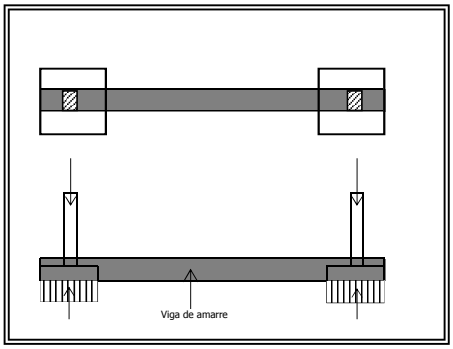
PROYECTO: SEDE EDUCATIVA AGROECOL UNIÓN PANAMERICANA (CHOCÓ)

VIGA DE AMARRE TIPO

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

b = **0.30** m
h = **0.40** m

Pmáx = 587.76 kN



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

Aa = ***0.40***
Paxial = 0.25*Aa*Pmáx
Paxial = *58.776* kN

DISEÑO A TENSIÓN

As = 1.7*58.776/(0.90*420)
As = **2.64** cm^2

DISEÑO A COMPRESIÓN

P com = 1.7*58.776
P com = *99.9* kN

Para esta carga la sección requiere cuantía mínima:

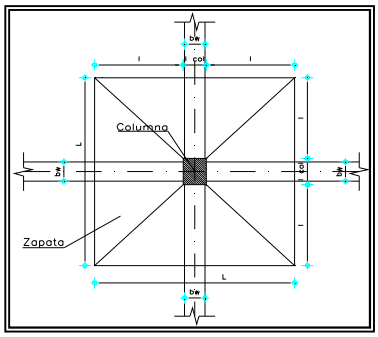
As = 0.00333*0.3*0.35
As = **3.50** cm^2

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

DISEÑO DE ZAPATAS
PROYECTO: SEDE EDUCATIVA AGROECOL UNIÓN PANAMERICANA (CHOCÓ)
Zapata Tipo 7 - Concentrica Und.1

Columna	**b =**	40	cm		**f'c =**	21.1	MPa		**σ =**	0.120	MPa
	t =	40	cm		**fy =**	420	MPa				

PREDIMENSIONAMIENTO



L =	1.500	m	
lcol =	0.400	m	
l =	0.550	m	
e =	0.00	m	
L =	1.490	m	

Cargas

Mu=	0.000	kN*m
Pu =	242.16	kN
Pp (10%) =	24	kN
Σ P =	266	kN

Area necesaria = $\frac{\Sigma P}{\sigma} = \frac{266.38}{0.120} =$ 2.22 m²

Aproximamos = 1.50 m

Carga de diseño = $\frac{Pu}{A\ real} = \frac{242.16}{2.250} =$ 0.108 MPa

Esfuerzos

σmáx=	0.118	MPa	OK
σmin=	0.118	MPa	OK

DISEÑO DE ZAPATA CONCENTRICA

FLEXIÓN

M borde de la columna = 17.91 kN*m

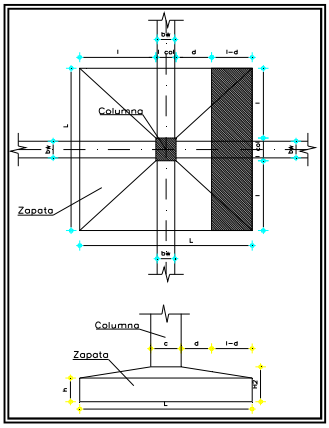
Mu = 1,7 * M borde de la columna = 30.44 kN*m

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

d=	0.23	m
Cuantia =	0.002	
As =	4.60	cm²/m

Armadura: 8#418c./0.20
en ambos sentidos

CORTANTE



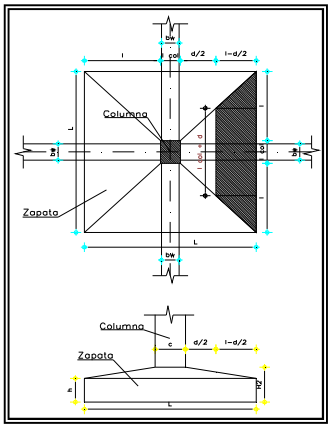
a. En una dirección (d)

L =	1.50	m
l =	0.55	m
l - d =	0.32	m
V (d) =	56.83	kN
Vu (d)=	1.7*V(d)	
Vu (d) =	96.61	kN
h□=	0.23	m

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

$\upsilon\nu = \frac{Vu}{L * h□} =$ 0.280 MPa

ϕvc = 0.574 MPa **OK**



b. En dos direcciones (d/2)

Zapata Tipo 7 - Concentrica

L =	1.500	m	**H =**	0.30	m
d/2 =	0.115	m	**h =**	0.30	m
l - d/2 =	0.435	m	**H-h =**	0.00	m

V (d/2) =	54.8	kN
Vu (d/2) =	1.5*V(d)	
Vu (d/2) =	82.3	kN
d_1 =	0.23	m

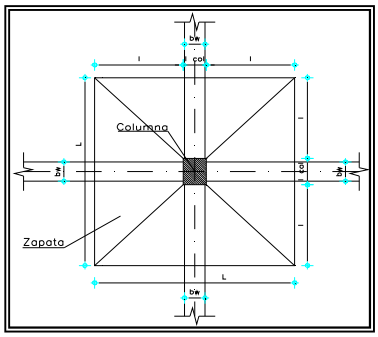
$$\nu u = \frac{Vu}{bo \times d_1} = 0.568 \text{ MPa}$$

ϕvc= 1.15 MPa **OK**

DISEÑO DE ZAPATAS
PROYECTO: SEDE EDUCATIVA AGROECOL UNIÓN PANAMERICANA (CHOCÓ)
Zapata Tipo 8 - Concentrica Und.3

Columna	**b =**	40	cm		**f'c =**	21.1	MPa		**σ =**	0.120	MPa
	t =	40	cm		**fy =**	420	MPa				

PREDIMENSIONAMIENTO



L =	2.400	m	
lcol =	0.400	m	
l =	1.000	m	

Cargas

Mu=	0.000	kN*m
Pu =	587.76	kN
Pp (10%) =	59	kN
Σ P =	647	kN

Area necesaria = $\frac{\Sigma P}{\sigma} = \frac{646.54}{0.120} =$ 5.39 m²

e =	0.00	m
L =	2.321	m

Aproximamos = 2.40 m

Carga de diseño = $\frac{Pu}{A\ real} = \frac{587.76}{5.760} =$ 0.102 MPa

Esfuerzos

σmáx=	0.112	MPa	OK
σmin=	0.112	MPa	OK

DISEÑO DE ZAPATA CONCENTRICA

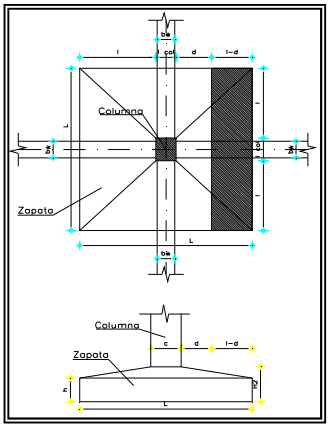
FLEXIÓN

	M borde de la columna =	56.12	kN*m
Mu =	1,7 * M borde de la columna =	95.41	kN*m

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

d=	0.33	m
Cuantia =	0.00213976	
As =	7.06	cm²/m
Armadura:	14#427c./0.18	
	en ambos sentidos	

CORTANTE



a. En una dirección (d)

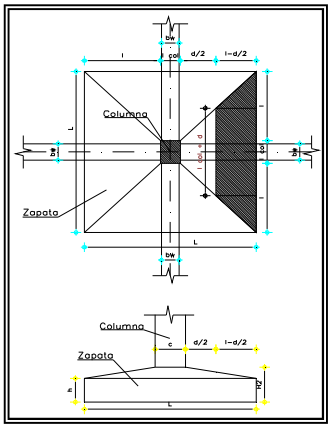
L =	2.40	m
l =	1.00	m
l - d =	0.67	m

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

V (d) =	180.49	kN
Vu (d)=	1.7*V(d)	
Vu (d) =	306.84	kN
h□=	0.30	m

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

ϕvc = 0.574 MPa **OK**



b. En dos direcciones (d/2)

Zapata Tipo 8 - Concentrica

L =	2.400	m	**H =**	0.40	m
d/2 =	0.165	m	**h =**	0.30	m
l - d/2 =	0.835	m	**H-h =**	0.10	m

V (d/2) =	146.7	kN
Vu (d/2) =	1.5*V(d)	
Vu (d/2) =	220.0	kN
d_1 =	0.31789474	m

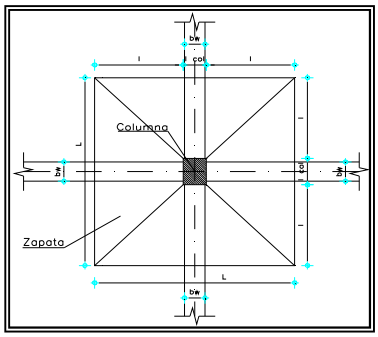
$$\nu u = \frac{Vu}{bo \times d_1} = 0.948 \text{ MPa}$$

ϕvc= 1.15 MPa **OK**

DISEÑO DE ZAPATAS
PROYECTO: SEDE EDUCATIVA AGROECOL UNIÓN PANAMERICANA (CHOCÓ)
Zapata Tipo 9 - Concentrica Und.2

Columna	**b =**	40	cm	**f'c =**	21.1	MPa		**σ =**	0.120	MPa
	t =	40	cm	**fy =**	420	MPa				

PREDIMENSIONAMIENTO



L =	1.800	m	
lcol =	0.400	m	
l =	0.700	m	

Cargas

Mu=	0.000	kN*m
Pu =	340.17	kN
Pp (10%) =	34	kN
Σ P =	374	kN

Area necesaria = $\frac{\Sigma P}{\sigma} = \frac{374.19}{0.120} =$ 3.12 m²

e =	0.00	m
L =	1.766	m

Aproximamos = 1.80 m

Carga de diseño = $\frac{Pu}{A\ real} = \frac{340.17}{3.240} =$ 0.105 MPa

Esfuerzos

σmáx=	0.115	MPa	OK
σmin=	0.115	MPa	OK

DISEÑO DE ZAPATA CONCENTRICA

FLEXIÓN

M borde de la columna = 28.30 kN*m

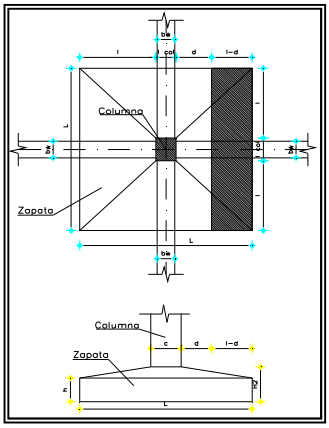
Mu = 1,7 * M borde de la columna = 48.10 kN*m

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

d=	0.23	m
Cuantia =	0.00222302	
As =	5.11	cm²/m

Armadura: 10#421c./0.20
en ambos sentidos

CORTANTE



a. En una dirección (d)

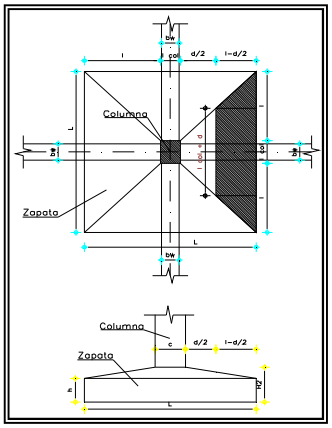
L =	1.80	m
l =	0.70	m
l - d =	0.47	m

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

V (d) =	97.70	kN
Vu (d)=	1.7*V(d)	
Vu (d) =	166.10	kN
h□=	0.23	m

$\upsilon\nu = \frac{Vu}{L * h□} =$ 0.401 MPa

ϕvc = 0.574 MPa **OK**



b. En dos direcciones (d/2)

Zapata Tipo 9 - Concentrica

L =	1.800	m	**H =**	0.30	m
d/2 =	0.115	m	**h =**	0.30	m
l - d/2 =	0.585	m	**H-h =**	0.00	m

V (d/2) =	82.1	kN
Vu (d/2) =	1.5*V(d)	
Vu (d/2) =	123.1	kN
d_1 =	0.23	m

$$\nu u = \frac{Vu}{bo \times d_1} = 0.850 \text{ MPa}$$

ϕvc= 1.15 MPa **OK**

5. DISEÑO DE VIGAS Y COLUMNAS

DISEÑO DE VIGAS Y COLUMNAS

PROYECTO: AGROECOL (CHOCÓ)

V-101/ N+4.00

B= 0.15 H= 0.45 L= 6.72			B= 0.15 H= 0.45 L= 6.72		
Mu=-18.46 As =2.54 As(r)=1.96		Mu=-43.38 As =3.96 As(r)=3.09	Mu=-40.39 As =3.96 As(r)=2.86		Mu=-20.52 As =2.54 As(r)=1.96
Mu=31.02 As =2.54 As(r)=2.16			Mu=31.74 As =2.54 As(r)=2.22		
Vu=-15.25	Vu=-8.38	Vu=23.74	Vu=-23.31	Vu=-16.44	Vu=16.68

V-102/ N+4.00

B= 0.35 H= 0.45 L= 6.62			B= 0.35 H= 0.45 L= 6.67		
Mu=-192.20 As =15.52 As(r)=14.67		Mu=-244.90 As =20.28 As(r)=19.63	Mu=-222.62 As =20.28 As(r)=17.46		Mu=-194.44 As =15.52 As(r)=14.87
Mu=143.53 As =11.40 As(r)=10.53			Mu=140.82 As =11.40 As(r)=10.31		
Vu=-124.80	Vu=-56.68	Vu=143.45	Vu=-136.13	Vu=-68.00	Vu=125.18

V-103/ N+4.00

B= 0.25 H= 0.45 L= 6.92			B= 0.25 H= 0.45 L= 6.92		
Mu=-47.75 As =0.71 As(r)=3.32		Mu=-111.73 As =7.76 As(r)=8.28	Mu=-104.60 As =7.76 As(r)=7.69		Mu=-53.57 As =4.27 As(r)=3.75
Mu=62.26 As =4.52 As(r)=4.73			Mu=61.66 As =4.52 As(r)=4.66		
Vu=-64.59	Vu=9.67	Vu=84.82	Vu=-83.36	Vu=-12.26	Vu=67.50

V-104/ N+4.00

B= 0.35 H= 0.45 L= 6.62			B= 0.35 H= 0.45 L= 6.67			B= 0.35 H= 0.45 L= 1.80		
Mu=-170.93 As =13.46 As(r)=12.81		Mu=-234.90 As =17.90 As(r)=18.64	Mu=-249.60 As =17.90 As(r)=20.11		Mu=-274.29 As =22.22 As(r)=23.93	Mu=-218.24 As =22.22 As(r)=17.05		Mu=-0.00 As =22.22 As(r)=4.57
Mu=104.61 As =7.92 As(r)=7.46			Mu=173.50 As =7.92 As(r)=13.03			Mu=0.00 As =7.92 As(r)=4.57		
Vu=-108.45	Vu=-40.33	Vu=143.71	Vu=-166.24	Vu=-67.06	Vu=173.81	Vu=-200.76	Vu=-106.44	Vu=-12.16

PROYECTO: AGROECOL (CHOCÓ)

V-105/ N+4.00

B= 0.15 H= 0.45 L= 1.17			B= 0.15 H= 0.45 L= 6.72			B= 0.15 H= 0.45 L= 1.83		
Mu=-5.59 As =1.90 As(r)=1.96		Mu=-18.28 As =2.54 As(r)=1.96	Mu=-38.71 As =2.54 As(r)=2.73		Mu=-48.95 As =3.96 As(r)=3.52	Mu=-38.92 As =3.96 As(r)=2.75		Mu=-2.76 As =3.96 As(r)=1.96
	Mu=0.00 As =2.54 As(r)=1.96			Mu=26.25 As =2.54 As(r)=1.96			Mu=0.00 As =2.54 As(r)=1.96	
Vu=5.04	Vu=9.37	Vu=13.90	Vu=-39.55	Vu=6.89	Vu=40.72	Vu=-27.36	Vu=-17.49	Vu=-8.36

V-106/ N+4.00

B= 0.35 H= 0.45 L= 6.60			B= 0.35 H= 0.45 L= 1.30		
Mu=-185.48 As =15.52 As(r)=14.07		Mu=-196.56 As =15.52 As(r)=15.06	Mu=-46.58 As =15.52 As(r)=4.57		Mu=-0.00 As =15.52 As(r)=4.57
	Mu=111.47 As =7.92 As(r)=7.99			Mu=0.00 As =7.92 As(r)=4.57	
Vu=-116.39	Vu=-49.20	Vu=119.80	Vu=-47.16	Vu=-30.79	Vu=-15.25

V-107/ N+4.00

B= 0.25 H= 0.45 L= 3.35			B= 0.25 H= 0.45 L= 3.40			B= 0.25 H= 0.45 L= 1.43		
Mu=-57.96 As =3.47 As(r)=4.07		Mu=-17.80 As =5.94 As(r)=3.27	Mu=-17.46 As =5.94 As(r)=3.27		Mu=-61.98 As =5.94 As(r)=4.37	Mu=-24.19 As =5.94 As(r)=3.27		Mu=-6.05 As =4.45 As(r)=3.27
	Mu=55.52 As =5.94 As(r)=4.42			Mu=56.59 As =5.94 As(r)=4.48			Mu=6.05 As =5.94 As(r)=3.27	
Vu=-69.59	Vu=-34.50	Vu=6.30	Vu=-7.06	Vu=34.90	Vu=68.97	Vu=-38.47	Vu=-12.00	Vu=23.33

V-108/ N+4.00

B= 0.15 H= 0.45 L= 1.90		
Mu=-5.41 As =1.90 As(r)=1.96		Mu=-16.87 As =1.90 As(r)=1.96
	Mu=4.22 As =2.54 As(r)=1.96	
Vu=-5.04	Vu=5.87	Vu=14.48

V-109/ N+4.00

B= 0.35 H= 0.45 L= 1.80			B= 0.35 H= 0.45 L= 6.60			B= 0.35 H= 0.45 L= 1.30		
Mu=-0.00 As =16.67 As(r)=4.57		Mu=-145.07 As =22.22 As(r)=10.66	Mu=-269.95 As =22.22 As(r)=23.66		Mu=-251.59 As =17.90 As(r)=20.31	Mu=-113.17 As =17.90 As(r)=8.12		Mu=-0.00 As =17.90 As(r)=4.57
	Mu=0.00 As =13.46 As(r)=4.57			Mu=206.22 As =13.46 As(r)=15.93			Mu=0.00 As =13.46 As(r)=4.57	
Vu=53.44	Vu=73.09	Vu=92.74	Vu=-165.11	Vu=-96.59	Vu=159.92	Vu=-105.84	Vu=-75.00	Vu=-45.58

PROYECTO: AGROECOL (CHOCÓ)

V-110/ N+4.00

B= 0.25 H= 0.45 L= 1.93			B= 0.25 H= 0.45 L= 3.40			B= 0.25 H= 0.45 L= 3.40		
Mu=-4.57 As =5.23 As(r)=3.27		Mu=-62.76 As =6.97 As(r)=4.43	Mu=-89.70 As =6.97 As(r)=6.49		Mu=-22.43 As =5.23 As(r)=3.27	Mu=-15.20 As =5.23 As(r)=3.27		Mu=-60.79 As =5.23 As(r)=4.28
	Mu=0.00 As =3.81 As(r)=3.27			Mu=39.75 As =3.81 As(r)=3.29			Mu=53.53 As =3.81 As(r)=4.11	
Vu=11.69	Vu=28.19	Vu=47.26	Vu=-73.41	Vu=-39.25	Vu=-7.26	Vu=-12.26	Vu=31.31	Vu=63.71

B= 0.25 H= 0.45 L= 1.43		
Mu=-23.76 As =5.23 As(r)=3.27		Mu=-5.94 As =3.92 As(r)=3.27
	Mu=5.94 As =3.81 As(r)=3.27	
Vu=-38.26	Vu=-11.78	Vu=24.69

V-111/ N+4.00

B= 0.35 H= 0.45 L= 1.75			B= 0.35 H= 0.45 L= 6.50			B= 0.35 H= 0.45 L= 1.25		
Mu=-0.00 As =17.90 As(r)=4.57		Mu=-176.97 As =17.90 As(r)=13.33	Mu=-243.85 As =17.90 As(r)=19.53		Mu=-199.69 As =15.52 As(r)=15.34	Mu=-49.50 As =15.52 As(r)=4.57		Mu=-0.00 As =15.52 As(r)=4.57
	Mu=0.00 As =7.92 As(r)=4.57			Mu=101.88 As =7.92 As(r)=7.25			Mu=0.00 As =7.92 As(r)=4.57	
Vu=68.08	Vu=88.50	Vu=108.92	Vu=-130.72	Vu=-63.53	Vu=117.98	Vu=-48.25	Vu=-32.22	Vu=-16.68

V-112/ N+4.00

B= 0.15 H= 0.45 L= 1.83		
Mu=-3.84 As =2.54 As(r)=1.96		Mu=-10.17 As =2.54 As(r)=1.96
	Mu=2.54 As =2.54 As(r)=1.96	
Vu=-8.36	Vu=3.90	Vu=12.16

V-201/ N+7.50

B= 0.15 H= 0.45 L= 6.72			B= 0.15 H= 0.45 L= 6.72			B= 0.15 H= 0.45 L= 1.62		
Mu=-11.24 As =2.54 As(r)=1.96		Mu=-11.45 As =2.54 As(r)=1.96	Mu=-8.51 As =2.54 As(r)=1.96		Mu=-22.11 As =2.54 As(r)=1.96	Mu=-12.61 As =2.54 As(r)=1.96		Mu=-1.75 As =2.54 As(r)=1.96
	Mu=7.43 As =2.54 As(r)=1.96			Mu=5.53 As =2.54 As(r)=1.96			Mu=0.00 As =2.54 As(r)=1.96	
Vu=-7.87	Vu=1.90	Vu=8.78	Vu=-6.95	Vu=3.02	Vu=9.89	Vu=-8.36	Vu=-6.54	Vu=-4.72

PROYECTO: AGROECOL (CHOCÓ)

V-202/ N+7.50

B= 0.35 H= 0.45 L= 6.62			B= 0.35 H= 0.45 L= 6.67			B= 0.35 H= 0.45 L= 1.60		
Mu=-46.57 As =6.50 As(r)=4.57		Mu=-47.14 As =6.50 As(r)=4.57	Mu=-28.75 As =6.50 As(r)=4.57		Mu=-74.46 As =6.50 As(r)=5.20	Mu=-39.61 As =6.50 As(r)=4.57		Mu=-0.15 As =6.50 As(r)=4.57
	Mu=13.70 As =5.08 As(r)=4.57			Mu=18.62 As =5.08 As(r)=4.57			Mu=0.00 As =5.08 As(r)=4.57	
Vu=-23.30	Vu=9.19	Vu=25.23	Vu=-17.37	Vu=13.55	Vu=29.58	Vu=-26.36	Vu=-22.11	Vu=-17.86

V-203/ N+7.50

B= 0.35 H= 0.45 L= 6.62			B= 0.35 H= 0.45 L= 6.67			B= 0.35 H= 0.45 L= 1.60		
Mu=-57.98 As =6.50 As(r)=4.57		Mu=-49.60 As =6.50 As(r)=4.57	Mu=-37.73 As =6.50 As(r)=4.57		Mu=-63.67 As =6.50 As(r)=4.57	Mu=-45.94 As =6.50 As(r)=4.57		Mu=-0.00 As =6.50 As(r)=4.57
	Mu=19.50 As =5.08 As(r)=4.57			Mu=15.92 As =5.08 As(r)=4.57			Mu=0.00 As =5.08 As(r)=4.57	
Vu=-28.34	Vu=-12.31	Vu=28.46	Vu=-20.70	Vu=10.72	Vu=26.76	Vu=-29.68	Vu=-25.43	Vu=-21.18

V-204/ N+7.50

B= 0.15 H= 0.45 L= 2.81			B= 0.15 H= 0.45 L= 6.72			B= 0.15 H= 0.45 L= 1.62		
Mu=-0.14 As =1.90 As(r)=1.96		Mu=-8.93 As =2.54 As(r)=1.96	Mu=-10.60 As =2.54 As(r)=1.96		Mu=-17.25 As =2.54 As(r)=1.96	Mu=-8.81 As =2.54 As(r)=1.96		Mu=-1.83 As =2.54 As(r)=1.96
	Mu=0.54 As =2.54 As(r)=1.96			Mu=4.84 As =2.54 As(r)=1.96			Mu=0.02 As =2.54 As(r)=1.96	
Vu=-1.10	Vu=2.95	Vu=6.09	Vu=-7.80	Vu=1.99	Vu=8.87	Vu=-6.11	Vu=-4.29	Vu=-2.47

V-205/ N+7.50

B= 0.35 H= 0.45 L= 6.60			B= 0.35 H= 0.45 L= 1.30			B= 0.35 H= 0.45 L= 0.40		
Mu=-79.54 As =6.50 As(r)=5.58		Mu=-85.46 As =6.50 As(r)=6.02	Mu=-26.83 As =6.50 As(r)=4.57		Mu=-6.71 As =6.50 As(r)=4.57	Mu=-0.88 As =6.50 As(r)=4.57		Mu=-0.00 As =4.88 As(r)=4.57
	Mu=26.82 As =5.08 As(r)=4.57			Mu=6.71 As =5.08 As(r)=4.57			Mu=0.00 As =5.08 As(r)=4.57	
Vu=-48.07	Vu=11.91	Vu=49.69	Vu=-22.70	Vu=-16.49	Vu=-10.55	Vu=-3.04	Vu=-1.52	Vu=0.00

V-206/ N+7.50

B= 0.15 H= 0.45 L= 1.90		
Mu=-0.22 As =1.90 As(r)=1.96		Mu=-9.42 As =1.90 As(r)=1.96
	Mu=0.00 As =2.54 As(r)=1.96	
Vu=1.10	Vu=4.50	Vu=8.22

PROYECTO: AGROECOL (CHOCÓ)

V-207/ N+7.50

B= 0.35 H= 0.45 L= 1.80			B= 0.35 H= 0.45 L= 6.60			B= 0.35 H= 0.45 L= 1.30		
Mu=-0.00 As =7.92 As(r)=4.57		Mu=-46.84 As =7.92 As(r)=4.57	Mu=-100.99 As =7.92 As(r)=7.18		Mu=-92.00 As =7.92 As(r)=6.51	Mu=-40.34 As =7.92 As(r)=4.57		Mu=-10.09 As =7.92 As(r)=4.57
	Mu=0.00 As =5.23 As(r)=4.57			Mu=30.72 As =5.23 As(r)=4.57			Mu=10.09 As =5.23 As(r)=4.57	
Vu=13.56	Vu=22.66	Vu=33.53	Vu=-60.49	Vu=-11.76	Vu=57.94	Vu=-35.37	Vu=-25.26	Vu=-18.26

B= 0.35 H= 0.45 L= 0.40		
Mu=-0.88 As =7.92 As(r)=4.57		Mu=-0.00 As =7.97 As(r)=4.57
	Mu=0.00 As =5.23 As(r)=4.57	
Vu=-3.04	Vu=-1.52	Vu=0.00

V-208/ N+7.50

B= 0.35 H= 0.45 L= 1.75			B= 0.35 H= 0.45 L= 6.50			B= 0.35 H= 0.45 L= 1.25		
Mu=-0.00 As =9.66 As(r)=4.57		Mu=-47.00 As =9.66 As(r)=4.57	Mu=-100.53 As =9.66 As(r)=7.15		Mu=-91.97 As =9.66 As(r)=6.50	Mu=-42.38 As =9.66 As(r)=4.57		Mu=-10.60 As =9.66 As(r)=4.57
	Mu=0.00 As =5.08 As(r)=4.57			Mu=30.32 As =5.08 As(r)=4.57			Mu=10.60 As =5.08 As(r)=4.57	
Vu=14.43	Vu=23.19	Vu=31.95	Vu=-55.99	Vu=-15.21	Vu=53.49	Vu=-33.58	Vu=-26.93	Vu=-20.28

B= 0.35 H= 0.45 L= 0.40		
Mu=-0.88 As =9.66 As(r)=4.57		Mu=-0.00 As =7.24 As(r)=4.57
	Mu=0.00 As =5.08 As(r)=4.57	
Vu=-3.04	Vu=-1.52	Vu=0.00

V-209/ N+7.50

B= 0.15 H= 0.45 L= 1.83			B= 0.15 H= 0.45 L= 6.65			B= 0.15 H= 0.45 L= 1.33		
Mu=-1.68 As =1.90 As(r)=1.96		Mu=-11.43 As =2.54 As(r)=1.96	Mu=-22.76 As =2.54 As(r)=1.96		Mu=-18.00 As =2.54 As(r)=1.96	Mu=-7.37 As =2.54 As(r)=1.96		Mu=-1.98 As =2.54 As(r)=1.96
	Mu=0.86 As =2.54 As(r)=1.96			Mu=8.89 As =2.54 As(r)=1.96			Mu=1.84 As =2.54 As(r)=1.96	
Vu=-2.47	Vu=4.84	Vu=7.71	Vu=-13.47	Vu=-3.80	Vu=12.19	Vu=-5.71	Vu=-3.54	Vu=3.60

PROYECTO: AGROECOL (CHOCÓ)

B= 0.15 H= 0.45 L= 0.40		
Mu=-0.38 As =2.54 As(r)=1.96		Mu=-0.00 As =1.90 As(r)=1.96
	Mu=0.00 As =2.54 As(r)=1.96	
Vu=-1.30	Vu=-0.65	Vu=0.00

PROYECTO: AGROECOL (CHOCO)

Columna A-2

Nivel	H Libre	Losa	B	H	M1	M2	P	V1	V2	Cuantia	m/mr	Col/Vig Eje ppal	Col/vig Eje sec
N+7.50					39.28	74.72				10/#5 (1.0%)	0.60	2.02	1.62
	3.05	.45	.40	.50			-63.32	33.65	44.96				
					-69.52	-83.98				10/#5 (1.0%)	0.73		
N+4.00					91.54	131.29				10/#5 (1.0%)	1.00	2.24	1.72
	3.55	.45	.40	.50			-243.04	79.44	69.18				
		1.00			-78.39	-145.54				10/#5 (1.0%)	1.02		

Columna C-2

Nivel	H Libre	Losa	B	H	M1	M2	P	V1	V2	Cuantia	m/mr	Col/Vig Eje ppal	Col/vig Eje sec
N+7.50					48.44	30.88				12/#8 #7 (3.5%)	0.29	1.90	1.68
	3.05	.45	.40	.40			-126.10	31.30	36.49				
					-54.76	-58.66				12/#8 #7 (3.5%)	0.41		
N+4.00					93.84	67.71				12/#8 #7 (3.5%)	0.63	1.54	1.24
	3.55	.45	.40	.40			-634.10	48.53	55.25				
		1.00			-40.28	-114.59				12/#8 #7 (3.5%)	0.61		

Columna E-2

Nivel	H Libre	Losa	B	H	M1	M2	P	V1	V2	Cuantia	m/mr	Col/Vig Eje ppal	Col/vig Eje sec
N+7.50					17.34	78.21				12/#6 #7 (1.9%)	0.28	1.59	1.69
	3.05	.45	.50	.40			-115.84	23.43	29.94				
					42.44	1.13				12/#6 #7 (1.9%)	0.19		
N+4.00					-94.35	-32.27				12/#6 #7 (1.9%)	0.47	1.22	2.01
	3.55	.45	.50	.40			-716.75	55.27	72.76				
		1.00			126.99	51.26				12/#6 #7 (1.9%)	0.65		

PROYECTO: AGROECOL (CHOCO)

Columna 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+7.50					1.09	-60.96				12/#5 #6 (1.4%)	0.36	2.77	1.20
	3.05	.45	.40	.50			-108.74	37.92	36.45				
					-63.15	67.78				12/#5 #6 (1.4%)	0.48		
N+4.00					41.71	-116.54				12/#5 #6 (1.4%)	0.66	2.69	1.44
	3.55	.45	.40	.50			-408.72	84.44	63.43				
		1.00			40.44	137.23				12/#5 #6 (1.4%)	0.77		

Columna C-1

Nivel	H Libre	Losa	B	H	M1	M2	P	V1	V2	Cuantia	m/mr	Col/Vig Eje ppal	Col/vig Eje sec
N+7.50					-79.97	-29.57				12/#6 #7 (2.4%)	0.46	1.52	1.28
	3.05	.45	.40	.40			-126.45	41.49	37.70				
					65.28	61.82				12/#6 #7 (2.4%)	0.54		
N+4.00					-84.58	-69.53				12/#6 #7 (2.4%)	0.68	1.23	1.20
	3.55	.45	.40	.40			-635.34	48.28	54.52				
		1.00			49.37	108.85				12/#6 #7 (2.4%)	0.69		

Columna E-1

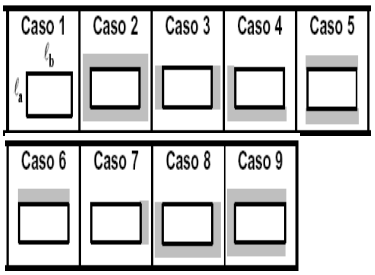
Nivel	H Libre	Losa	B	H	M1	M2	P	V1	V2	Cuantia	m/mr	Col/Vig Eje ppal	Col/vig Eje sec
N+7.50					-42.73	-71.01				8/#6 #7 (1.3%)	0.39	1.20	1.26
	3.05	.45	.50	.40			-151.43	44.61	36.74				
					96.16	46.97				8/#6 #7 (1.3%)	0.59		
N+4.00					-143.74	-72.33				8/#6 #7 (1.3%)	0.86	2.08	1.65
	3.55	.45	.50	.40			-440.59	74.35	78.23				
		1.00			153.95	70.63				8/#6 #7 (1.3%)	0.91		

6. DISEÑO DE ELEMENTOS COMPLEMENTARIOS

DISEÑO DE ELEMENTOS
COMPLEMENTARIOS

PROYECTO: PROYECTO: SEDE EDUCATIVA AGROECOL UNIÓN PANAMERICANA (CHOCÓ)
DISEÑO PLACA MACIZA (EN UNA DIRECCIÓN)

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 =	**1.30**	m	fy =	**420**	MPa
lb =	**3.25**	m	f'c =	**21.1**	MPa
Relación m =	**0.4**				

h = l/20 (0.4+Fy/700) = 0.07 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
Muros divisorios		2.00	kN/m²
Acabados	0.05x20	1.10	kN/m²
Carga Muerta Total		5.50	kN/m²
Carga Viva		2.00	kN/m²
Carga Última		9.80	kN/m²

DISEÑO A MOMENTO FLECTOR

Mu_a =	**2.07**	kN.m	*Cuantía:*	0.0020	*As =*	1.40 cm²/m	***Transversal***
			Cuantía:	0.0018	*As =*	1.26 cm²/m	***Longitudinal***

Distribución de refuerzo:

Malla electrosoldada ø 4 mm c/.15 Transversal
Malla electrosoldada ø 4 mm c/.15 Longitudinal

REVISIÓN A CORTANTE

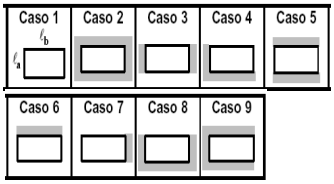
Coeficientes de relación de carga en las dos direcciones para cortante:

R= 6.37 **kN**

ϕvc =	**0.574**	**MPa**	
ϕvu =	**0.091**	**MPa**	**OK**

PROYECTO: PROYECTO: SEDE EDUCATIVA AGROECOL UNIÓN PANAMERICANA (CHOCÓ)
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 =	**3.22**	m	fy =	**420**	MPa
lb =	**3.25**	m	f'c =	**21.1**	MPa
Relación m =	**0.99**				

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

Teniendo en cuenta que la relación m es mayor de 0.5, la placa maciza trabaja en dos direcciones

Cargas

Peso propio de la losa	0.1x1.0x24	2.40	kN/m²
Muros divisorios		2.00	kN/m²
Acabados	0.05x20	1.10	kN/m²
Carga Muerta Total		5.50	kN/m²
Carga Viva		5.00	kN/m²
Carga Última		14.60	kN/m²

Tipo de soporte CASO Nº 2

DISEÑO A MOMENTO FLECTOR

Coeficientes para momento positivo por carga muerta y viva:

C_{aD} =	0.018
C_{bD} =	0.018
C_{aV} =	0.027
C_{bV} =	0.027

Mua =	**2.43**	kN.m	*Cuantía:*	0.0020	*As =*	1.40	cm²/m
Mu_b =	**2.47**	kN.m	*Cuantía:*	0.0020	*As =*	1.40	cm²/m

Coeficientes para momento negativo por carga última:

C_a =	0.045	Mu_a =	**6.81**	kN.m	*Cuantía:*	0.0034	*As =*	2.41	cm²/m
C_b =	0.045	Mu_b =	**6.94**	kN.m	*Cuantía:*	0.0035	*As =*	2.46	cm²/m

Distribución de refuerzo inferior:

Sentido La *Malla electrosoldada Ø 6 mm c/.15 inferior*

Sentido Lb *Malla electrosoldada Ø 6 mm c/.15 inferior*

Distribución de refuerzo superior:

Sentido La *Malla electrosoldada Ø 6 mm c/.15 superior*

Sentido Lb *Malla electrosoldada Ø 6 mm c/.15 superior*

REVISIÓN A CORTANTE

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

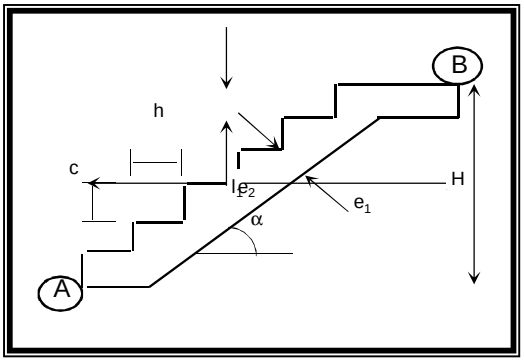
W_a =	0.50		
W_b =	0.50		
$\phi v c$ =	**0.574**	**MPa**	
$\phi v u_a$ =	**0.119**	**MPa**	**OK**
$\phi v u_b$ =	**0.118**	**MPa**	**OK**

PROYECTO: SEDE EDUCATIVA AGROECOL, UNIÓN PANAMERICANA (CHOCÓ)

DISEÑO DE ESCALERA TIPO

Diseño Tramos Inclinados

El diseño se realiza para el tramo inclinado de la escalera mas largo.



Geometría de la losa

l_1 =	**8.10**	m	fy =	**420**	MPa
H =	**3.50**	m	f'c =	**21.1**	MPa
c =	**17.3**	cm	h =	**30**	cm

Espesor escogido: **20** **cm**
Pendiente α = h/l1 : 29.971 °

Cargas

Peso propio de la losa	0.2x100x24/cos30.96º	5.54	kN/m²
Peso propio de peldaños	1/2x(0.18x0.28)/0.28x24	2.08	kN/m²
Acabado peldaños	0.04x(0.18+0.28)/0.28x22	1.39	kN/m²
Afinado Inferior	0.02x22/cos30.96º	0.51	kN/m²
Sobrecarga		5.00	kN/m²
		19.41	**kN/m²**

CU = ***19.41*** **kN/m²**

Diseño Tramo Inclinado

Momentos en tramo A-B. M= **159.23** kN-m

Cuantía: 0.0162 Asmín = 2.4 cm²/m
As 32.40 cm²/m *Colocar 1#7 c/.10 longitudinalmente*
Colocar 1#4 c/.15 transversalmente

PROYECTO:I.E. AGROECOL (CHOCÓ)
DISEÑO MIEMBROS ENSAMBLADOS

MATERIALES

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

CARGAS

V = 7.83 KN

Pernos Φ = 6.35 mm
Agujeros Φ = 9.5 mm

Espesor platina = 6.35 mm

DATOS DEL ELEMENTO

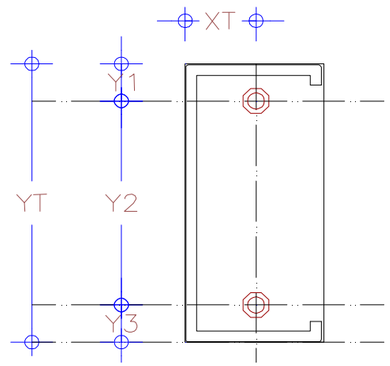
X1 = 40 mm
t = 6.35 mm
XT = 40 mm

Y1 = 35 mm
Y2 = 150 mm
Y3 = 35 mm

YT = 220 mm

A_g = 1174.75 mm^2

A_e = 1024 mm^2



FLUENCIA EN LA SECCIÓN BRUTA

Se debe cumplir:

$$Pu < 0.90\ F_y\ A_g$$

Pu < 266 kN
OK

$A_{g\ Diseño}$ = 35 mm^2
OK

FRACTURA EN LA SECCIÓN EFECTIVA

Se debe cumplir:

$$Pu < 0.75\ F_u\ A_e$$

Pu < 307 kN
OK

$A_{e\ Diseño}$ = 27 mm^2
OK

Resistencia al desgarre de un bloque por tensión y cortante

A_{nv} = 1024 mm^2
A_{nt} = 224 mm^2
$F_u\ A_{nt}$ = - KN
$0.6\ F_u\ A_{nv}$ = 246 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} = 1397 mm^2
A_{gt} = 254 mm^2

Por lo tanto,

P_u = 226 kN

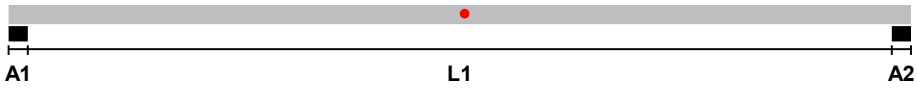
OK

Elementos calculados con el programa de diseño Arquimet 2.0 de ACESCO

REPORTE DE CORREAS

PHR C con atiesador 220 x 80 x 20 (3.00 mm)
con Fy = 35.15 Kgf/mm² cada 1.60 m con arriostramiento cada L/2.

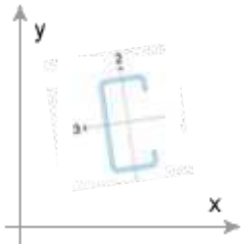
SECCION LONGITUDINAL

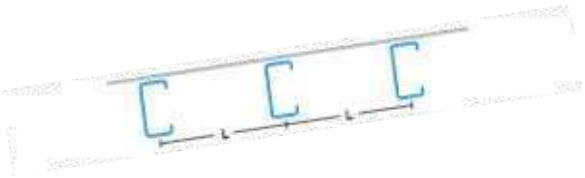


L1	6.75 m
A1	0.15 m
A2	0.15 m

CONFIGURACION	
TIPO DE CARGA	DISTRIBUIDA
Carga muerta	0.30 KN/m²
Peso propio correa	0.09 KN/m
Carga viva	0.50 KN/m²
Carga granizo	0.00 KN/m²
Viento compresión (Perpendicular)	0.40 KN/m²
Viento succión (Perpendicular)	0.40 KN/m²
Pendiente sección transversal	8.531° = 15.0000%

SECCION TRANSVERSAL





L = 1.60 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)	24.6636	4.9590	17.4562	4.9590
Calculado (KN.m)	3.1833E-06	4.0223E-08	13.4900	0.4345

REPORTE CORTANTE		
Ejes locales	2	3
Resistente (KN)	99.2653	75.4562
Calculado (KN)	7.7990	0.5065

REPORTE DEFLEXION		
Deflexiones máximas	Instantanea	Permanente
Admisible (m)	0.0256	0.0000
Calculado (m)	0.0132	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	-0.1815	1.9523
Viva de Cub.	-0.2531	2.7220
Granizo	0.0000	0.0000
Viento Comp.	-0.3275	2.1836
Viento Succion	0.3275	-2.1836
Comb. 1	-0.2541	2.7332
Comb. 2	-0.3443	3.7037
Comb. 3	-0.2178	2.3427
Comb. 4	-0.7865	7.7898
Comb. 5	-0.3816	3.4345
Comb. 6	-0.7865	7.7898
Comb. 7	-0.3816	3.4345
Comb. 8	-0.6719	5.8873
Comb. 9	-0.5453	4.5263
Comb. 10	-0.6719	5.8873
Comb. 11	-0.5453	4.5263
Comb. 12	-0.4909	3.9406
Comb. 13	-0.4909	3.9406

APOYO 2		
Combinacion	Rx	Ry
Muerta	-0.1815	1.9523
Viva de Cub.	-0.2531	2.7220
Granizo	0.0000	0.0000
Viento Comp.	-0.3275	2.1836
Viento Succion	0.3275	-2.1836
Comb. 1	-0.2541	2.7332
Comb. 2	-0.3443	3.7037
Comb. 3	-0.2178	2.3427
Comb. 4	-0.7865	7.7898
Comb. 5	-0.3816	3.4345
Comb. 6	-0.7865	7.7898
Comb. 7	-0.3816	3.4345
Comb. 8	-0.6719	5.8873
Comb. 9	-0.5453	4.5263
Comb. 10	-0.6719	5.8873
Comb. 11	-0.5453	4.5263
Comb. 12	-0.4909	3.9406
Comb. 13	-0.4909	3.9406

FUERZAS INTERNAS - EJES LOCALES (KN-m)

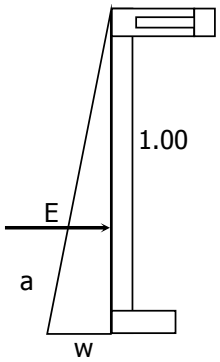
Elementos calculados con el programa de diseño Arquimet 2.0 de ACESCO

APOYO 1				
Combinacion	R2	R3	M2	M3
Muerta	0.1101	1.9576	0.0000	-6.5122E-07
Viva de Cub.	0.1535	2.7295	9.5768E-09	-1.2258E-06
Granizo	0.0000	0.0000	0.0000	0.0000
Viento Comp.	0.0000	2.2080	0.0000	-8.8107E-07
Viento Succion	0.0000	2.2080	0.0000	-8.8107E-07
Comb. 1	0.1542	2.7406	0.0000	-9.1171E-07
Comb. 2	0.2089	3.7138	4.7884E-09	-1.3944E-06
Comb. 3	0.1321	2.3491	0.0000	-7.8147E-07
Comb. 4	0.3778	7.8203	1.5323E-08	-3.1833E-06
Comb. 5	0.1321	3.4531	0.0000	-1.2220E-06
Comb. 6	0.3778	7.8203	1.5323E-08	-3.1833E-06
Comb. 7	0.1321	3.4531	0.0000	-1.2220E-06
Comb. 8	0.2089	5.9218	4.7884E-09	-2.2754E-06
Comb. 9	0.1321	4.5571	0.0000	-1.6625E-06
Comb. 10	0.2089	5.9218	4.7884E-09	-2.2754E-06
Comb. 11	0.1321	4.5571	0.0000	-1.6625E-06
Comb. 12	0.0991	3.9698	0.0000	-1.4672E-06
Comb. 13	0.0991	3.9698	0.0000	-1.4672E-06

APOYO 2				
Combinacion	R2	R3	M2	M3
Muerta	0.1101	1.9576	-2.8730E-08	1.2258E-06
Viva de Cub.	0.1535	2.7295	1.9154E-08	3.0646E-07
Granizo	0.0000	0.0000	0.0000	0.0000
Viento Comp.	0.0000	2.2080	0.0000	1.2258E-06
Viento Succion	0.0000	2.2080	0.0000	1.2258E-06
Comb. 1	0.1542	2.7406	-4.0223E-08	1.7162E-06
Comb. 2	0.2089	3.7138	-2.4900E-08	1.6242E-06
Comb. 3	0.1321	2.3491	-3.4477E-08	1.4710E-06
Comb. 4	0.3778	7.8203	-3.8307E-09	2.5742E-06
Comb. 5	0.1321	3.4531	-3.4477E-08	2.0839E-06
Comb. 6	0.3778	7.8203	-3.8307E-09	2.5742E-06
Comb. 7	0.1321	3.4531	-3.4477E-08	2.0839E-06
Comb. 8	0.2089	5.9218	-2.4900E-08	2.8501E-06
Comb. 9	0.1321	4.5571	-3.4477E-08	2.6968E-06
Comb. 10	0.2089	5.9218	-2.4900E-08	2.8501E-06
Comb. 11	0.1321	4.5571	-3.4477E-08	2.6968E-06
Comb. 12	0.0991	3.9698	-2.5857E-08	2.3291E-06
Comb. 13	0.0991	3.9698	-2.5857E-08	2.3291E-06

PROYECTO: I.E. AGROECOL (CHOCÓ)
DISEÑO DE MUROS DE CONTENCIÓN
MURO TIPO MC-2

Para efectos de diseño se tendrá en cuenta que el muro se encuentra apoyado en la viga de amarre y en la placa de entrepiso de la edificación.



$$E = \frac{1}{2} \times \gamma_s \times k_a \times h^2$$

γ_s=	19.2	kN/m³
Ko=	0.33	
h=	**1.00**	m
w=	6.4	kN/m

f'c:	**21.0**	MPa
fy:	**420.0**	MPa

E = 3.197 kN a=h/3= 0.33 m

Mmax= 0.43 kN.m Mu= **0.64** kN.m

b(cm)	e(cm)	d(cm)
1.00	**0.25**	0.18

Cuantia= 0.000047
Cuantia$_{min}$= 0.0020

As= **0.08** cm²/m
As$_{repartición}$= **3.60** cm²/m

Refuerzo long. Coloque 1#3 c/.20 en cada cara como refuerzo mínimo.
Refuerzo de transv. coloque 1#3 c/.20

REVISIÓN A CORTANTE

Vu= **3.20** **kN**
ϕvc = **0.573** **MPa**
ϕvu = **0.036** **Mpa** **OK**

PROYECTO: I.E. AGROECOL (CHOCÓ)
CALCULO DE DEFLEXIONES
V-115 EJES 4-8
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=	60	**cm**
fy=	420	**MPa**	d=	55	**cm**
			b=	40	**cm**

As=	1548 **mm²**		15.48 **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	**1548** mm^2	nAs =	14340.42	mm^2
d'	50 mm	5	cm	

Profundidad del eje neutro:

x=	144.5 **mm**		14.45 **cm**

PROYECTO: I.E. AGROECOL (CHOCÓ)
CALCULO DE DEFLEXIONES
V-115 EJES 4-8
MOMENTO DE INERCIA DE LA SECCION TRANSFORMADA FISURADA

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

I cr= 291994.80 **cm^4** 0.00292 **m^4**

MOMENTO DE INERCIA SECCIÓN TOTAL DE CONCRETO

Ig= 720000 **cm^4** 0.00720 **m^4**
Yt= 45.55 **cm**

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

Mcr= 50.82 **kN-m**

Ma = Momento máximo presente en la viga

Ma= **291.7** **kN-m**

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

Ie= 294258.1 **cm^4** 29.426 ***OK***

PROYECTO: I.E. AGROECOL (CHOCÓ)
CALCULO DE DEFLEXIONES
V-115 EJES 4-8
MOMENTO NEGATIVO

f'c=	**21.1**	**MPa**	h=	**60**	**cm**
fy=	**420**	**MPa**	d=	55	**cm**
			b=	**40**	**cm**

As=	**3060**	**mm²**	30.6 **cm²**
n=	**9.3**		
As'=	**1548**	**mm²**	15.48 **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'	**1548** mm^2	(2n-1)A's =	27132.84	mm^2
As	**3060** mm^2	nAs =	28347.34	mm^2
d'	**50** mm	5	cm	

Profundidad del eje neutro:

x=	185.3	**mm**	18.53 **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=	511541.00	**cm⁴**	0.00512 **m⁴**

PROYECTO: I.E. AGROECOL (CHOCÓ)
CALCULO DE DEFLEXIONES
V-115 EJES 4-8
MOMENTO DE INERCIA SECCIÓN TOTAL DE CONCRETO

Ig= 720000 **cm^4** 0.00720 **m^4**
Yt= 41.47 **cm**

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

Mcr= 55.83 **kN-m**

Ma = Momento máximo presente en la viga

Ma= **515.7** **kN-m**

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

Ie= 511805.5 **cm^4** 51.181 ***OK***

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

Ie= 403031.81 **cm^4** 40.303 **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 **4.82** **kN/m**
E **21589** **MPa**

δ= 0.0026 m

DEFLEXIÓN INMEDIATA POR :

CARGA MUERTA 80%	0.002 m	0.212 mm
CARGA VIVA 20%	0.000 m	0.048 mm

DEFLEXIÓN ADICIONAL LARGO PLAZO (5 AÑOS O MAS)

PROYECTO: I.E. AGROECOL (CHOCÓ)
CALCULO DE DEFLEXIONES
V-115 EJES 4-8

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= 0.0029 m

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

	L=	**9.00**	**m**	
DEFLEXION LIMITE	L/480	**0.0188**	**m**	
DEFLEXION LARGO PLAZO		**0.0034**	**m**	***OK***

7. DISEÑO DE ELEMENTOS NO ESTRUCTURALES

DISEÑO DE ELEMENTOS NO ESTRUCTURALES

DISEÑO DE ELEMENTOS NO ESTRUCTURALES

Units: kN*m

STORY DATA

Story	Height	Elevation	SimilarTo
N+7.50	3.50	7.45	None
N+4.00	4.00	3.95	N+7.50
BASE	0.00	-0.05	None

CENTER MASS RIGIDITY

Story	Diaphragm	MassX	MassY	XCM	YCM	CumMassX	CumMassY	XCCM	YCCM	XCR	YCR
N+4.00	D1	95.9822	95.9822	7.673	30.914	95.9822	95.9822	7.673	30.914	8.361	30.978
N+7.50	D2	40.1747	40.1747	8.289	31.068	40.1747	40.1747	8.289	31.068	7.99	31.013

STORY SHEARS

Story	Load	Loc	P	VX	VY	T	MX	MY
N+7.50	SISDISX	Top	0.00	93.12	10.32	2999.93	0.00	0.00
N+7.50	SISDISX	Bottom	0.00	93.12	10.32	2999.93	36.13	325.91
N+7.50	SISDISY	Top	0.00	10.01	94.39	642.62	0.00	0.00
N+7.50	SISDISY	Bottom	0.00	10.01	94.39	642.62	330.36	35.03
N+4.00	SISDISX	Top	0.00	224.42	24.56	7205.22	36.13	325.91
N+4.00	SISDISX	Bottom	0.00	224.42	24.56	7205.22	134.36	1213.93
N+4.00	SISDISY	Top	0.00	24.56	219.62	1410.71	330.36	35.03
N+4.00	SISDISY	Bottom	0.00	24.56	219.62	1410.71	1198.79	133.25

$$F_p = \frac{a_x a_p}{R_p} gM_p \geq \frac{A_a I}{2} gM_p \qquad a_x = \frac{C_{vx} V_s}{m_x g} \leq 2S_a \qquad C_{vx} = \frac{m_x h_x^k}{\sum_{i=1}^{n} (m_i h_i^k)}$$

$$V_s = S_a gM$$

g: 9.81 m/s^2
Sa: 0.300 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: 4.00 m
Carga 7.8 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+7.50	93.12	95.98	0.600	1.0	6	0.780	1.560	1.560
N+4.00	131.30	40.17	0.600	1.0	6	0.780	1.560	1.560

	Sección Vigas V.			As. (cm2)		Separación column.		Fl. 1/4"
Story	b	d	ρ	neces.	ubicado	S max	S escogida	S estribos
N+7.50	0.15	0.21	0.00057	0.18	0.71	3.99	4.00	0.188
N+4.00	0.15	0.21	0.00057	0.18	0.71	3.99	4.00	0.188

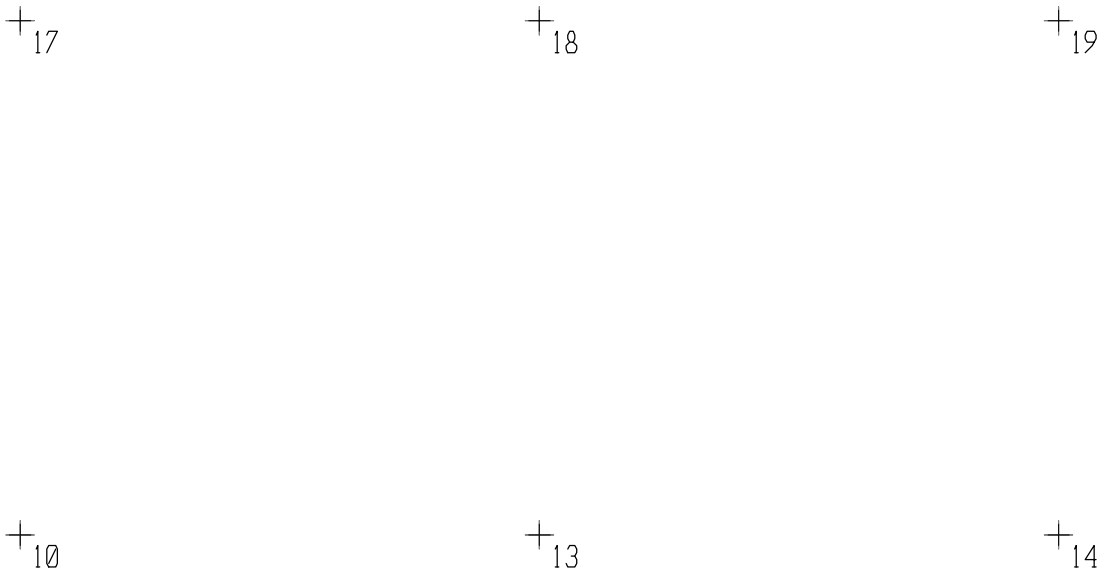
DISEÑO PARA ANTEPECHOS

Story	Fx	Wx	ax	ap	Rp	Fp	M	V
N+7.50	93.12	95.98	0.600	2.5	6	1.950	3.900	3.900
N+4.00	131.30	40.17	0.600	2.5	6	1.950	3.900	3.900

	Sección columneta			As. (cm2)		Separación column.		Fl. 1/4"
Story	b	d	ρ	neces.	ubicado	S max	S escogida	S estribos
N+7.50	0.15	0.21	0.00143	0.45	1.29	2.87	2.90	0.188
N+4.00	0.15	0.21	0.00143	0.45	1.29	2.87	2.90	0.188

8. ANEXOS DE COMPUTADOR

ANEXOS DE COMPUTADOR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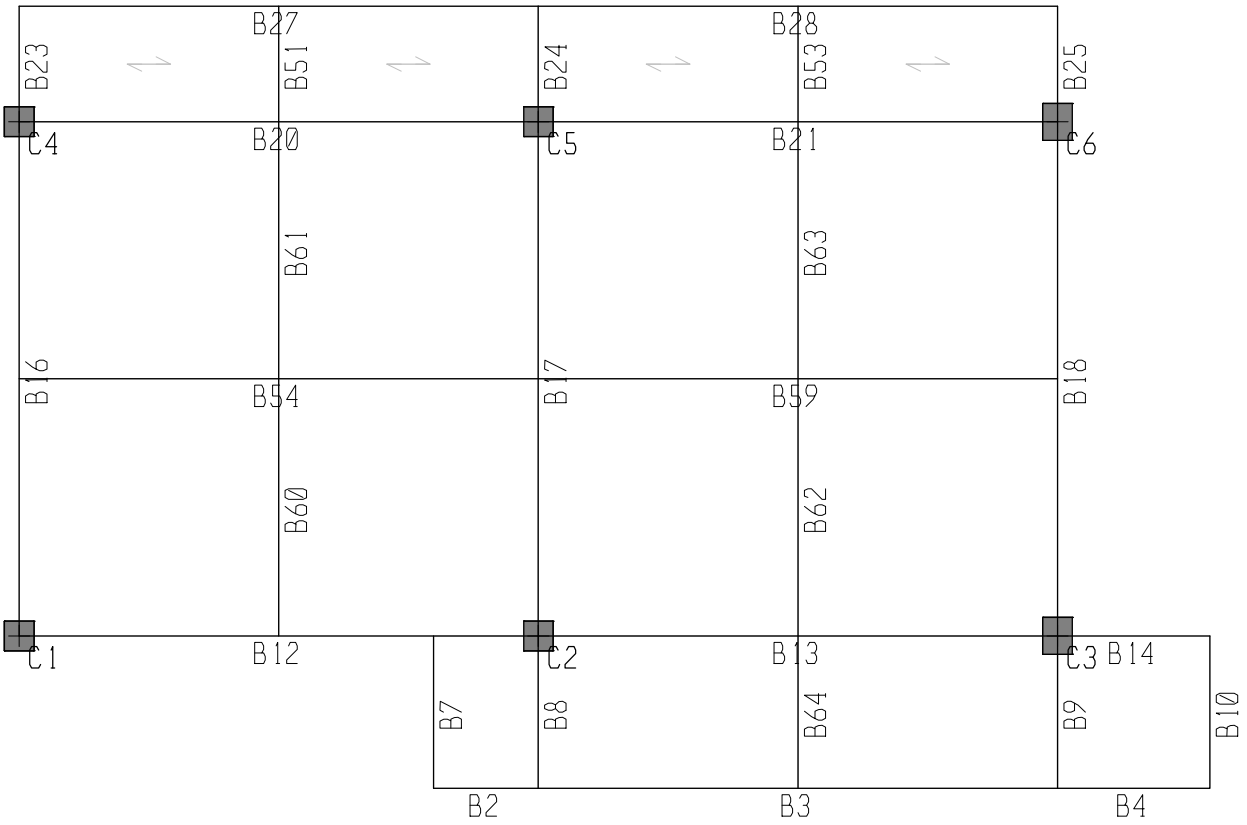
18
19
10
13
14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B17
B59
B18
B60
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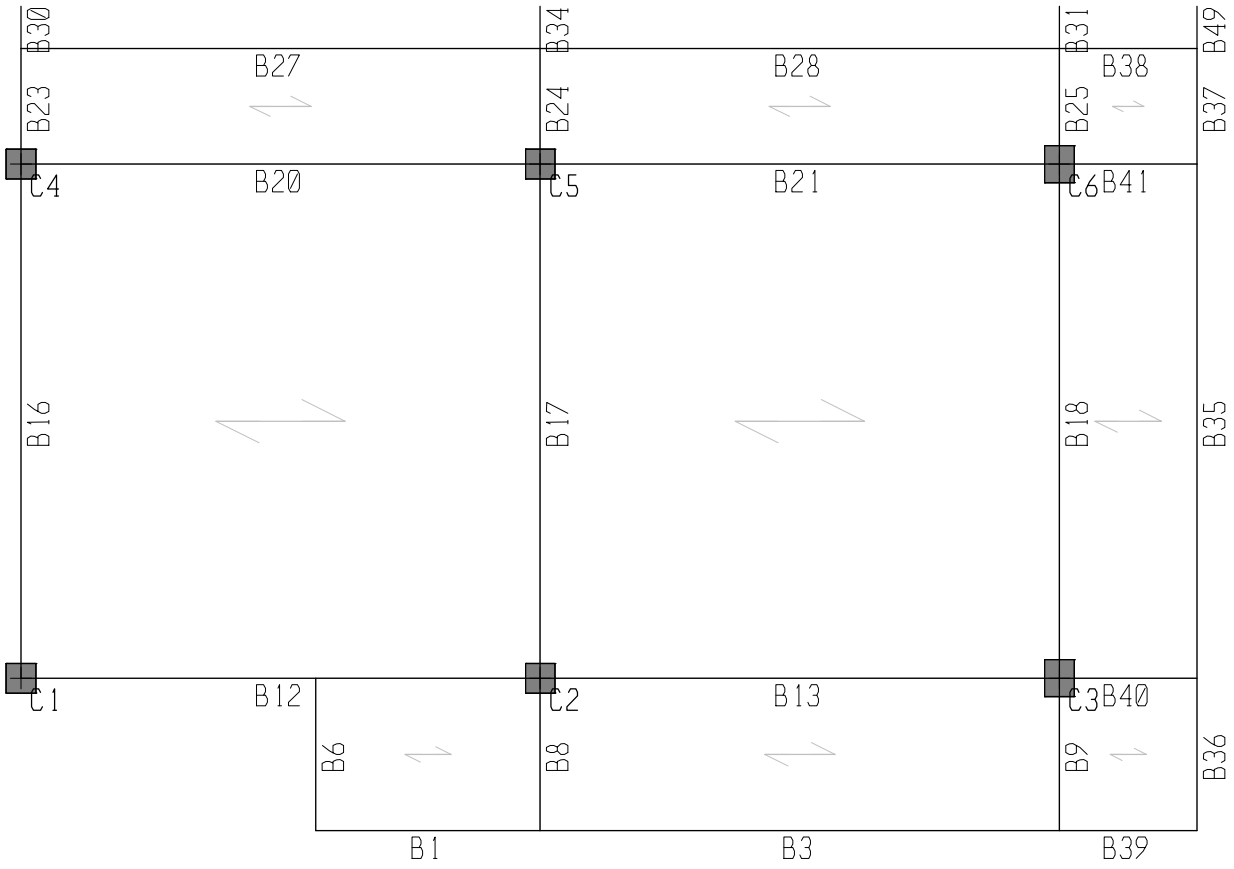
B4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B41
B16
B17
B18
B35
C1
B12
C2
B13
C3
B40
B6
B8
B9
B36
B1
B3
B39

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S T O R Y D A T A

STORY	SIMILAR TO	HEIGHT	ELEVATION
N+7.50	None	3.500	7.450
N+4.00	N+7.50	4.000	3.950
BASE	None		-0.050

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

POINT	X	Y	DZ-BELOW
4	4.015	25.375	0.000
5	5.645	25.375	0.000
6	7.070	25.375	0.000
7	14.140	25.375	0.000
8	16.215	25.375	0.000
10	0.000	27.450	0.000
11	4.015	27.450	0.000
12	5.645	27.450	0.000
13	7.070	27.450	0.000
14	14.140	27.450	0.000
15	16.215	27.450	0.000
17	0.000	34.450	0.000
18	7.070	34.450	0.000
19	14.140	34.450	0.000
21	0.000	36.025	0.000
22	7.070	36.025	0.000
23	14.140	36.025	0.000
25	0.000	36.600	0.000
26	14.140	36.600	0.000
28	7.070	36.600	0.000
29	16.015	27.450	0.000
30	16.015	34.450	0.000
31	16.015	25.375	0.000
32	16.015	36.025	0.000
38	16.015	36.600	0.000
39	3.535	27.450	0.000
40	3.535	34.450	0.000
41	3.535	36.025	0.000
42	10.605	27.450	0.000
43	10.605	34.450	0.000
44	10.605	36.025	0.000
45	0.000	30.950	0.000
46	7.070	30.950	0.000
47	3.535	30.950	0.000
48	10.605	30.950	0.000
49	14.140	30.950	0.000
50	10.605	25.375	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
C1	10	10	Below
C2	13	13	Below
C3	14	14	Below
C4	17	17	Below
C5	18	18	Below
C6	19	19	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
B1	4	6
B2	5	6
B3	6	7
B4	7	8

B6	4	11
B7	5	12
B8	6	13
B9	7	14
B10	8	15
B12	10	13
B13	13	14
B14	14	15
B16	10	17
B17	13	18
B18	14	19
B20	17	18
B21	18	19
B23	17	21
B24	18	22
B25	19	23
B27	21	22
B28	22	23
B30	21	25
B31	23	26
B34	22	28
B35	29	30
B36	31	29
B37	30	32
B38	23	32
B39	7	31
B40	14	29
B41	19	30
B49	32	38
B51	40	41
B53	43	44
B54	45	46
B59	46	49
B60	39	47
B61	47	40
B62	42	48
B63	48	43
B64	50	42

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+7.50	D2	17	18	19	10	13
		14	21	22	23	25
		26	6	7	4	11
		28	29	30	31	32
		38				
N+4.00	D1	17	18	19	10	13
		14	21	22	23	6
		7	8	15	5	12
		45	46	49	39	47
		40	41	42	48	43
		44	50			

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	21538000.000	0.2000	9.9000E-06	8974166.667
OTHER	Iso	None	All	199947978.80	0.3000	1.1700E-05	76903068.77

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

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

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
VIG30X45	CONC21	Rectangular		Yes
COL40X40	CONC21	Rectangular	Yes	
VIG15X45	CONC21	Rectangular		Yes
VIG35X45	CONC21	Rectangular		Yes
VIG25X45	CONC21	Rectangular		Yes
COL40X50	CONC21	Rectangular	Yes	
COL50X40	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
VIG30X45	0.4500	0.3000	0.0000	0.0000	0.0000	0.0000
COL40X40	0.4000	0.4000	0.0000	0.0000	0.0000	0.0000
VIG15X45	0.4500	0.1500	0.0000	0.0000	0.0000	0.0000
VIG35X45	0.4500	0.3500	0.0000	0.0000	0.0000	0.0000
VIG25X45	0.4500	0.2500	0.0000	0.0000	0.0000	0.0000
COL40X50	0.4000	0.5000	0.0000	0.0000	0.0000	0.0000
COL50X40	0.5000	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
VIG30X45	0.1350	0.0024	0.0023	0.0010	0.1125	0.1125
COL40X40	0.1600	0.0036	0.0021	0.0021	0.1333	0.1333
VIG15X45	0.0675	0.0004	0.0011	0.0001	0.0563	0.0563
VIG35X45	0.1575	0.0034	0.0027	0.0016	0.1313	0.1313
VIG25X45	0.1125	0.0015	0.0019	0.0006	0.0938	0.0938
COL40X50	0.2000	0.0055	0.0027	0.0042	0.1667	0.1667
COL50X40	0.2000	0.0055	0.0042	0.0027	0.1667	0.1667

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
VIG30X45	0.0101	0.0068	0.0152	0.0101	0.1299	0.0866
COL40X40	0.0107	0.0107	0.0160	0.0160	0.1155	0.1155
VIG15X45	0.0051	0.0017	0.0076	0.0025	0.1299	0.0433
VIG35X45	0.0118	0.0092	0.0177	0.0138	0.1299	0.1010
VIG25X45	0.0084	0.0047	0.0127	0.0070	0.1299	0.0722
COL40X50	0.0133	0.0167	0.0200	0.0250	0.1155	0.1443
COL50X40	0.0167	0.0133	0.0250	0.0200	0.1443	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

FRAME SECTION NAME	TOTAL WEIGHT	TOTAL MASS
VIG30X45	0.0000	0.0000
COL40X40	57.6000	5.7600
VIG15X45	113.6835	11.3684
VIG35X45	468.1908	46.8191
VIG25X45	90.0855	9.0086
COL40X50	72.0000	7.2000
COL50X40	72.0000	7.2000

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
COL40X40	Rectangular	Ties	#9/Design	3/3	N/A	0.0500
COL40X50	Rectangular	Ties	#9/Design	3/3	N/A	0.0457
COL50X40	Rectangular	Ties	#9/Design	3/3	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
VIG30X45	0.0500	0.0500	0.000	0.000	0.000	0.000
VIG15X45	0.0500	0.0500	0.000	0.000	0.000	0.000
VIG35X45	0.0450	0.0450	0.000	0.000	0.000	0.000
VIG25X45	0.0457	0.0457	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
CUBLIV	CONC21	Membrane	Yes	0.0130	0.0130	50.6153	5.0615
CUBMACSALON	CONC21	Membrane	Yes	0.2290	0.2290	122.3987	12.2399
CUBMACSALON	CONC21	Membrane	No	0.2290	0.2290	664.5365	66.4536
CUBMACTANQU	CONC21	Membrane	No	0.1960	0.1960	0.0000	0.0000

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: 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	0.0200	0.0000	0.0200

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	0.0200	0.0000	0.0200

RESPONSE SPECTRUM FUNCTION ASSIGNMENT DATA

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

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

COMBO	COMBO TYPE	CASE	CASE TYPE	SCALE FACTOR
CIM1	ADD	DEAD	Static	1.0000
		LIVE	Static	1.0000
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
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
CIM2	ADD	DEAD	Static	1.0000
		LIVE	Static	0.7500
		SISDISX	Spectra	0.5250
		SISDISY	Spectra	0.1575
CIM3	ADD	DEAD	Static	1.0000
		LIVE	Static	0.7500
		SISDISX	Spectra	0.1575
		SISDISY	Spectra	0.5250
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

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

FUNCTION NAME: DERIVAS

FILE NAME: c:\users\dyein_000\desktop\cristian\agroecol\correccion\modelo\agroecol1\derivas.txt
DATA TYPE: Period vs Acceleration
NUMBER OF HEADER LINES = 0

PERIOD	ACCEL

0.0000	1.1250
0.0700	1.1250
0.1300	1.1250
0.2000	1.1250
0.2700	1.1250
0.5200	1.1250
0.7700	1.1250
1.0300	1.1250
1.2800	1.1250
1.5300	0.9420
1.7800	0.8100
2.0300	0.7110
2.2800	0.6330
2.5200	0.5700
2.7700	0.5190
3.0200	0.4760
3.2700	0.4400
3.5200	0.4090
3.7700	0.3820
4.0200	0.3580
4.2700	0.3380
4.5200	0.3190
4.7600	0.3020
5.0100	0.2870
5.2600	0.2740
5.5100	0.2610
5.7600	0.2500
6.7600	0.1820
7.7600	0.1380

FUNCTION NAME: DISENO

FILE NAME: c:\users\dyein_000\desktop\cristian\agroecol\correccion\modelo\agroecol1\diseño.txt
DATA TYPE: Period vs Acceleration
NUMBER OF HEADER LINES = 0

PERIOD	ACCEL
0.0000	0.1786
0.0700	0.1786
0.1300	0.1786
0.2000	0.1786
0.2700	0.1786
0.5200	0.1786
0.7700	0.1786
1.0300	0.1786
1.2800	0.1786
1.5300	0.1495
1.7800	0.1286
2.0300	0.1128
2.2800	0.1004
2.5200	0.0905
2.7700	0.0824
3.0200	0.0756
3.2700	0.0699
3.5200	0.0649
3.7700	0.0606
4.0200	0.0569
4.2700	0.0536
4.5200	0.0506
4.7600	0.0480
5.0100	0.0456
5.2600	0.0434
5.5100	0.0415
5.7600	0.0397
6.7600	0.0288
7.7600	0.0219

FUNCTION NAME: UMBRAL

FILE NAME: c:\users\dyein_000\desktop\cristian\agroecol\correccion\modelo\agroecol1\umbral.txt
DATA TYPE: Period vs Acceleration
NUMBER OF HEADER LINES = 0

PERIOD	ACCEL
0.0000	0.1000
0.0500	0.1400
0.1000	0.1800
0.1500	0.2200
0.2000	0.2600
0.2500	0.3000
0.4900	0.3000
0.7300	0.3000
0.9800	0.3000
1.2200	0.3000
1.4600	0.3000
1.7000	0.3000
1.9500	0.3000
2.1900	0.3000
2.7800	0.2360
3.3800	0.1940
3.9700	0.1650
4.5600	0.1440
5.1600	0.1270
5.7500	0.1140
6.3400	0.1030
6.9400	0.0950
7.5300	0.0870
8.1300	0.0810
8.7200	0.0750
9.3100	0.0700
9.9100	0.0660
10.5000	0.0630
11.5000	0.0520
12.5000	0.0440

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+7.50	C1	Column	Rectangular	None	COL50X40	Conc Frame	COL50X40
N+7.50	C2	Column	Rectangular	None	COL40X40	Conc Frame	COL40X40
N+7.50	C3	Column	Rectangular	None	COL40X50	Conc Frame	COL40X50
N+7.50	C4	Column	Rectangular	None	COL50X40	Conc Frame	COL50X40
N+7.50	C5	Column	Rectangular	None	COL40X40	Conc Frame	COL40X40
N+7.50	C6	Column	Rectangular	None	COL40X50	Conc Frame	COL40X50
N+4.00	C1	Column	Rectangular	None	COL50X40	Conc Frame	COL50X40
N+4.00	C2	Column	Rectangular	None	COL40X40	Conc Frame	COL40X40
N+4.00	C3	Column	Rectangular	None	COL40X50	Conc Frame	COL40X50
N+4.00	C4	Column	Rectangular	None	COL50X40	Conc Frame	COL50X40
N+4.00	C5	Column	Rectangular	None	COL40X40	Conc Frame	COL40X40
N+4.00	C6	Column	Rectangular	None	COL40X50	Conc Frame	COL40X50
N+7.50	B1	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+7.50	B3	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+7.50	B6	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+7.50	B8	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+7.50	B9	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+7.50	B12	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+7.50	B13	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+7.50	B16	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+7.50	B17	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+7.50	B18	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+7.50	B20	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+7.50	B21	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+7.50	B23	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+7.50	B24	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+7.50	B25	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+7.50	B27	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+7.50	B28	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+7.50	B30	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+7.50	B31	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+7.50	B34	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+7.50	B35	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+7.50	B36	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+7.50	B37	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+7.50	B38	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+7.50	B39	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45

N+7.50	B40	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+7.50	B41	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+7.50	B49	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+4.00	B2	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+4.00	B3	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+4.00	B4	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+4.00	B7	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+4.00	B8	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+4.00	B9	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+4.00	B10	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+4.00	B12	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+4.00	B13	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+4.00	B14	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+4.00	B16	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+4.00	B17	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+4.00	B18	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+4.00	B20	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+4.00	B21	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+4.00	B23	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+4.00	B24	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+4.00	B25	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+4.00	B27	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+4.00	B28	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+4.00	B51	Beam	Rectangular	None	VIG25X45	Conc Frame	VIG25X45
N+4.00	B53	Beam	Rectangular	None	VIG25X45	Conc Frame	VIG25X45
N+4.00	B54	Beam	Rectangular	None	VIG25X45	Conc Frame	VIG25X45
N+4.00	B59	Beam	Rectangular	None	VIG25X45	Conc Frame	VIG25X45
N+4.00	B60	Beam	Rectangular	None	VIG25X45	Conc Frame	VIG25X45
N+4.00	B61	Beam	Rectangular	None	VIG25X45	Conc Frame	VIG25X45
N+4.00	B62	Beam	Rectangular	None	VIG25X45	Conc Frame	VIG25X45
N+4.00	B63	Beam	Rectangular	None	VIG25X45	Conc Frame	VIG25X45
N+4.00	B64	Beam	Rectangular	None	VIG25X45	Conc Frame	VIG25X45

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+7.50	B16	Force	Gravity	0.000	7.000	2.670	2.670
DEAD	N+7.50	B17	Force	Gravity	0.000	7.000	2.670	2.670
DEAD	N+7.50	B18	Force	Gravity	0.000	7.000	2.670	2.670
DEAD	N+4.00	B12	Force	Gravity	0.000	7.070	5.950	5.950
DEAD	N+4.00	B13	Force	Gravity	0.000	7.070	5.950	5.950
DEAD	N+4.00	B14	Force	Gravity	0.000	2.075	39.000	39.000
DEAD	N+4.00	B16	Force	Gravity	0.000	7.000	5.950	5.950
DEAD	N+4.00	B18	Force	Gravity	0.000	7.000	5.950	5.950
DEAD	N+4.00	B20	Force	Gravity	0.000	7.070	5.950	5.950
DEAD	N+4.00	B21	Force	Gravity	0.000	7.070	5.950	5.950
LIVE	N+4.00	B14	Force	Gravity	0.000	2.075	20.000	20.000

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+7.50	F17	Floor	Gravity	0.5000
LIVE	N+7.50	F18	Floor	Gravity	0.5000
LIVE	N+7.50	F19	Floor	Gravity	0.5000
LIVE	N+7.50	F20	Floor	Gravity	0.5000
LIVE	N+7.50	F21	Floor	Gravity	0.5000
LIVE	N+7.50	F22	Floor	Gravity	0.5000
LIVE	N+7.50	F23	Floor	Gravity	0.5000
LIVE	N+7.50	F24	Floor	Gravity	0.5000
LIVE	N+7.50	F25	Floor	Gravity	0.5000
LIVE	N+4.00	F1	Floor	Gravity	2.0000
LIVE	N+4.00	F2	Floor	Gravity	2.0000
LIVE	N+4.00	F3	Floor	Gravity	2.0000
LIVE	N+4.00	F4	Floor	Gravity	2.0000
LIVE	N+4.00	F5	Floor	Gravity	5.0000
LIVE	N+4.00	F6	Floor	Gravity	5.0000
LIVE	N+4.00	F7	Floor	Gravity	5.0000
LIVE	N+4.00	F8	Floor	Gravity	5.0000
LIVE	N+4.00	F9	Floor	Gravity	2.0000
LIVE	N+4.00	F10	Floor	Gravity	2.0000
LIVE	N+4.00	F11	Floor	Gravity	2.0000

LIVE	N+4.00	F12	Floor	Gravity	2.0000
LIVE	N+4.00	F13	Floor	Gravity	2.0000
LIVE	N+4.00	F14	Floor	Gravity	2.0000
LIVE	N+4.00	F15	Floor	Gravity	2.0000
LIVE	N+4.00	F16	Floor	Gravity	2.0000

FUERZAS EN VIGAS

BEAM FORCES
UNID: kN-m

Story	Beam	Load	Loc	P	V2	T	M3
N+7.50	B1	ENVOLVENTE MAX	0	0	0	0.217	0.831
N+7.50	B1	ENVOLVENTE MAX	1.528	0	2.95	0.217	0.542
N+7.50	B1	ENVOLVENTE MAX	3.055	0	6.09	0.217	-2.914
N+7.50	B1	ENVOLVENTE MIN	0	0	-1.1	0.003	-0.142
N+7.50	B1	ENVOLVENTE MIN	1.528	0	1.15	0.003	-2.15
N+7.50	B1	ENVOLVENTE MIN	3.055	0	3.38	0.003	-8.927
N+4.00	B2	ENVOLVENTE MAX	0	0	5.04	5.411	-2.145
N+4.00	B2	ENVOLVENTE MAX	0.713	0	9.37	5.411	-3.848
N+4.00	B2	ENVOLVENTE MAX	1.425	0	13.9	5.411	-6.832
N+4.00	B2	ENVOLVENTE MIN	0	0	0.54	2.434	-5.59
N+4.00	B2	ENVOLVENTE MIN	0.713	0	2.83	2.434	-9.711
N+4.00	B2	ENVOLVENTE MIN	1.425	0	5.13	2.434	-18.28
N+7.50	B3	ENVOLVENTE MAX	0	0	-3.34	0.008	-1.28
N+7.50	B3	ENVOLVENTE MAX	3.535	0	1.99	0.008	4.843
N+7.50	B3	ENVOLVENTE MAX	7.07	0	8.87	0.008	-0.888
N+7.50	B3	ENVOLVENTE MIN	0	0	-7.8	-0.216	-10.597
N+7.50	B3	ENVOLVENTE MIN	3.535	0	-1.11	-0.216	1.404
N+7.50	B3	ENVOLVENTE MIN	7.07	0	4.05	-0.216	-17.251
N+4.00	B3	ENVOLVENTE MAX	0	0	-13.72	-0.596	-7.194
N+4.00	B3	ENVOLVENTE MAX	3.535	0	6.89	-0.596	26.247
N+4.00	B3	ENVOLVENTE MAX	3.535	0	2.61	3.439	25.124
N+4.00	B3	ENVOLVENTE MAX	7.07	0	40.72	3.439	-2.559
N+4.00	B3	ENVOLVENTE MIN	0	0	-39.55	-1.326	-38.709
N+4.00	B3	ENVOLVENTE MIN	3.535	0	-1.91	-1.326	7.293
N+4.00	B3	ENVOLVENTE MIN	3.535	0	-7.13	1.036	4.383
N+4.00	B3	ENVOLVENTE MIN	7.07	0	12.64	1.036	-48.953
N+4.00	B4	ENVOLVENTE MAX	0	0	-9.54	-0.575	-11.677
N+4.00	B4	ENVOLVENTE MAX	1.038	0	-5.37	-0.575	-3.481
N+4.00	B4	ENVOLVENTE MAX	2.075	0	-1.19	-0.575	-0.537
N+4.00	B4	ENVOLVENTE MIN	0	0	-27.36	-3.842	-38.918
N+4.00	B4	ENVOLVENTE MIN	1.038	0	-17.49	-3.842	-14.637
N+4.00	B4	ENVOLVENTE MIN	2.075	0	-8.36	-3.842	-2.764
N+7.50	B6	ENVOLVENTE MAX	0	0	1.1	0.831	-0.003
N+7.50	B6	ENVOLVENTE MAX	1.038	0	4.5	0.831	-1.154
N+7.50	B6	ENVOLVENTE MAX	2.075	0	8.22	0.831	-4.198
N+7.50	B6	ENVOLVENTE MIN	0	0	0	-0.142	-0.217
N+7.50	B6	ENVOLVENTE MIN	1.038	0	1.95	-0.142	-2.982
N+7.50	B6	ENVOLVENTE MIN	2.075	0	3.91	-0.142	-9.417
N+4.00	B7	ENVOLVENTE MAX	0	0	-0.54	-2.145	-2.434
N+4.00	B7	ENVOLVENTE MAX	1.038	0	5.87	-2.145	-0.32
N+4.00	B7	ENVOLVENTE MAX	2.075	0	14.48	-2.145	-2.815
N+4.00	B7	ENVOLVENTE MIN	0	0	-5.04	-5.59	-5.411
N+4.00	B7	ENVOLVENTE MIN	1.038	0	0.11	-5.59	-5.991
N+4.00	B7	ENVOLVENTE MIN	2.075	0	4.02	-5.59	-16.874
N+7.50	B8	ENVOLVENTE MAX	0	0	13.56	5.762	0.328
N+7.50	B8	ENVOLVENTE MAX	1.038	0	22.66	5.762	-10.461
N+7.50	B8	ENVOLVENTE MAX	2.075	0	33.53	5.762	-26.331
N+7.50	B8	ENVOLVENTE MIN	0	0	7.79	-5.799	0.176
N+7.50	B8	ENVOLVENTE MIN	1.038	0	12.79	-5.799	-17.777
N+7.50	B8	ENVOLVENTE MIN	2.075	0	17.8	-5.799	-46.836
N+4.00	B8	ENVOLVENTE MAX	0	0	53.44	2.441	6.588
N+4.00	B8	ENVOLVENTE MAX	1.038	0	73.09	2.441	-20.359
N+4.00	B8	ENVOLVENTE MAX	2.075	0	92.74	2.441	-54.646
N+4.00	B8	ENVOLVENTE MIN	0	0	19.37	-23.232	3.169
N+4.00	B8	ENVOLVENTE MIN	1.038	0	27.97	-23.232	-56.652
N+4.00	B8	ENVOLVENTE MIN	2.075	0	36.56	-23.232	-145.074
N+7.50	B9	ENVOLVENTE MAX	0	0	14.43	9.733	1.654
N+7.50	B9	ENVOLVENTE MAX	1.038	0	23.19	9.733	-7.144
N+7.50	B9	ENVOLVENTE MAX	2.075	0	31.95	9.733	-20.234
N+7.50	B9	ENVOLVENTE MIN	0	0	5.28	-0.389	0.22
N+7.50	B9	ENVOLVENTE MIN	1.038	0	10.11	-0.389	-18.481
N+7.50	B9	ENVOLVENTE MIN	2.075	0	14.95	-0.389	-46.996
N+4.00	B9	ENVOLVENTE MAX	0	0	68.08	11.718	6.665
N+4.00	B9	ENVOLVENTE MAX	1.038	0	88.5	11.718	-24.359
N+4.00	B9	ENVOLVENTE MAX	2.075	0	108.92	11.718	-62.586
N+4.00	B9	ENVOLVENTE MIN	0	0	22.45	-9.118	2.279
N+4.00	B9	ENVOLVENTE MIN	1.038	0	31.31	-9.118	-71.845
N+4.00	B9	ENVOLVENTE MIN	2.075	0	40.16	-9.118	-176.971
N+4.00	B10	ENVOLVENTE MAX	0	0	-1.19	2.764	-0.575
N+4.00	B10	ENVOLVENTE MAX	1.038	0	3.9	2.764	1.622
N+4.00	B10	ENVOLVENTE MAX	2.075	0	12.16	2.764	-0.232
N+4.00	B10	ENVOLVENTE MIN	0	0	-8.36	0.537	-3.842
N+4.00	B10	ENVOLVENTE MIN	1.038	0	-1.02	0.537	-1.041
N+4.00	B10	ENVOLVENTE MIN	2.075	0	3.16	0.537	-10.168
N+7.50	B12	ENVOLVENTE MAX	0	0	-4.89	6.217	18.182
N+7.50	B12	ENVOLVENTE MAX	3.535	0	7.13	6.217	19.505
N+7.50	B12	ENVOLVENTE MAX	4.015	0	8.76	6.217	19.278
N+7.50	B12	ENVOLVENTE MAX	4.015	0	14.61	-0.919	18.475
N+7.50	B12	ENVOLVENTE MAX	7.07	0	28.46	-0.919	9.62
N+7.50	B12	ENVOLVENTE MIN	0	0	-28.34	2.472	-57.984
N+7.50	B12	ENVOLVENTE MIN	3.535	0	-12.31	2.472	8.592
N+7.50	B12	ENVOLVENTE MIN	4.015	0	-10.13	2.472	10.389
N+7.50	B12	ENVOLVENTE MIN	4.015	0	-4.16	-4.006	10.503
N+7.50	B12	ENVOLVENTE MIN	7.07	0	6.23	-4.006	-49.605
N+4.00	B12	ENVOLVENTE MAX	0	0	-41.75	-1.743	0.039
N+4.00	B12	ENVOLVENTE MAX	3.535	0	4.65	-1.743	104.614
N+4.00	B12	ENVOLVENTE MAX	3.535	0	57.6	32.582	105.831
N+4.00	B12	ENVOLVENTE MAX	5.645	0	100.36	32.582	14.723
N+4.00	B12	ENVOLVENTE MAX	5.645	0	112.46	15.716	16.934
N+4.00	B12	ENVOLVENTE MAX	7.07	0	143.71	15.716	-56.324
N+4.00	B12	ENVOLVENTE MIN	0	0	-108.45	-26.238	-170.925
N+4.00	B12	ENVOLVENTE MIN	3.535	0	-40.33	-26.238	55.313
N+4.00	B12	ENVOLVENTE MIN	3.535	0	6	4.327	54.271
N+4.00	B12	ENVOLVENTE MIN	5.645	0	34.9	4.327	-56.138

N+4.00	B12	ENVOLVENTE MIN	5.645	0	40.34	1.503	-50.628
N+4.00	B12	ENVOLVENTE MIN	7.07	0	60.35	1.503	-234.904
N+7.50	B13	ENVOLVENTE MAX	0	0	-2.44	0.517	14.914
N+7.50	B13	ENVOLVENTE MAX	3.535	0	10.72	0.517	7.292
N+7.50	B13	ENVOLVENTE MAX	7.07	0	26.76	0.517	6.042
N+7.50	B13	ENVOLVENTE MIN	0	0	-20.7	-1.846	-37.731
N+7.50	B13	ENVOLVENTE MIN	3.535	0	-5.8	-1.846	2.084
N+7.50	B13	ENVOLVENTE MIN	7.07	0	6.23	-1.846	-63.668
N+4.00	B13	ENVOLVENTE MAX	0	0	-68.73	2.07	-60.692
N+4.00	B13	ENVOLVENTE MAX	3.535	0	-9.51	2.07	173.5
N+4.00	B13	ENVOLVENTE MAX	3.535	0	71.86	21.769	175.689
N+4.00	B13	ENVOLVENTE MAX	7.07	0	173.81	21.769	-60.563
N+4.00	B13	ENVOLVENTE MIN	0	0	-166.24	-7.542	-249.601
N+4.00	B13	ENVOLVENTE MIN	3.535	0	-67.06	-7.542	74.94
N+4.00	B13	ENVOLVENTE MIN	3.535	0	12.48	-0.166	76.194
N+4.00	B13	ENVOLVENTE MIN	7.07	0	71.7	-0.166	-274.292
N+4.00	B14	ENVOLVENTE MAX	0	0	-88.37	10.168	-93.292
N+4.00	B14	ENVOLVENTE MAX	1.038	0	-45.77	10.168	-23.246
N+4.00	B14	ENVOLVENTE MAX	2.075	0	-3.16	10.168	2.764
N+4.00	B14	ENVOLVENTE MIN	0	0	-200.76	0.232	-218.242
N+4.00	B14	ENVOLVENTE MIN	1.038	0	-106.44	0.232	-57.522
N+4.00	B14	ENVOLVENTE MIN	2.075	0	-12.16	0.232	0.537
N+7.50	B16	ENVOLVENTE MAX	0	0	-11.88	1.141	13.55
N+7.50	B16	ENVOLVENTE MAX	3.5	0	11.91	1.141	24.693
N+7.50	B16	ENVOLVENTE MAX	7	0	49.69	1.141	7.188
N+7.50	B16	ENVOLVENTE MIN	0	0	-48.07	-1.048	-79.544
N+7.50	B16	ENVOLVENTE MIN	3.5	0	-10.16	-1.048	13.311
N+7.50	B16	ENVOLVENTE MIN	7	0	13.76	-1.048	-85.458
N+4.00	B16	ENVOLVENTE MAX	0	0	-39.98	26.431	4.619
N+4.00	B16	ENVOLVENTE MAX	3.5	0	5.81	26.431	111.474
N+4.00	B16	ENVOLVENTE MAX	3.5	0	52.62	-1.719	112.551
N+4.00	B16	ENVOLVENTE MAX	7	0	119.8	-1.719	-5.318
N+4.00	B16	ENVOLVENTE MIN	0	0	-116.39	2.56	-185.478
N+4.00	B16	ENVOLVENTE MIN	3.5	0	-49.2	2.56	63.454
N+4.00	B16	ENVOLVENTE MIN	3.5	0	-2.78	-23.093	64.005
N+4.00	B16	ENVOLVENTE MIN	7	0	43.01	-23.093	-196.562
N+7.50	B17	ENVOLVENTE MAX	0	0	-17.3	1.173	-0.203
N+7.50	B17	ENVOLVENTE MAX	3.5	0	9.97	1.173	30.721
N+7.50	B17	ENVOLVENTE MAX	7	0	57.94	1.173	3.37
N+7.50	B17	ENVOLVENTE MIN	0	0	-60.49	-0.276	-100.989
N+7.50	B17	ENVOLVENTE MIN	3.5	0	-11.76	-0.276	12.427
N+7.50	B17	ENVOLVENTE MIN	7	0	16.26	-0.276	-92.005
N+4.00	B17	ENVOLVENTE MAX	0	0	-70.27	5.075	-58.277
N+4.00	B17	ENVOLVENTE MAX	3.5	0	-28.07	5.075	206.223
N+4.00	B17	ENVOLVENTE MAX	3.5	0	91.4	8.407	206.252
N+4.00	B17	ENVOLVENTE MAX	7	0	159.92	8.407	-56.511
N+4.00	B17	ENVOLVENTE MIN	0	0	-165.11	-12.016	-269.951
N+4.00	B17	ENVOLVENTE MIN	3.5	0	-96.59	-12.016	113.484
N+4.00	B17	ENVOLVENTE MIN	3.5	0	27.71	-6.115	114.227
N+4.00	B17	ENVOLVENTE MIN	7	0	69.91	-6.115	-251.586
N+7.50	B18	ENVOLVENTE MAX	0	0	-11.13	1.68	17.855
N+7.50	B18	ENVOLVENTE MAX	3.5	0	13.58	1.68	27.453
N+7.50	B18	ENVOLVENTE MAX	7	0	53.49	1.68	20.741
N+7.50	B18	ENVOLVENTE MIN	0	0	-55.99	0.058	-100.527
N+7.50	B18	ENVOLVENTE MIN	3.5	0	-15.21	0.058	13.335
N+7.50	B18	ENVOLVENTE MIN	7	0	10.36	0.058	-91.971
N+4.00	B18	ENVOLVENTE MAX	0	0	-39.89	-6.702	0.138
N+4.00	B18	ENVOLVENTE MAX	3.5	0	5.91	-6.702	101.881
N+4.00	B18	ENVOLVENTE MAX	3.5	0	50.79	24.293	101.014
N+4.00	B18	ENVOLVENTE MAX	7	0	117.98	24.293	19.02
N+4.00	B18	ENVOLVENTE MIN	0	0	-130.72	-31.121	-243.854
N+4.00	B18	ENVOLVENTE MIN	3.5	0	-63.53	-31.121	58.939
N+4.00	B18	ENVOLVENTE MIN	3.5	0	-11.39	2.75	58.772
N+4.00	B18	ENVOLVENTE MIN	7	0	34.41	2.75	-199.693
N+7.50	B20	ENVOLVENTE MAX	0	0	-3.18	0.747	21.05
N+7.50	B20	ENVOLVENTE MAX	3.535	0	9.19	0.747	13.704
N+7.50	B20	ENVOLVENTE MAX	7.07	0	25.23	0.747	10.457
N+7.50	B20	ENVOLVENTE MIN	0	0	-23.3	-1.141	-46.571
N+7.50	B20	ENVOLVENTE MIN	3.535	0	-7.61	-1.141	4.791
N+7.50	B20	ENVOLVENTE MIN	7.07	0	4.41	-1.141	-47.139
N+4.00	B20	ENVOLVENTE MAX	0	0	-51.57	22.086	-16.202
N+4.00	B20	ENVOLVENTE MAX	3.535	0	-5.16	22.086	143.534
N+4.00	B20	ENVOLVENTE MAX	3.535	0	75.33	-1.219	144.664
N+4.00	B20	ENVOLVENTE MAX	7.07	0	143.45	-1.219	-67.7
N+4.00	B20	ENVOLVENTE MIN	0	0	-124.8	2.249	-192.195
N+4.00	B20	ENVOLVENTE MIN	3.535	0	-56.68	2.249	72.207
N+4.00	B20	ENVOLVENTE MIN	3.535	0	16.44	-16.554	71.933
N+4.00	B20	ENVOLVENTE MIN	7.07	0	62.85	-16.554	-244.905
N+7.50	B21	ENVOLVENTE MAX	0	0	-0.95	2.145	21.374
N+7.50	B21	ENVOLVENTE MAX	3.535	0	13.55	2.145	6.391
N+7.50	B21	ENVOLVENTE MAX	7.07	0	29.58	2.145	-1.748
N+7.50	B21	ENVOLVENTE MIN	0	0	-17.37	-0.483	-28.747
N+7.50	B21	ENVOLVENTE MIN	3.535	0	-3.81	-0.483	1.414
N+7.50	B21	ENVOLVENTE MIN	7.07	0	8.22	-0.483	-74.462
N+4.00	B21	ENVOLVENTE MAX	0	0	-59.57	14.528	-56.642
N+4.00	B21	ENVOLVENTE MAX	3.535	0	-13.16	14.528	140.82
N+4.00	B21	ENVOLVENTE MAX	3.535	0	57.06	0.527	140.212
N+4.00	B21	ENVOLVENTE MAX	7.07	0	125.18	0.527	-26.899
N+4.00	B21	ENVOLVENTE MIN	0	0	-136.13	0.971	-222.616
N+4.00	B21	ENVOLVENTE MIN	3.535	0	-68	0.971	69.391
N+4.00	B21	ENVOLVENTE MIN	3.535	0	7.5	-23.804	69.555
N+4.00	B21	ENVOLVENTE MIN	7.07	0	53.91	-23.804	-194.441
N+7.50	B23	ENVOLVENTE MAX	0	0	-12.25	11.241	-14.484
N+7.50	B23	ENVOLVENTE MAX	0.788	0	-8.79	11.241	-6.197
N+7.50	B23	ENVOLVENTE MAX	1.575	0	-5.33	11.241	-0.557
N+7.50	B23	ENVOLVENTE MIN	0	0	-22.7	-3.044	-26.83
N+7.50	B23	ENVOLVENTE MIN	0.788	0	-16.49	-3.044	-11.481
N+7.50	B23	ENVOLVENTE MIN	1.575	0	-10.55	-3.044	-1.02
N+4.00	B23	ENVOLVENTE MAX	0	0	-24.05	18.457	-21.34
N+4.00	B23	ENVOLVENTE MAX	0.788	0	-14.49	18.457	-5.977
N+4.00	B23	ENVOLVENTE MAX	1.575	0	-4.92	18.457	2.694

N+4.00	B23	ENVOLVENTE MIN	0	0	-47.16	-9.895	-46.583
N+4.00	B23	ENVOLVENTE MIN	0.788	0	-30.79	-9.895	-16.409
N+4.00	B23	ENVOLVENTE MIN	1.575	0	-15.25	-9.895	0.691
N+7.50	B24	ENVOLVENTE MAX	0	0	-20.05	5.647	-25.255
N+7.50	B24	ENVOLVENTE MAX	0.788	0	-15.8	5.647	-11.14
N+7.50	B24	ENVOLVENTE MAX	1.575	0	-11.56	5.647	-0.352
N+7.50	B24	ENVOLVENTE MIN	0	0	-35.37	-10.659	-40.34
N+7.50	B24	ENVOLVENTE MIN	0.788	0	-25.26	-10.659	-17.565
N+7.50	B24	ENVOLVENTE MIN	1.575	0	-18.26	-10.659	-0.587
N+4.00	B24	ENVOLVENTE MAX	0	0	-55.39	12.756	-57.859
N+4.00	B24	ENVOLVENTE MAX	0.788	0	-38.95	12.756	-20.712
N+4.00	B24	ENVOLVENTE MAX	1.575	0	-22.5	12.756	5.144
N+4.00	B24	ENVOLVENTE MIN	0	0	-105.84	-15.946	-113.173
N+4.00	B24	ENVOLVENTE MIN	0.788	0	-75	-15.946	-42.777
N+4.00	B24	ENVOLVENTE MIN	1.575	0	-45.58	-15.946	2.286
N+7.50	B25	ENVOLVENTE MAX	0	0	-15.93	0.208	-18.982
N+7.50	B25	ENVOLVENTE MAX	0.788	0	-12.26	0.208	-7.78
N+7.50	B25	ENVOLVENTE MAX	1.575	0	-8.59	0.208	0.894
N+7.50	B25	ENVOLVENTE MIN	0	0	-33.58	-10.921	-42.385
N+7.50	B25	ENVOLVENTE MIN	0.788	0	-26.93	-10.921	-18.662
N+7.50	B25	ENVOLVENTE MIN	1.575	0	-20.28	-10.921	-0.536
N+4.00	B25	ENVOLVENTE MAX	0	0	-24.03	8.327	-20.688
N+4.00	B25	ENVOLVENTE MAX	0.788	0	-14.47	8.327	-5.529
N+4.00	B25	ENVOLVENTE MAX	1.575	0	-4.9	8.327	2.906
N+4.00	B25	ENVOLVENTE MIN	0	0	-48.25	-20.525	-49.502
N+4.00	B25	ENVOLVENTE MIN	0.788	0	-32.22	-20.525	-18.013
N+4.00	B25	ENVOLVENTE MIN	1.575	0	-16.68	-20.525	0.435
N+7.50	B27	ENVOLVENTE MAX	0	0	-3.38	0.007	3.044
N+7.50	B27	ENVOLVENTE MAX	3.535	0	1.9	0.007	7.43
N+7.50	B27	ENVOLVENTE MAX	7.07	0	8.78	0.007	-2.245
N+7.50	B27	ENVOLVENTE MIN	0	0	-7.87	-0.193	-11.241
N+7.50	B27	ENVOLVENTE MIN	3.535	0	-1.13	-0.193	2.879
N+7.50	B27	ENVOLVENTE MIN	7.07	0	4.03	-0.193	-11.451
N+4.00	B27	ENVOLVENTE MAX	0	0	-4.92	2.694	9.895
N+4.00	B27	ENVOLVENTE MAX	3.535	0	0.23	2.694	31.016
N+4.00	B27	ENVOLVENTE MAX	3.535	0	16.87	-1.072	30.243
N+4.00	B27	ENVOLVENTE MAX	7.07	0	23.74	-1.072	-14.193
N+4.00	B27	ENVOLVENTE MIN	0	0	-15.25	0.691	-18.457
N+4.00	B27	ENVOLVENTE MIN	3.535	0	-8.38	0.691	10.484
N+4.00	B27	ENVOLVENTE MIN	3.535	0	5.22	-2.753	11.531
N+4.00	B27	ENVOLVENTE MIN	7.07	0	10.37	-2.753	-43.377
N+7.50	B28	ENVOLVENTE MAX	0	0	-2.75	0.232	-0.17
N+7.50	B28	ENVOLVENTE MAX	3.535	0	3.02	0.232	3.92
N+7.50	B28	ENVOLVENTE MAX	7.07	0	9.89	0.232	-2.973
N+7.50	B28	ENVOLVENTE MIN	0	0	-6.95	-0.019	-8.514
N+7.50	B28	ENVOLVENTE MIN	3.535	0	-0.7	-0.019	0.453
N+7.50	B28	ENVOLVENTE MIN	7.07	0	4.46	-0.019	-22.108
N+4.00	B28	ENVOLVENTE MAX	0	0	-10.65	2.519	-13.992
N+4.00	B28	ENVOLVENTE MAX	3.535	0	-5.5	2.519	31.735
N+4.00	B28	ENVOLVENTE MAX	3.535	0	9.81	-0.435	32.163
N+4.00	B28	ENVOLVENTE MAX	7.07	0	16.68	-0.435	8.327
N+4.00	B28	ENVOLVENTE MIN	0	0	-23.31	1.086	-40.388
N+4.00	B28	ENVOLVENTE MIN	3.535	0	-16.44	1.086	12.694
N+4.00	B28	ENVOLVENTE MIN	3.535	0	-0.25	-2.906	10.69
N+4.00	B28	ENVOLVENTE MIN	7.07	0	4.9	-2.906	-20.525
N+7.50	B30	ENVOLVENTE MAX	0	0	-1.96	0	-0.562
N+7.50	B30	ENVOLVENTE MAX	0.288	0	-0.98	0	-0.141
N+7.50	B30	ENVOLVENTE MAX	0.575	0	0	0	0
N+7.50	B30	ENVOLVENTE MIN	0	0	-3.04	0	-0.875
N+7.50	B30	ENVOLVENTE MIN	0.288	0	-1.52	0	-0.219
N+7.50	B30	ENVOLVENTE MIN	0.575	0	0	0	0
N+7.50	B31	ENVOLVENTE MAX	0	0	-1.96	0	-0.562
N+7.50	B31	ENVOLVENTE MAX	0.288	0	-0.98	0	-0.141
N+7.50	B31	ENVOLVENTE MAX	0.575	0	0	0	0
N+7.50	B31	ENVOLVENTE MIN	0	0	-3.04	0	-0.875
N+7.50	B31	ENVOLVENTE MIN	0.288	0	-1.52	0	-0.219
N+7.50	B31	ENVOLVENTE MIN	0.575	0	0	0	0
N+7.50	B34	ENVOLVENTE MAX	0	0	-1.96	0	-0.562
N+7.50	B34	ENVOLVENTE MAX	0.288	0	-0.98	0	-0.141
N+7.50	B34	ENVOLVENTE MAX	0.575	0	0	0	0
N+7.50	B34	ENVOLVENTE MIN	0	0	-3.04	0	-0.875
N+7.50	B34	ENVOLVENTE MIN	0.288	0	-1.52	0	-0.219
N+7.50	B34	ENVOLVENTE MIN	0.575	0	0	0	0
N+7.50	B35	ENVOLVENTE MAX	0	0	-3.17	0.236	4.048
N+7.50	B35	ENVOLVENTE MAX	3.5	0	2.86	0.236	8.673
N+7.50	B35	ENVOLVENTE MAX	7	0	12.19	0.236	5.901
N+7.50	B35	ENVOLVENTE MIN	0	0	-13.47	-0.112	-22.756
N+7.50	B35	ENVOLVENTE MIN	3.5	0	-3.8	-0.112	4.049
N+7.50	B35	ENVOLVENTE MIN	7	0	2.57	-0.112	-18.002
N+7.50	B36	ENVOLVENTE MAX	0	0	2.05	1.832	-0.406
N+7.50	B36	ENVOLVENTE MAX	1.038	0	4.84	1.832	0.86
N+7.50	B36	ENVOLVENTE MAX	2.075	0	7.71	1.832	0.562
N+7.50	B36	ENVOLVENTE MIN	0	0	-2.47	0.203	-1.676
N+7.50	B36	ENVOLVENTE MIN	1.038	0	-0.61	0.203	-4.923
N+7.50	B36	ENVOLVENTE MIN	2.075	0	1.18	0.203	-11.434
N+7.50	B37	ENVOLVENTE MAX	0	0	0.28	0.081	1.92
N+7.50	B37	ENVOLVENTE MAX	0.788	0	1.63	0.081	1.169
N+7.50	B37	ENVOLVENTE MAX	1.575	0	3.6	0.081	-0.466
N+7.50	B37	ENVOLVENTE MIN	0	0	-5.71	-1.754	-7.367
N+7.50	B37	ENVOLVENTE MIN	0.788	0	-3.54	-1.754	-3.724
N+7.50	B37	ENVOLVENTE MIN	1.575	0	-1.98	-1.754	-1.978
N+7.50	B38	ENVOLVENTE MAX	0	0	-1.6	1.657	-1.755
N+7.50	B38	ENVOLVENTE MAX	0.938	0	-0.23	1.657	-0.863
N+7.50	B38	ENVOLVENTE MAX	1.875	0	1.14	1.657	0.081
N+7.50	B38	ENVOLVENTE MIN	0	0	-8.36	0.225	-12.613
N+7.50	B38	ENVOLVENTE MIN	0.938	0	-6.54	0.225	-5.662
N+7.50	B38	ENVOLVENTE MIN	1.875	0	-4.72	0.225	-1.754
N+7.50	B39	ENVOLVENTE MAX	0	0	-0.69	-0.406	0.014
N+7.50	B39	ENVOLVENTE MAX	0.938	0	0.68	-0.406	0.016
N+7.50	B39	ENVOLVENTE MAX	1.875	0	2.05	-0.406	-0.203
N+7.50	B39	ENVOLVENTE MIN	0	0	-6.11	-1.676	-8.811

N+7.50	B39	ENVOLVENTE MIN	0.938	0	-4.29	-1.676	-3.937
N+7.50	B39	ENVOLVENTE MIN	1.875	0	-2.47	-1.676	-1.832
N+7.50	B40	ENVOLVENTE MAX	0	0	-10.73	4.089	-13.976
N+7.50	B40	ENVOLVENTE MAX	0.938	0	-7.54	4.089	-5.412
N+7.50	B40	ENVOLVENTE MAX	1.875	0	-4.35	4.089	1.888
N+7.50	B40	ENVOLVENTE MIN	0	0	-29.68	-11.925	-45.937
N+7.50	B40	ENVOLVENTE MIN	0.938	0	-25.43	-11.925	-20.101
N+7.50	B40	ENVOLVENTE MIN	1.875	0	-21.18	-11.925	0.023
N+7.50	B41	ENVOLVENTE MAX	0	0	-8.71	11.397	-10.409
N+7.50	B41	ENVOLVENTE MAX	0.938	0	-5.52	11.397	-3.737
N+7.50	B41	ENVOLVENTE MAX	1.875	0	-2.33	11.397	1.95
N+7.50	B41	ENVOLVENTE MIN	0	0	-26.36	-4.743	-39.608
N+7.50	B41	ENVOLVENTE MIN	0.938	0	-22.11	-4.743	-16.885
N+7.50	B41	ENVOLVENTE MIN	1.875	0	-17.86	-4.743	-0.154
N+7.50	B49	ENVOLVENTE MAX	0	0	-0.84	0	-0.241
N+7.50	B49	ENVOLVENTE MAX	0.288	0	-0.42	0	-0.06
N+7.50	B49	ENVOLVENTE MAX	0.575	0	0	0	0
N+7.50	B49	ENVOLVENTE MIN	0	0	-1.3	0	-0.375
N+7.50	B49	ENVOLVENTE MIN	0.288	0	-0.65	0	-0.094
N+7.50	B49	ENVOLVENTE MIN	0.575	0	0	0	0
N+4.00	B51	ENVOLVENTE MAX	0	0	-15.61	2.328	-1.799
N+4.00	B51	ENVOLVENTE MAX	0.788	0	0.07	2.328	4.397
N+4.00	B51	ENVOLVENTE MAX	1.575	0	23.33	2.328	-1.894
N+4.00	B51	ENVOLVENTE MIN	0	0	-38.47	-2.602	-24.19
N+4.00	B51	ENVOLVENTE MIN	0.788	0	-12	-2.602	-4.395
N+4.00	B51	ENVOLVENTE MIN	1.575	0	6.9	-2.602	-5.316
N+4.00	B53	ENVOLVENTE MAX	0	0	-14.57	3.492	0.018
N+4.00	B53	ENVOLVENTE MAX	0.788	0	1.11	3.492	5.724
N+4.00	B53	ENVOLVENTE MAX	1.575	0	24.69	3.492	-1.677
N+4.00	B53	ENVOLVENTE MIN	0	0	-38.26	-1.916	-23.759
N+4.00	B53	ENVOLVENTE MIN	0.788	0	-11.78	-1.916	-4.465
N+4.00	B53	ENVOLVENTE MIN	1.575	0	6.81	-1.916	-5.268
N+4.00	B54	ENVOLVENTE MAX	0	0	-32.73	1.4	-6.053
N+4.00	B54	ENVOLVENTE MAX	3.535	0	9.67	1.4	62.262
N+4.00	B54	ENVOLVENTE MAX	3.535	0	14.03	1.922	59.692
N+4.00	B54	ENVOLVENTE MAX	7.07	0	84.82	1.922	-54.163
N+4.00	B54	ENVOLVENTE MIN	0	0	-64.59	-2.921	-47.75
N+4.00	B54	ENVOLVENTE MIN	3.535	0	1.76	-2.921	28.785
N+4.00	B54	ENVOLVENTE MIN	3.535	0	4.17	-1.084	30.38
N+4.00	B54	ENVOLVENTE MIN	7.07	0	43.66	-1.084	-111.734
N+4.00	B59	ENVOLVENTE MAX	0	0	-43.5	1.651	-51.924
N+4.00	B59	ENVOLVENTE MAX	3.535	0	-4.01	1.651	61.658
N+4.00	B59	ENVOLVENTE MAX	3.535	0	-0.56	2.436	64.169
N+4.00	B59	ENVOLVENTE MAX	7.07	0	67.5	2.436	-11.297
N+4.00	B59	ENVOLVENTE MIN	0	0	-83.36	-1.52	-104.599
N+4.00	B59	ENVOLVENTE MIN	3.535	0	-12.26	-1.52	32.023
N+4.00	B59	ENVOLVENTE MIN	3.535	0	-7.06	-3.139	30.785
N+4.00	B59	ENVOLVENTE MIN	7.07	0	34.18	-3.139	-53.569
N+4.00	B60	ENVOLVENTE MAX	0	0	-32.78	2.715	-6.928
N+4.00	B60	ENVOLVENTE MAX	1.75	0	-13.38	2.715	55.52
N+4.00	B60	ENVOLVENTE MAX	3.5	0	6.3	2.715	70.925
N+4.00	B60	ENVOLVENTE MIN	0	0	-69.59	-1.088	-57.961
N+4.00	B60	ENVOLVENTE MIN	1.75	0	-34.5	-1.088	20.451
N+4.00	B60	ENVOLVENTE MIN	3.5	0	-2.79	-1.088	37.694
N+4.00	B61	ENVOLVENTE MAX	0	0	3.79	0.799	69.365
N+4.00	B61	ENVOLVENTE MAX	1.75	0	34.9	0.799	56.589
N+4.00	B61	ENVOLVENTE MAX	3.5	0	68.97	0.799	-6.122

N+4.00	B61	ENVOLVENTE MIN	0	0	-7.06	-2.649	35.616
N+4.00	B61	ENVOLVENTE MIN	1.75	0	13.23	-2.649	16.598
N+4.00	B61	ENVOLVENTE MIN	3.5	0	32.63	-2.649	-61.976
N+4.00	B62	ENVOLVENTE MAX	0	0	-32.79	1.027	-12.626
N+4.00	B62	ENVOLVENTE MAX	1.75	0	-13.39	1.027	39.75
N+4.00	B62	ENVOLVENTE MAX	3.5	0	6.01	1.027	53.884
N+4.00	B62	ENVOLVENTE MIN	0	0	-73.41	-2.115	-89.702
N+4.00	B62	ENVOLVENTE MIN	1.75	0	-39.25	-2.115	7.102
N+4.00	B62	ENVOLVENTE MIN	3.5	0	-7.26	-2.115	30.063
N+4.00	B63	ENVOLVENTE MAX	0	0	2.37	2.882	55.205
N+4.00	B63	ENVOLVENTE MAX	1.75	0	31.31	2.882	53.532
N+4.00	B63	ENVOLVENTE MAX	3.5	0	63.71	2.882	-1.728
N+4.00	B63	ENVOLVENTE MIN	0	0	-12.26	-0.521	30.275
N+4.00	B63	ENVOLVENTE MIN	1.75	0	10.19	-0.521	13.643
N+4.00	B63	ENVOLVENTE MIN	3.5	0	29.59	-0.521	-60.789
N+4.00	B64	ENVOLVENTE MAX	0	0	11.69	0.78	-1.829
N+4.00	B64	ENVOLVENTE MAX	1.038	0	28.19	0.78	-2.73
N+4.00	B64	ENVOLVENTE MAX	2.075	0	47.26	0.78	-13.587
N+4.00	B64	ENVOLVENTE MIN	0	0	-2.19	-4.812	-4.568
N+4.00	B64	ENVOLVENTE MIN	1.038	0	5.65	-4.812	-22.727
N+4.00	B64	ENVOLVENTE MIN	2.075	0	13.5	-4.812	-62.757

FUERZAS EN COLUMNAS

COLUMN FORCES
UNID: kN-m

Story	Column	Load	Loc	P	V2	V3	T	M2	M3
N+7.50	C1	ENVOLVENTE MAX	0.000	-38.500	-6.590	-2.960	2.065	-26.464	-25.839
N+7.50	C1	ENVOLVENTE MAX	1.750	-30.940	-6.590	-2.960	2.065	2.044	9.252
N+7.50	C1	ENVOLVENTE MAX	3.500	-23.380	-6.590	-2.960	2.065	74.716	58.746
N+7.50	C1	ENVOLVENTE MIN	0.000	-89.970	-33.650	-44.960	-3.567	-83.979	-75.096
N+7.50	C1	ENVOLVENTE MIN	1.750	-79.890	-33.650	-44.960	-3.567	-28.613	-39.772
N+7.50	C1	ENVOLVENTE MIN	3.500	-69.810	-33.650	-44.960	-3.567	-17.410	-18.850
N+4.00	C1	ENVOLVENTE MAX	0.000	-149.280	46.850	32.610	2.306	97.630	143.386
N+4.00	C1	ENVOLVENTE MAX	2.000	-140.640	46.850	32.610	2.306	37.354	57.368
N+4.00	C1	ENVOLVENTE MAX	4.000	-132.000	46.850	32.610	2.306	131.294	143.062
N+4.00	C1	ENVOLVENTE MIN	0.000	-326.090	-79.440	-69.180	-3.254	-145.541	-174.812
N+4.00	C1	ENVOLVENTE MIN	2.000	-314.570	-79.440	-69.180	-3.254	-12.111	-23.610
N+4.00	C1	ENVOLVENTE MIN	4.000	-303.050	-79.440	-69.180	-3.254	-32.897	-44.120
N+7.50	C2	ENVOLVENTE MAX	0.000	-73.190	31.300	5.480	1.360	-9.416	44.909
N+7.50	C2	ENVOLVENTE MAX	1.750	-67.140	31.300	5.480	1.360	-5.642	1.688
N+7.50	C2	ENVOLVENTE MAX	3.500	-61.090	31.300	5.480	1.360	54.733	51.065
N+7.50	C2	ENVOLVENTE MIN	0.000	-140.480	-29.480	-36.490	-2.349	-73.185	-54.759
N+7.50	C2	ENVOLVENTE MIN	1.750	-132.420	-29.480	-36.490	-2.349	-22.692	-14.730
N+7.50	C2	ENVOLVENTE MIN	3.500	-124.360	-29.480	-36.490	-2.349	-28.800	-67.299
N+4.00	C2	ENVOLVENTE MAX	0.000	-357.560	42.050	23.360	1.519	69.665	97.417
N+4.00	C2	ENVOLVENTE MAX	2.000	-350.650	42.050	23.360	1.519	25.430	16.833
N+4.00	C2	ENVOLVENTE MAX	4.000	-343.740	42.050	23.360	1.519	106.460	93.843
N+4.00	C2	ENVOLVENTE MIN	0.000	-720.110	-48.530	-55.250	-2.143	-114.593	-100.275
N+4.00	C2	ENVOLVENTE MIN	2.000	-710.890	-48.530	-55.250	-2.143	-6.562	-6.729
N+4.00	C2	ENVOLVENTE MIN	4.000	-701.670	-48.530	-55.250	-2.143	-23.799	-70.777
N+7.50	C3	ENVOLVENTE MAX	0.000	-69.780	23.430	17.900	2.065	12.710	42.442
N+7.50	C3	ENVOLVENTE MAX	1.750	-62.220	23.430	17.900	2.065	26.602	24.451
N+7.50	C3	ENVOLVENTE MAX	3.500	-54.660	23.430	17.900	2.065	78.212	36.072
N+7.50	C3	ENVOLVENTE MIN	0.000	-152.930	-8.890	-29.940	-3.567	-32.920	3.130
N+7.50	C3	ENVOLVENTE MIN	1.750	-142.850	-8.890	-29.940	-3.567	-25.732	-4.324
N+7.50	C3	ENVOLVENTE MIN	3.500	-132.770	-8.890	-29.940	-3.567	-56.263	-41.391
N+4.00	C3	ENVOLVENTE MAX	0.000	-346.180	55.270	63.250	2.306	167.254	126.985
N+4.00	C3	ENVOLVENTE MAX	2.000	-337.540	55.270	63.250	2.306	43.050	17.740
N+4.00	C3	ENVOLVENTE MAX	4.000	-328.900	55.270	63.250	2.306	103.735	48.057
N+4.00	C3	ENVOLVENTE MIN	0.000	-763.870	-35.400	-72.760	-3.254	-191.656	-93.800
N+4.00	C3	ENVOLVENTE MIN	2.000	-752.350	-35.400	-72.760	-3.254	-48.425	-24.294
N+4.00	C3	ENVOLVENTE MIN	4.000	-740.830	-35.400	-72.760	-3.254	-90.081	-94.350
N+7.50	C4	ENVOLVENTE MAX	0.000	-51.220	-5.490	36.450	2.065	67.775	-34.351
N+7.50	C4	ENVOLVENTE MAX	1.750	-43.660	-5.490	36.450	2.065	26.554	4.117
N+7.50	C4	ENVOLVENTE MAX	3.500	-36.100	-5.490	36.450	2.065	24.395	58.131
N+7.50	C4	ENVOLVENTE MIN	0.000	-108.740	-37.920	-1.860	-3.567	16.741	-83.959
N+7.50	C4	ENVOLVENTE MIN	1.750	-98.660	-37.920	-1.860	-3.567	-2.576	-46.460
N+7.50	C4	ENVOLVENTE MIN	3.500	-88.580	-37.920	-1.860	-3.567	-60.957	-24.507
N+4.00	C4	ENVOLVENTE MAX	0.000	-201.130	45.000	63.430	2.306	137.228	141.834
N+4.00	C4	ENVOLVENTE MAX	2.000	-192.490	45.000	63.430	2.306	14.914	62.549
N+4.00	C4	ENVOLVENTE MAX	4.000	-183.850	45.000	63.430	2.306	42.763	161.716
N+4.00	C4	ENVOLVENTE MIN	0.000	-408.720	-84.440	-35.900	-3.254	-100.898	-176.118
N+4.00	C4	ENVOLVENTE MIN	2.000	-397.200	-84.440	-35.900	-3.254	-33.638	-17.961
N+4.00	C4	ENVOLVENTE MIN	4.000	-385.680	-84.440	-35.900	-3.254	-116.539	-38.254
N+7.50	C5	ENVOLVENTE MAX	0.000	-69.830	41.490	37.700	1.360	77.808	65.281
N+7.50	C5	ENVOLVENTE MAX	1.750	-63.780	41.490	37.700	1.360	25.058	4.240
N+7.50	C5	ENVOLVENTE MAX	3.500	-57.730	41.490	37.700	1.360	27.285	44.756
N+7.50	C5	ENVOLVENTE MIN	0.000	-133.000	-23.240	-4.790	-2.349	10.227	-36.598
N+7.50	C5	ENVOLVENTE MIN	1.750	-124.940	-23.240	-4.790	-2.349	5.381	-7.508
N+7.50	C5	ENVOLVENTE MIN	3.500	-116.870	-23.240	-4.790	-2.349	-54.444	-79.974
N+4.00	C5	ENVOLVENTE MAX	0.000	-365.810	48.280	54.520	1.519	108.850	108.534
N+4.00	C5	ENVOLVENTE MAX	2.000	-358.900	48.280	54.520	1.519	5.905	12.012
N+4.00	C5	ENVOLVENTE MAX	4.000	-351.990	48.280	54.520	1.519	24.950	74.430
N+4.00	C5	ENVOLVENTE MIN	0.000	-676.330	-41.240	-24.250	-2.143	-72.078	-90.519
N+4.00	C5	ENVOLVENTE MIN	2.000	-667.110	-41.240	-24.250	-2.143	-29.678	-8.078
N+4.00	C5	ENVOLVENTE MIN	4.000	-657.900	-41.240	-24.250	-2.143	-109.268	-84.577
N+7.50	C6	ENVOLVENTE MAX	0.000	-70.090	44.610	36.740	2.065	59.413	96.162
N+7.50	C6	ENVOLVENTE MAX	1.750	-62.530	44.610	36.740	2.065	38.054	41.195
N+7.50	C6	ENVOLVENTE MAX	3.500	-54.970	44.610	36.740	2.065	56.159	22.264
N+7.50	C6	ENVOLVENTE MIN	0.000	-151.430	4.410	-13.270	-3.567	7.901	36.782
N+7.50	C6	ENVOLVENTE MIN	1.750	-141.350	4.410	-13.270	-3.567	-11.825	5.956
N+7.50	C6	ENVOLVENTE MIN	3.500	-131.270	4.410	-13.270	-3.567	-71.014	-60.907
N+4.00	C6	ENVOLVENTE MAX	0.000	-214.530	74.350	78.230	2.306	185.831	153.947
N+4.00	C6	ENVOLVENTE MAX	2.000	-205.890	74.350	78.230	2.306	33.118	10.677
N+4.00	C6	ENVOLVENTE MAX	4.000	-197.250	74.350	78.230	2.306	64.024	16.102
N+4.00	C6	ENVOLVENTE MIN	0.000	-450.570	-22.750	-58.040	-3.254	-171.520	-75.185
N+4.00	C6	ENVOLVENTE MIN	2.000	-439.050	-22.750	-58.040	-3.254	-59.186	-35.113
N+4.00	C6	ENVOLVENTE MIN	4.000	-427.530	-22.750	-58.040	-3.254	-130.470	-143.738

8. VERIFICACIONES

VERIFICACIONES

PROYECTO: AGROECOL
RESISTENCIA A CORTANTE PARA VIGAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3.1 (a)

f'c = 21.1 MPa
fy = 420 MPa
$\Phi_{Cortante}$ = 0.75
Estribos Φ = 9.5 mm
Av = 71 mm²
R= 6.30

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)	COMDIS3	COMDIS4	COMDIS5	COMDIS6	COMDIS7	COMDIS8	COMDIS9	COMDIS10	COMDIS11	COMDIS12	COMDIS13	COMDIS14	COMDIS15	COMDIS16	COMDIS17	COMDIS18
N+7.50	B1	0.000	3.055	V1G1SX45	0.15	0.40	0.265	0.132	0.376	0.017	-0.376	-0.017	0.510	0.391	0.509	0.390	0.471	0.435	0.465	0.429	0.299	0.180	0.297	0.178	0.259	0.223	0.254	0.218
	B1	3.055					-5.471	-0.352	1.914	0.319	-1.914	-0.319	6.598	7.206	6.629	7.236	6.775	6.958	6.877	7.059	4.605	5.213	4.635	5.243	4.782	4.964	4.883	5.066
N+4.00	B2	0.000	1.425	V1G1SX45	0.15	0.40	-3.131	-1.145	0.619	0.181	-0.619	-0.181	4.795	4.992	4.813	5.009	4.844	4.903	4.901	4.960	2.711	2.908	2.728	2.925	2.760	2.819	2.817	2.876
	B2	1.425					-10.202	-3.688	0.944	2.067	-0.944	-2.067	15.682	15.982	15.879	16.179	15.557	15.647	16.214	16.303	8.934	9.233	9.130	9.430	8.809	8.899	9.465	9.555
N+7.50	B3	0.000	7.070	V1G1SX45	0.15	0.40	-5.557	-0.208	3.388	1.110	-3.388	-1.110	6.286	7.361	6.391	7.467	6.539	6.862	6.891	7.214	4.411	5.486	4.516	5.592	4.664	4.986	5.016	5.339
	B3	7.070					-8.342	-0.621	6.040	1.931	-6.040	-1.931	9.581	11.498	9.705	11.682	10.037	10.613	10.650	11.226	6.457	8.375	6.641	8.558	6.914	7.489	7.527	8.102
N+4.00	B3	0.000	7.070	V1G1SX45	0.15	0.40	-17.736	-8.657	7.909	2.864	-7.909	-2.864	28.548	31.059	28.821	31.332	29.109	29.862	30.018	30.771	14.571	17.081	14.843	17.354	15.131	15.884	16.040	16.794
	B3	7.070					-18.591	-12.472	12.328	6.148	-12.328	-6.148	32.532	36.445	33.117	37.031	33.218	34.392	35.170	36.344	14.482	18.396	15.068	18.981	15.169	16.343	17.121	18.295
N+4.00	B4	0.000	2.075	V1G1SX45	0.15	0.40	-18.214	-10.663	4.154	1.873	-4.154	-1.873	31.771	33.090	31.950	33.268	32.025	32.420	32.619	33.015	15.644	16.963	15.822	17.141	15.897	16.293	16.492	16.888
	B4	2.075					-1.228	-0.722	0.484	0.281	-0.484	-0.281	2.105	2.259	2.132	2.286	2.128	2.174	2.217	2.263	1.015	1.169	1.042	1.195	1.038	1.084	1.127	1.173
N+7.50	B6	0.000	2.075	V1G1SX45	0.15	0.40	-0.131	0.056	0.079	0.066	-0.079	-0.066	0.086	0.111	0.092	0.117	0.087	0.094	0.108	0.115	0.102	0.127	0.109	0.134	0.104	0.111	0.125	0.132
	B6	2.075					-5.883	-1.260	1.010	0.291	-1.010	-0.291	8.145	8.466	8.173	8.494	8.225	8.322	8.318	8.414	5.121	5.441	5.148	5.469	5.200	5.297	5.293	5.389
N+4.00	B7	0.000	2.075	V1G1SX45	0.15	0.40	-2.892	-1.213	0.136	0.109	-0.136	-0.109	4.657	4.700	4.667	4.710	4.660	4.673	4.694	4.707	2.576	2.619	2.586	2.630	2.579	2.592	2.614	2.627
	B7	2.075					-6.909	-5.179	0.610	3.220	-0.610	-3.220	13.220	13.413	13.526	13.720	12.930	12.988	13.952	14.010	5.968	6.162	6.275	6.468	5.678	5.736	6.700	6.758
N+7.50	B8	0.000	2.075	V1G3SX45	0.35	0.40	0.235	-0.066	0.005	0.008	-0.005	-0.008	0.217	0.216	0.216	0.215	0.218	0.217	0.215	0.214	0.213	0.211	0.212	0.210	0.213	0.213	0.210	0.210
	B8	2.075					-31.400	-5.723	1.719	0.699	-1.719	-0.699	43.097	43.643	43.163	43.709	43.210	43.374	43.432	43.596	27.954	28.500	28.020	28.566	28.067	28.231	28.289	28.453
N+4.00	B8	0.000	2.075	V1G3SX45	0.35	0.40	3.771	1.290	0.210	0.048	-0.210	-0.048	5.851	5.784	5.846	5.780	5.833	5.813	5.818	5.798	3.430	3.363	3.425	3.358	3.412	3.392	3.396	3.376
	B8	2.075					-70.360	-37.901	4.523	7.321	-4.523	-7.321	121.266	122.702	121.964	123.400	120.956	121.386	123.280	123.710	62.257	63.693	62.955	64.391	61.947	62.377	64.271	64.701
N+7.50	B9	0.000	2.075	V1G3SX45	0.35	0.40	0.823	0.147	0.427	0.310	-0.427	-0.310	1.217	1.082	1.188	1.052	1.204	1.163	1.106	1.065	0.823	0.688	0.794	0.658	0.810	0.770	0.712	0.671
	B9	2.075					-29.718	-4.823	4.669	5.111	-4.669	-5.111	39.500	40.982	39.987	41.469	39.451	39.896	41.074	41.518	25.762	27.244	26.248	27.731	25.713	26.157	27.335	27.780
N+4.00	B9	0.000	2.075	V1G3SX45	0.35	0.40	3.501	1.540	0.822	0.165	-0.822	-0.165	5.880	5.619	5.864	5.603	5.807	5.728	5.754	5.676	3.289	3.028	3.274	3.013	3.216	3.138	3.164	3.086
	B9	2.075					-81.815	-49.246	8.569	8.262	-8.569	-8.262	145.670	148.391	146.457	149.178	145.705	146.521	148.327	149.143	71.880	74.600	72.667	75.387	71.914	72.730	74.537	75.353
N+4.00	B10	0.000	2.075	V1G1SX45	0.15	0.40	-1.620	-1.016	0.748	0.450	-0.748	-0.450	2.820	3.057	2.863	3.100	2.853	2.924	2.996	3.067	1.318	1.555	1.361	1.598	1.351	1.422	1.494	1.565
	B10	2.075					-3.884	-2.243	2.922	1.143	-2.922	-1.143	6.386	7.313	6.494	7.422	6.583	6.862	6.946	7.224	2.977	3.905	3.086	4.014	3.175	3.453	3.538	3.816
N+7.50	B12	0.000	7.070	V1G3SX45	0.35	0.40	-18.102	-1.787	33.060	4.712	-33.060	-4.712	18.037	28.533	18.486	28.981	21.187	24.336	22.683	25.832	10.820	21.315	11.269	21.764	13.970	17.118	15.465	18.614
	B12	7.070					-19.142	0.214	25.745	3.675	-25.745	-3.675	18.495	26.668	18.845	27.018	20.947	23.399	22.114	24.566	12.966	21.139	13.316	21.489	15.419	17.870	16.585	19.037
N+4.00	B12	0.000	7.070	V1G3SX45	0.35	0.40	-75.364	-12.621	65.130	9.125	-65.130	-9.125	92.285	112.961	93.154	113.830	98.508	104.711	101.405	107.608	57.055	77.731	57.924	78.600	63.278	69.481	66.175	72.377
	B12	7.070					-123.441	-32.003	52.494	7.594	-52.494	-7.594	171.438	188.103	172.161	188.826	176.427	181.427	178.838	183.837	102.403	119.068	103.126	119.791	107.392	112.391	109.803	114.802
N+7.50	B13	0.000	7.070	V1G3SX45	0.35	0.40	-11.180	0.662	24.290	2.290	-24.290	-2.290	8.789	16.501	9.007	16.719	11.234	13.547	11.961	14.274	6.097	13.809	6.315	14.027	8.542	10.855	9.269	11.582
	B13	7.070					-26.057	-2.907	28.781	2.372	-28.781	-2.372	29.494	38.631	29.720	38.857	32.428	35.169	33.181	35.922	18.770	27.907	18.996	28.133	21.704	24.445	22.457	25.198
N+4.00	B13	0.000	7.070	V1G3SX45	0.35	0.40	-127.871	-41.765	50.288	13.679	-50.288	-13.679	186.577	202.541	187.879	203.844	190.644	195.434	194.987	199.776	106.450	122.415	107.753	123.718	110.518	115.307	114.861	119.650
	B13	7.070					-134.689	-52.009	57.918	9.128	-57.918	-9.128	204.008	222.394	204.877	223.264	209.429	214.945	212.327	217.843	111.592	129.979	112.461	130.848	117.013	122.529	119.911	125.427
N+4.00	B14	0.000	2.075	V1G3SX45	0.35	0.40	-108.897	-54.729	4.154	1.873	-4.154	-1.873	184.657	185.976	184.835	186.154	184.910	185.306	185.505	185.901	97.259	98.577	97.437	98.756	97.512	97.908	98.107	98.502
	B14	2.075					1.228	0.722	0.484	0.281	-0.484	-0.281	2.286	2.132	2.259	2.105	2.263	2.217	2.174	2.128	1.195	1.042	1.169	1.015	1.173	1.127	1.084	1.038
N+7.50	B16	0.000	7.000	V1G3SX45	0.35	0.40	-27.476	-8.295	3.454	37.242	-3.454	-37.242	38.945	40.041	42.491	43.588	35.190	35.519	47.013	47.342	22.407	23.503	25.954	27.050	18.652	18.981	30.475	30.804
	B16	7.000					-34.811	-5.168	3.934	37.337	-3.934	-37.337	44.539	45.788	48.095	49.344	40.827	41.202	52.680	53.055	28.928	30.176	32.483	33.732	25.216	25.591	37.069	37.444
N+4.00	B16	0.000	7.000	V1G3SX45	0.35	0.40	-78.327	-16.372	6.815	73.069	-6.815	-73.069	105.803	107.967	112.762	114.926	98.442	99.091	121.638	122.287	65.933	68.097	72.892	75.056	58.572	59.221	81.768	82.417
	B16	7.000					-89.414	-14.110	9.322	72.358	-9.322	-72.358	116.481	119.441	123.373	126.332	109.477	110.365	132.448	133.336	75.547	78.507	82.439	85.398	68.543	69.431	91.514	92.402
N+7.50	B17	0.000	7.000	V1G3SX45	0.35	0.40	-41.061	-14.964	0.591	36.575	-0.591	-36.575	62.402	62.589	65.885	66.073	58.404	58.460	70.015	70.071	35.119	35.307	38.603	38.790	31.121	31.177	42.732	42.789
	B17	7.000					-37.012	-10.910	0.359	36.573	-0.359	-36.573	53.526	53.640	57.009	57.123	49.502	49.536	61.113	61.147	31.512	31.626	34.995	35.109	27.488	27.523	39.099	39.133
N+4.00	B17	0.000	7.000	V1G3SX45	0.35	0.40	-134.638	-45.488	1.121	62.561	-1.121	-62.561	203.897	204.252	209.855	210.211	197.070	197.177	216.931	217.037	118.017	118.373	123.975	124.331	111.191	111.297	131.051	131.158
	B17	7.000					-132.230	-30.416	1.310	62.102	-1.310	-62.102	185.927	186.343	191.841	192.257	179.172	179.297	198.887	199.012	115.842	116.258	121.756	122.172	109.087	109.212	128.802	128.927
N+7.50	B18	0.000	7.000	V1G3SX45	0.35	0.40	-34.369	-10.497	3.086	47.861	-3.086	-47.861	48.971	49.951	53.529	54.509	43.996	44.290	59.190	59.484	28.163	29.143	32.721	33.701	23.188	23.482	38.382	38.676
	B18	7.000					-31.368	-5.357	3.650	47.877	-3.650	-47.877	40.139	41.298	44.699	45.858	35.225	35.573	50.424	50.772	25.372	26.531	29.932	31.090	20.458	20.805	35.657	36.005
N+4.00	B18	0.000	7.000	V1G3SX45	0.35	0.40	-102.018	-29.478	6.429	90.025	-6.429	-90.025	146.592	148.633	155.166	157.207	137.304	137.916	165.883	166.495	86.509	88.550	95.083	97.124	77.220	77.833	105.800	106.412
	B18	7.000					-82.082	-8.301	8.646	90.300	-8.646	-90.300	101.127	103.872	109.727	112.472	92.054	92.878	120.721	121.544	68.201	70.946	76.801	79.546	59.129	59.952	87.795	88.619
N+7.50	B20	0.000	7.070	V1G3SX45	0.35	0.40	-12.398	0.515	30.856	4.506	-30.856	-4.506	9.250	19.046	9.679	19.475	12.178	15.117	13.609	16.547	6.046	15.841	6.475	16.271	8.974	11.912	10.404	13.343
	B20	7.070					-17.243	-0.471	24.885	3.639	-24.885	-3.639	17.039	24.939	17.386	25.286	19.400	21.770	20.555	22.925	11.395	19.295	11.742	19.642	13.756	16.126	14.911	17.281
N+4.00	B20	0.000	7.070	V1G3SX45	0.35	0.40	-90.987	-17.325	61.925	12.538	-61.925	-12.538	116.083	135.742	117.277	136.936	121.570	127.468	125.551	131.448	71.462	91.121	72.656	92.315	76.949	82.847	80.930	86.827
	B20	7.070					-134.946	-29.219	50.875	9.586	-50.875	-9.586	182.622	198.773	183.535	199.686	187.210	192.055	190.253	195.098	112.920	129.070	113.832	129.983	117.507	122.352	120.550	125.396
N+7.50	B21	0.000	7.070	V1G3SX45	0.35	0.40	-5.142	3.424	23.452	2.225	-23.452	-2.225	1.082	6.363	0.870	6.575	1.276	3.510	1.983	4.216	0.799	8.244	1.011	8.456	3.158	5.391	3.864	6.098
	B21	7.070					-33.676	-5.491	27.897	2.212	-27.897	-2.212	41.369	50.225	41.579	50.436	44.223	46.880	44.925	47.582	25.775	34.631	25.986	34.842	28.629	31.286	29.331	31.988
N+4.00	B21	0.000	7.070	V1G3SX45	0.35	0.40	-121.748	-23.587	48.638	14.309	-48.638	-14.309	161.283	176.724	162.646	178.086	165.097	169.729	169.640	174.272	101.172	116.612	102.534	117.975	104.986	109.618	109.528	114.161
	B21	7.070					-95.788	-20.184	56.793	8.393	-56.793	-8.393	125.715	143.745	126.515	144.544	131.093	136.502	133.757	139.166	76.795	94.824	77.594	95.624	82.173	87.581	84.837	90.246

PROYECTO: AGROECOL
RESISTENCIA A CORTANTE PARA VIGAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3.1 (a)

f'c = **21.1** MPa
fy = **420** MPa
Φ Cortante = **0.75**
Estribos Φ = **9.5** mm
Av = **71** mm²
R= **6.30**

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	$V_m = M_{nI} + M_{nr} / l_n$															
	COMBDIS3	COMBDIS4	COMBDIS5	COMBDIS6	COMBDIS7	COMBDIS8	COMBDIS9	COMBDIS10	COMBDIS11	COMBDIS12	COMBDIS13	COMBDIS14	COMBDIS15	COMBDIS16	COMBDIS17	COMBDIS18
(kN)	(kN)															
0.464	2.327	2.487	2.336	2.496	2.372	2.420	2.403	2.451	1.605	1.765	1.615	1.774	1.650	1.698	1.682	1.729
5.476																
3.724	14.370	14.718	14.520	14.869	14.317	14.421	14.818	14.922	8.172	8.520	8.322	8.670	8.118	8.223	8.619	8.723
13.892																
6.300	2.244	2.668	2.285	2.709	2.345	2.472	2.481	2.608	1.537	1.961	1.578	2.001	1.638	1.765	1.774	1.901
7.440																
39.556	8.639	9.548	8.761	9.669	8.816	9.088	9.220	9.493	4.109	5.018	4.231	5.139	4.286	4.558	4.690	4.963
40.716																
27.352	16.326	17.036	16.425	17.135	16.459	16.672	16.789	17.002	8.028	8.738	8.127	8.837	8.161	8.374	8.491	8.704
7.620																
0.464	3.967	4.133	3.983	4.150	4.006	4.056	4.061	4.111	2.517	2.684	2.533	2.700	2.556	2.606	2.611	2.661
8.228																
3.724	8.615	8.729	8.768	8.882	8.477	8.511	8.986	9.020	4.118	4.232	4.270	4.384	3.979	4.013	4.489	4.523
14.480																
11.776	20.874	21.136	20.906	21.168	20.929	21.008	21.035	21.113	13.574	13.836	13.606	13.868	13.629	13.708	13.735	13.813
33.532																
53.448	61.261	61.921	61.595	62.255	61.103	61.301	62.216	62.414	31.656	32.316	31.990	32.650	31.498	31.696	32.611	32.809
92.740																
11.348	19.623	20.272	19.843	20.492	19.593	19.788	20.327	20.522	12.812	13.461	13.032	13.681	12.782	12.977	13.517	13.711
31.660																
68.080	73.036	74.221	73.408	74.593	73.017	73.373	74.256	74.612	36.226	37.411	36.598	37.783	36.207	36.563	37.446	37.802
108.916																
7.620	4.436	4.998	4.509	5.071	4.548	4.716	4.791	4.960	2.070	2.631	2.143	2.705	2.181	2.350	2.425	2.593
12.124																
19.940	5.167	7.808	5.280	7.921	5.960	6.752	6.336	7.128	3.364	6.005	3.477	6.118	4.157	4.949	4.533	5.325
20.352																
96.832	37.302	42.583	37.527	42.809	38.888	40.472	39.638	41.223	22.554	27.836	22.779	28.061	24.140	25.724	24.891	26.475
138.400																
12.712	5.415	7.798	5.478	7.861	6.176	6.891	6.385	7.100	3.517	5.900	3.580	5.963	4.278	4.993	4.487	5.202
19.364																
166.232	55.245	60.104	55.553	60.411	56.587	58.045	57.612	59.069	30.841	35.699	31.148	36.006	32.183	33.640	33.207	34.664
173.808																
200.748	90.093	90.654	90.166	90.727	90.204	90.373	90.448	90.616	47.448	48.009	47.521	48.082	47.559	47.728	47.803	47.971
12.124																
41.076	11.926	12.261	12.941	13.276	10.860	10.960	14.242	14.342	7.333	7.669	8.348	8.683	6.267	6.367	9.649	9.750
42.160																
101.620	31.755	32.487	33.734	34.465	29.703	29.922	36.298	36.518	20.211	20.943	22.190	22.922	18.159	18.379	24.755	24.974
104.696																
57.764	16.561	16.604	17.556	17.599	15.415	15.428	18.732	18.745	9.519	9.562	10.514	10.557	8.373	8.386	11.690	11.703
54.528																
163.824	55.689	55.799	57.385	57.495	53.749	53.782	59.403	59.436	33.408	33.519	35.105	35.215	31.468	31.501	37.122	37.155
156.092																
47.164	12.730	13.036	14.033	14.338	11.317	11.409	15.659	15.751	7.648	7.953	8.950	9.256	6.235	6.327	10.577	10.669
43.780																
112.984	35.388	36.072	37.842	38.526	32.765	32.971	40.943	41.149	22.101	22.785	24.555	25.239	19.478	19.684	27.656	27.862
96.220																
14.992	3.718	6.221	3.828	6.331	4.466	5.217	4.832	5.583	2.467	4.970	2.577	5.080	3.215	3.966	3.581	4.332
17.084																
115.264	42.250	47.315	42.548	47.613	43.675	45.194	44.668	46.188	26.079	31.144	26.377	31.442	27.504	29.024	28.498	30.017
135.896																
9.180	6.004	8.004	6.004	8.064	6.436	7.127	6.635	7.326	3.759	6.064	3.819	6.124	4.496	5.188	4.695	5.387
22.896																
127.776	40.594	45.328	40.900	45.634	41.894	43.314	42.913	44.334	25.172	29.906	25.478	30.212	26.472	27.892	27.492	28.912
117.244																

PROYECTO: AGROECOL
RESISTENCIA A CORTANTE PARA VIGAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3.1 (a)

f'c = 21.1 MPa
fy = 420 MPa
Φ Cortante = 0.75
Estribos Φ = 9.5 mm
Av = 71 mm^2
R= 6.30

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)	
2.791	2.951	2.800	2.960	2.836	2.884	2.867	2.915	2.069	2.229	2.079	2.238	2.114	2.162	2.162	2.146	2.193	5.5	**0.10**	178.92	34.45	213.37	OK
5.476	5.476	5.476	5.476	5.476	5.476	5.476	5.476	5.476	5.476	5.476	5.476	5.476	5.476	5.476	5.476	5.476						
18.094	18.442	18.244	18.593	18.041	18.145	18.542	18.646	11.896	12.244	12.046	12.394	11.842	11.947	12.343	12.447	18.6	**0.10**	178.92	34.45	213.37	OK
13.892	13.892	13.892	13.892	13.892	13.892	13.892	13.892	13.892	13.892	13.892	13.892	13.892	13.892	13.892	13.892							
8.544	8.968	8.585	9.009	8.645	8.772	8.781	8.908	7.837	8.261	7.878	8.301	7.938	8.065	8.074	8.201	9.0	**0.10**	178.92	34.45	213.37	OK
7.440	7.440	7.440	7.440	7.440	7.440	7.440	7.440	7.440	7.440	7.440	7.440	7.440	7.440	7.440	7.440							
48.195	49.104	48.317	49.225	48.372	48.644	48.776	49.049	43.665	44.574	43.787	44.695	43.842	44.114	44.246	44.519	49.2	**0.10**	178.92	34.45	213.37	OK
40.716	40.716	40.716	40.716	40.716	40.716	40.716	40.716	40.716	40.716	40.716	40.716	40.716	40.716	40.716	40.716							
43.678	44.388	43.777	44.487	43.811	44.024	44.141	44.354	35.380	36.090	35.479	36.189	35.513	35.726	35.843	36.056	44.5	**0.10**	178.92	34.45	213.37	OK
7.620	7.620	7.620	7.620	7.620	7.620	7.620	7.620	7.620	7.620	7.620	7.620	7.620	7.620	7.620	7.620							
4.431	4.597	4.447	4.614	4.470	4.520	4.525	4.575	2.981	3.148	2.997	3.164	3.020	3.070	3.075	3.125	8.2	**0.10**	178.92	34.45	213.37	OK
8.228	8.228	8.228	8.228	8.228	8.228	8.228	8.228	8.228	8.228	8.228	8.228	8.228	8.228	8.228	8.228							
12.339	12.453	12.492	12.606	12.201	12.235	12.710	12.744	7.842	7.956	7.994	8.108	7.703	7.737	8.213	8.247	14.5	**0.10**	178.92	34.45	213.37	OK
14.480	14.480	14.480	14.480	14.480	14.480	14.480	14.480	14.480	14.480	14.480	14.480	14.480	14.480	14.480	14.480							
32.650	32.912	32.682	32.944	32.705	32.784	32.811	32.889	25.350	25.612	25.382	25.644	25.405	25.484	25.511	25.589	33.5	**0.10**	178.92	80.39	259.31	OK
33.532	33.532	33.532	33.532	33.532	33.532	33.532	33.532	33.532	33.532	33.532	33.532	33.532	33.532	33.532	33.532							
114.709	115.369	115.043	115.703	114.551	114.749	115.664	115.862	85.104	85.764	85.438	86.098	84.946	85.144	86.059	86.257	115.9	**0.10**	178.92	80.39	259.31	OK
92.740	92.740	92.740	92.740	92.740	92.740	92.740	92.740	92.740	92.740	92.740	92.740	92.740	92.740	92.740	92.740							
30.971	31.620	31.191	31.840	30.941	31.136	31.675	31.870	24.160	24.809	24.380	25.029	24.130	24.325	24.865	25.059	31.9	**0.10**	178.92	80.39	259.31	OK
31.660	31.660	31.660	31.660	31.660	31.660	31.660	31.660	31.660	31.660	31.660	31.660	31.660	31.660	31.660	31.660							
141.116	142.301	141.488	142.673	141.097	141.453	142.336	142.692	104.306	105.491	104.678	105.863	104.287	104.643	105.526	105.882	142.7	**0.10**	178.92	80.39	259.31	OK
108.916	108.916	108.916	108.916	108.916	108.916	108.916	108.916	108.916	108.916	108.916	108.916	108.916	108.916	108.916	108.916							
12.056	12.618	12.129	12.691	12.168	12.336	12.411	12.580	9.690	10.251	9.763	10.325	9.801	9.970	10.045	10.213	12.7	**0.10**	178.92	34.45	213.37	OK
12.124	12.124	12.124	12.124	12.124	12.124	12.124	12.124	12.124	12.124	12.124	12.124	12.124	12.124	12.124	12.124							
25.107	27.748	25.220	27.861	25.900	26.692	26.276	27.068	23.304	25.945	23.417	26.058	24.097	24.889	24.473	25.265	27.9	**0.10**	178.92	80.39	259.31	OK
20.352	20.352	20.352	20.352	20.352	20.352	20.352	20.352	20.352	20.352	20.352	20.352	20.352	20.352	20.352	20.352							
134.134	139.415	134.359	139.641	135.720	137.304	136.470	138.055	119.386	124.668	119.611	124.893	120.972	122.556	121.723	123.307	139.6	**0.10**	178.92	80.39	259.31	OK
138.400	138.400	138.400	138.400	138.400	138.400	138.400	138.400	138.400	138.400	138.400	138.400	138.400	138.400	138.400	138.400							
18.127	20.510	18.190	20.573	18.888	19.603	19.097	19.812	16.229	18.612	16.292	18.675	16.990	17.705	17.199	17.914	20.6	**0.10**	178.92	80.39	259.31	OK
19.364	19.364	19.364	19.364	19.364	19.364	19.364	19.364	19.364	19.364	19.364	19.364	19.364	19.364	19.364	19.364							
221.477	226.336	221.785	226.643	222.819	224.277	223.844	225.301	197.073	201.931	197.380	202.238	198.415	199.872	199.439	200.896	226.6	**0.10**	178.92	80.39	259.31	OK
173.808	173.808	173.808	173.808	173.808	173.808	173.808	173.808	173.808	173.808	173.808	173.808	173.808	173.808	173.808	173.808							
290.841	291.402	290.914	291.475	290.952	291.121	291.196	291.364	248.196	248.757	248.269	248.830	248.307	248.476	248.551	248.719	291.5	**0.10**	214.70	80.39	295.09	OK
12.124	12.124	12.124	12.124	12.124	12.124	12.124	12.124	12.124	12.124	12.124	12.124	12.124	12.124	12.124	12.124							
53.002	53.337	54.017	54.352	51.936	52.036	55.318	55.418	48.409	48.745	49.424	49.759	47.343	47.443	50.725	50.826	55.4	**0.10**	178.92	80.39	259.31	OK
42.160	42.160	42.160	42.160	42.160	42.160	42.160	42.160	42.160	42.160	42.160	42.160	42.160	42.160	42.160	42.160							
133.375	134.107	135.354	136.085	131.323	131.542	137.918	138.138	121.831	122.563	123.810	124.542	119.779	119.999	126.375	126.594	138.1	**0.10**	178.92	80.39	259.31	OK
104.696	104.696	104.696	104.696	104.696	104.696	104.696	104.696	104.696	104.696	104.696	104.696	104.696	104.696	104.696	104.696							
74.325	74.368	75.320	75.363	73.179	73.192	76.496	76.509	67.283	67.326	68.278	68.321	66.137	66.150	69.454	69.467	76.5	**0.10**	178.92	80.39	259.31	OK
54.528	54.528	54.528	54.528	54.528	54.528	54.528	54.528	54.528	54.528	54.528	54.528	54.528	54.528	54.528	54.528							
219.513	219.623	221.209	221.319	217.573	217.606	223.227	223.260	197.232	197.343	198.929	199.039	195.292	195.325	200.946	200.979	223.3	**0.10**	178.92	80.39	259.31	OK
156.092	156.092	156.092	156.092	156.092	156.092	156.092	156.092	156.092	156.092	156.092	156.092	156.092	156.092	156.092	156.092							
59.894	60.200	61.197	61.502	58.481	58.573	62.823	62.915	54.812	55.117	56.114	56.420	53.399	53.491	57.741	57.833	62.9	**0.10**	178.92	80.39	259.31	OK
43.780	43.780	43.780	43.780	43.780	43.780	43.780	43.780	43.780	43.780	43.780	43.780	43.780	43.780	43.780	43.780							
148.372	149.056	150.826	151.510	145.749	145.955	153.927	154.133	135.085	135.769	137.539	138.223	132.462	132.668	140.640	140.846	154.1	**0.10**	178.92	80.39	259.31	OK
96.220	96.220	96.220	96.220	96.220	96.220	96.220	96.220	96.220	96.220	96.220	96.220	96.220	96.220	96.220	96.220							
18.710	21.213	18.820	21.323	19.458	20.209	19.824	20.575	17.459	19.962	17.569	20.072	18.207	18.958	18.573	19.324	21.3	**0.10**	178.92	80.39	259.31	OK
17.084	17.084	17.084	17.084	17.084	17.084	17.084	17.084	17.084	17.084	17.084	17.084	17.084	17.084	17.084	17.084							
157.514	162.579	157.812	162.877	158.939	160.458	159.932	161.452	141.343	146.408	141.641	146.706	142.768	144.288	143.762	145.281	162.9	**0.10**	178.92	80.39	259.31	OK
135.896	135.896	135.896	135.896	135.896	135.896	135.896	135.896	135.896	135.896	135.896	135.896	135.896	135.896	135.896	135.896							
15.184	17.184	15.184	17.244	15.616	16.307	15.815	16.506	12.939	15.244	12.999	15.304	13.676	14.368	13.875	14.567	22.9	**0.10**	178.92	80.39	259.31	OK
22.896	22.896	22.896	22.896	22.896	22.896	22.896	22.896	22.896	22.896	22.896	22.896	22.896	22.896	22.896	22.896							
168.370	173.104	168.676	173.410	169.670	171.090	170.689	172.110	152.948	157.682	153.254	157.988	154.248	155.668	155.268	156.688	173.4	**0.10**	178.92	80.39	259.31	OK
117.244	117.244	117.244	117.244	117.244	117.244	117.244	117.244	117.244	117.244	117.244	117.244	117.244	117.244	117.244	117.244							

PROYECTO: AGROECOL
RESISTENCIA A CORTANTE PARA VIGAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3.1 (a)

f'c = 21.1 MPa
fy = 420 MPa
$\Phi_{Cortante}$ = 0.75
Estribos Φ = 9.5 mm
Av = 71 mm²
R= 6.30

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)	COMDIS3	COMDIS4	COMDIS5	COMDIS6	COMDIS7	COMDIS8	COMDIS9	COMDIS10	COMDIS11	COMDIS12	COMDIS13	COMDIS14	COMDIS15	COMDIS16	COMDIS17	COMDIS18
N+7.50	B23	0.000	1.575	V1G35X45	0.35	0.40	-18.658	-2.133	2.159	0.497	-2.159	-0.497	24.156	24.842	24.204	24.889	24.341	24.547	24.499	24.704	16.426	17.111	16.473	17.159	16.611	16.816	16.768	16.974
	B23	1.575					-0.729	0.032	0.057	0.082	-0.057	-0.082	0.830	0.848	0.838	0.856	0.827	0.832	0.853	0.859	0.643	0.661	0.651	0.669	0.640	0.646	0.666	0.672
N+4.00	B23	0.000	1.575	V1G35X45	0.35	0.40	-29.538	-5.894	4.011	4.041	-4.011	-4.041	40.511	41.784	40.895	42.169	40.507	40.889	41.790	42.172	25.755	27.028	26.140	27.413	25.752	26.134	27.035	27.417
	B23	1.575					1.438	0.364	0.140	0.562	-0.140	-0.562	2.139	2.094	2.085	2.041	2.185	2.172	2.007	1.994	1.343	1.299	1.290	1.245	1.390	1.377	1.212	1.198
N+7.50	B24	0.000	1.575	V1G35X45	0.35	0.40	-28.385	-3.923	0.071	0.270	-0.071	-0.270	37.961	37.983	37.987	38.009	37.939	37.946	38.024	38.031	25.522	25.545	25.548	25.571	25.500	25.507	25.586	25.593
	B24	1.575					-0.419	-0.034	0.012	0.021	-0.012	-0.021	0.534	0.538	0.536	0.540	0.533	0.534	0.540	0.541	0.374	0.378	0.376	0.380	0.373	0.374	0.380	0.381
N+4.00	B24	0.000	1.575	V1G35X45	0.35	0.40	-72.803	-16.131	0.555	7.497	-0.555	-7.497	103.050	103.226	103.764	103.940	102.278	102.331	104.658	104.711	65.078	65.254	65.792	65.968	64.306	64.399	66.686	66.739
	B24	1.575					3.211	0.686	0.030	0.595	-0.030	-0.595	4.572	4.563	4.516	4.506	4.635	4.632	4.446	4.443	2.923	2.913	2.866	2.857	2.986	2.983	2.797	2.794
N+7.50	B25	0.000	1.575	V1G35X45	0.35	0.40	-27.374	-3.881	3.942	4.472	-3.942	-4.472	35.891	37.143	36.317	37.568	35.832	36.208	37.252	37.627	23.798	25.049	24.224	25.475	23.739	24.114	25.159	25.534
	B25	1.575					0.114	0.118	0.384	0.524	-0.384	-0.524	0.341	0.219	0.291	0.169	0.356	0.320	0.190	0.153	0.189	0.067	0.139	0.017	0.204	0.167	0.038	0.001
N+4.00	B25	0.000	1.575	V1G35X45	0.35	0.40	-30.398	-6.354	3.762	5.542	-3.762	-5.542	41.971	43.165	42.498	43.693	41.773	42.131	43.532	43.890	26.497	27.691	27.025	28.219	26.299	26.658	28.059	28.417
	B25	1.575					1.436	0.325	0.154	0.811	-0.154	-0.811	2.111	2.062	2.034	1.985	2.184	2.170	1.927	1.912	1.355	1.307	1.278	1.229	1.428	1.414	1.171	1.156
N+7.50	B27	0.000	7.070	V1G15X45	0.15	0.40	-3.982	0.164	6.266	1.205	-6.266	-1.205	3.562	5.552	3.677	5.666	4.125	4.722	4.507	5.104	2.532	4.521	2.647	4.636	3.094	3.691	3.477	4.073
	B27	7.070					-6.542	0.043	3.445	0.660	-3.445	-0.660	7.229	8.323	7.292	8.386	7.539	7.867	7.748	8.076	5.310	6.403	5.372	6.466	5.619	5.947	5.829	6.157
N+4.00	B27	0.000	7.070	V1G15X45	0.15	0.40	-4.011	-0.139	12.477	3.426	-12.477	-3.426	2.809	6.770	3.135	7.096	3.814	5.003	4.902	6.090	1.466	5.427	1.793	5.754	2.472	3.660	3.560	4.748
	B27	7.070					-24.985	-5.103	6.967	4.421	-6.967	-4.421	33.769	35.980	34.190	36.401	34.051	34.715	35.455	36.119	21.170	23.382	21.591	23.803	21.453	22.117	22.856	23.520
N+7.50	B28	0.000	7.070	V1G15X45	0.15	0.40	-4.482	0.728	3.544	1.064	-3.544	-1.064	4.037	5.162	4.139	5.264	4.313	4.650	4.651	4.988	3.421	4.546	3.522	4.647	3.696	4.034	4.034	4.371
	B28	7.070					-11.174	-1.617	6.526	1.859	-6.526	-1.859	13.901	15.973	14.078	16.150	14.420	15.041	15.010	15.632	8.932	11.004	9.109	11.181	9.451	10.072	10.041	10.662
N+4.00	B28	0.000	7.070	V1G15X45	0.15	0.40	-23.737	-4.531	6.281	3.637	-6.281	-3.637	31.845	33.839	32.192	34.186	32.139	32.737	33.294	33.892	20.193	22.187	20.540	22.533	20.487	21.085	21.642	22.240
	B28	7.070					-5.301	-1.066	11.401	5.659	-11.401	-5.659	5.348	8.967	5.887	9.506	5.986	7.072	7.783	8.868	2.692	6.311	3.231	6.850	3.330	4.416	5.126	6.212
N+7.50	B30	0.000	0.575	V1G35X45	0.35	0.40	-0.625	0.000	0.000	0.000	0.000	0.000	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.563	0.563	0.563	0.563	0.563	0.563	0.563	0.563
	B30	0.575					0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
N+7.50	B31	0.000	0.575	V1G35X45	0.35	0.40	-0.625	0.000	0.000	0.000	0.000	0.000	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.563	0.563	0.563	0.563	0.563	0.563	0.563	0.563
	B31	0.575					0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
N+7.50	B34	0.000	0.575	V1G35X45	0.35	0.40	-0.625	0.000	0.000	0.000	0.000	0.000	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.563	0.563	0.563	0.563	0.563	0.563	0.563	0.563
	B34	0.575					0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
N+7.50	B35	0.000	7.000	V1G15X45	0.15	0.40	-7.964	-1.985	1.318	10.820	-1.318	-10.820	10.817	11.236	11.848	12.266	9.762	9.887	13.196	13.322	6.443	6.862	7.474	7.892	5.387	5.513	8.822	8.948
	B35	7.000					-5.620	-0.300	0.871	10.697	-0.871	-10.697	6.396	6.673	7.415	7.692	5.305	5.388	8.700	8.783	4.410	4.687	5.429	5.706	3.319	3.402	6.714	6.797
N+7.50	B36	0.000	2.075	V1G15X45	0.15	0.40	-0.926	-0.136	0.352	0.253	-0.352	-0.253	1.179	1.291	1.203	1.315	1.190	1.224	1.271	1.304	0.765	0.877	0.790	0.901	0.776	0.810	0.857	0.890
	B36	2.075					-4.648	-1.111	1.940	4.163	-1.940	-4.163	6.182	6.798	6.579	7.195	5.935	6.120	7.257	7.442	3.677	4.293	4.074	4.689	3.430	3.615	4.752	4.936
N+7.50	B37	0.000	1.575	V1G15X45	0.15	0.40	-2.596	0.006	1.715	3.742	-1.715	-3.742	2.659	3.203	3.015	3.560	2.434	2.597	3.622	3.785	1.886	2.430	2.242	2.787	1.661	1.824	2.849	3.012
	B37	1.575					-1.109	-0.116	0.318	0.436	-0.318	-0.436	1.376	1.477	1.417	1.518	1.362	1.393	1.501	1.531	0.927	1.028	0.968	1.069	0.914	0.944	1.052	1.082
N+7.50	B38	0.000	1.875	V1G15X45	0.15	0.40	-6.396	-0.938	2.520	3.245	-2.520	-3.245	8.059	8.859	8.368	9.168	7.978	8.218	9.008	9.248	5.202	6.002	5.511	6.311	5.121	5.361	6.151	6.391
	B38	1.875					-0.748	-0.101	0.211	0.692	-0.211	-0.692	0.932	0.999	0.998	1.065	0.879	0.899	1.098	1.118	0.607	0.674	0.673	0.740	0.553	0.573	0.773	0.793
N+7.50	B39	0.000	1.875	V1G15X45	0.15	0.40	-4.094	-0.199	2.270	3.018	-2.270	-3.018	4.608	5.328	4.895	5.616	4.525	4.741	5.483	5.699	3.181	3.901	3.468	4.189	3.097	3.314	4.056	4.272
	B39	1.875					-0.889	-0.167	0.243	0.524	-0.243	-0.524	1.170	1.247	1.220	1.297	1.139	1.162	1.305	1.329	0.737	0.814	0.786	0.864	0.705	0.728	0.872	0.895
N+7.50	B40	0.000	1.875	V1G35X45	0.35	0.40	-26.074	-5.157	2.795	8.652	-2.795	-8.652	35.590	36.477	36.414	37.301	34.939	35.206	37.686	37.952	22.611	23.498	23.435	24.322	21.960	22.226	24.707	24.973
	B40	1.875					0.832	0.163	0.242	0.653	-0.242	-0.653	1.231	1.154	1.169	1.092	1.277	1.254	1.069	1.046	0.818	0.741	0.756	0.679	0.864	0.841	0.657	0.634
N+7.50	B41	0.000	1.875	V1G35X45	0.35	0.40	-22.357	-3.067	2.778	8.879	-2.778	-8.879	29.032	29.914	29.877	30.759	28.354	28.618	31.172	31.437	19.258	20.139	20.103	20.985	18.580	18.844	21.398	21.663
	B41	1.875					0.805	0.105	0.194	0.821	-0.194	-0.821	1.141	1.079	1.063	1.001	1.211	1.192	0.950	0.931	0.794	0.733	0.716	0.655	0.864	0.846	0.603	0.585
N+7.50	B49	0.000	0.575	V1G15X45	0.15	0.40	-0.268	0.000	0.000	0.000	0.000	0.000	0.322	0.322	0.322	0.322	0.322	0.322	0.322	0.322	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
	B49	0.575					0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
N+4.00	B51	0.000	1.575	V1G25X45	0.25	0.40	-10.709	-3.500	0.379	7.725	-0.379	-7.725	15.923	16.043	16.658	16.779	15.107	15.143	17.559	17.595	9.210	9.330	9.946	10.066	8.394	8.430	10.846	10.882
	B51	1.575					-3.091	-0.719	0.099	0.858	-0.099	-0.858	4.372	4.403	4.453	4.485	4.287	4.297	4.560	4.569	2.725	2.757	2.807	2.838	2.641	2.650	2.913	2.923
N+4.00	B53	0.000	1.575	V1G25X45	0.25	0.40	-9.782	-3.197	0.493	8.674	-0.493	-8.674	14.444	14.601	15.270	15.427	13.535	13.582	16.289	16.336	8.312	8.469	9.139	9.295	7.403	7.450	10.157	10.204
	B53	1.575					-2.995	-0.656	0.127	0.980	-0.127	-0.980	4.183	4.223	4.277	4.317	4.088	4.100	4.400	4.412	2.629	2.669	2.722	2.762	2.534	2.546	2.845	2.857
N+4.00	B54	0.000	7.070	V1G25X45	0.25	0.40	-22.422	-6.718	14.053	0.247	-14.053	-0.247	31.382	35.843	31.406	35.867	32.916	34.254	32.994	34.333	17.937	22.399	17.961	22.422	19.471	20.810	19.550	20.888
	B54	7.070					-68.276	-18.627	7.165	0.402	-7.165	-0.402	99.402	101.676	99.440	101.715	100.153	100.836	100.281	100.963	60.292	62.567	60.330	62.605	61.043	61.726	61.171	61.853
N+4.00	B59	0.000	7.070	V1G25X45	0.25	0.40	-64.741	-16.819	6.335	0.027	-6.335	-0.027	93.501	95.512	93.504	95.515	94.202	94.806	94.211	94.814	57.260	59.271	57.263	59.274	57.961	58.564	57.970	58.573
	B59	7.070					-26.742	-8.708	12.740	0.102	-12.740	-0.102	38.771	42.816	38.781	42.825	40.176	41.389	40.208	41.421	22.041	26.085	22.050	26.095	23.445	24.658	23.477	24.691
N+4.00	B60	0.000	3.500	V1G25X45	0.25	0.40	-25.930	-10.436	0.919	16.133	-0.919	-16.133	40.638	40.930	42.174	42.466	38.947	39.035	44.069	44.157	22.423	22.715	23.959	24.251	20.732	20.820	25.854	25.942
	B60	3.500					43.239	11.899	0.464	1.082	-0.464	-1.082	63.911	63.764	63.808	63.661	63.980	63.935	63.636	63.592	39.040	38.893	38.937	38.790	39.109	39.065	38.765	38.721
N+4.00	B61	0.000	3.500	V1G25X45	0.25	0.40	42.214	11.693	0.486	2.231	-0.486	-2.231	62.533	62.379	62.321	62.166	62.727	62.681	62.019	61.973	38.176	38.022	37.964	37.809	38.370	38.324	37.662	37.615
	B61	3.500					-28.597	-8.043	1.076	19.293	-1.076	-19.293	41.270	41.611	43.107	43.449	39.246	39.348	45.371	45.473	24.648	24.989	26.485	26.827	22.624	22.726	28.748	28.851
N+4.00	B62	0.000	3.500	V1G25X45	0.25	0.40	-39.596	-19.176	1.048	22.697	-1.048	-22.697	65.444	65.777	67.606	67.938	63.039	63.138	70.244	70.344	34.389	34.722	36.551	36.884	31.984	32.084	39.189	39.289
	B62	3.500					35.722	8.886	0.258	2.010	-0.258	-2.010	49.889	49.807	49.698	49.616	50.084	50.059	49.446	49.421	32.286	32.205	32.095	32.013	32.481	32.457	31.843	31.818
N+4.00	B63	0.000	3.500	V1G25X45	0.25	0.40	35.728	7.707	0.230	1.811	-0.230	-1.811	50.703	50.630	50.531	50.458	50.879	50.857	50.304	50.282	32.278	32.205	32.105	32.032	32.454	32.432	31.879	31.857
	B63	3.500					-26.426	-7.023	0.786	21.819	-0.786	-21.819	37.570	37.820	39.648	39.898	35.233	35.308	42.160	42.235	22.620	22.869	24.698	24.947	20.283	20.357	27.209	27.284
N+4.00	B64	0.000	2.075	V1G25X45	0.25	0.40	-2.760	-0.601	0.059	0.637	-0.059	-0.637	3.873	3.892	3.934	3.953	3.809	3.815	4.011	4.017	2.444	2.463	2.505	2.524	2.380	2.386	2.582	2.588
	B64	2.075					-26.688	-19.207	0.521	10.276	-0.521	-10.276	50.661	50.826	51.639	51.805	49.577	49.626	52.839	52.889	23.447	23.613	24.426	24.591	22.363	22.413	25.626	25.675

PROYECTO: AGROECOL
RESISTENCIA A CORTANTE PARA VIGAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3.1 (a)

f'c = **21.1** MPa
fy = **420** MPa
$\Phi_{Cortante}$ = **0.75**
Estribos Φ = **9.5** mm
Av = **71** mm^2
R= **6.30**

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)															
22.708 9.016	15.864	16.311	15.899	16.346	15.980	16.114	16.096	16.230	10.837	11.284	10.872	11.319	10.953	11.087	11.070	11.204
47.164 12.752	27.079	27.859	27.289	28.069	27.106	27.341	27.808	28.042	17.205	17.986	17.416	18.196	17.233	17.467	17.934	18.168
35.364 15.152	24.441	24.458	24.459	24.475	24.426	24.431	24.485	24.490	16.442	16.459	16.460	16.477	16.428	16.433	16.486	16.491
105.832 44.164	68.331	68.437	68.749	68.854	67.881	67.913	69.273	69.304	43.175	43.281	43.592	43.698	42.725	42.757	44.116	44.148
32.716 17.304	23.004	23.721	23.243	23.960	22.977	23.192	23.773	23.988	15.229	15.947	15.468	16.185	15.202	15.417	15.998	16.213
48.240 13.844	27.988	28.716	28.275	29.002	27.909	28.127	28.863	29.081	17.684	18.411	17.970	18.698	17.605	17.823	18.559	18.777
6.400 7.340	1.526	1.962	1.552	1.988	1.650	1.781	1.733	1.864	1.109	1.545	1.134	1.570	1.232	1.363	1.316	1.447
12.752 22.176	5.174	6.047	5.279	6.152	5.356	5.618	5.708	5.970	3.202	4.075	3.307	4.181	3.384	3.646	3.736	3.998
5.208 8.532	2.537	2.989	2.577	3.029	2.650	2.785	2.781	2.917	1.747	2.199	1.787	2.239	1.860	1.995	1.991	2.126
21.976 13.844	5.261	6.055	5.386	6.180	5.393	5.631	5.810	6.048	3.237	4.031	3.362	4.156	3.369	3.607	3.786	4.024
2.604 0.000	1.304	1.304	1.304	1.304	1.304	1.304	1.304	1.304	0.978	0.978	0.978	0.978	0.978	0.978	0.978	0.978
2.604 0.000	1.304	1.304	1.304	1.304	1.304	1.304	1.304	1.304	0.978	0.978	0.978	0.978	0.978	0.978	0.978	0.978
2.604 0.000	1.304	1.304	1.304	1.304	1.304	1.304	1.304	1.304	0.978	0.978	0.978	0.978	0.978	0.978	0.978	0.978
11.444 9.872	2.459	2.558	2.752	2.851	2.152	2.182	3.128	3.158	1.551	1.650	1.843	1.943	1.244	1.273	2.220	2.249
0.260 6.072	3.548	3.898	3.750	4.101	3.434	3.539	4.110	4.215	2.141	2.492	2.344	2.694	2.027	2.132	2.703	2.808
3.404 1.392	2.561	2.971	2.814	3.224	2.410	2.533	3.252	3.375	1.786	2.196	2.039	2.448	1.635	1.758	2.477	2.600
6.156 2.508	4.795	5.258	4.995	5.457	4.724	4.862	5.390	5.529	3.098	3.560	3.298	3.760	3.026	3.165	3.693	3.832
3.908 0.260	3.082	3.507	3.262	3.687	3.021	3.148	3.620	3.748	2.089	2.515	2.269	2.695	2.028	2.156	2.628	2.756
26.012 17.516	19.638	20.070	20.044	20.476	19.315	19.445	20.669	20.799	12.496	12.928	12.902	13.334	12.173	12.303	13.527	13.657
21.784 13.276	16.092	16.530	16.501	16.939	15.768	15.899	17.132	17.263	10.694	11.132	11.104	11.541	10.370	10.501	11.734	11.866
1.116 0.000	0.559	0.559	0.559	0.559	0.559	0.559	0.559	0.559	0.419	0.419	0.419	0.419	0.419	0.419	0.419	0.419
38.440 21.188	12.885	12.982	13.404	13.501	12.314	12.342	14.044	14.072	7.578	7.674	8.097	8.193	7.006	7.035	8.736	8.765
37.576 22.064	11.827	11.952	12.411	12.536	11.190	11.227	13.135	13.173	6.947	7.072	7.531	7.656	6.309	6.347	8.255	8.293
64.596 84.812	18.498	19.451	18.507	19.460	18.822	19.107	18.851	19.137	11.065	12.018	11.074	12.026	11.388	11.674	11.417	11.703
83.368 67.496	18.709	19.566	18.711	19.567	19.007	19.264	19.013	19.270	11.217	12.073	11.218	12.075	11.514	11.771	11.520	11.777
69.600 1.732	29.871	29.912	30.281	30.322	29.408	29.420	30.773	30.785	17.561	17.602	17.970	18.012	17.098	17.110	18.463	18.475
2.368 68.964	29.658	29.712	30.122	30.176	29.135	29.151	30.683	30.699	17.950	18.003	18.414	18.467	17.427	17.443	18.974	18.990
73.408 2.064	32.952	33.024	33.515	33.587	32.321	32.342	34.197	34.219	19.050	19.122	19.613	19.685	18.419	18.440	20.295	20.316
7.632 63.700	25.221	25.272	25.766	25.816	24.604	24.619	26.418	26.433	15.685	15.735	16.229	16.280	15.068	15.083	16.882	16.897
9.100 47.260	26.281	26.370	26.782	26.871	25.728	25.755	27.398	27.424	12.478	12.567	12.979	13.067	11.925	11.951	13.594	13.621

PROYECTO: AGROECOL
RESISTENCIA A CORTANTE PARA VIGAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3.1 (a)

f'c = 21.1 MPa
fy = 420 MPa
Φ Contante = 0.75
Estribos Φ = 9.5 mm
Av = 71 mm^2
R= 6.30

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)	
38.572	39.019	38.607	39.054	38.688	38.822	38.804	38.938	33.545	33.992	33.580	34.027	33.661	33.795	33.778	33.912						
9.016	9.016	9.016	9.016	9.016	9.016	9.016	9.016	9.016	9.016	9.016	9.016	9.016	9.016	9.016	9.016						
74.243	75.023	74.453	75.233	74.270	74.505	74.972	75.206	64.369	65.150	64.580	65.360	64.397	64.631	65.098	65.332	39.1	**0.10**	178.92	80.39	259.31	**OK**
12.752	12.752	12.752	12.752	12.752	12.752	12.752	12.752	12.752	12.752	12.752	12.752	12.752	12.752	12.752	12.752						
59.805	59.822	59.823	59.839	59.790	59.795	59.849	59.854	51.806	51.823	51.824	51.841	51.792	51.797	51.850	51.855	75.2	**0.10**	178.92	80.39	259.31	**OK**
15.152	15.152	15.152	15.152	15.152	15.152	15.152	15.152	15.152	15.152	15.152	15.152	15.152	15.152	15.152	15.152						
174.163	174.269	174.581	174.686	173.713	173.745	175.105	175.136	149.007	149.113	149.424	149.530	148.557	148.589	149.948	149.980	59.9	**0.10**	178.92	80.39	259.31	**OK**
44.164	44.164	44.164	44.164	44.164	44.164	44.164	44.164	44.164	44.164	44.164	44.164	44.164	44.164	44.164	44.164						
55.720	56.437	55.959	56.676	55.693	55.908	56.489	56.704	47.945	48.663	48.184	48.901	47.918	48.133	48.714	48.929	175.1	**0.10**	178.92	80.39	259.31	**OK**
17.304	17.304	17.304	17.304	17.304	17.304	17.304	17.304	17.304	17.304	17.304	17.304	17.304	17.304	17.304	17.304						
76.228	76.956	76.515	77.242	76.149	76.367	77.103	77.321	65.924	66.651	66.210	66.938	65.845	66.063	66.799	67.017	56.7	**0.10**	178.92	80.39	259.31	**OK**
13.844	13.844	13.844	13.844	13.844	13.844	13.844	13.844	13.844	13.844	13.844	13.844	13.844	13.844	13.844	13.844						
7.926	8.362	7.952	8.388	8.050	8.181	8.133	8.264	7.509	7.945	7.534	7.970	7.632	7.763	7.716	7.847	77.3	**0.10**	178.92	80.39	259.31	**OK**
7.340	7.340	7.340	7.340	7.340	7.340	7.340	7.340	7.340	7.340	7.340	7.340	7.340	7.340	7.340	7.340						
17.926	18.799	18.031	18.904	18.108	18.370	18.460	18.722	15.954	16.827	16.059	16.933	16.136	16.398	16.488	16.750	8.4	**0.10**	178.92	34.45	213.37	**OK**
22.176	22.176	22.176	22.176	22.176	22.176	22.176	22.176	22.176	22.176	22.176	22.176	22.176	22.176	22.176	22.176						
7.745	8.197	7.785	8.237	7.858	7.993	7.989	8.125	6.955	7.407	6.995	7.447	7.068	7.203	7.199	7.334	22.2	**0.10**	178.92	34.45	213.37	**OK**
8.532	8.532	8.532	8.532	8.532	8.532	8.532	8.532	8.532	8.532	8.532	8.532	8.532	8.532	8.532	8.532						
27.237	28.031	27.362	28.156	27.369	27.607	27.786	28.024	25.213	26.007	25.338	26.132	25.345	25.583	25.762	26.000	8.5	**0.10**	178.92	34.45	213.37	**OK**
13.844	13.844	13.844	13.844	13.844	13.844	13.844	13.844	13.844	13.844	13.844	13.844	13.844	13.844	13.844	13.844						
3.908	3.908	3.908	3.908	3.908	3.908	3.908	3.908	3.582	3.582	3.582	3.582	3.582	3.582	3.582	3.582	28.2	**0.10**	178.92	34.45	213.37	**OK**
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
3.908	3.908	3.908	3.908	3.908	3.908	3.908	3.908	3.582	3.582	3.582	3.582	3.582	3.582	3.582	3.582	3.9	**0.10**	178.92	80.39	259.31	**OK**
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
3.908	3.908	3.908	3.908	3.908	3.908	3.908	3.908	3.582	3.582	3.582	3.582	3.582	3.582	3.582	3.582	3.9	**0.10**	178.92	80.39	259.31	**OK**
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
13.903	14.002	14.196	14.295	13.596	13.626	14.572	14.602	12.995	13.094	13.287	13.387	12.688	12.717	13.664	13.693	14.6	**0.10**	178.92	34.45	213.37	**OK**
9.872	9.872	9.872	9.872	9.872	9.872	9.872	9.872	9.872	9.872	9.872	9.872	9.872	9.872	9.872	9.872						
3.808	4.158	4.010	4.361	3.694	3.799	4.370	4.475	2.401	2.752	2.604	2.954	2.287	2.392	2.963	3.068	6.1	**0.10**	178.92	34.45	213.37	**OK**
6.072	6.072	6.072	6.072	6.072	6.072	6.072	6.072	6.072	6.072	6.072	6.072	6.072	6.072	6.072	6.072						
5.965	6.375	6.218	6.628	5.814	5.937	6.656	6.779	5.190	5.600	5.443	5.852	5.039	5.162	5.881	6.004	6.8	**0.10**	178.92	34.45	213.37	**OK**
1.392	1.392	1.392	1.392	1.392	1.392	1.392	1.392	1.392	1.392	1.392	1.392	1.392	1.392	1.392	1.392						
10.951	11.414	11.151	11.613	10.880	11.018	11.546	11.685	9.254	9.716	9.454	9.916	9.182	9.321	9.849	9.988	11.7	**0.10**	178.92	34.45	213.37	**OK**
2.508	2.508	2.508	2.508	2.508	2.508	2.508	2.508	2.508	2.508	2.508	2.508	2.508	2.508	2.508	2.508						
6.990	7.415	7.170	7.595	6.929	7.056	7.528	7.656	5.997	6.423	6.177	6.603	5.936	6.064	6.536	6.664	7.7	**0.10**	178.92	34.45	213.37	**OK**
0.260	0.260	0.260	0.260	0.260	0.260	0.260	0.260	0.260	0.260	0.260	0.260	0.260	0.260	0.260	0.260						
45.650	46.082	46.056	46.488	45.327	45.457	46.681	46.811	38.508	38.940	38.914	39.346	38.185	38.315	39.539	39.669	46.8	**0.10**	178.92	80.39	259.31	**OK**
17.516	17.516	17.516	17.516	17.516	17.516	17.516	17.516	17.516	17.516	17.516	17.516	17.516	17.516	17.516	17.516						
37.876	38.314	38.285	38.723	37.552	37.683	38.916	39.047	32.478	32.916	32.888	33.325	32.154	32.285	33.518	33.650	39.0	**0.10**	178.92	80.39	259.31	**OK**
13.276	13.276	13.276	13.276	13.276	13.276	13.276	13.276	13.276	13.276	13.276	13.276	13.276	13.276	13.276	13.276						
1.675	1.675	1.675	1.675	1.675	1.675	1.675	1.675	1.535	1.535	1.535	1.535	1.535	1.535	1.535	1.535	1.7	**0.10**	178.92	34.45	213.37	**OK**
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
51.325	51.422	51.844	51.941	50.754	50.782	52.484	52.512	46.018	46.114	46.537	46.633	45.446	45.475	47.176	47.205	52.5	**0.10**	178.92	57.42	236.34	**OK**
21.188	21.188	21.188	21.188	21.188	21.188	21.188	21.188	21.188	21.188	21.188	21.188	21.188	21.188	21.188	21.188						
49.403	49.528	49.987	50.112	48.766	48.803	50.711	50.749	44.523	44.648	45.107	45.232	43.885	43.923	45.831	45.869	50.7	**0.10**	178.92	57.42	236.34	**OK**
22.064	22.064	22.064	22.064	22.064	22.064	22.064	22.064	22.064	22.064	22.064	22.064	22.064	22.064	22.064	22.064						
83.094	84.047	83.103	84.056	83.418	83.703	83.447	83.733	75.661	76.614	75.670	76.622	75.984	76.270	76.013	76.299	84.8	**0.10**	178.92	57.42	236.34	**OK**
84.812	84.812	84.812	84.812	84.812	84.812	84.812	84.812	84.812	84.812	84.812	84.812	84.812	84.812	84.812	84.812						
102.077	102.934	102.079	102.935	102.375	102.632	102.381	102.638	94.585	95.441	94.586	95.443	94.882	95.139	94.888	95.145	102.9	**0.10**	178.92	57.42	236.34	**OK**
67.496	67.496	67.496	67.496	67.496	67.496	67.496	67.496	67.496	67.496	67.496	67.496	67.496	67.496	67.496	67.496						
99.471	99.512	99.881	99.922	99.008	99.020	100.373	100.385	87.161	87.202	87.570	87.612	86.698	86.710	88.063	88.075	100.4	**0.10**	178.92	57.42	236.34	**OK**
1.732	1.732	1.732	1.732	1.732	1.732	1.732	1.732	1.732	1.732	1.732	1.732	1.732	1.732	1.732	1.732						
32.026	32.080	32.490	32.544	31.503	31.519	33.051	33.067	20.318	20.371	20.782	20.835	19.795	19.811	21.342	21.358	69.0	**0.10**	178.92	57.42	236.34	**OK**
68.964	68.964	68.964	68.964	68.964	68.964	68.964	68.964	68.964	68.964	68.964	68.964	68.964	68.964	68.964	68.964						
106.360	106.432	106.923	106.995	105.729	105.750	107.605	107.627	92.458	92.530	93.021	93.093	91.827	91.848	93.703	93.724	107.6	**0.10**	178.92	57.42	236.34	**OK**
2.064	2.064	2.064	2.064	2.064	2.064	2.064	2.064	2.064	2.064	2.064	2.064	2.064	2.064	2.064	2.064						
32.853	32.904	33.398	33.448	32.236	32.251	34.050	34.065	23.317	23.367	23.861	23.912	22.700	22.715	24.514	24.529	63.7	**0.10**	178.92	57.42	236.34	**OK**
63.700	63.700	63.700	63.700	63.700	63.700	63.700	63.700	63.700	63.700	63.700	63.700	63.700	63.700	63.700	63.700						
35.381	35.470	35.882	35.971	34.828	34.855	36.498	36.524	21.578	21.667	22.079	22.167	21.025	21.051	22.694	22.721	47.3	**0.10**	178.92	57.42	236.34	**OK**
47.260	47.260	47.260	47.260	47.260	47.260	47.260	47.260	47.260	47.260	47.260	47.260	47.260	47.260	47.260	47.260						

Diseños & Estructuras

PROYECTO: AGROECOL
RESISTENCIA A CORTANTE PARA VIGAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3.1 (b)

f'c = 21.0 MPa
fy = 420 MPa
Φ Cortante = 0.75
Estribos Φ = 9.5 mm
Av = 71 mm²
R= 6.30

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 sísmico 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						$2V_E$														$2V_{E\,max}$	S	ΦVs	ΦVc	ΦVn	ΦVn > $2V_{Emax}$
	ELEMENTO												Combinaciones de carga de diseño para el doble del cortante donde se incluya E																			
	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+7.50	B1	0	3.055	VIG15X45	0.15	0.40	-0.6	0.16	1.02	0.22	-1.02	-0.22	0.388	0.711	0.409	0.732	0.477	0.574	0.546	0.643	0.368	0.691	0.389	0.712	0.457	0.554	0.526	0.623	5.6	**0.10**	178.92	34.37	213.29	OK
	B1	3.055					4.35	0.16	1.02	0.22	-1.02	-0.22	5.552	5.229	5.531	5.208	5.463	5.366	5.394	5.297	4.087	3.764	4.066	3.743	3.998	3.901	3.929	3.832						
N+4.00	B2	0	1.425	VIG15X45	0.15	0.40	2.41	0.52	0.46	3.14	-0.46	-3.14	3.635	3.489	3.335	3.189	3.932	3.889	2.935	2.892	2.392	2.246	2.092	1.946	2.689	2.646	1.692	1.649	12.6	**0.10**	178.92	34.37	213.29	OK
	B2	1.425					7.51	3.05	0.46	3.14	-0.46	-3.14	12.285	12.139	11.985	11.839	12.582	12.539	11.585	11.542	6.982	6.836	6.682	6.536	7.279	7.236	6.282	6.239						
N+7.50	B3	0	7.07	VIG15X45	0.15	0.40	-5.33	0.06	2.66	0.86	-2.66	-0.86	5.873	6.717	5.955	6.799	6.073	6.326	6.346	6.599	4.334	5.178	4.416	5.260	4.534	4.787	4.807	5.060	7.9	**0.10**	178.92	34.37	213.29	OK
	B3	7.07					6.12	0.06	2.66	0.86	-2.66	-0.86	7.867	7.023	7.785	6.941	7.667	7.414	7.394	7.141	5.971	5.127	5.889	5.045	5.771	5.518	5.498	5.245						
N+4.00	B3	0	7.07	VIG15X45	0.15	0.40	-18.67	-10.72	5	3.92	-5	-3.92	32.144	33.731	32.517	34.104	32.264	32.740	33.508	33.984	15.823	17.410	16.196	17.783	15.943	16.419	17.187	17.663	35.0	**0.10**	178.92	34.37	213.29	OK
	B3	7.07					18.45	11.61	5.52	6.28	-5.52	-6.28	34.925	33.173	34.327	32.575	35.010	34.484	33.016	32.490	17.780	16.028	17.182	15.430	17.865	17.339	15.871	15.345						
N+4.00	B4	0	2.075	VIG15X45	0.15	0.40	-12.82	-7.48	3.54	1.54	-3.54	-1.54	22.229	23.353	22.375	23.499	22.451	22.788	22.940	23.277	10.903	12.027	11.049	12.173	11.125	11.462	11.614	11.951	23.5	**0.10**	178.92	34.37	213.29	OK
	B4	2.075					-3.55	-2.1	3.54	1.54	-3.54	-1.54	5.725	6.849	5.871	6.995	5.947	6.284	6.436	6.773	2.560	3.684	2.706	3.830	2.782	3.119	3.271	3.608						
N+7.50	B6	0	2.075	VIG15X45	0.15	0.40	0.6	-0.16	1.02	0.22	-1.02	-0.22	0.732	0.409	0.711	0.388	0.643	0.546	0.574	0.477	0.712	0.389	0.691	0.368	0.623	0.526	0.554	0.457	7.5	**0.10**	178.92	34.37	213.29	OK
	B6	2.075					4.95	1.43	1.02	0.22	-1.02	-0.22	7.542	7.219	7.521	7.198	7.453	7.356	7.384	7.287	4.627	4.304	4.606	4.283	4.538	4.441	4.469	4.372						
N+4.00	B7	0	2.075	VIG15X45	0.15	0.40	-2.41	-0.52	0.46	3.14	-0.46	-3.14	3.189	3.335	3.489	3.635	2.892	2.935	3.889	3.932	1.946	2.092	2.246	2.392	1.649	1.692	2.646	2.689	12.4	**0.10**	178.92	34.37	213.29	OK
	B7	2.075					6.28	4.34	0.46	3.14	-0.46	-3.14	12.099	11.953	11.799	11.653	12.396	12.353	11.399	11.356	5.875	5.729	5.575	5.429	6.172	6.129	5.175	5.132						
N+7.50	B8	0	2.075	VIG35X45	0.35	0.40	9.68	0.1	1.66	0.68	-1.66	-0.68	12.012	11.485	11.947	11.420	11.903	11.745	11.687	11.529	9.008	8.481	8.943	8.416	8.899	8.741	8.683	8.525	30.6	**0.10**	178.92	80.20	259.12	OK
	B8	2.075					20.81	5.35	1.66	0.68	-1.66	-0.68	30.618	30.091	30.553	30.026	30.509	30.351	30.293	30.135	19.025	18.498	18.960	18.433	18.916	18.758	18.700	18.542						
N+4.00	B8	0	2.075	VIG35X45	0.35	0.40	26.18	13.77	4.54	7.02	-4.54	-7.02	46.241	44.800	45.572	44.131	46.516	46.084	44.288	43.856	24.617	23.176	23.948	22.507	24.892	24.460	22.664	22.232	79.7	**0.10**	178.92	80.20	259.12	OK
	B8	2.075					45.27	24.01	4.54	7.02	-4.54	-7.02	79.389	77.948	78.720	77.279	79.664	79.232	77.436	77.004	41.798	40.357	41.129	39.688	42.073	41.641	39.845	39.413						
N+7.50	B9	0	2.075	VIG35X45	0.35	0.40	9.35	0.08	4.88	4.62	-4.88	-4.62	12.295	10.745	11.855	10.305	12.266	11.801	10.799	10.334	9.410	7.860	8.970	7.420	9.381	8.916	7.914	7.449	29.8	**0.10**	178.92	80.20	259.12	OK
	B9	2.075					20.09	4.72	4.88	4.62	-4.88	-4.62	29.823	28.273	29.383	27.833	29.794	29.329	28.327	27.862	19.076	17.526	18.636	17.086	19.047	18.582	17.580	17.115						
N+4.00	B9	0	2.075	VIG35X45	0.35	0.40	31.28	19.09	9.06	7.82	-9.06	-7.82	58.436	55.560	57.692	54.816	58.299	57.436	55.816	54.953	29.962	27.086	29.218	26.342	29.825	28.962	27.342	26.479	92.8	**0.10**	178.92	80.20	259.12	OK
	B9	2.075					50.95	29.86	9.06	7.82	-9.06	-7.82	92.810	89.934	92.066	89.190	92.673	91.810	90.190	89.327	47.665	44.789	46.921	44.045	47.528	46.665	45.045	44.182						
N+4.00	B10	0	2.075	VIG15X45	0.15	0.40	-3.55	-2.1	3.54	1.54	-3.54	-1.54	5.725	6.849	5.871	6.995	5.947	6.284	6.436	6.773	2.560	3.684	2.706	3.830	2.782	3.119	3.271	3.608	10.8	**0.10**	178.92	34.37	213.29	OK
	B10	2.075					5.73	3.28	3.54	1.54	-3.54	-1.54	10.791	9.667	10.645	9.521	10.569	10.232	10.080	9.743	5.792	4.668	5.646	4.522	5.570	5.233	5.081	4.744						
N+7.50	B12	0	7.07	VIG35X45	0.35	0.40	-15.39	-0.92	17.18	2.46	-17.18	-2.46	16.544	21.998	16.778	22.232	18.179	19.816	18.960	20.597	11.007	16.461	11.241	16.695	12.642	14.279	13.423	15.060	22.7	**0.10**	178.92	80.20	259.12	OK
	B12	7.07					16.28	0.51	16.16	2.26	-16.16	-2.26	22.719	17.589	22.503	17.373	21.174	19.635	20.457	18.918	17.325	12.195	17.109	11.979	15.780	14.241	15.063	13.524						
N+4.00	B12	0	7.07	VIG35X45	0.35	0.40	-66.44	-10.69	34.04	6.8	-34.04	-6.8	84.691	95.497	85.339	96.145	87.718	90.960	89.876	93.118	54.069	64.875	54.717	65.523	57.096	60.338	59.254	62.496	131.4	**0.10**	178.92	80.20	259.12	OK
	B12	7.07					87.08	21.19	33.5	8.52	-33.5	-8.52	131.409	120.774	130.598	119.963	128.634	125.443	125.929	122.738	84.095	73.460	83.284	72.649	81.320	78.129	78.615	75.424						
N+7.50	B13	0	7.07	VIG35X45	0.35	0.40	-11.26	0.5	15.02	1.24	-15.02	-1.24	10.569	15.337	10.687	15.455	12.100	13.530	12.494	13.924	7.691	12.459	7.809	12.577	9.222	10.652	9.616	11.046	21.5	**0.10**	178.92	80.20	259.12	OK
	B13	7.07					15.47	0.5	15.02	1.24	-15.02	-1.24	21.507	16.739	21.389	16.621	19.976	18.546	19.582	18.152	16.366	11.598	16.248	11.480	14.835	13.405	14.441	13.011						
N+4.00	B13	0	7.07	VIG35X45	0.35	0.40	-96.34	-31.64	31.94	13.34	-31.94	-13.34	141.543	151.683	142.813	152.953	143.610	146.651	147.845	150.886	81.001	91.141	82.271	92.411	83.068	86.109	87.303	90.344	158.4	**0.10**	178.92	80.20	259.12	OK
	B13	7.07					98.6	34.68	30.98	10.28	-30.98	-10.28	158.407	148.572	157.428	147.593	156.107	153.157	152.843	149.893	94.147	84.312	93.168	83.333	91.847	88.897	88.583	85.633						
N+4.00	B14	0	2.075	VIG35X45	0.35	0.40	-100.41	-50.16	3.54	1.54	-3.54	-1.54	170.017	171.141	170.163	171.287	170.239	170.576	170.728	171.065	89.734	90.858	89.880	91.004	89.956	90.293	90.445	90.782	171.3	**0.10**	178.92	80.20	259.12	OK
	B14	2.075					-5.73	-3.28	3.54	1.54	-3.54	-1.54	9.521	10.645	9.667	10.791	9.743	10.080	10.232	10.569	4.522	5.646	4.668	5.792	4.744	5.081	5.233	5.570						
N+7.50	B16	0	7	VIG35X45	0.35	0.40	-25.39	-6.63	2.1	21.3	-2.1	-21.3	35.750	36.417	37.779	38.446	33.617	33.817	40.379	40.579	21.503	22.170	23.532	24.199	19.370	19.570	26.132	26.332	42.2	**0.10**	178.92	80.20	259.12	OK
	B16	7					27.48	5.74	2.1	21.3	-2.1	-21.3	40.064	39.397	38.035	37.368	42.197	41.997	35.435	35.235	26.080	25.413	24.051	23.384	28.213	28.013	21.451	21.251						
N+4.00	B16	0	7	VIG35X45	0.35	0.40	-68.79	-11.92	4.98	42.36	-4.98	-42.36	91.660	93.241	95.695	97.276	87.507	87.981	100.955	101.429	59.103	60.684	63.138	64.719	54.950	55.424	68.398	68.872	104.9	**0.10**	178.92	80.20	259.12	OK
	B16	7					72.14	11.33	6.64	41.82	-6.64	-41.82	100.943	98.835	96.961	94.853	104.852	104.220	91.576	90.944	67.971	65.863	63.989	61.881	71.880	71.248	58.604	57.972						
N+7.50	B17	0	7	VIG35X45	0.35	0.40	-30.87	-12.95	0.26	20.9	-0.26	-20.9	48.957	49.040	50.948	51.031	46.664	46.689	53.299	53.324	26.746	26.829	28.737	28.820	24.453	24.478	31.088	31.113	53.3	**0.10**	178.92	80.20	259.12	OK
	B17	7					29.72	11.79	0.26	20.9	-0.26	-20.9	48.491	48.408	46.500	46.417	50.784	50.759	44.149	44.124	27.785	27.702	25.794	25.711	30.078	30.053	23.443	23.418						
N+4.00	B17	0	7	VIG35X45	0.35	0.40	-98.52	-28.5	0.42	36.66	-0.42	-36.66	144.912	145.045	148.403	148.536	140.885	140.925	152.523	152.563	86.856	86.989	90.347	90.480	82.829	82.869	94.467	94.507	152.6	**0.10**	178.92	80.20	259.12	OK
	B17	7					97.97	24.08	1.1	36.2	-1.1	-36.2	143.542	143.193	140.095	139.746	147.442	147.338	135.950	135.846	90.071	89.722	86.624	86.275	93.971	93.867	82.479	82.375						
N+7.50	B18	0	7	VIG35X45	0.35	0.40	-27.89	-8.56	1.92	27.36	-1.92	-27.36	40.420	41.030	43.026	43.636	37.594	37.777	46.279	46.462	23.493	24.103	26.099	26.709	20.667	20.850	29.352	29.535	46.5	**0.10**	178.92	80.20	259.12	OK
	B18	7					27.03	7.09	1.92	27.36	-1.92	-27.36	41.134	40.524	38.528	37.918	43.960	43.777	35.275	35.092	25.935	25.325	23.329	22.719	28.761	28.578	20.076	19.893						
N+4.00	B18	0	7	VIG35X45	0.35	0.40	-74.06	-15.07	4.74	52.12	-4.74	-52.12	100.708	102.212	105.672	107.176	95.443	95.895	111.989	112.441	63.420	64.924	68.384	69.888	58.155	58.607	74.701	75.153	112.4	**0.10**	178.92	80.20	259.12	OK
	B18	7					68.33	8.89	6.1	52.34	-6.1	-52.34	94.347	92.410	89.362	87.425	99.484	98.903	82.869	82.288	64.958	63.021	59.973	58.036	70.095	69.514	53.480	52.899						
N+7.50	B20	0	7.07	VIG35X45	0.35	0.40	-12.68	0.14	15.76	2.3	-15.76	-2.3	12.465	17.468	12.684	17.687	13.960	15.461	14.691	16.192	8.801	13.804	9.020	14.023	10.296	11.797	11.027	12.528	19.6	**0.10**	178.92	80.20	259.12	OK
	B20	7.07					14.05	0.14	15.76	2.3	-15.76	-2.3	19.611	14.608	19.392	14.389	18.116	16.615	17.385	15.884	15.256	10.253	15.037	10.034	13.761	12.260	13.030	11.529						
N+4.00	B20	0	7.07	VIG35X45	0.35	0.40	-77.28	-14.08	32.7	10.88	-32.7	-10.88	101.107	111.488	102.144	112.525	103.532	106.646	106.986	110.100	63.843	74.224	64.880	75.261	66.268	69.382	69.722	72.836	131.1	**0.10**	178.92	80.20	259.12	OK
	B20	7.07					89.9	17.51	33.1	10.08	-33.1	-10.08	131.124	120.616	130.164	119.656	128.566	125.414	125.366	122.214	86.644	76.136	85.684	75.176	84.086	80.934	80.886	77.734						
N+7.50	B21	0	7.07	VIG35X45	0.35	0.40	-9.33	1.26	14.52	1.2	-14.52	-1.2	7.574	12.184	7.688	12.298	9.054	10.437	9.435	10.818	6.035	10.645	6.149	10.759	7.515	8.898	7.896	9.279	24.5	**0.10**	178.92	80.20	259.12	OK
	B21	7.07					17.4	1.26	14.52	1.2	-14.52	-1.2	24.502	19.892	24.388	19.778	23.022	21.639	22.641	21.258	18.022	13.412	17.908	13.298	16.542	15.159	16.161	14.778						
N+4.00	B21	0	7.07	VIG35X45	0.35	0.40	-85.8	-15.51	31.18	13.76	-31.18	-13.76	112.866	122.764	114.176	124.074	114.801	117.771	119.169	122.139	71.616	81.514	72.926	82.824	73.551	76.521	77.919	80.889	124.1	**0.10**	178.92	80.20	259.12	OK
	B21	7.07					78.37	14.5	30.32	9.8	-30.32	-9.8	113.823	104.198	112.890	103.265	111.543	108.656	108.432	105.545	75.812	66.187	74.879	65.254	73.532	70.645	70.421	67.534						
N+7.50	B23	0	1.575	VIG35X45	0.35	0.40	-15.23	-2.77	2.74	0.52	-2.74	-0.52	20.586	21.456	20.636	21.506	20.833	21.094	20.998	21.259	13.247	14.117	13.297	14.167	13.494	13.755	13.659	13.920	21.5	**0.10**	178.92	80.20	259.12	OK
	B23	1.575					-7.54	0.02	2.74	0.52	-2.74	-0.52	8.568	9.438	8.618	9.488	8.815	9.076	8.980	9.241	6.326	7.196	6.376	7.246	6.573	6.834	6.738	6.999						
N+4.00	B23	0	1.575	VIG35X45	0.35	0.40	-30.29	-6.76	5.1	4.42	-5.1	-4.42	42.088	43.707	42.509	44.128	42.164	42.649	43.567	44.052	26.241	27.860	26.662	28.281	26.317	26.802	27.720	28.205	44.1	**0.10**	178.92	80.20	259.12	OK
	B23	1.575					-9.04	-1.19	5.1	4.42	-5.1	-4.42	11.018	12.637	11.439	13.058	11.094	11.579	12.497	12.982	7.116	8.735	7.537	9.156	7.192	7.677	8.595	9.080						
N+7.50	B24	0	1.575	VIG35X45	0.35	0.40	-22.47	-5.25	0.1	0.32	-0.1	-0.32	32.183	32.215	32.213	32.245	32.158	32.168	32.260	32.270	20.192	20.224	20.222	20.254	20.167	20.177	20.269	20.279	32.3	**0.10**	178.92	80.20	259.12	OK
	B24	1.575					-13.04	0.31	0.1	0.32	-0.1	-0.32	15.307	15.339	15.337	15.369	15.282	15.292	15.384	15.394	11.705	11.737	11.735	11.767	11.680	11.690	11.782	11.792						
N+4.00	B24	0	1.575	VIG35X45	0.35	0.40	-66.54	-16.24	0.72	8.76	-0.72	-8.76	95.557	95.785	96.391	96.619	94.663	94.732	97.444	97.513	59.355	59.583	60.189	60.417	58.461	58.530	61.242	61.311	97.5	**0.10**	178.92	80.20	259.12	OK

Diseños & Estructuras

PROYECTO: AGROECOL
RESISTENCIA A CORTANTE PARA VIGAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3.1 (b)

f'c = 21.0 MPa
fy = 420 MPa
Φ Cortante = 0.75
Estribos Φ = 9.5 mm
Av = 71 mm²
R= 6.30

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 sísmico 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)))

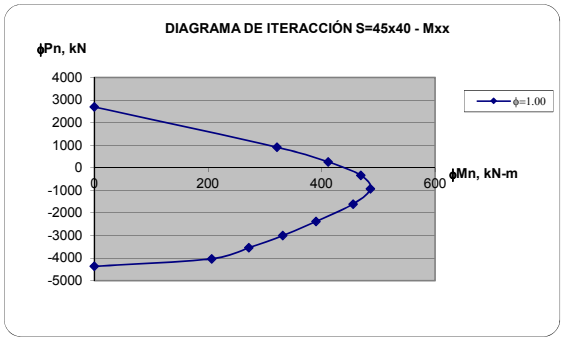
NIVEL	VIGA	LOC.	LONG.	PROPIEDADES DEL ELEMENTO			V2						$2V_E$ Combinaciones de carga de diseño para el doble del cortante donde se incluya E															$2V_{E\,max}$	S	ΦVs	ΦVc	ΦVn	ΦVn > $2V_{Emax}$
	ELEMENTO			SECCION	b	d	C.M.	C.V.	SISMO X	SISMO Y	-SISMO X	-SISMO Y	COMBDIS3	COMBDIS4	COMBDIS5	COMBDIS6	COMBDIS7	COMBDIS8	COMBDIS9	COMBDIS10	COMBDIS11	COMBDIS12	COMBDIS13	COMBDIS14	COMBDIS15	COMBDIS16	COMBDIS17	COMBDIS18					
	No.	(m)	(m)		(m)	(m)	(KN.m)	(KN.m)	(KN.m)	(KN.m)	(KN.m)	(KN.m)																	(kN)	(m)	(kN)	(kN)	(kN)	
N+4.00	B24	1.575	1.575	VIG35X45	0.35	0.40	-29.99	-5.11	0.72	8.76	-0.72	-8.76	40.567	40.795	41.401	41.629	39.673	39.742	42.454	42.523	26.460	26.688	27.294	27.522	25.566	25.635	28.347	28.416	97.3	0.10	178.92	80.20	259.12	OK
N+7.50	B25	0	1.575	VIG35X45	0.35	0.40	-21.53	-4.3	5.4	5.02	-5.4	-5.02	29.040	30.754	29.518	31.232	29.082	29.596	30.676	31.190	18.281	19.995	18.759	20.473	18.323	18.837	19.917	20.431	31.2	0.10	178.92	80.20	259.12	OK
	B25	1.575					-13.38	-0.78	5.4	5.02	-5.4	-5.02	15.740	17.454	16.218	17.932	15.782	16.296	17.376	17.890	10.946	12.660	11.424	13.138	10.988	11.502	12.582	13.096						
N+4.00	B25	0	1.575	VIG35X45	0.35	0.40	-30.84	-7.02	4.8	6	-4.8	-6	42.980	44.504	43.552	45.076	42.847	43.304	44.752	45.209	26.708	28.232	27.280	28.804	26.575	27.032	28.480	28.937	45.2	0.10	178.92	80.20	259.12	OK
	B25	1.575					-9.59	-1.46	4.8	6	-4.8	-6	11.920	13.444	12.492	14.016	11.787	12.244	13.692	14.149	7.583	9.107	8.155	9.679	7.450	7.907	9.355	9.812						
N+7.50	B27	0	7.07	VIG15X45	0.15	0.40	-5.36	0.02	2.74	0.52	-2.74	-0.52	5.952	6.822	6.002	6.872	6.199	6.460	6.364	6.625	4.364	5.234	4.414	5.284	4.611	4.872	4.776	5.037	7.8	0.10	178.92	34.37	213.29	OK
	B27	7.07					6.09	0.02	2.74	0.52	-2.74	-0.52	7.788	6.918	7.738	6.868	7.541	7.280	7.376	7.115	5.941	5.071	5.891	5.021	5.694	5.433	5.529	5.268						
N+4.00	B27	0	7.07	VIG15X45	0.15	0.40	-9.04	-1.19	5.1	4.42	-5.1	-4.42	11.018	12.637	11.439	13.058	11.094	11.579	12.497	12.982	7.116	8.735	7.537	9.156	7.192	7.677	8.595	9.080	21.6	0.10	178.92	34.37	213.29	OK
	B27	7.07					15	2.61	4.7	4.84	-4.7	-4.84	21.587	20.094	21.126	19.633	21.602	21.154	20.066	19.618	14.477	12.984	14.016	12.523	14.492	14.044	12.956	12.508						
N+7.50	B28	0	7.07	VIG15X45	0.15	0.40	-4.78	0.33	2.84	0.82	-2.84	-0.82	4.916	5.818	4.994	5.896	5.141	5.411	5.401	5.671	3.812	4.714	3.890	4.792	4.037	4.307	4.297	4.567	8.8	0.10	178.92	34.37	213.29	OK
	B28	7.07					6.67	0.33	2.84	0.82	-2.84	-0.82	8.824	7.922	8.746	7.844	8.599	8.329	8.339	8.069	6.493	5.591	6.415	5.513	6.268	5.998	6.008	5.738						
N+4.00	B28	0	7.07	VIG15X45	0.15	0.40	-14.98	-2.5	4.08	4.44	-4.08	-4.44	19.617	20.912	20.040	21.335	19.577	19.966	20.986	21.375	12.623	13.918	13.046	14.341	12.583	12.972	13.992	14.381	21.4	0.10	178.92	34.37	213.29	OK
	B28	7.07					9.59	1.46	4.8	6	-4.8	-6	14.016	12.492	13.444	11.920	14.149	13.692	12.244	11.787	9.679	8.155	9.107	7.583	9.812	9.355	7.907	7.450						
N+7.50	B30	0	0.575	VIG35X45	0.35	0.40	-2.17	0	0	0	0	0	2.604	2.604	2.604	2.604	2.604	2.604	2.604	2.604	1.953	1.953	1.953	1.953	1.953	1.953	1.953	1.953	2.6	0.10	178.92	80.20	259.12	OK
	B30	0.575					0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
N+7.50	B31	0	0.575	VIG35X45	0.35	0.40	-2.17	0	0	0	0	0	2.604	2.604	2.604	2.604	2.604	2.604	2.604	2.604	1.953	1.953	1.953	1.953	1.953	1.953	1.953	1.953	2.6	0.10	178.92	80.20	259.12	OK
	B31	0.575					0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
N+7.50	B34	0	0.575	VIG35X45	0.35	0.40	-2.17	0	0	0	0	0	2.604	2.604	2.604	2.604	2.604	2.604	2.604	2.604	1.953	1.953	1.953	1.953	1.953	1.953	1.953	1.953	2.6	0.10	178.92	80.20	259.12	OK
	B34	0.575					0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
N+7.50	B35	0	7	VIG15X45	0.15	0.40	-7.03	-1.88	0.56	6.14	-0.56	-6.14	9.935	10.113	10.519	10.697	9.315	9.368	11.264	11.317	5.946	6.124	6.530	6.708	5.326	5.379	7.275	7.328	11.3	0.10	178.92	34.37	213.29	OK
	B35	7					6.36	1.4	0.56	6.14	-0.56	-6.14	9.413	9.235	8.829	8.651	10.033	9.980	8.084	8.031	6.105	5.927	5.521	5.343	6.725	6.672	4.776	4.723						
N+7.50	B36	0	2.075	VIG15X45	0.15	0.40	-0.19	-0.02	2.2	3.78	-2.2	-3.78	0.281	0.417	0.079	0.777	0.457	0.247	0.743	0.953	0.358	0.340	0.002	0.700	0.534	0.324	0.666	0.876	6.2	0.10	178.92	34.37	213.29	OK
	B36	2.075					3.78	0.96	2.2	3.78	-2.2	-3.78	6.025	5.327	5.665	4.967	6.201	5.991	5.001	4.791	3.931	3.233	3.571	2.873	4.107	3.897	2.907	2.697						
N+7.50	B37	0	1.575	VIG15X45	0.15	0.40	-2.45	-0.29	2.54	4.2	-2.54	-4.2	2.627	3.433	3.027	3.833	2.442	2.684	3.776	4.018	1.602	2.408	2.002	2.808	1.417	1.659	2.751	2.993	4.0	0.10	178.92	34.37	213.29	OK
	B37	1.575					0.56	0.45	2.54	4.2	-2.54	-4.2	1.725	0.919	1.325	0.519	1.910	1.668	0.576	0.334	1.107	0.301	0.707	0.099	1.292	1.050	0.042	0.284						
N+7.50	B38	0	1.875	VIG15X45	0.15	0.40	-4.53	-0.45	2.54	4.2	-2.54	-4.2	5.283	6.089	5.683	6.489	5.098	5.340	6.432	6.674	3.474	4.280	3.874	4.680	3.289	3.531	4.623	4.865	6.7	0.10	178.92	34.37	213.29	OK
	B38	1.875					-1.49	-0.45	2.54	4.2	-2.54	-4.2	1.635	2.441	2.035	2.841	1.450	1.692	2.784	3.026	0.738	1.544	1.138	1.944	0.553	0.795	1.887	2.129						
N+7.50	B39	0	1.875	VIG15X45	0.15	0.40	-3.23	-0.02	2.2	3.78	-2.2	-3.78	3.367	4.065	3.727	4.425	3.191	3.401	4.391	4.601	2.378	3.076	2.738	3.436	2.202	2.412	3.402	3.612	4.6	0.10	178.92	34.37	213.29	OK
	B39	1.875					-0.19	-0.02	2.2	3.78	-2.2	-3.78	0.281	0.417	0.079	0.777	0.457	0.247	0.743	0.953	0.358	0.340	0.002	0.700	0.534	0.324	0.666	0.876						
N+7.50	B40	0	1.875	VIG35X45	0.35	0.40	-17.89	-2.84	2.76	9.92	-2.76	-9.92	23.398	24.274	24.342	25.218	22.602	22.865	25.751	26.014	15.191	16.067	16.135	17.011	14.395	14.658	17.544	17.807	26.0	0.10	178.92	80.20	259.12	OK
	B40	1.875					-10.81	-2.84	2.76	9.92	-2.76	-9.92	14.902	15.778	15.846	16.722	14.106	14.369	17.255	17.518	8.819	9.695	9.763	10.639	8.023	8.286	11.172	11.435						
N+7.50	B41	0	1.875	VIG35X45	0.35	0.40	-15.9	-1.69	2.82	10.34	-2.82	-10.34	19.830	20.725	20.815	21.710	18.994	19.263	22.277	22.546	13.370	14.265	14.355	15.250	12.534	12.803	15.817	16.086	22.5	0.10	178.92	80.20	259.12	OK
	B41	1.875					-8.81	-1.69	2.82	10.34	-2.82	-10.34	11.322	12.217	12.307	13.202	10.486	10.755	13.769	14.038	6.989	7.884	7.974	8.869	6.153	6.422	9.436	9.705						
N+7.50	B49	0	0.575	VIG15X45	0.15	0.40	-0.93	0	0	0	0	0	1.116	1.116	1.116	1.116	1.116	1.116	1.116	1.116	0.837	0.837	0.837	0.837	0.837	0.837	0.837	0.837	1.1	0.10	178.92	34.37	213.29	OK
	B49	0.575					0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
N+4.00	B51	0	1.575	VIG25X45	0.25	0.40	-22.26	-7.33	0.44	8.72	-0.44	-8.72	33.557	33.697	34.387	34.527	32.637	32.679	35.405	35.447	19.549	19.689	20.379	20.519	18.629	18.671	21.397	21.439	35.4	0.10	178.92	57.28	236.20	OK
	B51	1.575					12.59	3.8	0.44	8.72	-0.44	-8.72	19.393	19.253	18.563	18.423	20.313	20.271	17.545	17.503	11.816	11.676	10.986	10.846	12.736	12.694	9.968	9.926						
N+4.00	B53	0	1.575	VIG25X45	0.25	0.40	-21.74	-7.18	0.72	9.76	-0.72	-9.76	32.689	32.918	33.618	33.847	31.685	31.753	34.783	34.851	18.987	19.216	19.916	20.145	17.983	18.051	21.081	21.149	34.9	0.10	178.92	57.28	236.20	OK
	B53	1.575					13.12	3.95	0.72	9.76	-0.72	-9.76	20.273	20.044	19.344	19.115	21.277	21.209	18.179	18.111	12.387	12.158	11.458	11.229	13.391	13.323	10.293	10.225						
N+4.00	B54	0	7.07	VIG25X45	0.25	0.40	-39.15	-11.01	4.84	0.54	-4.84	-0.54	57.196	58.733	57.247	58.784	57.674	58.135	57.845	58.306	34.441	35.978	34.492	36.029	34.919	35.380	35.090	35.551	77.2	0.10	178.92	57.28	236.20	OK
	B54	7.07					51.73	14.21	5.6	0.62	-5.6	-0.62	77.204	75.427	77.145	75.368	76.651	76.118	76.454	75.921	47.475	45.698	47.416	45.639	46.922	46.389	46.725	46.192						
N+4.00	B59	0	7.07	VIG25X45	0.25	0.40	-50.98	-13.87	4.72	0.16	-4.72	-0.16	74.289	75.788	74.304	75.803	74.796	75.245	74.847	75.296	45.125	46.624	45.140	46.639	45.632	46.081	45.683	46.132	75.8	0.10	178.92	57.28	236.20	OK
	B59	7.07					40.62	11.72	4.68	0.24	-4.68	-0.24	61.218	59.733	61.195	59.710	60.725	60.279	60.649	60.203	37.312	35.827	37.289	35.804	36.819	36.373	36.743	36.297						
N+4.00	B60	0	3.5	VIG25X45	0.25	0.40	-41.32	-12.51	0.7	8.6	-0.7	-8.6	61.573	61.796	62.392	62.615	60.696	60.762	63.426	63.492	36.667	36.890	37.486	37.709	35.790	35.856	38.520	38.586	63.5	0.10	178.92	57.28	236.20	OK
	B60	3.5					1.79	-0.26	0.7	8.6	-0.7	-8.6	2.409	2.186	1.590	1.367	3.286	3.220	0.556	0.490	2.132	1.909	1.313	1.090	3.009	2.943	0.279	0.213						
N+4.00	B61	0	3.5	VIG25X45	0.25	0.40	-1.32	-0.49	0.72	9.76	-0.72	-9.76	1.495	1.724	2.424	2.653	0.491	0.559	3.589	3.657	0.609	0.838	1.538	1.767	0.395	0.327	2.703	2.771	63.5	0.10	178.92	57.28	236.20	OK
	B61	3.5					41.79	11.76	0.72	9.76	-0.72	-9.76	62.487	62.258	61.558	61.329	63.491	63.423	60.393	60.325	38.190	37.961	37.261	37.032	39.194	39.126	36.096	36.028						
N+4.00	B62	0	3.5	VIG25X45	0.25	0.40	-43.08	-13.57	0.46	11.82	-0.46	-11.82	64.630	64.776	65.756	65.902	63.368	63.412	67.120	67.164	38.136	38.282	39.262	39.408	36.874	36.918	40.626	40.670	67.2	0.10	178.92	57.28	236.20	OK
	B62	3.5					0.04	-1.32	0.46	11.82	-0.46	-11.82	0.636	0.782	1.762	1.908	0.626	0.582	3.126	3.170	0.672	0.526	0.454	0.600	1.934	1.890	1.818	1.862						
N+4.00	B63	0	3.5	VIG25X45	0.25	0.40	-3.8	-1.92	0.48	11.44	-0.48	-11.44	5.859	6.011	6.949	7.101	4.641	4.687	8.273	8.319	2.799	2.951	3.889	4.041	1.581	1.627	5.213	5.259	59.3	0.10	178.92	57.28	236.20	OK
	B63	3.5					39.31	10.33	0.48	11.44	-0.48	-11.44	58.123	57.971	57.033	56.881	59.341	59.295	55.709	55.663	36.000	35.848	34.910	34.758	37.218	37.172	33.586	33.540						
N+4.00	B64	0	2.075	VIG25X45	0.25	0.40	2.81	3.58	0.52	9.3	-0.52	-9.3	7.477	7.312	6.592	6.427	8.453	8.403	5.501	5.451	3.054	2.889	2.169	2.004	4.030	3.980	1.078	1.028	40.2	0.10	178.92	57.28	236.20	OK
	B64	2.075					20.25	14.35	0.52	9.3	-0.52	-9.3	39.175	39.010	38.290	38.125	40.151	40.101	37.199	37.149	18.750	18.585	17.865	17.700	19.726	19.676	16.774	16.724						

PROYECTO: AGROECOL (CHOCO)
RESISTENCIA A CORTANTE PARA COLUMNAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3.2 (a) - COLUMNA S=40X40 (12/#8 #7 (3.5%))

f'c =	**21.1**	MPa	**Estribos Φ =**	**9.5**	mm
fy =	**420**	MPa	**Av =**	**71**	mm^2
$\Phi_{Cortante}$ =	**0.75**		**Cantidad de ramas =**	**4**	
bx =	**0.40**	m	**S =**	**0.10**	m
by =	**0.40**	m	**Recub. =**	**0.05**	m
Lcol =	**7.50**	m			

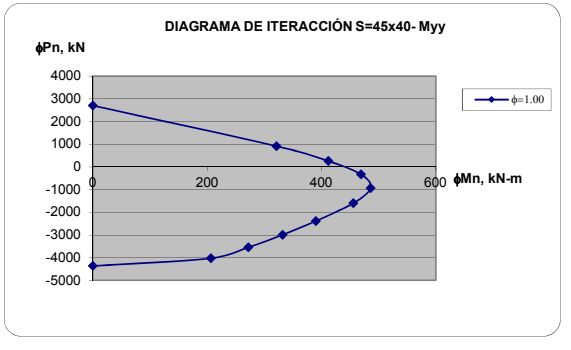
C.21.3.3.2(a) El cortante ΦVn no debe ser menor que la suma del cortante debido a flexión en curvatura inversa asociado con el desarrollo de los momentos nominales de la columna en cada extremo restringido de la longitud libre.

DATOS PARA LOS DIAGRAMAS DE ITERACCIÓN			
No.	**Curve 1**	**0. degrees**	
	P	**M3**	**M2**
1	-4368.00	0.00	0.00
2	-4032.00	206.42	0.00
3	-3546.00	271.67	0.00
4	-3002.00	331.78	0.00
5	-2385.00	389.94	0.00
6	-1607.00	455.31	0.00
7	-935.23	485.97	0.00
8	-333.68	468.88	0.00
9	259.71	411.61	0.00
10	914.48	321.23	0.00
11	2696.12	0.00	0.00



P_{ua} =	716.75	**kN**
P_{ub} =	693.71	**kN**
ΦM_{na} =	384.32	**kN-m**
ΦM_{nb} =	381.14	**kN-m**
$V_{umáx}$ =	102.06	**kN**
ΦV_s =	313.11	**kN**
ΦV_c =	80.39	**kN**
ΦV_n =	393.50	**kN**
$\Phi V_n > V_{umáx}$ =	OK	

DATOS PARA LOS DIAGRAMAS DE ITERACCIÓN			
No.	**Curve 7**	**90. degrees**	
	P	**M3**	**M2**
1	-4368.00	0.00	0.00
2	-4032.00	0.00	206.42
3	-3546.00	0.00	271.67
4	-3002.00	0.00	331.78
5	-2385.00	0.00	389.94
6	-1607.00	0.00	455.31
7	-935.23	0.00	485.97
8	-333.68	0.00	468.88
9	259.71	0.00	411.61
10	914.48	0.00	321.23
11	2696.12	0.00	0.00



P_{ua} =	727.07	**kN**
P_{ub} =	704.03	**kN**
ΦM_{na} =	385.74	**kN-m**
ΦM_{nb} =	382.56	**kN-m**
$V_{umáx}$ =	102.44	**kN**
ΦV_s =	313.11	**kN**
ΦV_c =	80.39	**kN**
ΦV_n =	393.50	**kN**
$\Phi V_n > V_{umáx}$ =	OK	

Diseños & Estructuras

PROYECTO: AGROECOL (CHOCO)
RESISTENCIA A CORTANTE PARA COLUMNAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3.2 (b)

f'c =	**21.1**	MPa	**Estribos Φ =**	**9.5**	mm
fy =	**420**	MPa	**Av =**	**71**	mm^2
$\Phi_{Cortante}$ =	**0.75**		**Cantidad de ramas =**	**4**	
bx =	**0.40**	m	**S =**	**0.10**	m
by =	**0.50**	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 la que incluyan E, con E incrementado por medio de Ωo.

Para cortante V2

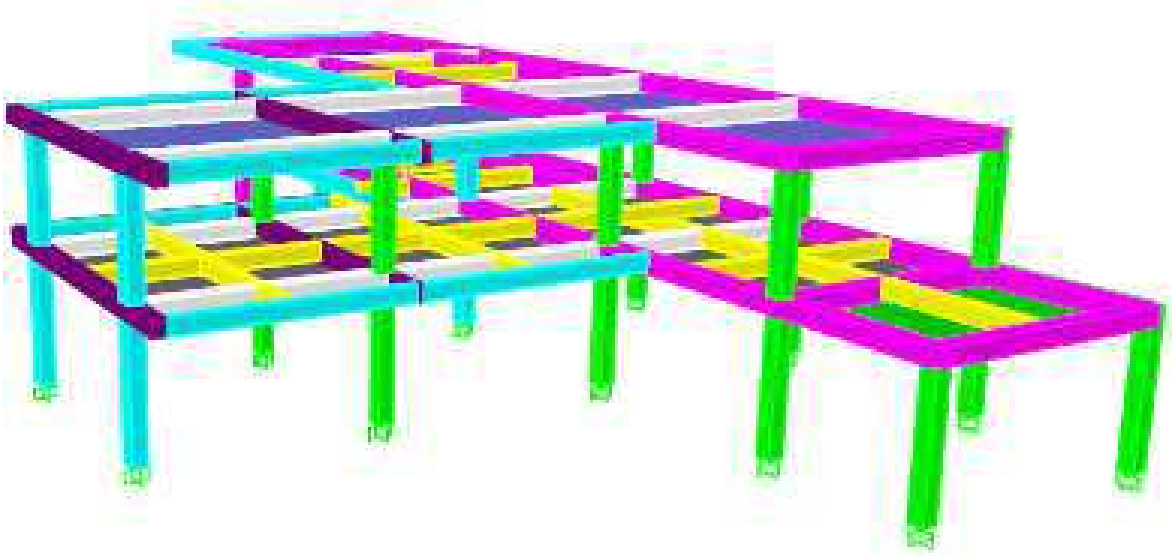
Ω_o*$V_{umáx}$ =	205.63	**kN**
ΦV_s =	391.39	**kN**
ΦV_c =	100.48	**kN**
ΦV_n =	491.87	**kN**
$\Phi V_n > \Omega_o * V_{umáx}$ =	OK	

Para cortante V3

Ω_o*$V_{umáx}$ =	212.68	**kN**
ΦV_s =	402.57	**kN**
ΦV_c =	103.35	**kN**
ΦV_n =	505.92	**kN**
$\Phi V_n > \Omega_o * V_{umáx}$ =	OK	

PROYECTO: JORNADA ÚNICA DEL MINISTERIO DE EDUCACIÓN- MODULO 2. SEDE EDUCATIVA AGROECOL BLOQUE B MUNICIPIO UNIÓN PANAMERICANA (CHOCÓ)

Dye 16-2255



MEMORIAS DE ANÁLISIS Y DISEÑO ESTRUCTURAL

Bogotá D.C. 18 DE NOVIEMBRE 2016

1. DESCRIPCIÓN DEL PROYECTO

1.1. INTRODUCCIÓN

El presente documento contiene las memorias de análisis y diseño estructural correspondiente al proyecto **JORNADA ÚNICA DEL MINISTERIO DE EDUCACIÓN- MODULO 2. SEDE EDUCATIVA AGROECOL (2)** ubicado en el municipio **UNIÓN PANAMERICANA** en **CHOCÓ.**

1.2. DESCRIPCIÓN ARQUITECTÓNICA

El proyecto se encuentra ubicado en un lote de **1166.56 m²** de área aproximadamente, en el cual se contempla la construcción de un edificio destinado como institución educativa.

1.3. DESCRIPCIÓN SISTEMA ESTRUCTURAL

El proyecto se soluciona mediante el diseño de una estructura aporticada, utilizando para el entrepiso del nivel N:-0.05 m y N: +4.00 m placa maciza en una y dos direcciones de espesor e=0.10 m y e=0.15 m. La cubierta liviana se compone de vigas en el nivel N:+7.50m. Se manejan luces entre 3.00 m y 9.00 m 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:

- ✓ 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 se afecta por las irregularidades presentes en la geometría de cada estructura, las cuales se describen a continuación.

- ✓ Irregularidad en planta: $\phi_P =$ .90

El valor final del coeficiente R es igual a **6.30**

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 de clase y **5.00 kN/ m²** para cubiertas y corredores.

Para la cimentación se siguieron las recomendaciones descritas en el respectivo estudio de suelos, que recomienda apoyar la estructura a **-1.20 m** del nivel de la placa aérea de cimentación, apoyando las zapatas a **-1.20 m**, según lo indicado en los planos estructurales. La capacidad portante de seguridad admisible del suelo es **0.12 MPa** y el tipo de suelo es **E**.

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 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

Bogotá, D.C. 18 DE NOVIEMBRE 2016

Señores
PLANEACIÓN 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 registrado en el consejo profesional de Ingeniería y Arquitectura de Cundinamarca, presento los Cálculos y Diseños Estructurales elaborados de acuerdo a los requerimientos de la **NORMA COLOMBIANA DE DISEÑO Y CONSTRUCCIÓN SISMO RESISTENTE LEY 400 DE 1997 (MODIFICADA LEY 1229 DE 2008) Y DECRETO 926 DE MARZO DE 2010**, para el proyecto **JORNADA ÚNICA DEL MINISTERIO DE EDUCACIÓN- MODULO 2. SEDE EDUCATIVA AGROECOL,** ubicado en el municipio **UNIÓN PANAMERICANA** en **CHOCÓ** declaro que asumo la responsabilidad por los perjuicios que causa de ellos puedan deducirse, exonerando a **PLANEACIÓN MUNICIPAL** de cualquier responsabilidad.

Acepto y reconozco que la revisión efectuada por PLANEACIÓN 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

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REPUBLICA DE COLOMBIA
Consejo Profesional Nacional de Ingeniería y Arquitectura
MATRICULA No. 2520256174CND
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APELLIDOS
USECHE MACIAS
NOMBRES
JAIR
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UNIV. NACIONAL - BOGOTA

2. AVALÚO DE CARGAS

AVALÚO DE CARGAS

PROYECTO: SEDE EDUCATIVA AGROECOL UNION PANAMERICANA (CHOCO)

AVALUO DE CARGAS

1. CUBIERTA LIVIANA

Teja termo-acústica			0.10 kN/m²
Estructura metálica de soporte			0.10 kN/m²
Acabados e iluminacion			0.10 kN/m²
		CM	0.30 kN/m²
	Tabla 4.2.1-2 de NSR-10 (Caso F)	CV	0.50 kN/m²
		CR	0.80 kN/m²
Muros culata	1.37x0.15x13		2.67 kN/m

CU = 1.2x0.3+1.6x0.5 = ***1.2 kN/m²***

Espesor de placa equivalente:

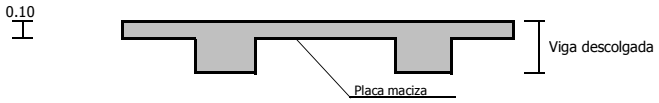
e=CM/24 0.013 m

Pendiente de Cubierta α (º) = **8.540** → Equivale a 15%

B.4.8.3 de NSR-10 (Carga de granizo) CV

Según la tabla B.4.2.1-2 - En cubiertas inclinadas con menos de 15° de pendiente en estructura metálica o de madera la carga viva asumida puede ser 1 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 0.5 kN/m^2.

2. PLACA MACIZA - ENTREPISO



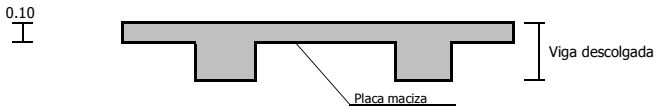
Placa maciza e=0.10m	0.10x24		2.40 kN/m²
Muros divisorios			2.00 kN/m²
Acabados	22x0.05		1.10 kN/m²
		CM	5.50 kN/m²
	Tabla 4.2.1-1	CV	2.00 kN/m²
		CR	7.50 kN/m²
Muros antepecho	1.00x0.15x13		1.95 kN/m
Muros perimetrales	3.05x0.15x13		5.95 kN/m

CU = 1.2x5.5+1.6x2 = ***9.8 kN/m²***

Espesor de placa equivalente:

e=CM/24 0.229 m

3. PLACA MACIZA - ENTREPISO



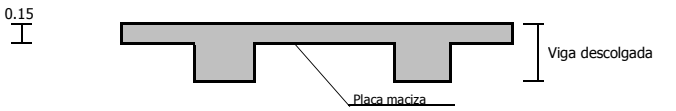
Placa maciza e=0.10m	0.10x24		2.40 kN/m²
Muros antepecho			2.00 kN/m²
Acabados	22x0.05		1.10 kN/m²
		CM	5.50 kN/m²
	Tabla 4.2.1-2 (Caso A)	CV	5.00 kN/m²
		CR	10.50 kN/m²
Muros antepecho	1.00x0.15x13		1.95 kN/m

CU = 1.2x5.5+1.6x5 = ***14.6 kN/m²***

Espesor de placa equivalente:

e=CM/24 0.229 m

3. PLACA MACIZA - TANQUES



Placa maciza e=0.15m	0.15x24		3.60 kN/m²
Acabados	22x0.05		1.10 kN/m²
		CM	4.70 kN/m²
	Tabla 4.2.1-2 (Caso A)	CV	5.00 kN/m²
		CR	9.70 kN/m²
Muros antepecho	1.43x0.15x13		2.79 kN/m

CU = 1.2x4.7+1.6x5 = ***13.6 kN/m²***

Espesor de placa equivalente:

e=CM/24 0.196 m

PROYECTO: I.E. AGROECOL
AVALÚO DE CARGAS DE VIENTO
ANÁLISIS SIMPLIFICADO (sprfv)

Para que le 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: $\boxed{Ps = \lambda KztIPs_{10}}$

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=	UNION PANAMERICANA	1	60

Luego:

λ=	1.0
K_{zt}=	1.0
I=	1.3
P_{s10}=	**0.09**

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: PROYECTO: SEDE EDUCATIVA AGROECOL UNIÓN PANAMERICANA (CHOCÓ)

ANÁLISIS SÍSMICO (ESPECTRO DE DISEÑO NSR-10)

ZONA DE AMENAZA SÍSMICA
ALTA

EFECTOS LOCALES

Perfil de Suelo	**E**
Coeficiente Aa	**0.40**
Coeficiente Av	**0.40**

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 =	**7.50**	m
α =	**0.90**	
T_a=	**0.29**	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	**1.00**
ϕ_p	**0.90**
ϕ_r	**1.00**
ϕ	**1.00**
R	**6.30**

TIPO	DESCRIPCIÓN	VALOR
	N.A	ϕ_P: 1.00
	RETROCESO DE ESQUINAS	ϕ_a: 0.90
	AUSENCIA DE REDUNDANCIA	ϕ_r: 1.00
	UNIONES SOLDADAS	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 ALTA		
T_o:	0.27	Seg
T_C:	1.28	Seg
T_L:	5.76	Seg
Aa:	0.40	
Av:	0.40	
Fa:	0.90	
Fv:	2.40	

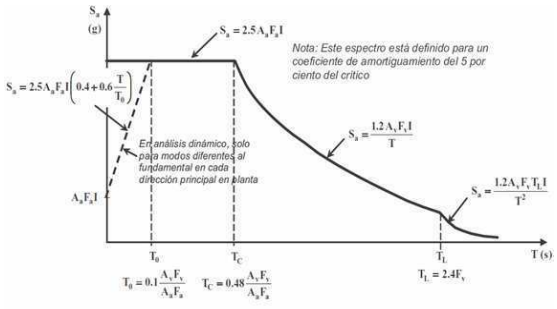
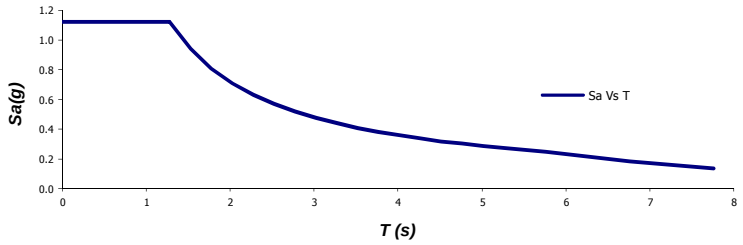


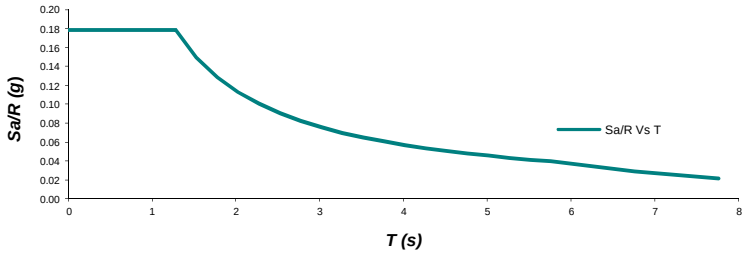
Figura A.2.6-1 — Espectro Elástico de Aceleraciones de Diseño como fracción de g

T (Seg)	Sa (%g)	Sa/$R_{adoptado}$ (%g)
0.00	1.125	0.179
0.07	1.125	0.179
0.13	1.125	0.179
0.20	1.125	0.179
0.27	1.125	0.179
0.52	1.125	0.179
0.77	1.125	0.179
1.03	1.125	0.179
1.28	1.125	0.179
1.53	0.942	0.150
1.78	0.810	0.129
2.03	0.711	0.113
2.28	0.633	0.100
2.52	0.570	0.091
2.77	0.519	0.082
3.02	0.476	0.076
3.27	0.440	0.070
3.52	0.409	0.065
3.77	0.382	0.061
4.02	0.358	0.057
4.27	0.338	0.054
4.52	0.319	0.051
4.76	0.302	0.048
5.01	0.287	0.046
5.26	0.274	0.043
5.51	0.261	0.041
5.76	0.250	0.040
6.76	0.182	0.029
7.76	0.138	0.022

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: PROYECTO: SEDE EDUCATIVA AGROECOL UNIÓN PANAMERICANA (CHOCÓ)

ANÁLISIS SÍSMICO (ESPECTRO DE UMBRAL DE DAÑO NSR-10)

ZONA DE AMENAZA SÍSMICA
ALTA

EFECTOS LOCALES

Perfil de Suelo	**E**
Coeficiente Ad	**0.10**
Coeficiente Fv	**3.50**

COEFICIENTE DE IMPORTANCIA

Grupo de Uso	**III**
Coeficiente de importancia I	**1.25**
Coeficiente de Sitio Ŝ:	**4.38**

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: **0.10**
T_{Cd}: 2.19 Seg
T_{Ld}: 10.5 Seg

T (Seg)	Sad (%g)
0.00	0.100
0.05	0.140
0.10	0.180
0.15	0.220
0.20	0.260
0.25	0.300
0.49	0.300
0.73	0.300
0.98	0.300
1.22	0.300
1.46	0.300
1.70	0.300
1.95	0.300

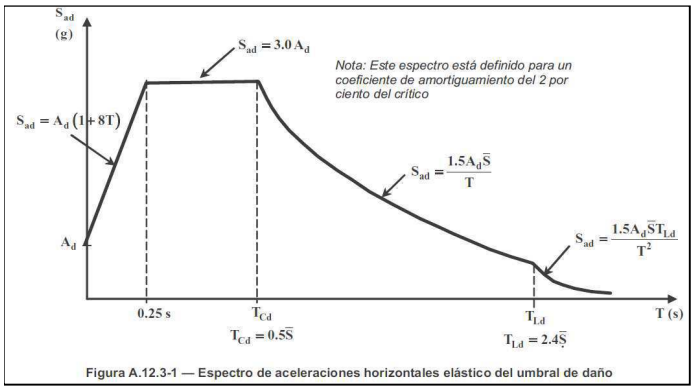
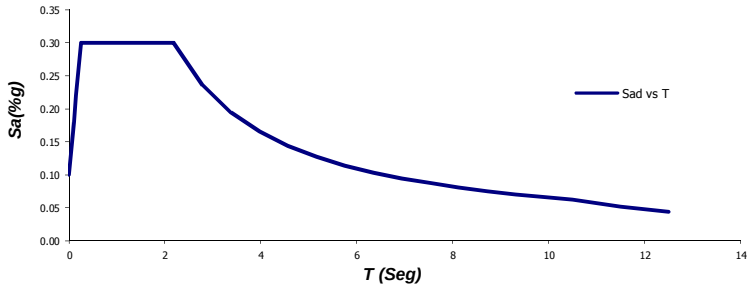


Figura A.12.3-1 — Espectro de aceleraciones horizontales elástico del umbral de daño

2.19	0.300
2.78	0.236
3.38	0.194
3.97	0.165
4.56	0.144
5.16	0.127
5.75	0.114
6.34	0.103
6.94	0.095
7.53	0.087
8.13	0.081
8.72	0.075
9.31	0.070
9.91	0.066
10.50	0.063
11.50	0.052
12.50	0.044

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: SEDE EDUCATIVA AGROECOL, UNIÓN PANAMERICANA (CHOCÓ)
CALCULO DEL CORTANTE BASAL DE LA ESTRUCTURA (ESPECTRO DE DISEÑO NSR-10)

CALCULO DEL CORTANTE BASAL DE LA ESTRUCTURA

$H_{edificio}$ =	7.50	m	
Tipo de Perfil:	E		
Aa =	0.40		
Av =	0.40		
Fa =	0.90		
Fv =	2.40		
T_c =	1.28	Seg	
C_t =	0.047		
α =	0.90		
T_a =	0.29	Seg	
C_u =	1.20		
$C_u T_a$ =	0.35	Seg	
$T_{modelación\ estructural}$ =	0.30	Seg	
ΔT =	4.10	%	Ok!
$T_{adoptado}$ =	0.30	Seg	
S_a =	1.125		S_a obtenido del espectro de diseño
g =	9.81	m/s^2	
M =	463.70	Ton	Masa obtenida del modelo
V_s =	5117.51	kN	
90% Vs =	4605.76	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	F2	Total	Factor		g corregido
$V_{s(x)}$ =	4779.13	0	4779.13	0.964	9.454	Se aplica en SISMO X
$V_{s(y)}$ =	0	4631.26	4631.26	0.994	9.756	Se aplica en SISMO Y

MODELO CORREGIDO
Response Espectrum Base Reactions

	F1	F2	Total	90% Vs
$V_{s(x)}$ =	4779.13	0	**4779.13**	**4605.8**
$V_{s(y)}$ =	0	4631.26	**4631.26**	**4605.8**

PROYECTO: SEDE EDUCATIVA AGROECOL, UNIÓN PANAMERICANA (CHOCÓ)
CALCULO DEL CORTANTE BASAL DE LA ESTRUCTURA (ESPECTRO DE UMBRAL DE DAÑO NSR-10)

CALCULO DEL CORTANTE BASAL DE LA ESTRUCTURA

$H_{edificio}$=	**7.50**	m	
Tipo de Perfil:	**E**		
Ad =	0.10		
Fv =	0.40		
C_t =	**0.047**		
α =	**0.90**		
T_a =	0.29	Seg	
C_u =	1.20		
$C_u T_a$ =	0.35	Seg	
$T_{modelación\ estructural}$ =	**0.30**	Seg	
ΔT =	4.10	%	Ok!
$T_{adoptado}$ =	0.29	Seg	
S_a =	**0.300**		S_a obtenido del espectro de diseño
g =	9.81	m/s^2	
M =	**463.70**	Ton	Masa obtenida del modelo
V_s =	**1364.67**	kN	

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
$V_{s(x)}$=	1273.7	0	1273.70	0.964	**9.460**	Se aplica en SISMO X
$V_{s(y)}$=	0	1233.86	1233.86	0.995	**9.765**	Se aplica en SISMO Y

MODELO CORREGIDO
Response Espectrum Base Reactions

	F1	F2	Total	90% Vs
$V_{s(x)}$=	1273.7	0	**1273.70**	**1228.2**
$V_{s(y)}$=	0	1233.86	**1233.86**	**1228.2**

Diseños & Estructuras

PROYECTO: AGROECOL (CHOCO)

CÁLCULO DE DERIVAS MÁXIMAS

ALTURA DE N+7.50	3.50	m
ALTURA DE N+4.00	4.00	m
ALTURA DE BASE	0.00	m
ALTURA DE N-0.05	1.75	m
ALTURA DE N-1.80	1.70	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+4.00	1	COMDER1 MAX	0.03766	0.00805	0.03851	0.96	OK
N+4.00	1	COMDER1 MIN	-0.03766	-0.00805	0.03851	0.96	OK
N+4.00	1	COMDER2 MAX	0.02814	0.02191	0.03566	0.89	OK
N+4.00	1	COMDER2 MIN	-0.02814	-0.02191	0.03566	0.89	OK
BASE	1	COMDER1 MAX	0	0	--	--	--
BASE	1	COMDER1 MIN	0	0	--	--	--
BASE	1	COMDER2 MAX	0	0	--	--	--
BASE	1	COMDER2 MIN	0	0	--	--	--
N+4.00	2	COMDER1 MAX	0.03766	0.00882	0.03868	0.97	OK
N+4.00	2	COMDER1 MIN	-0.03766	-0.00882	0.03868	0.97	OK
N+4.00	2	COMDER2 MAX	0.02814	0.0196	0.03429	0.86	OK
N+4.00	2	COMDER2 MIN	-0.02814	-0.0196	0.03429	0.86	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+7.50	3	COMDER1 MAX	0.05796	0.014	0.02318	0.66	OK
N+7.50	3	COMDER1 MIN	-0.05796	-0.014	0.02318	0.66	OK
N+7.50	3	COMDER2 MAX	0.04032	0.03794	0.02307	0.66	OK
N+7.50	3	COMDER2 MIN	-0.04032	-0.03794	0.02307	0.66	OK
N+4.00	3	COMDER1 MAX	0.03556	0.00805	0.03646	0.91	OK
N+4.00	3	COMDER1 MIN	-0.03556	-0.00805	0.03646	0.91	OK
N+4.00	3	COMDER2 MAX	0.02373	0.02191	0.03230	0.81	OK
N+4.00	3	COMDER2 MIN	-0.02373	-0.02191	0.03230	0.81	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+7.50	4	COMDER1 MAX	0.05796	0.01547	0.02337	0.67	OK
N+7.50	4	COMDER1 MIN	-0.05796	-0.01547	0.02337	0.67	OK
N+7.50	4	COMDER2 MAX	0.04032	0.03367	0.02175	0.62	OK
N+7.50	4	COMDER2 MIN	-0.04032	-0.03367	0.02175	0.62	OK
N+4.00	4	COMDER1 MAX	0.03556	0.00882	0.03664	0.92	OK
N+4.00	4	COMDER1 MIN	-0.03556	-0.00882	0.03664	0.92	OK
N+4.00	4	COMDER2 MAX	0.02373	0.0196	0.03078	0.77	OK
N+4.00	4	COMDER2 MIN	-0.02373	-0.0196	0.03078	0.77	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+7.50	5	COMDER1 MAX	0.05341	0.03066	0.02534	0.72	OK
N+7.50	5	COMDER1 MIN	-0.05341	-0.03066	0.02534	0.72	OK
N+7.50	5	COMDER2 MAX	0.02905	0.06118	0.02928	0.84	OK
N+7.50	5	COMDER2 MIN	-0.02905	-0.06118	0.02928	0.84	OK
N+4.00	5	COMDER1 MAX	0.03248	0.01638	0.03638	0.91	OK
N+4.00	5	COMDER1 MIN	-0.03248	-0.01638	0.03638	0.91	OK
N+4.00	5	COMDER2 MAX	0.01729	0.03437	0.03847	0.96	OK
N+4.00	5	COMDER2 MIN	-0.01729	-0.03437	0.03847	0.96	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+7.50	6	COMDER1 MAX	0.05341	0.02212	0.02320	0.66	OK
N+7.50	6	COMDER1 MIN	-0.05341	-0.02212	0.02320	0.66	OK
N+7.50	6	COMDER2 MAX	0.02905	0.04942	0.02437	0.70	OK
N+7.50	6	COMDER2 MIN	-0.02905	-0.04942	0.02437	0.70	OK
N+4.00	6	COMDER1 MAX	0.03248	0.01211	0.03466	0.87	OK
N+4.00	6	COMDER1 MIN	-0.03248	-0.01211	0.03466	0.87	OK
N+4.00	6	COMDER2 MAX	0.01729	0.02807	0.03297	0.82	OK
N+4.00	6	COMDER2 MIN	-0.01729	-0.02807	0.03297	0.82	OK
BASE	6	COMDER1 MAX	0	0	--	--	--
BASE	6	COMDER1 MIN	0	0	--	--	--
BASE	6	COMDER2 MAX	0	0	--	--	--
BASE	6	COMDER2 MIN	0	0	--	--	--
N+7.50	7	COMDER1 MAX	0.05341	0.014	0.02176	0.62	OK

Diseños & Estructuras

PROYECTO: AGROECOL (CHOCO)

CÁLCULO DE DERIVAS MÁXIMAS

ALTURA DE N+7.50	3.50	m
ALTURA DE N+4.00	4.00	m
ALTURA DE BASE	0.00	m
ALTURA DE N-0.05	1.75	m
ALTURA DE N-1.80	1.70	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+7.50	7	COMDER1 MIN	-0.05341	-0.014	0.02176	0.62	OK
N+7.50	7	COMDER2 MAX	0.02905	0.03794	0.01988	0.57	OK
N+7.50	7	COMDER2 MIN	-0.02905	-0.03794	0.01988	0.57	OK
N+4.00	7	COMDER1 MAX	0.03248	0.00805	0.03346	0.84	OK
N+4.00	7	COMDER1 MIN	-0.03248	-0.00805	0.03346	0.84	OK
N+4.00	7	COMDER2 MAX	0.01729	0.02191	0.02791	0.70	OK
N+4.00	7	COMDER2 MIN	-0.01729	-0.02191	0.02791	0.70	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+7.50	8	COMDER1 MAX	0.05341	0.01547	0.02196	0.63	OK
N+7.50	8	COMDER1 MIN	-0.05341	-0.01547	0.02196	0.63	OK
N+7.50	8	COMDER2 MAX	0.02905	0.03367	0.01834	0.52	OK
N+7.50	8	COMDER2 MIN	-0.02905	-0.03367	0.01834	0.52	OK
N+4.00	8	COMDER1 MAX	0.03248	0.00882	0.03366	0.84	OK
N+4.00	8	COMDER1 MIN	-0.03248	-0.00882	0.03366	0.84	OK
N+4.00	8	COMDER2 MAX	0.01729	0.0196	0.02614	0.65	OK
N+4.00	8	COMDER2 MIN	-0.01729	-0.0196	0.02614	0.65	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+7.50	12	COMDER1 MAX	0.04858	0.03066	0.02402	0.69	OK
N+7.50	12	COMDER1 MIN	-0.04858	-0.03066	0.02402	0.69	OK
N+7.50	12	COMDER2 MAX	0.01708	0.06118	0.02761	0.79	OK
N+7.50	12	COMDER2 MIN	-0.01708	-0.06118	0.02761	0.79	OK
N+4.00	12	COMDER1 MAX	0.02926	0.01638	0.03353	0.84	OK
N+4.00	12	COMDER1 MIN	-0.02926	-0.01638	0.03353	0.84	OK
N+4.00	12	COMDER2 MAX	0.0105	0.03437	0.03594	0.90	OK
N+4.00	12	COMDER2 MIN	-0.0105	-0.03437	0.03594	0.90	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+7.50	13	COMDER1 MAX	0.04858	0.02212	0.02176	0.62	OK
N+7.50	13	COMDER1 MIN	-0.04858	-0.02212	0.02176	0.62	OK
N+7.50	13	COMDER2 MAX	0.01708	0.04942	0.02234	0.64	OK
N+7.50	13	COMDER2 MIN	-0.01708	-0.04942	0.02234	0.64	OK
N+4.00	13	COMDER1 MAX	0.02926	0.01211	0.03167	0.79	OK
N+4.00	13	COMDER1 MIN	-0.02926	-0.01211	0.03167	0.79	OK
N+4.00	13	COMDER2 MAX	0.0105	0.02807	0.02997	0.75	OK
N+4.00	13	COMDER2 MIN	-0.0105	-0.02807	0.02997	0.75	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+7.50	15	COMDER1 MAX	0.04858	0.014	0.02022	0.58	OK
N+7.50	15	COMDER1 MIN	-0.04858	-0.014	0.02022	0.58	OK
N+7.50	15	COMDER2 MAX	0.01708	0.03794	0.01733	0.50	OK
N+7.50	15	COMDER2 MIN	-0.01708	-0.03794	0.01733	0.50	OK
N+4.00	15	COMDER1 MAX	0.02926	0.00805	0.03035	0.76	OK
N+4.00	15	COMDER1 MIN	-0.02926	-0.00805	0.03035	0.76	OK
N+4.00	15	COMDER2 MAX	0.0105	0.02191	0.02430	0.61	OK
N+4.00	15	COMDER2 MIN	-0.0105	-0.02191	0.02430	0.61	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+7.50	16	COMDER1 MAX	0.04858	0.01547	0.02043	0.58	OK
N+7.50	16	COMDER1 MIN	-0.04858	-0.01547	0.02043	0.58	OK
N+7.50	16	COMDER2 MAX	0.01708	0.03367	0.01553	0.44	OK
N+7.50	16	COMDER2 MIN	-0.01708	-0.03367	0.01553	0.44	OK
N+4.00	16	COMDER1 MAX	0.02926	0.00882	0.03056	0.76	OK
N+4.00	16	COMDER1 MIN	-0.02926	-0.00882	0.03056	0.76	OK

Diseños & Estructuras

PROYECTO: AGROECOL (CHOCO)

CÁLCULO DE DERIVAS MÁXIMAS

ALTURA DE N+7.50	3.50	m
ALTURA DE N+4.00	4.00	m
ALTURA DE BASE	0.00	m
ALTURA DE N-0.05	1.75	m
ALTURA DE N-1.80	1.70	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+4.00	16	COMDER2 MAX	0.0105	0.0196	0.02224	0.56	OK
N+4.00	16	COMDER2 MIN	-0.0105	-0.0196	0.02224	0.56	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+7.50	18	COMDER1 MAX	0.05887	0.014	0.02555	0.73	OK
N+7.50	18	COMDER1 MIN	-0.05887	-0.014	0.02555	0.73	OK
N+7.50	18	COMDER2 MAX	0.03031	0.03794	0.02096	0.60	OK
N+7.50	18	COMDER2 MIN	-0.03031	-0.03794	0.02096	0.60	OK
N+4.00	18	COMDER1 MAX	0.03402	0.00805	0.03496	0.87	OK
N+4.00	18	COMDER1 MIN	-0.03402	-0.00805	0.03496	0.87	OK
N+4.00	18	COMDER2 MAX	0.0168	0.02191	0.02761	0.69	OK
N+4.00	18	COMDER2 MIN	-0.0168	-0.02191	0.02761	0.69	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+7.50	19	COMDER1 MAX	0.05887	0.01547	0.02572	0.73	OK
N+7.50	19	COMDER1 MIN	-0.05887	-0.01547	0.02572	0.73	OK
N+7.50	19	COMDER2 MAX	0.03031	0.03367	0.01951	0.56	OK
N+7.50	19	COMDER2 MIN	-0.03031	-0.03367	0.01951	0.56	OK
N+4.00	19	COMDER1 MAX	0.03402	0.00882	0.03514	0.88	OK
N+4.00	19	COMDER1 MIN	-0.03402	-0.00882	0.03514	0.88	OK
N+4.00	19	COMDER2 MAX	0.0168	0.0196	0.02581	0.65	OK
N+4.00	19	COMDER2 MIN	-0.0168	-0.0196	0.02581	0.65	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	--	--	--
N+7.50	21	COMDER1 MAX	0.06797	0.014	0.03006	0.86	OK
N+7.50	21	COMDER1 MIN	-0.06797	-0.014	0.03006	0.86	OK
N+7.50	21	COMDER2 MAX	0.04382	0.03794	0.02543	0.73	OK
N+7.50	21	COMDER2 MIN	-0.04382	-0.03794	0.02543	0.73	OK
N+4.00	21	COMDER1 MAX	0.0385	0.00805	0.03933	0.98	OK
N+4.00	21	COMDER1 MIN	-0.0385	-0.00805	0.03933	0.98	OK
N+4.00	21	COMDER2 MAX	0.02408	0.02191	0.03256	0.81	OK
N+4.00	21	COMDER2 MIN	-0.02408	-0.02191	0.03256	0.81	OK
BASE	21	COMDER1 MAX	0	0	--	--	--
BASE	21	COMDER1 MIN	0	0	--	--	--
BASE	21	COMDER2 MAX	0	0	--	--	--
BASE	21	COMDER2 MIN	0	0	--	--	--
N+7.50	22	COMDER1 MAX	0.06797	0.01547	0.03021	0.86	OK
N+7.50	22	COMDER1 MIN	-0.06797	-0.01547	0.03021	0.86	OK
N+7.50	22	COMDER2 MAX	0.04382	0.03367	0.02424	0.69	OK
N+7.50	22	COMDER2 MIN	-0.04382	-0.03367	0.02424	0.69	OK
N+4.00	22	COMDER1 MAX	0.0385	0.00882	0.03950	0.99	OK
N+4.00	22	COMDER1 MIN	-0.0385	-0.00882	0.03950	0.99	OK
N+4.00	22	COMDER2 MAX	0.02408	0.0196	0.03105	0.78	OK
N+4.00	22	COMDER2 MIN	-0.02408	-0.0196	0.03105	0.78	OK
BASE	22	COMDER1 MAX	0	0	--	--	--
BASE	22	COMDER1 MIN	0	0	--	--	--
BASE	22	COMDER2 MAX	0	0	--	--	--
BASE	22	COMDER2 MIN	0	0	--	--	--

Diseños & Estructuras

PROYECTO: AGROECOL (CHOCO)

CÁLCULO DE DERIVAS MÁXIMAS (ESPECTRO DE UMBRAL DE DAÑO)

ALTURA DE N+7.50	3.50	m
ALTURA DE N+4.00	4.00	m
ALTURA DE BASE	0.00	m
ALTURA DE N-0.05	1.75	m
ALTURA DE N-1.80	1.70	m
ALTURA DE BASE	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+4.00	1	COMDERUMB1 MAX	0.01300	0.00300	0.01334	0.33	OK
N+4.00	1	COMDERUMB1 MIN	-0.01300	-0.00300	0.01334	0.33	OK
N+4.00	1	COMDERUMB2 MAX	0.00980	0.00830	0.01284	0.32	OK
N+4.00	1	COMDERUMB2 MIN	-0.00980	-0.00830	0.01284	0.32	OK
BASE	1	COMDERUMB1 MAX	0.00000	0.00000	--	--	--
BASE	1	COMDERUMB1 MIN	0.00000	0.00000	--	--	--
BASE	1	COMDERUMB2 MAX	0.00000	0.00000	--	--	--
BASE	1	COMDERUMB2 MIN	0.00000	0.00000	--	--	--
N+4.00	2	COMDERUMB1 MAX	0.01300	0.00290	0.01332	0.33	OK
N+4.00	2	COMDERUMB1 MIN	-0.01300	-0.00290	0.01332	0.33	OK
N+4.00	2	COMDERUMB2 MAX	0.00980	0.00710	0.01210	0.30	OK
N+4.00	2	COMDERUMB2 MIN	-0.00980	-0.00710	0.01210	0.30	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+7.50	3	COMDERUMB1 MAX	0.02030	0.00520	0.00810	0.23	OK
N+7.50	3	COMDERUMB1 MIN	-0.02030	-0.00520	0.00810	0.23	OK
N+7.50	3	COMDERUMB2 MAX	0.01400	0.01440	0.00835	0.24	OK
N+7.50	3	COMDERUMB2 MIN	-0.01400	-0.01440	0.00835	0.24	OK
N+4.00	3	COMDERUMB1 MAX	0.01250	0.00300	0.01285	0.32	OK
N+4.00	3	COMDERUMB1 MIN	-0.01250	-0.00300	0.01285	0.32	OK
N+4.00	3	COMDERUMB2 MAX	0.00830	0.00830	0.01174	0.29	OK
N+4.00	3	COMDERUMB2 MIN	-0.00830	-0.00830	0.01174	0.29	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+7.50	4	COMDERUMB1 MAX	0.02030	0.00510	0.00810	0.23	OK
N+7.50	4	COMDERUMB1 MIN	-0.02030	-0.00510	0.00810	0.23	OK
N+7.50	4	COMDERUMB2 MAX	0.01400	0.01220	0.00765	0.22	OK
N+7.50	4	COMDERUMB2 MIN	-0.01400	-0.01220	0.00765	0.22	OK
N+4.00	4	COMDERUMB1 MAX	0.01250	0.00290	0.01283	0.32	OK
N+4.00	4	COMDERUMB1 MIN	-0.01250	-0.00290	0.01283	0.32	OK
N+4.00	4	COMDERUMB2 MAX	0.00830	0.00710	0.01092	0.27	OK
N+4.00	4	COMDERUMB2 MIN	-0.00830	-0.00710	0.01092	0.27	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+7.50	5	COMDERUMB1 MAX	0.01940	0.00980	0.00888	0.25	OK
N+7.50	5	COMDERUMB1 MIN	-0.01940	-0.00980	0.00888	0.25	OK
N+7.50	5	COMDERUMB2 MAX	0.01030	0.02190	0.01044	0.30	OK
N+7.50	5	COMDERUMB2 MIN	-0.01030	-0.02190	0.01044	0.30	OK
N+4.00	5	COMDERUMB1 MAX	0.01180	0.00520	0.01289	0.32	OK
N+4.00	5	COMDERUMB1 MIN	-0.01180	-0.00520	0.01289	0.32	OK
N+4.00	5	COMDERUMB2 MAX	0.00620	0.01230	0.01377	0.34	OK
N+4.00	5	COMDERUMB2 MIN	-0.00620	-0.01230	0.01377	0.34	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+7.50	6	COMDERUMB1 MAX	0.01940	0.00740	0.00833	0.24	OK
N+7.50	6	COMDERUMB1 MIN	-0.01940	-0.00740	0.00833	0.24	OK
N+7.50	6	COMDERUMB2 MAX	0.01030	0.01810	0.00881	0.25	OK
N+7.50	6	COMDERUMB2 MIN	-0.01030	-0.01810	0.00881	0.25	OK
N+4.00	6	COMDERUMB1 MAX	0.01180	0.00400	0.01246	0.31	OK
N+4.00	6	COMDERUMB1 MIN	-0.01180	-0.00400	0.01246	0.31	OK
N+4.00	6	COMDERUMB2 MAX	0.00620	0.01030	0.01202	0.30	OK
N+4.00	6	COMDERUMB2 MIN	-0.00620	-0.01030	0.01202	0.30	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	--	--	--
N+7.50	7	COMDERUMB1 MAX	0.01940	0.00520	0.00791	0.23	OK
N+7.50	7	COMDERUMB1 MIN	-0.01940	-0.00520	0.00791	0.23	OK

Diseños & Estructuras

PROYECTO: AGROECOL (CHOCO)

CÁLCULO DE DERIVAS MÁXIMAS (ESPECTRO DE UMBRAL DE DAÑO)

ALTURA DE N+7.50	3.50	m
ALTURA DE N+4.00	4.00	m
ALTURA DE BASE	0.00	m
ALTURA DE N-0.05	1.75	m
ALTURA DE N-1.80	1.70	m
ALTURA DE BASE	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+7.50	7	COMDERUMB2 MAX	0.01030	0.01440	0.00735	0.21	OK
N+7.50	7	COMDERUMB2 MIN	-0.01030	-0.01440	0.00735	0.21	OK
N+4.00	7	COMDERUMB1 MAX	0.01180	0.00300	0.01218	0.30	OK
N+4.00	7	COMDERUMB1 MIN	-0.01180	-0.00300	0.01218	0.30	OK
N+4.00	7	COMDERUMB2 MAX	0.00620	0.00830	0.01036	0.26	OK
N+4.00	7	COMDERUMB2 MIN	-0.00620	-0.00830	0.01036	0.26	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+7.50	8	COMDERUMB1 MAX	0.01940	0.00510	0.00791	0.23	OK
N+7.50	8	COMDERUMB1 MIN	-0.01940	-0.00510	0.00791	0.23	OK
N+7.50	8	COMDERUMB2 MAX	0.01030	0.01220	0.00654	0.19	OK
N+7.50	8	COMDERUMB2 MIN	-0.01030	-0.01220	0.00654	0.19	OK
N+4.00	8	COMDERUMB1 MAX	0.01180	0.00290	0.01215	0.30	OK
N+4.00	8	COMDERUMB1 MIN	-0.01180	-0.00290	0.01215	0.30	OK
N+4.00	8	COMDERUMB2 MAX	0.00620	0.00710	0.00943	0.24	OK
N+4.00	8	COMDERUMB2 MIN	-0.00620	-0.00710	0.00943	0.24	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+7.50	12	COMDERUMB1 MAX	0.01840	0.00980	0.00863	0.25	OK
N+7.50	12	COMDERUMB1 MIN	-0.01840	-0.00980	0.00863	0.25	OK
N+7.50	12	COMDERUMB2 MAX	0.00640	0.02190	0.00990	0.28	OK
N+7.50	12	COMDERUMB2 MIN	-0.00640	-0.02190	0.00990	0.28	OK
N+4.00	12	COMDERUMB1 MAX	0.01110	0.00520	0.01226	0.31	OK
N+4.00	12	COMDERUMB1 MIN	-0.01110	-0.00520	0.01226	0.31	OK
N+4.00	12	COMDERUMB2 MAX	0.00400	0.01230	0.01293	0.32	OK
N+4.00	12	COMDERUMB2 MIN	-0.00400	-0.01230	0.01293	0.32	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+7.50	13	COMDERUMB1 MAX	0.01840	0.00740	0.00805	0.23	OK
N+7.50	13	COMDERUMB1 MIN	-0.01840	-0.00740	0.00805	0.23	OK
N+7.50	13	COMDERUMB2 MAX	0.00640	0.01810	0.00816	0.23	OK
N+7.50	13	COMDERUMB2 MIN	-0.00640	-0.01810	0.00816	0.23	OK
N+4.00	13	COMDERUMB1 MAX	0.01110	0.00400	0.01180	0.29	OK
N+4.00	13	COMDERUMB1 MIN	-0.01110	-0.00400	0.01180	0.29	OK
N+4.00	13	COMDERUMB2 MAX	0.00400	0.01030	0.01105	0.28	OK
N+4.00	13	COMDERUMB2 MIN	-0.00400	-0.01030	0.01105	0.28	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+7.50	15	COMDERUMB1 MAX	0.01840	0.00520	0.00762	0.22	OK
N+7.50	15	COMDERUMB1 MIN	-0.01840	-0.00520	0.00762	0.22	OK
N+7.50	15	COMDERUMB2 MAX	0.00640	0.01440	0.00656	0.19	OK
N+7.50	15	COMDERUMB2 MIN	-0.00640	-0.01440	0.00656	0.19	OK
N+4.00	15	COMDERUMB1 MAX	0.01110	0.00300	0.01150	0.29	OK
N+4.00	15	COMDERUMB1 MIN	-0.01110	-0.00300	0.01150	0.29	OK
N+4.00	15	COMDERUMB2 MAX	0.00400	0.00830	0.00921	0.23	OK
N+4.00	15	COMDERUMB2 MIN	-0.00400	-0.00830	0.00921	0.23	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+7.50	16	COMDERUMB1 MAX	0.01840	0.00510	0.00762	0.22	OK
N+7.50	16	COMDERUMB1 MIN	-0.01840	-0.00510	0.00762	0.22	OK
N+7.50	16	COMDERUMB2 MAX	0.00640	0.01220	0.00564	0.16	OK
N+7.50	16	COMDERUMB2 MIN	-0.00640	-0.01220	0.00564	0.16	OK
N+4.00	16	COMDERUMB1 MAX	0.01110	0.00290	0.01147	0.29	OK
N+4.00	16	COMDERUMB1 MIN	-0.01110	-0.00290	0.01147	0.29	OK
N+4.00	16	COMDERUMB2 MAX	0.00400	0.00710	0.00815	0.20	OK
N+4.00	16	COMDERUMB2 MIN	-0.00400	-0.00710	0.00815	0.20	OK

PROYECTO: AGROECOL (CHOCO)

CÁLCULO DE DERIVAS MÁXIMAS (ESPECTRO DE UMBRAL DE DAÑO)

ALTURA DE N+7.50	**3.50**	**m**
ALTURA DE N+4.00	**4.00**	**m**
ALTURA DE BASE	**0.00**	**m**
ALTURA DE N-0.05	**1.75**	**m**
ALTURA DE N-1.80	**1.70**	**m**
ALTURA DE BASE	**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*	*%*	
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	--	--	--
N+7.50	18	COMDERUMB1 MAX	0.02130	0.00520	0.00926	0.26	OK
N+7.50	18	COMDERUMB1 MIN	-0.02130	-0.00520	0.00926	0.26	OK
N+7.50	18	COMDERUMB2 MAX	0.01070	0.01440	0.00776	0.22	OK
N+7.50	18	COMDERUMB2 MIN	-0.01070	-0.01440	0.00776	0.22	OK
N+4.00	18	COMDERUMB1 MAX	0.01230	0.00300	0.01266	0.32	OK
N+4.00	18	COMDERUMB1 MIN	-0.01230	-0.00300	0.01266	0.32	OK
N+4.00	18	COMDERUMB2 MAX	0.00590	0.00830	0.01018	0.25	OK
N+4.00	18	COMDERUMB2 MIN	-0.00590	-0.00830	0.01018	0.25	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+7.50	19	COMDERUMB1 MAX	0.02130	0.00510	0.00926	0.26	OK
N+7.50	19	COMDERUMB1 MIN	-0.02130	-0.00510	0.00926	0.26	OK
N+7.50	19	COMDERUMB2 MAX	0.01070	0.01220	0.00700	0.20	OK
N+7.50	19	COMDERUMB2 MIN	-0.01070	-0.01220	0.00700	0.20	OK
N+4.00	19	COMDERUMB1 MAX	0.01230	0.00290	0.01264	0.32	OK
N+4.00	19	COMDERUMB1 MIN	-0.01230	-0.00290	0.01264	0.32	OK
N+4.00	19	COMDERUMB2 MAX	0.00590	0.00710	0.00923	0.23	OK
N+4.00	19	COMDERUMB2 MIN	-0.00590	-0.00710	0.00923	0.23	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	--	--	--
N+7.50	21	COMDERUMB1 MAX	0.02380	0.00520	0.01053	0.30	OK
N+7.50	21	COMDERUMB1 MIN	-0.02380	-0.00520	0.01053	0.30	OK
N+7.50	21	COMDERUMB2 MAX	0.01520	0.01440	0.00921	0.26	OK
N+7.50	21	COMDERUMB2 MIN	-0.01520	-0.01440	0.00921	0.26	OK
N+4.00	21	COMDERUMB1 MAX	0.01350	0.00300	0.01383	0.35	OK
N+4.00	21	COMDERUMB1 MIN	-0.01350	-0.00300	0.01383	0.35	OK
N+4.00	21	COMDERUMB2 MAX	0.00830	0.00830	0.01174	0.29	OK
N+4.00	21	COMDERUMB2 MIN	-0.00830	-0.00830	0.01174	0.29	OK
BASE	21	COMDERUMB1 MAX	0.00000	0.00000	--	--	--
BASE	21	COMDERUMB1 MIN	0.00000	0.00000	--	--	--
BASE	21	COMDERUMB2 MAX	0.00000	0.00000	--	--	--
BASE	21	COMDERUMB2 MIN	0.00000	0.00000	--	--	--
N+7.50	22	COMDERUMB1 MAX	0.02380	0.00510	0.01053	0.30	OK
N+7.50	22	COMDERUMB1 MIN	-0.02380	-0.00510	0.01053	0.30	OK
N+7.50	22	COMDERUMB2 MAX	0.01520	0.01220	0.00858	0.25	OK
N+7.50	22	COMDERUMB2 MIN	-0.01520	-0.01220	0.00858	0.25	OK
N+4.00	22	COMDERUMB1 MAX	0.01350	0.00290	0.01381	0.35	OK
N+4.00	22	COMDERUMB1 MIN	-0.01350	-0.00290	0.01381	0.35	OK
N+4.00	22	COMDERUMB2 MAX	0.00830	0.00710	0.01092	0.27	OK
N+4.00	22	COMDERUMB2 MIN	-0.00830	-0.00710	0.01092	0.27	OK
BASE	22	COMDERUMB1 MAX	0.00000	0.00000	--	--	--
BASE	22	COMDERUMB1 MIN	0.00000	0.00000	--	--	--
BASE	22	COMDERUMB2 MAX	0.00000	0.00000	--	--	--
BASE	22	COMDERUMB2 MIN	0.00000	0.00000	--	--	--

Diseños & Estructuras

PROYECTO: AGROECOL (CHOCO)

VERIFICACIÓN IRREGULARIDAD TORSIONAL

Story	Point	Load	UX	UY	UZ	Δ_1	*Irregularidad Torsional* $1.2*(\Delta_1+\Delta_2)/2$	*Irregularidad Torsional Extrema* $1.4*(\Delta_1+\Delta_2)/2$	I.T.Extrema≥Δ1 >I.T.?	Δ1>I.T.Extrema?
			m	m	m	m				
N+7.50	3	COMDER1 MAX	0.0828	0.02	0.0003	0.0331	0.0399	0.0465	NO	NO
N+7.50	3	COMDER1 MIN	-0.0828	-0.02	-0.0003	0.0331	0.0399	0.0465	NO	NO
N+7.50	3	COMDER2 MAX	0.0576	0.0542	0.0002	0.0330	0.0384	0.0448	NO	NO
N+7.50	3	COMDER2 MIN	-0.0576	-0.0542	-0.0002	0.0330	0.0384	0.0448	NO	NO
N+4.00	3	COMDER1 MAX	0.0508	0.0115	0.0003	0.0521	0.0627	0.0731	NO	NO
N+4.00	3	COMDER1 MIN	-0.0508	-0.0115	-0.0003	0.0521	0.0627	0.0731	NO	NO
N+4.00	3	COMDER2 MAX	0.0339	0.0313	0.0002	0.0461	0.0541	0.0631	NO	NO
N+4.00	3	COMDER2 MIN	-0.0339	-0.0313	-0.0002	0.0461	0.0541	0.0631	NO	NO
BASE	3	COMDER1 MAX	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	3	COMDER1 MIN	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	3	COMDER2 MAX	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	3	COMDER2 MIN	0	0	0	0.0000	0.0000	0.0000	NO	NO

Story	Point	Load	UX	UY	UZ	Δ_1	*Irregularidad Torsional* $1.2*(\Delta_1+\Delta_2)/2$	*Irregularidad Torsional Extrema* $1.4*(\Delta_1+\Delta_2)/2$	I.T.Extrema≥Δ1 >I.T.?	Δ1>I.T.Extrema?
			m	m	m	m				
N+7.50	4	COMDER1 MAX	0.0828	0.0221	0.0003	0.0334	0.0459	0.0536	NO	NO
N+7.50	4	COMDER1 MIN	-0.0828	-0.0221	-0.0003	0.0334	0.0459	0.0536	NO	NO
N+7.50	4	COMDER2 MAX	0.0576	0.0481	0.0002	0.0311	0.0394	0.0460	NO	NO
N+7.50	4	COMDER2 MIN	-0.0576	-0.0481	-0.0002	0.0311	0.0394	0.0460	NO	NO
N+4.00	4	COMDER1 MAX	0.0508	0.0126	0.0003	0.0523	0.0653	0.0761	NO	NO
N+4.00	4	COMDER1 MIN	-0.0508	-0.0126	-0.0003	0.0523	0.0653	0.0761	NO	NO
N+4.00	4	COMDER2 MAX	0.0339	0.028	0.0002	0.0440	0.0530	0.0618	NO	NO
N+4.00	4	COMDER2 MIN	-0.0339	-0.028	-0.0002	0.0440	0.0530	0.0618	NO	NO
BASE	4	COMDER1 MAX	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	4	COMDER1 MIN	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	4	COMDER2 MAX	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	4	COMDER2 MIN	0	0	0	0.0000	0.0000	0.0000	NO	NO

Story	Point	Load	UX	UY	UZ	Δ_1	*Irregularidad Torsional* $1.2*(\Delta_1+\Delta_2)/2$	*Irregularidad Torsional Extrema* $1.4*(\Delta_1+\Delta_2)/2$	I.T.Extrema≥Δ1 >I.T.?	Δ1>I.T.Extrema?
			m	m	m	m				
N+7.50	22	COMDER1 MAX	0.0971	0.0221	0.0004	0.0432	0.0517	0.0603	NO	NO
N+7.50	22	COMDER1 MIN	-0.0971	-0.0221	-0.0004	0.0432	0.0517	0.0603	NO	NO
N+7.50	22	COMDER2 MAX	0.0626	0.0481	0.0003	0.0346	0.0426	0.0497	NO	NO
N+7.50	22	COMDER2 MIN	-0.0626	-0.0481	-0.0003	0.0346	0.0426	0.0497	NO	NO
N+4.00	22	COMDER1 MAX	0.055	0.0126	0.0003	0.0564	0.0676	0.0788	NO	NO
N+4.00	22	COMDER1 MIN	-0.055	-0.0126	-0.0003	0.0564	0.0676	0.0788	NO	NO
N+4.00	22	COMDER2 MAX	0.0344	0.028	0.0002	0.0444	0.0545	0.0636	NO	NO
N+4.00	22	COMDER2 MIN	-0.0344	-0.028	-0.0002	0.0444	0.0545	0.0636	NO	NO
BASE	22	COMDER1 MAX	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	22	COMDER1 MIN	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	22	COMDER2 MAX	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	22	COMDER2 MIN	0	0	0	0.0000	0.0000	0.0000	NO	NO

Story	Point	Load	UX	UY	UZ	Δ_1	***Irregularidad Torsional*** 1.2*($\Delta_1+\Delta_2$)/2	***Irregularidad Torsional Extrema*** 1.4*($\Delta_1+\Delta_2$)/2	I.T.Extrema≥Δ1 >I.T.?	Δ1>I.T.Extrema?
			m	m	m	m				
N+7.50	21	COMDER1 MAX	0.0971	0.02	0.0003	0.0429	0.0431	0.0503	NO	NO
N+7.50	21	COMDER1 MIN	-0.0971	-0.02	-0.0003	0.0429	0.0431	0.0503	NO	NO
N+7.50	21	COMDER2 MAX	0.0626	0.0542	0.0002	0.0363	0.0366	0.0428	NO	NO
N+7.50	21	COMDER2 MIN	-0.0626	-0.0542	-0.0002	0.0363	0.0366	0.0428	NO	NO
N+4.00	21	COMDER1 MAX	0.055	0.0115	0.0003	0.0562	0.0597	0.0697	NO	NO
N+4.00	21	COMDER1 MIN	-0.055	-0.0115	-0.0003	0.0562	0.0597	0.0697	NO	NO
N+4.00	21	COMDER2 MAX	0.0344	0.0313	0.0002	0.0465	0.0487	0.0569	NO	NO
N+4.00	21	COMDER2 MIN	-0.0344	-0.0313	-0.0002	0.0465	0.0487	0.0569	NO	NO
BASE	21	COMDER1 MAX	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	21	COMDER1 MIN	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	21	COMDER2 MAX	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	21	COMDER2 MIN	0	0	0	0.0000	0.0000	0.0000	NO	NO

Story	Point	Load	UX	UY	UZ	Δ_1	***Irregularidad Torsional*** 1.2*($\Delta_1+\Delta_2$)/2	***Irregularidad Torsional Extrema*** 1.4*($\Delta_1+\Delta_2$)/2	I.T.Extrema≥Δ1 >I.T.?	Δ1>I.T.Extrema?
			m	m	m	m				
N+7.50	15	COMDER1 MAX	0.0694	0.02	0.0001	0.0289	0.0379	0.0442	NO	NO
N+7.50	15	COMDER1 MIN	-0.0694	-0.02	-0.0001	0.0289	0.0379	0.0442	NO	NO
N+7.50	15	COMDER2 MAX	0.0244	0.0542	0.0001	0.0248	0.0385	0.0449	NO	NO
N+7.50	15	COMDER2 MIN	-0.0244	-0.0542	-0.0001	0.0248	0.0385	0.0449	NO	NO
N+4.00	15	COMDER1 MAX	0.0418	0.0115	0.0001	0.0434	0.0548	0.0639	NO	NO
N+4.00	15	COMDER1 MIN	-0.0418	-0.0115	-0.0001	0.0434	0.0548	0.0639	NO	NO
N+4.00	15	COMDER2 MAX	0.015	0.0313	0.0001	0.0347	0.0516	0.0602	NO	NO
N+4.00	15	COMDER2 MIN	-0.015	-0.0313	-0.0001	0.0347	0.0516	0.0602	NO	NO
BASE	15	COMDER1 MAX	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	15	COMDER1 MIN	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	15	COMDER2 MAX	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	15	COMDER2 MIN	0	0	0	0.0000	0.0000	0.0000	NO	NO

Story	Point	Load	UX	UY	UZ	Δ_1	***Irregularidad Torsional*** 1.2*($\Delta_1+\Delta_2$)/2	***Irregularidad Torsional Extrema*** 1.4*($\Delta_1+\Delta_2$)/2	I.T.Extrema≥Δ1 >I.T.?	Δ1>I.T.Extrema?
			m	m	m	m				
N+7.50	12	COMDER1 MAX	0.0694	0.0438	0.0003	0.0343	0.0423	0.0494	NO	NO
N+7.50	12	COMDER1 MIN	-0.0694	-0.0438	-0.0003	0.0343	0.0423	0.0494	NO	NO
N+7.50	12	COMDER2 MAX	0.0244	0.0874	0.0004	0.0394	0.0488	0.0569	NO	NO
N+7.50	12	COMDER2 MIN	-0.0244	-0.0874	-0.0004	0.0394	0.0488	0.0569	NO	NO
N+4.00	12	COMDER1 MAX	0.0418	0.0234	0.0002	0.0479	0.0599	0.0699	NO	NO
N+4.00	12	COMDER1 MIN	-0.0418	-0.0234	-0.0002	0.0479	0.0599	0.0699	NO	NO
N+4.00	12	COMDER2 MAX	0.015	0.0491	0.0003	0.0513	0.0638	0.0744	NO	NO
N+4.00	12	COMDER2 MIN	-0.015	-0.0491	-0.0003	0.0513	0.0638	0.0744	NO	NO
BASE	12	COMDER1 MAX	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	12	COMDER1 MIN	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	12	COMDER2 MAX	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	12	COMDER2 MIN	0	0	0	0.0000	0.0000	0.0000	NO	NO

Story	Point	Load	UX	UY	UZ	Δ_1	***Irregularidad Torsional*** 1.2*($\Delta_1+\Delta_2$)/2	***Irregularidad Torsional Extrema*** 1.4*($\Delta_1+\Delta_2$)/2	I.T.Extrema≥Δ1 >I.T.?	Δ1>I.T.Extrema?
			m	m	m	m				
N+7.50	5	COMDER1 MAX	0.0763	0.0438	0.0003	0.0362	0.0404	0.0471	NO	NO
N+7.50	5	COMDER1 MIN	-0.0763	-0.0438	-0.0003	0.0362	0.0404	0.0471	NO	NO
N+7.50	5	COMDER2 MAX	0.0415	0.0874	0.0003	0.0418	0.0421	0.0492	NO	NO
N+7.50	5	COMDER2 MIN	-0.0415	-0.0874	-0.0003	0.0418	0.0421	0.0492	NO	NO
N+4.00	5	COMDER1 MAX	0.0464	0.0234	0.0002	0.0520	0.0599	0.0698	NO	NO
N+4.00	5	COMDER1 MIN	-0.0464	-0.0234	-0.0002	0.0520	0.0599	0.0698	NO	NO
N+4.00	5	COMDER2 MAX	0.0247	0.0491	0.0002	0.0550	0.0569	0.0664	NO	NO
N+4.00	5	COMDER2 MIN	-0.0247	-0.0491	-0.0002	0.0550	0.0569	0.0664	NO	NO
BASE	5	COMDER1 MAX	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	5	COMDER1 MIN	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	5	COMDER2 MAX	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	5	COMDER2 MIN	0	0	0	0.0000	0.0000	0.0000	NO	NO

Story	Point	Load	UX	UY	UZ	Δ_1	***Irregularidad Torsional*** 1.2*($\Delta_1+\Delta_2$)/2	***Irregularidad Torsional Extrema*** 1.4*($\Delta_1+\Delta_2$)/2	I.T.Extrema≥Δ1 >I.T.?	Δ1>I.T.Extrema?
			m	m	m	m				
N+7.50	7	COMDER1 MAX	0.0763	0.02	0.0001	0.0311	0.0385	0.0449	NO	NO
N+7.50	7	COMDER1 MIN	-0.0763	-0.02	-0.0001	0.0311	0.0385	0.0449	NO	NO
N+7.50	7	COMDER2 MAX	0.0415	0.0542	0	0.0284	0.0368	0.0430	NO	NO
N+7.50	7	COMDER2 MIN	-0.0415	-0.0542	0	0.0284	0.0368	0.0430	NO	NO
N+4.00	7	COMDER1 MAX	0.0464	0.0115	0	0.0478	0.0599	0.0699	NO	NO
N+4.00	7	COMDER1 MIN	-0.0464	-0.0115	0	0.0478	0.0599	0.0699	NO	NO
N+4.00	7	COMDER2 MAX	0.0247	0.0313	0	0.0399	0.0516	0.0602	NO	NO
N+4.00	7	COMDER2 MIN	-0.0247	-0.0313	0	0.0399	0.0516	0.0602	NO	NO
BASE	7	COMDER1 MAX	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	7	COMDER1 MIN	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	7	COMDER2 MAX	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	7	COMDER2 MIN	0	0	0	0.0000	0.0000	0.0000	NO	NO

Story	Point	Load	UX	UY	UZ	Δ_1	***Irregularidad Torsional*** 1.2*($\Delta_1+\Delta_2$)/2	***Irregularidad Torsional Extrema*** 1.4*($\Delta_1+\Delta_2$)/2	I.T.Extrema≥Δ1 >I.T.?	Δ1>I.T.Extrema?
			m	m	m	m				
N+7.50	3	COMDER1 MAX	0.0828	0.02	0.0003	0.0331	0.0399	0.0465	NO	NO
N+7.50	3	COMDER1 MIN	-0.0828	-0.02	-0.0003	0.0331	0.0399	0.0465	NO	NO
N+7.50	3	COMDER2 MAX	0.0576	0.0542	0.0002	0.0330	0.0384	0.0448	NO	NO
N+7.50	3	COMDER2 MIN	-0.0576	-0.0542	-0.0002	0.0330	0.0384	0.0448	NO	NO
N+4.00	3	COMDER1 MAX	0.0508	0.0115	0.0003	0.0521	0.0627	0.0731	NO	NO
N+4.00	3	COMDER1 MIN	-0.0508	-0.0115	-0.0003	0.0521	0.0627	0.0731	NO	NO
N+4.00	3	COMDER2 MAX	0.0339	0.0313	0.0002	0.0461	0.0541	0.0631	NO	NO
N+4.00	3	COMDER2 MIN	-0.0339	-0.0313	-0.0002	0.0461	0.0541	0.0631	NO	NO
BASE	3	COMDER1 MAX	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	3	COMDER1 MIN	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	3	COMDER2 MAX	0	0	0	0.0000	0.0000	0.0000	NO	NO
BASE	3	COMDER2 MIN	0	0	0	0.0000	0.0000	0.0000	NO	NO

Diseños & Estructuras

PROYECTO: I.E. AGROECOL BLOQUE B
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+7.50	D2	COMDER1 MAX	0.1312	0.0389	0.063
N+7.50	D2	COMDER1 MIN	-0.1312	-0.0389	0.063
N+7.50	D2	COMDER2 MAX	0.045	0.0999	0.050
N+7.50	D2	COMDER2 MIN	-0.045	-0.0999	0.050
N+4.00	D1	COMDER1 MAX	0.0706	0.0209	0.074
N+4.00	D1	COMDER1 MIN	-0.0706	-0.0209	0.074
N+4.00	D1	COMDER2 MAX	0.028	0.0531	0.060
N+4.00	D1	COMDER2 MIN	-0.028	-0.0531	0.060

Diseños & Estructuras

PROYECTO: I.E. AGROECOL BLOQUE B
VERIFICACIÓN DE INDICE DE ESTABILIDAD Qi

DESPLAZAMIENTO DE DIAFRAGMAS RIGIDOS

FUERZA CORTANTE DEL PISO i

PISO	Fx	Vi
	kN	kN
N+7.50	1442.0	1442.00
N+4.00	3841.2	5283.20

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+7.50	425.76	347.58	347.58	0.35	149.02	149.02	496.59
N+4.00	432.83	116.10	116.10	2.45	1060.43	1060.43	1176.53

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.

Diseños & Estructuras

PROYECTO: I.E. AGROECOL BLOQUE B
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	Pi	Δcm	Vi	Qi	ESTABILIDAD
		m	kN	m	kN		Qi<0.10
N+7.50	COMDER1 MAX	3.50	496.591	0.063	1442.000	0.0062	ESTABLE
N+7.50	COMDER1 MIN	3.50	496.591	0.063	1442.000	0.0062	ESTABLE
N+7.50	COMDER2 MAX	3.50	496.591	0.050	1442.000	0.0049	ESTABLE
N+7.50	COMDER2 MIN	3.50	496.591	0.050	1442.000	0.0049	ESTABLE
N+4.00	COMDER1 MAX	4.00	1176.532	0.074	5283.200	0.0041	ESTABLE
N+4.00	COMDER1 MIN	4.00	1176.532	0.074	5283.200	0.0041	ESTABLE
N+4.00	COMDER2 MAX	4.00	1176.532	0.060	5283.200	0.0033	ESTABLE
N+4.00	COMDER2 MIN	4.00	1176.532	0.060	5283.200	0.0033	ESTABLE

4. DISEÑO DE CIMENTACIÓN

DISEÑO DE CIMENTACIÓN

PROYECTO: SEDE EDUCATIVA AGROECOL UNIÓN PANAMERICANA (CHOCÓ)
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 Limite de Servicio	CIMEN2= 1D + 0.75L + 0.70*(0.75/R)Ex + 0.21*(0.75/	**B.2.3-8**	**1.50**
	CIMEN3= 1D + 0.75L + 0.21*(0.75/R)Ex + 0.70*(0.75/		

Story	Point	Load	FX	FY	FZ	MX	MY	MZ	Load	COMBINACIÓN	Pumax
BASE	1	CIM1	34.55	9.91	144.93	-12.058	47.176	-0.029	CIM1		
BASE	1	CIM2 MAX	61.14	18.53	151.25	11.781	114.117	0.994	CIM2 MAX		
BASE	1	CIM2 MIN	2.25	-0.32	120.31	-34.269	-27.654	-1.065	CIM2 MIN	CIM1	144.9
BASE	1	CIM3 MAX	53.58	34.71	151.79	51.373	96.064	1.52	CIM3 MAX		
BASE	1	CIM3 MIN	9.82	-16.5	119.77	-73.86	-9.601	-1.592	CIM3 MIN		
BASE	2	CIM1	-31.5	9.86	143.6	-11.797	-39.624	-0.029	CIM1		
BASE	2	CIM2 MAX	0.57	19.34	149.92	14.409	34.515	0.994	CIM2 MAX		
BASE	2	CIM2 MIN	-58.53	-1.33	119.23	-36.188	-107.531	-1.065	CIM2 MIN	CIM1	143.6
BASE	2	CIM3 MAX	-6.59	31.77	154.58	44.909	16.991	1.52	CIM3 MAX		
BASE	2	CIM3 MIN	-51.37	-13.76	114.57	-66.689	-90.006	-1.592	CIM3 MIN		
BASE	3	CIM1	28.2	3.92	323.54	-4.713	38.537	-0.019	CIM1		
BASE	3	CIM2 MAX	48.85	10.49	325.8	8.761	89.822	0.655	CIM2 MAX		
BASE	3	CIM2 MIN	2.93	-2.24	286.21	-18.965	-19.09	-0.702	CIM2 MIN	CIM1	323.5
BASE	3	CIM3 MAX	40.87	21.37	322.95	32.527	71.248	1.001	CIM3 MAX		
BASE	3	CIM3 MIN	10.92	-13.12	289.06	-42.731	-0.516	-1.048	CIM3 MIN		
BASE	4	CIM1	-27.26	3.37	312.97	-3.892	-34.344	-0.019	CIM1		
BASE	4	CIM2 MAX	-2.37	10.57	315.37	10.995	22.503	0.655	CIM2 MAX		
BASE	4	CIM2 MIN	-47.77	-3.43	276.76	-19.51	-85.727	-0.702	CIM2 MIN	CIM1	313.0
BASE	4	CIM3 MAX	-10.4	19.11	308.4	29.536	3.874	1.001	CIM3 MAX		
BASE	4	CIM3 MIN	-39.75	-11.97	283.73	-38.052	-67.097	-1.048	CIM3 MIN		
BASE	5	CIM1	21.38	13.4	289.1	-16.968	30.054	-0.029	CIM1		
BASE	5	CIM2 MAX	44.59	28.95	301.42	25.126	88.17	0.994	CIM2 MAX		
BASE	5	CIM2 MIN	-3.82	-2.52	256.76	-59.22	-30.976	-1.065	CIM2 MIN	CIM1	289.1
BASE	5	CIM3 MAX	32.79	47	299.72	72.825	59.675	1.52	CIM3 MAX		
BASE	5	CIM3 MIN	7.99	-20.58	258.46	-106.919	-2.481	-1.592	CIM3 MIN		
BASE	6	CIM1	-0.57	15.1	502.89	-19.498	0.82	-0.019	CIM1		
BASE	6	CIM2 MAX	23.53	21.67	490.54	-1.121	54.586	0.655	CIM2 MAX		
BASE	6	CIM2 MIN	-24.63	7.28	472.97	-36.516	-53.141	-0.702	CIM2 MIN	CIM1	502.9
BASE	6	CIM3 MAX	12.37	31.46	498.12	22.678	29.533	1.001	CIM3 MAX		
BASE	6	CIM3 MIN	-13.47	-2.51	465.39	-60.315	-28.088	-1.048	CIM3 MIN		
BASE	7	CIM1	7.39	5.1	578.19	-6.259	11.274	-0.019	CIM1		
BASE	7	CIM2 MAX	30.68	10.59	555.58	7.057	63.978	0.655	CIM2 MAX		
BASE	7	CIM2 MIN	-17.11	-0.94	549.35	-19.103	-43.255	-0.702	CIM2 MIN	CIM1	578.2
BASE	7	CIM3 MAX	19.54	20.57	554.06	29.634	38.956	1.001	CIM3 MAX		
BASE	7	CIM3 MIN	-5.97	-10.92	550.87	-41.68	-18.233	-1.048	CIM3 MIN		
BASE	8	CIM1	-25.44	0.66	354.24	-0.334	-31.869	-0.019	CIM1		
BASE	8	CIM2 MAX	-3.51	6.97	355.56	13.816	19.042	0.655	CIM2 MAX		
BASE	8	CIM2 MIN	-44.52	-5.59	324.64	-14.771	-79.278	-0.702	CIM2 MIN	CIM1	354.2
BASE	8	CIM3 MAX	-13.23	14.49	348.06	31.018	-4.109	1.001	CIM3 MAX		
BASE	8	CIM3 MIN	-34.81	-13.1	332.14	-31.972	-56.128	-1.048	CIM3 MIN		
BASE	12	CIM1	27.26	-9.81	326.9	13.273	37.895	-0.029	CIM1		
BASE	12	CIM2 MAX	47.18	5.83	331.8	55.392	88.962	0.994	CIM2 MAX		
BASE	12	CIM2 MIN	3.6	-25.73	288.88	-29.112	-18.335	-1.065	CIM2 MIN	CIM1	326.9
BASE	12	CIM3 MAX	33.68	23.87	335.21	103.053	55.172	1.52	CIM3 MAX		
BASE	12	CIM3 MIN	17.09	-43.77	285.47	-76.773	15.455	-1.592	CIM3 MIN		
BASE	13	CIM1	1.54	-5.35	601.2	7.376	3.683	-0.019	CIM1		
BASE	13	CIM2 MAX	22.77	1.25	574.93	25.751	51.505	0.655	CIM2 MAX		
BASE	13	CIM2 MIN	-19.98	-13.17	553.88	-9.684	-44.707	-0.702	CIM2 MIN	CIM1	601.2
BASE	13	CIM3 MAX	8.88	11.11	579.92	49.634	20.405	1.001	CIM3 MAX		
BASE	13	CIM3 MIN	-6.09	-23.03	548.9	-33.567	-13.606	-1.048	CIM3 MIN		
BASE	15	CIM1	-1.78	20.62	851.38	-26.008	-0.267	-0.029	CIM1		
BASE	15	CIM2 MAX	24.22	29.53	809.07	0.032	58.801	0.994	CIM2 MAX		
BASE	15	CIM2 MIN	-26.53	8.69	799.05	-48.601	-57.936	-1.065	CIM2 MIN	CIM1	851.4
BASE	15	CIM3 MAX	7.95	47.3	808.7	41.692	21.366	1.52	CIM3 MAX		
BASE	15	CIM3 MIN	-10.26	-9.08	799.43	-90.261	-20.501	-1.592	CIM3 MIN		
BASE	16	CIM1	-23.37	-1.48	419.32	2.478	-29.046	-0.019	CIM1		
BASE	16	CIM2 MAX	-4.21	5.96	422.33	17.014	16.043	0.655	CIM2 MAX		
BASE	16	CIM2 MIN	-40.34	-8.02	389.38	-13.435	-71.468	-0.702	CIM2 MIN	CIM1	419.3
BASE	16	CIM3 MAX	-15.59	14.36	415.11	35.385	-11.749	1.001	CIM3 MAX		
BASE	16	CIM3 MIN	-28.97	-16.42	396.6	-31.806	-43.676	-1.048	CIM3 MIN		
BASE	18	CIM1	14.83	-31.61	790.9	42.066	21.728	-0.029	CIM1		
BASE	18	CIM2 MAX	45.08	-18.55	784.84	63.008	90.455	0.994	CIM2 MAX		
BASE	18	CIM2 MIN	-15.83	-39.63	706.45	14.068	-47.721	-1.065	CIM2 MIN	CIM1	790.9
BASE	18	CIM3 MAX	29.51	-0.3	766.31	105.303	55.296	1.52	CIM3 MAX		
BASE	18	CIM3 MIN	-0.27	-57.89	724.99	-28.227	-12.561	-1.592	CIM3 MIN		
BASE	19	CIM1	-28.97	-0.88	516.41	2.455	-33.38	-0.047	CIM1		
BASE	19	CIM2 MAX	19.76	12.55	536.07	34.941	86.719	1.598	CIM2 MAX		
BASE	19	CIM2 MIN	-75.46	-14.68	456.94	-30.037	-150.924	-1.713	CIM2 MIN	CIM1	516.4
BASE	19	CIM3 MAX	-5.05	28.89	516.75	74.135	25.669	2.444	CIM3 MAX		
BASE	19	CIM3 MIN	-50.66	-31.03	476.26	-69.232	-89.873	-2.559	CIM3 MIN		
BASE	21	CIM1	32.04	-15.45	373.46	21.795	47.293	-0.066	CIM1		
BASE	21	CIM2 MAX	87.37	0.94	397.04	63.45	196.349	2.252	CIM2 MAX		
BASE	21	CIM2 MIN	-26.01	-30.18	327.14	-23.046	-105.614	-2.413	CIM2 MIN	CIM1	373.5
BASE	21	CIM3 MAX	65.03	27.8	384.02	138.02	138.387	3.444	CIM3 MAX		
BASE	21	CIM3 MIN	-3.66	-57.03	340.16	-97.616	-47.652	-3.606	CIM3 MIN		
BASE	22	CIM1	-28.3	-17.35	326.87	24.644	-31.35	-0.066	CIM1		
BASE	22	CIM2 MAX	29.76	1.24	353.2	71.132	121.265	2.252	CIM2 MAX		
BASE	22	CIM2 MIN	-83.65	-34.04	279.44	-25.159	-180.749	-2.413	CIM2 MIN	CIM1	326.9
BASE	22	CIM3 MAX	7.82	22.1	348.22	128.988	63.837	3.444	CIM3 MAX		
BASE	22	CIM3 MIN	-61.72	-54.9	284.42	-83.015	-123.322	-3.606	CIM3 MIN		

CARGAS A CIMENTACIÓN

PROYECTO: SEDE EDUCATIVA AGROECOL UNIÓN PANAMERICANA (CHOCÓ)

Story	Point	Load	FX	FY	FZ	MX	MY	MZ
BASE	16	CIM1	-23.370	-1.480	419.320	2.478	-29.046	-0.019

DISEÑO VIGAS DE AMARRE

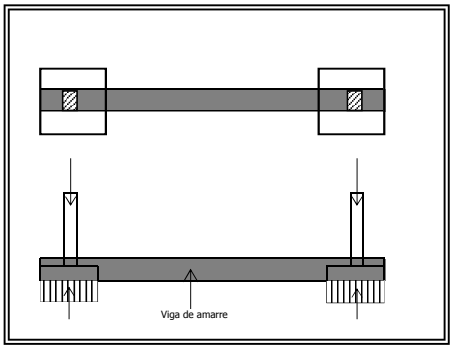
PROYECTO: SEDE EDUCATIVA AGROECOL UNIÓN PANAMERICANA (CHOCÓ)

VIGA DE AMARRE TIPO

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

b = **0.30** m
h = **0.40** m

Pmáx = 851.38 kN



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

Aa = ***0.40***
Paxial = 0.25*Aa*Pmáx
Paxial = *85.138* kN

DISEÑO A TENSIÓN

As = 1.7*85.138/(0.90*420)
As = **3.83** cm^2

DISEÑO A COMPRESIÓN

P com = 1.7*85.138
P com = *144.7* kN

Para esta carga la sección requiere cuantía mínima:

As = 0.00333*0.3*0.35
As = **3.50** cm^2

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

DISEÑO VIGAS DE AMARRE

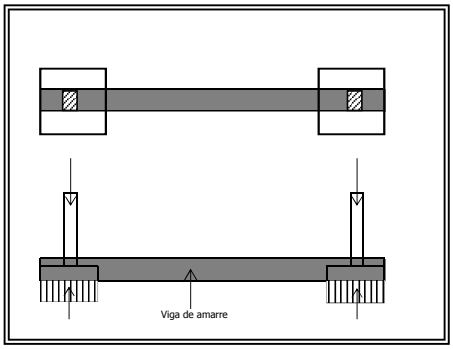
PROYECTO: SEDE EDUCATIVA AGROECOL UNIÓN PANAMERICANA (CHOCÓ)

VIGA DE AMARRE TIPO

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

b = **0.30** m
h = **0.50** m

Pmáx = 851.38 kN



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

Aa = ***0.40***
Paxial = 0.25*Aa*Pmáx
Paxial = *85.138* kN

DISEÑO A TENSIÓN

As = 1.7*85.138/(0.90*420)
As = **3.83** cm^2

DISEÑO A COMPRESIÓN

P com = 1.7*85.138
P com = *144.7* kN

Para esta carga la sección requiere cuantía mínima:

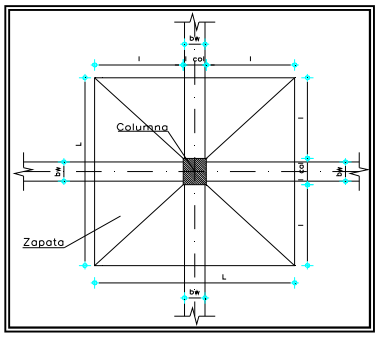
As = 0.00333*0.3*0.45
As = **4.50** cm^2

Se suministra un refuerzo constituido por 3#4 arriba y 3#5 abajo (como refuerzo mínimo).

DISEÑO DE ZAPATAS
PROYECTO: SEDE EDUCATIVA AGROECOL UNIÓN PANAMERICANA (CHOCÓ)
Zapata Tipo 1 - Concentrica Und.2

Columna	**b =**	40	cm		**f'c =**	21.1	MPa		**σ =**	0.120	MPa
	t =	40	cm		**fy =**	420	MPa				

PREDIMENSIONAMIENTO



L =	1.200	m	
lcol =	0.400	m	
l =	0.400	m	

Cargas

Mu=	0.000	kN*m
Pu =	144.93	kN
Pp (10%) =	14	kN
Σ P =	159	kN

Area necesaria = $\frac{\Sigma P}{\sigma} = \frac{159.42}{0.120} =$ 1.33 m²

e =	0.00	m
L =	1.153	m

Aproximamos = 1.20 m

Carga de diseño = $\frac{Pu}{A\ real} = \frac{144.93}{1.440} =$ 0.101 MPa

Esfuerzos

σmáx=	0.111	MPa	OK
σmin=	0.111	MPa	OK

DISEÑO DE ZAPATA CONCENTRICA

FLEXIÓN

M borde de la columna = 8.86 kN*m

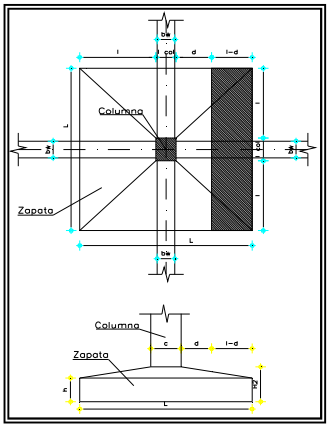
Mu = 1,7 * M borde de la columna = 15.06 kN*m

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

d=	0.23	m
Cuantia =	0.002	
As =	4.60	cm²/m

Armadura: 7#415c./0.20
en ambos sentidos

CORTANTE



a. En una dirección (d)

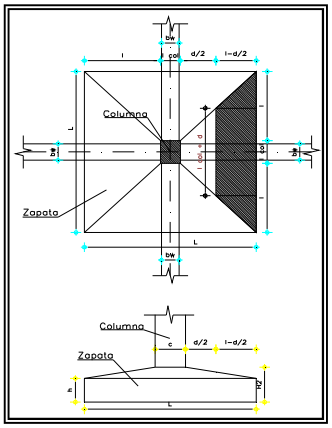
L =	1.20	m
l =	0.40	m
l - d =	0.17	m

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

V (d) =	22.58	kN
Vu (d)=	1.7*V(d)	
Vu (d) =	38.39	kN
h□=	0.23	m

$\upsilon v = \frac{Vu}{L * h□} =$ 0.139 MPa

ϕvc = 0.574 MPa **OK**



b. En dos direcciones (d/2)

Zapata Tipo 1 - Concentrica

L =	1.200	m	**H =**	0.30	m
d/2 =	0.115	m	**h =**	0.30	m
l - d/2 =	0.285	m	**H-h =**	0.00	m

V (d/2) =	28.9	kN
Vu (d/2) =	1.5*V(d)	
Vu (d/2) =	43.3	kN
d_1 =	0.23	m

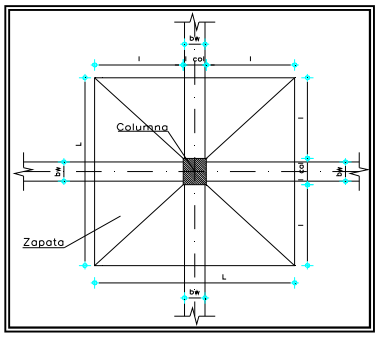
$$\nu u = \frac{Vu}{bo \times d_1} = 0.299 \text{ MPa}$$

ϕvc= 1.15 MPa **OK**

DISEÑO DE ZAPATAS
PROYECTO: SEDE EDUCATIVA AGROECOL UNIÓN PANAMERICANA (CHOCÓ)
Zapata Tipo 2 - Concentrica Und.7

Columna	**b =**	40	cm		**f'c =**	21.1	MPa		**σ =**	0.120	MPa
	t =	40	cm		**fy =**	420	MPa				

PREDIMENSIONAMIENTO



L =	1.900	m	
lcol =	0.400	m	
l =	0.750	m	

Cargas

Mu=	0.000	kN*m
Pu =	373.46	kN
Pp (10%) =	37	kN
Σ P =	411	kN

Area necesaria = $\frac{\Sigma P}{\sigma} = \frac{410.81}{0.120} =$ 3.42 m²

e =	0.00	m	
L =	1.850	m	*Aproximamos =* 1.90 m

Carga de diseño = $\frac{Pu}{A\ real} = \frac{373.46}{3.610} =$ 0.103 MPa

Esfuerzos

σmáx=	0.114	MPa	OK
σmin=	0.114	MPa	OK

DISEÑO DE ZAPATA CONCENTRICA

FLEXIÓN

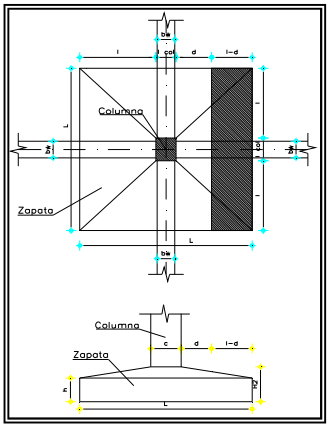
M borde de la columna = 32.01 kN*m

Mu = 1,7 * M borde de la columna = 54.41 kN*m

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

d=	0.23	m
Cuantia =	0.00252367	
As =	5.80	cm²/m
Armadura:	10#422c./0.20	
	en ambos sentidos	

CORTANTE



a. En una dirección (d)

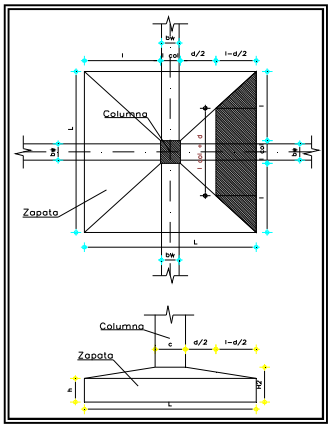
L =	1.90	m
l =	0.75	m
l - d =	0.52	m

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

V (d) =	112.43	kN
Vu (d)=	1.7*V(d)	
Vu (d) =	191.13	kN
h□=	0.23	m

$\upsilon\nu = \frac{Vu}{L * h□} =$ 0.437 MPa

ϕvc = 0.574 MPa **OK**



b. En dos direcciones (d/2)

Zapata Tipo 2 - Concentrica

L =	1.900	m	**H =**	0.30	m
d/2 =	0.115	m	**h =**	0.30	m
l - d/2 =	0.635	m	**H-h =**	0.00	m

V (d/2) =	91.4	kN
Vu (d/2) =	1.5*V(d)	
Vu (d/2) =	137.1	kN
d_1 =	0.23	m

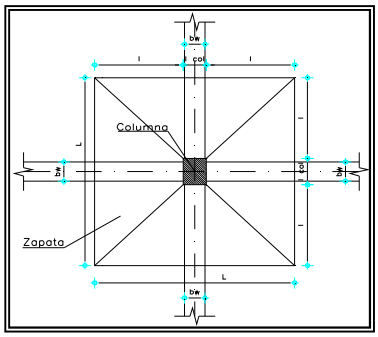
$$\nu u = \frac{Vu}{bo \times d_1} = 0.946 \text{ MPa}$$

ϕvc= 1.15 MPa **OK**

DISEÑO DE ZAPATAS
PROYECTO: SEDE EDUCATIVA AGROECOL UNIÓN PANAMERICANA (CHOCÓ)
Zapata Tipo 3 - Concentrica Und.2

Columna	**b =**	40	cm		**f'c =**	21.1	MPa		**σ =**	0.120	MPa
	t =	40	cm		**fy =**	420	MPa				

PREDIMENSIONAMIENTO



L =	2.200	m	
lcol =	0.400	m	
l =	0.900	m	

Cargas

Mu=	0.000	kN*m
Pu =	516.41	kN
Pp (10%) =	52	kN
Σ P =	568	kN

Area necesaria = $\frac{\Sigma P}{\sigma} = \frac{568.05}{0.120} =$ 4.73 m²

e =	0.00	m	
L =	2.176	m	*Aproximamos =* 2.20 m

Carga de diseño = $\frac{Pu}{A\ real} = \frac{516.41}{4.840} =$ 0.107 MPa

Esfuerzos

σmáx=	0.117	MPa	OK
σmin=	0.117	MPa	OK

DISEÑO DE ZAPATA CONCENTRICA

FLEXIÓN

M borde de la columna = 47.53 kN*m

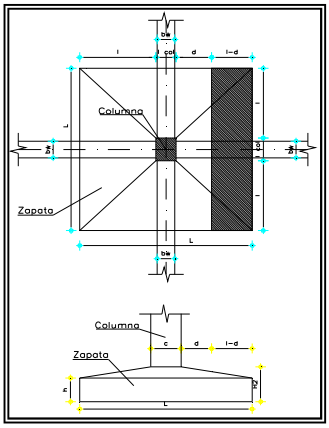
Mu = 1,7 * M borde de la columna = 80.81 kN*m

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

d=	0.33	m
Cuantia =	0.002	
As =	6.60	cm²/m

Armadura: 13#425c./0.19
en ambos sentidos

CORTANTE



a. En una dirección (d)

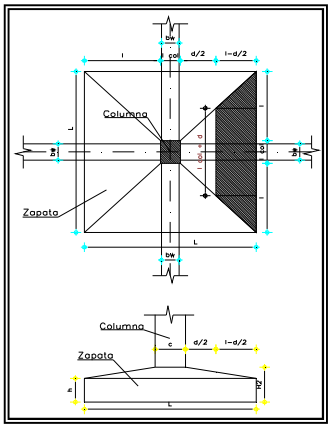
L =	2.20	m
l =	0.90	m
l - d =	0.57	m

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

V (d) =	147.18	kN
Vu (d)=	1.7*V(d)	
Vu (d) =	250.20	kN
h□=	0.30	m

$\upsilon v = \frac{Vu}{L * h□} =$ 0.383 MPa

ϕvc = 0.574 MPa **OK**



b. En dos direcciones (d/2)

Zapata Tipo 3 - Concentrica

L =	2.200	m	**H =**	0.40	m
d/2 =	0.165	m	**h =**	0.30	m
l - d/2 =	0.735	m	**H-h =**	0.10	m

V (d/2) =	126.4	kN
Vu (d/2) =	1.5*V(d)	
Vu (d/2) =	189.6	kN
d_1 =	0.31647059	m

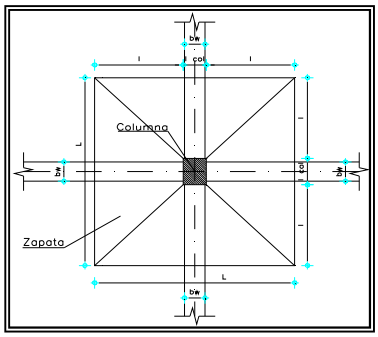
$$\nu u = \frac{Vu}{bo \times d_1} = 0.821 \text{ MPa}$$

ϕvc= 1.15 MPa **OK**

DISEÑO DE ZAPATAS
PROYECTO: SEDE EDUCATIVA AGROECOL UNIÓN PANAMERICANA (CHOCÓ)
Zapata Tipo 4 - Concentrica Und.2

Columna	**b =**	40	cm	**f'c =**	21.1	MPa		**σ =**	0.120	MPa
	t =	40	cm	**fy =**	420	MPa				

PREDIMENSIONAMIENTO



L =	2.400	m	
lcol =	0.400	m	
l =	1.000	m	

Cargas

Mu=	0.000	kN*m
Pu =	601.20	kN
Pp (10%) =	60	kN
Σ P =	661	kN

Area necesaria = $\frac{\Sigma P}{\sigma}$ = $\frac{661.32}{0.120}$ = 5.51 m²

e =	0.00	m
L =	2.348	m

Aproximamos = 2.40 m

Carga de diseño = $\frac{Pu}{A\ real}$ = $\frac{601.2}{5.760}$ = 0.104 MPa

Esfuerzos

σmáx=	0.115	MPa	OK
σmin=	0.115	MPa	OK

DISEÑO DE ZAPATA CONCENTRICA

FLEXIÓN

M borde de la columna = 57.41 kN*m

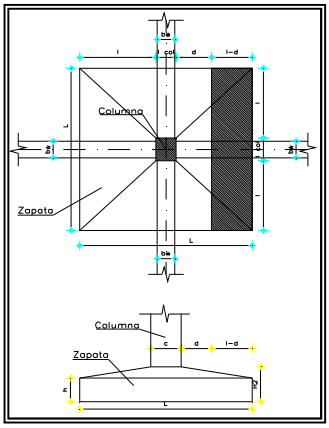
Mu = 1,7 * M borde de la columna = 97.59 kN*m

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

d=	0.33	m
Cuantia =	0.00219001	
As =	7.23	cm²/m

Armadura: 15#427c./0.17 en ambos sentidos

CORTANTE



a. En una dirección (d)

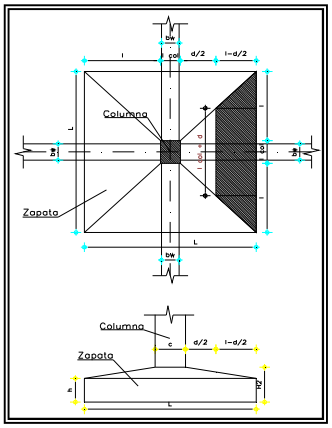
L =	2.40	m
l =	1.00	m
l - d =	0.67	m

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

V (d) =	184.62	kN
Vu (d)=	1.7*V(d)	
Vu (d) =	313.85	kN
h□=	0.30	m

υv = $\frac{Vu}{L * h□}$ = 0.435 MPa

ϕvc = 0.574 MPa **OK**



b. En dos direcciones (d/2)

Zapata Tipo 4 - Concentrica

L =	2.400	m	**H =**	0.40	m
d/2 =	0.165	m	**h =**	0.30	m
l - d/2 =	0.835	m	**H-h =**	0.10	m

V (d/2) =	150.0	kN
Vu (d/2) =	1.5*V(d)	
Vu (d/2) =	225.1	kN
d_1 =	0.31789474	m

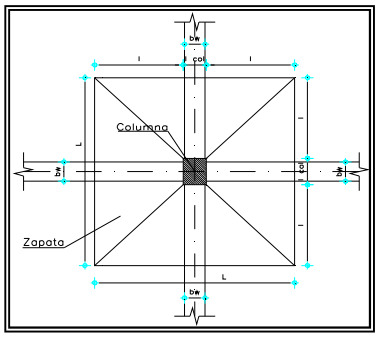
$$\nu u = \frac{Vu}{bo \times d_1} = 0.970 \text{ MPa}$$

ϕvc= 1.15 MPa **OK**

DISEÑO DE ZAPATAS
PROYECTO: SEDE EDUCATIVA AGROECOL UNIÓN PANAMERICANA (CHOCÓ)
Zapata Tipo 5 - Concentrica Und.2

Columna	**b =**	40	cm		**f'c =**	21.1	MPa		**σ =**	0.120	MPa
	t =	40	cm		**fy =**	420	MPa				

PREDIMENSIONAMIENTO



L =	2.800	m	
lcol =	0.400	m	
l =	1.200	m	

Cargas

Mu=	0.000	kN*m
Pu =	851.38	kN
Pp (10%) =	85	kN
Σ P =	937	kN

Area necesaria = $\frac{\Sigma P}{\sigma} = \frac{936.52}{0.120} =$ 7.80 m²

e =	0.00	m	
L =	2.794	m	*Aproximamos =* 2.80 m

Carga de diseño = $\frac{Pu}{A\ real} = \frac{851.38}{7.840} =$ 0.109 MPa

Esfuerzos

σmáx=	0.119	MPa	OK
σmin=	0.119	MPa	OK

DISEÑO DE ZAPATA CONCENTRICA

FLEXIÓN

M borde de la columna = 86.01 kN*m

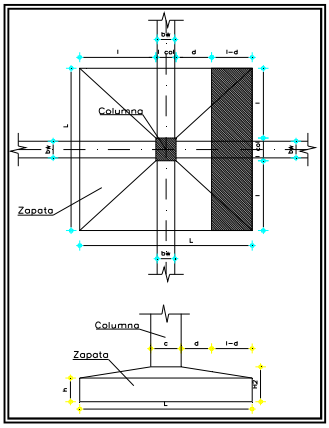
Mu = 1,7 * M borde de la columna = 146.21 kN*m

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

d=	0.43	m
Cuantia =	0.002	
As =	8.60	cm²/m

Armadura: 15#531c./0.20
en ambos sentidos

CORTANTE



a. En una dirección (d)

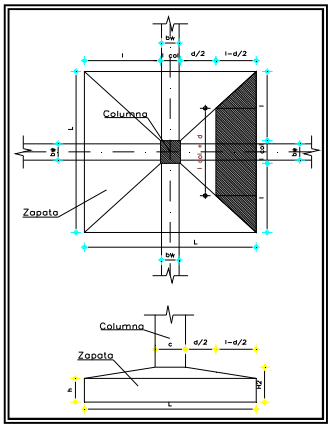
L =	2.80	m
l =	1.20	m
l - d =	0.77	m

V (d) =	257.54	kN
Vu (d)=	1.7*V(d)	
Vu (d) =	437.82	kN
h□=	0.36	m

H =	0.50	m
h =	0.30	m
H-h =	0.20	m

$\upsilon\nu = \frac{Vu}{L * h□} =$ 0.430 MPa

ϕvc = 0.574 MPa **OK**



b. En dos direcciones (d/2)

Zapata Tipo 5 - Concentrica

L =	2.800	m	**H =**	0.50	m
d/2 =	0.215	m	**h =**	0.30	m
l - d/2 =	0.985	m	**H-h =**	0.20	m

V (d/2) =	213.6	kN
Vu (d/2) =	1.5*V(d)	
Vu (d/2) =	320.3	kN
d_1 =	0.40130435	m

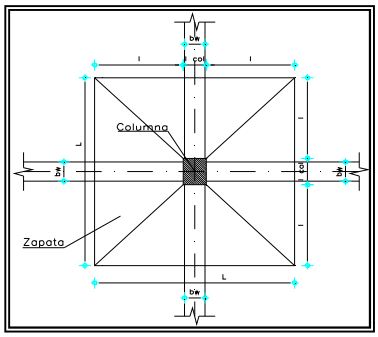
$$\nu u = \frac{Vu}{bo \times d_1} = 0.962 \text{ MPa}$$

ϕvc= 1.15 MPa **OK**

DISEÑO DE ZAPATAS
PROYECTO: SEDE EDUCATIVA AGROECOL UNIÓN PANAMERICANA (CHOCÓ)
Zapata Tipo 6 - Concentrica Und.1

Columna	**b =**	40	cm	**f'c =**	21.1	MPa		**σ =**	0.120	MPa
	t =	40	cm	**fy =**	420	MPa				

PREDIMENSIONAMIENTO



L = 2.000 m
lcol = 0.400 m
l = 0.800 m

Cargas

Mu=	0.000	kN*m
Pu =	419.32	kN
Pp (10%) =	42	kN
Σ P =	461	kN

Area necesaria = $\frac{\Sigma P}{\sigma} = \frac{461.25}{0.120} =$ 3.84 m²

e = 0.00 m
L = 1.961 m

Aproximamos = 2.00 m

Carga de diseño = $\frac{Pu}{A\ real} = \frac{419.32}{4.000} =$ 0.105 MPa

Esfuerzos

σmáx=	0.115	MPa	OK
σmin=	0.115	MPa	OK

DISEÑO DE ZAPATA CONCENTRICA

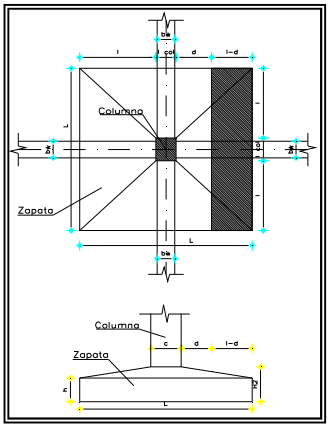
FLEXIÓN

M borde de la columna = 36.90 kN*m
Mu = 1,7 * M borde de la columna = 62.73 kN*m

Con el criterio de calcular el refuerzo por metro lineal utilizamos una altura efectiva igual a: **d=** 0.23 m

Cuantia = 0.00292379
As = 6.72 cm²/m
Armadura: 11#423c./0.19
en ambos sentidos

CORTANTE



a. En una dirección (d)

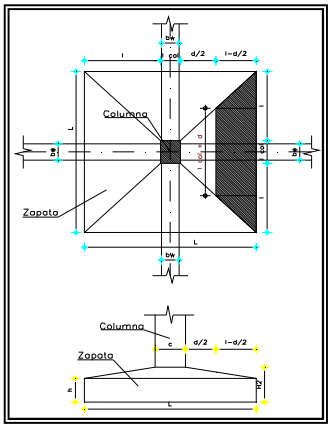
L =	2.00	m
l =	0.80	m
l - d =	0.57	m

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

V (d) = 131.46 kN
Vu (d)= 1.7*V(d)
Vu (d) = 223.48 kN
h□= 0.23 m

υv = $\frac{Vu}{L * h□}$ = 0.486 MPa

ϕvc = 0.574 MPa **OK**



b. En dos direcciones (d/2)

Zapata Tipo 6 - Concentrica

L =	2.000	m	**H =**	0.30	m
d/2 =	0.115	m	**h =**	0.30	m
l - d/2 =	0.685	m	**H-h =**	0.00	m

V (d/2) =	103.9	kN
Vu (d/2) =	1.5*V(d)	
Vu (d/2) =	155.8	kN
d_1 =	0.23	m

$$\nu u = \frac{Vu}{bo \times d_1} = 1.075 \text{ MPa}$$

ϕvc= 1.15 MPa **OK**

5. DISEÑO DE VIGAS Y COLUMNAS

DISEÑO DE VIGAS Y COLUMNAS

PROYECTO: AGROECOL (CHOCÓ)

V-113/ N+4.00

B= 0.15 H= 0.45 L= 6.55		
Mu=-38.42 As =2.54 As(r)=2.71		Mu=-34.96 As =2.54 As(r)=2.45
	Mu=28.86 As =2.54 As(r)=2.01	
Vu=-21.43	Vu=-14.67	Vu=20.39

V-114/ N+4.00

B= 0.40 H= 0.45 L= 6.45		
Mu=-280.13 As =22.22 As(r)=22.46		Mu=-265.23 As =22.22 As(r)=20.99
	Mu=150.07 As =11.40 As(r)=10.91	
Vu=-155.09	Vu=-86.31	Vu=151.07

V-115/ N+4.00

B= 0.25 H= 0.45 L= 3.32			B= 0.25 H= 0.45 L= 3.33		
Mu=-64.65 As =1.49 As(r)=4.57		Mu=-16.16 As =5.94 As(r)=3.27	Mu=-15.98 As =5.94 As(r)=3.27		Mu=-58.60 As =4.45 As(r)=4.12
	Mu=51.27 As =5.94 As(r)=3.98			Mu=57.28 As =5.94 As(r)=4.39	
Vu=-66.11	Vu=-33.79	Vu=10.33	Vu=-11.89	Vu=31.05	Vu=63.58

V-116/ N+4.00

B= 0.35 H= 0.45 L= 1.55			B= 0.35 H= 0.60 L= 6.50		
Mu=-0.76 As =8.55 As(r)=4.57		Mu=-71.23 As =11.40 As(r)=4.97	Mu=-295.56 As =20.28 As(r)=15.87		Mu=-375.48 As =20.28 As(r)=20.88
	Mu=0.00 As =7.92 As(r)=4.57			Mu=174.96 As =11.40 As(r)=9.69	
Vu=28.57	Vu=38.78	Vu=49.00	Vu=-157.02	Vu=-110.06	Vu=235.20

PROYECTO: AGROECOL (CHOCÓ)

V-117/ N+4.00

B= 0.25 H= 0.45 L= 1.68			B= 0.25 H= 0.45 L= 4.80		
Mu=-0.73 As =4.45 As(r)=3.27		Mu=-60.93 As =5.94 As(r)=4.29	Mu=-69.07 As =5.94 As(r)=4.90		Mu=-0.00 As =4.45 As(r)=3.27
	Mu=0.00 As =3.81 As(r)=3.27			Mu=38.21 As =3.81 As(r)=3.27	
Vu=24.24	Vu=33.28	Vu=42.31	Vu=-51.19	Vu=-18.50	Vu=22.22

V-118/ N+4.00

B= 0.25 H= 0.45 L= 1.68			B= 0.25 H= 0.45 L= 4.80		
Mu=-0.67 As =6.41 As(r)=3.27		Mu=-84.53 As =8.55 As(r)=6.09	Mu=-98.40 As =8.55 As(r)=7.19		Mu=-0.00 As =6.41 As(r)=3.27
	Mu=0.00 As =5.94 As(r)=3.27			Mu=54.48 As =5.94 As(r)=4.17	
Vu=45.16	Vu=48.12	Vu=51.07	Vu=-84.76	Vu=-22.08	Vu=41.64

V-119/ N+4.00

B= 0.15 H= 0.45 L= 6.42			B= 0.15 H= 0.45 L= 4.99		
Mu=-19.02 As =2.54 As(r)=1.96		Mu=-50.08 As =3.96 As(r)=3.60	Mu=-53.85 As =3.96 As(r)=3.90		Mu=-0.00 As =3.96 As(r)=1.96
	Mu=25.04 As =2.54 As(r)=1.99			Mu=16.03 As =2.54 As(r)=1.96	
Vu=-31.08	Vu=11.78	Vu=41.70	Vu=-42.23	Vu=-7.28	Vu=9.86

V-120/ N+4.00

B= 0.35 H= 0.45 L= 6.32			B= 0.35 H= 0.45 L= 6.67			B= 0.35 H= 0.45 L= 6.55		
Mu=-218.33 As =17.90 As(r)=17.05		Mu=-267.22 As =24.60 As(r)=23.49	Mu=-273.35 As =24.60 As(r)=23.87		Mu=-276.84 As =24.60 As(r)=24.09	Mu=-266.05 As =24.60 As(r)=23.41		Mu=-222.80 As =17.90 As(r)=17.48
	Mu=168.60 As =11.40 As(r)=12.61			Mu=173.82 As =11.40 As(r)=13.06			Mu=144.02 As =11.40 As(r)=10.57	
Vu=-155.08	Vu=-63.65	Vu=174.56	Vu=-177.04	Vu=-72.35	Vu=192.21	Vu=-151.01	Vu=-69.63	Vu=169.32

V-121/ N+4.00

B= 0.25 H= 0.45 L= 6.57			B= 0.25 H= 0.45 L= 6.97			B= 0.25 H= 0.45 L= 6.80		
Mu=-33.59 As =1.49 As(r)=3.27		Mu=-87.60 As =6.97 As(r)=6.33	Mu=-86.50 As =6.97 As(r)=6.24		Mu=-113.22 As =8.55 As(r)=8.40	Mu=-114.78 As =8.55 As(r)=8.53		Mu=-43.32 As =3.92 As(r)=3.27
	Mu=57.11 As =5.23 As(r)=4.31			Mu=41.60 As =5.23 As(r)=3.27			Mu=63.31 As =5.23 As(r)=4.91	
Vu=-57.57	Vu=9.64	Vu=75.24	Vu=-72.56	Vu=-0.93	Vu=81.57	Vu=-86.45	Vu=-17.85	Vu=63.09

PROYECTO: AGROECOL (CHOCÓ)

V-122/ N+4.00

B= 0.35 H= 0.45 L= 6.32			B= 0.35 H= 0.45 L= 6.67			B= 0.35 H= 0.45 L= 6.55		
Mu=-188.99 As =13.46 As(r)=14.38		Mu=-221.56 As =17.90 As(r)=17.36	Mu=-209.85 As =17.90 As(r)=16.26		Mu=-214.62 As =20.28 As(r)=16.71	Mu=-258.71 As =20.28 As(r)=21.04		Mu=-192.87 As =15.52 As(r)=14.73
	Mu=136.50 As =9.66 As(r)=9.96			Mu=122.85 As =9.66 As(r)=8.88			Mu=177.43 As =9.66 As(r)=13.37	
Vu=-124.26	Vu=-60.77	Vu=137.68	Vu=-126.09	Vu=-57.97	Vu=126.73	Vu=-155.41	Vu=-87.88	Vu=134.42

V-123/ N+4.00

B= 0.15 H= 0.45 L= 6.42			B= 0.15 H= 0.45 L= 6.82		
Mu=-14.99 As =2.54 As(r)=1.96		Mu=-33.03 As =2.54 As(r)=2.31	Mu=-33.81 As =2.54 As(r)=2.37		Mu=-39.09 As =0.00 As(r)=2.76
	Mu=26.74 As =2.54 As(r)=1.96			Mu=21.44 As =2.54 As(r)=1.96	
Vu=-14.35	Vu=-7.82	Vu=20.17	Vu=-18.87	Vu=-11.99	Vu=18.89

V-124/ N+4.00

B= 0.25 H= 0.45 L= 3.32			B= 0.25 H= 0.45 L= 3.33		
Mu=-65.46 As =1.49 As(r)=4.63		Mu=-17.92 As =5.94 As(r)=3.27	Mu=-18.40 As =5.94 As(r)=3.27		Mu=-48.81 As =4.45 As(r)=3.40
	Mu=48.51 As =5.94 As(r)=4.02			Mu=61.92 As =5.94 As(r)=4.81	
Vu=-71.91	Vu=-36.88	Vu=-5.44	Vu=-8.90	Vu=31.44	Vu=65.69

V-125/ N+4.00

B= 0.40 H= 0.45 L= 6.55		
Mu=-247.09 As =17.90 As(r)=19.26		Mu=-233.73 As =17.90 As(r)=18.03
	Mu=209.26 As =15.52 As(r)=15.84	
Vu=-161.08	Vu=-85.12	Vu=156.68

V-126/ N+4.00

B= 0.40 H= 0.45 L= 6.55		
Mu=-190.78 As =15.52 As(r)=14.25		Mu=-185.45 As =15.52 As(r)=13.80
	Mu=141.40 As =13.46 As(r)=10.22	
Vu=-126.56	Vu=-51.60	Vu=125.40

PROYECTO: AGROECOL (CHOCÓ)

V-127/ N+4.00

B= 0.30 H= 0.45 L= 1.25			B= 0.30 H= 0.45 L= 6.50			B= 0.30 H= 0.45 L= 1.75		
Mu=-0.00 As =11.41 As(r)=3.92		Mu=-44.02 As =15.21 As(r)=3.92	Mu=-193.61 As =15.21 As(r)=15.23		Mu=-199.34 As =15.21 As(r)=15.78	Mu=-88.06 As =15.21 As(r)=6.27		Mu=-0.00 As =15.21 As(r)=3.92
	Mu=0.00 As =6.81 As(r)=3.92			Mu=94.08 As =8.95 As(r)=6.73			Mu=0.00 As =6.81 As(r)=3.92	
Vu=14.35	Vu=28.79	Vu=43.29	Vu=-113.08	Vu=-48.20	Vu=114.69	Vu=-54.86	Vu=-42.97	Vu=-31.08

V-128/ N+4.00

B= 0.25 H= 0.45 L= 1.42			B= 0.25 H= 0.45 L= 3.40			B= 0.25 H= 0.45 L= 3.40		
Mu=-7.39 As =3.29 As(r)=3.27		Mu=-29.57 As =5.23 As(r)=3.27	Mu=-69.47 As =5.23 As(r)=4.93		Mu=-17.37 As =5.23 As(r)=3.27	Mu=-23.26 As =5.23 As(r)=3.27		Mu=-93.05 As =6.97 As(r)=6.76
	Mu=7.39 As =4.52 As(r)=3.27			Mu=51.56 As =4.52 As(r)=4.04			Mu=40.18 As =4.52 As(r)=3.36	
Vu=-20.42	Vu=15.41	Vu=40.71	Vu=-67.01	Vu=-34.58	Vu=9.41	Vu=9.13	Vu=41.08	Vu=75.01

B= 0.25 H= 0.45 L= 1.92		
Mu=-66.31 As =6.97 As(r)=4.69		Mu=-4.80 As =5.55 As(r)=3.27
	Mu=0.00 As =4.52 As(r)=3.27	
Vu=-48.76	Vu=-29.69	Vu=-13.29

V-129/ N+4.00

B= 0.30 H= 0.45 L= 1.30			B= 0.30 H= 0.45 L= 6.60			B= 0.30 H= 0.45 L= 1.80		
Mu=-0.00 As =14.38 As(r)=3.92		Mu=-98.88 As =19.17 As(r)=7.11	Mu=-225.42 As =19.17 As(r)=19.91		Mu=-253.27 As =20.13 As(r)=21.64	Mu=-208.99 As =20.13 As(r)=16.74		Mu=-0.00 As =20.13 As(r)=3.92
	Mu=0.00 As =11.64 As(r)=3.92			Mu=177.10 As =13.04 As(r)=13.69			Mu=0.00 As =11.64 As(r)=3.92	
Vu=38.57	Vu=65.75	Vu=95.40	Vu=-143.80	Vu=-77.59	Vu=153.13	Vu=-123.42	Vu=-103.68	Vu=-83.93

V-130/ N+4.00

B= 0.25 H= 0.45 L= 1.42			B= 0.25 H= 0.45 L= 3.40			B= 0.25 H= 0.45 L= 3.40		
Mu=-5.81 As =3.29 As(r)=3.27		Mu=-20.42 As =5.15 As(r)=3.27	Mu=-52.50 As =4.79 As(r)=3.67		Mu=-13.13 As =5.23 As(r)=3.27	Mu=-22.13 As =5.23 As(r)=3.27		Mu=-88.52 As =6.97 As(r)=6.40
	Mu=5.11 As =3.81 As(r)=3.27			Mu=42.84 As =3.81 As(r)=3.32			Mu=23.13 As =3.81 As(r)=3.27	
Vu=-21.35	Vu=9.55	Vu=38.29	Vu=-61.03	Vu=-26.32	Vu=12.42	Vu=3.59	Vu=37.14	Vu=72.81

PROYECTO: AGROECOL (CHOCÓ)

B= 0.25 H= 0.45 L= 1.92		
Mu=-57.37 As =6.97 As(r)=4.03		Mu=-4.68 As =5.55 As(r)=3.27
	Mu=0.00 As =3.81 As(r)=3.27	
Vu=-44.25	Vu=-25.42	Vu=-7.31

V-131/ N+ 4.00

B= 0.15 H= 0.45 L= 9.22		
Mu=-49.98 As =2.97 As(r)=3.59		Mu=-31.25 As =2.54 As(r)=2.18
	Mu=36.02 As =2.54 As(r)=2.55	
Vu=-59.96	Vu=-8.79	Vu=28.57

V-132/ N+ 4.00

B= 0.40 H= 0.45 L= 4.05			B= 0.40 H= 0.45 L= 6.05			B= 0.40 H= 0.45 L= 6.55		
Mu=-87.53 As =9.66 As(r)=6.13		Mu=-124.70 As =9.66 As(r)=8.92	Mu=-143.45 As =9.66 As(r)=10.38		Mu=-205.26 As =15.52 As(r)=15.50	Mu=-231.22 As =15.52 As(r)=17.80		Mu=-298.05 As =29.42 As(r)=25.28
	Mu=31.62 As =6.50 As(r)=5.23			Mu=94.77 As =8.13 As(r)=6.66			Mu=182.76 As =7.92 As(r)=13.58	
Vu=-69.91	Vu=38.89	Vu=92.16	Vu=-103.05	Vu=-40.95	Vu=148.79	Vu=-151.23	Vu=-78.24	Vu=173.07

B= 0.40 H= 0.60 L= 9.00			B= 0.40 H= 0.45 L= 6.45			B= 0.40 H= 0.45 L= 1.20		
Mu=-515.72 As =29.42 As(r)=29.76		Mu=-503.68 As =29.42 As(r)=28.91	Mu=-229.51 As =29.42 As(r)=17.64		Mu=-172.96 As =15.52 As(r)=12.77	Mu=-57.22 As =15.52 As(r)=5.23		Mu=-0.00 As =0.00 As(r)=5.23
	Mu=291.73 As =7.92 As(r)=15.63			Mu=90.12 As =7.92 As(r)=6.32			Mu=0.00 As =6.50 As(r)=5.23	
Vu=-283.93	Vu=32.58	Vu=313.21	Vu=-126.01	Vu=-56.56	Vu=106.74	Vu=-53.11	Vu=-37.27	Vu=-21.43

V-133/ N+ 4.00

B= 0.25 H= 0.45 L= 6.85			B= 0.25 H= 0.45 L= 6.35			B= 0.25 H= 0.45 L= 4.35		
Mu=-71.83 As =1.31 As(r)=5.11		Mu=-79.73 As =5.23 As(r)=5.71	Mu=-82.34 As =5.23 As(r)=5.92		Mu=-61.81 As =5.23 As(r)=4.35	Mu=-67.93 As =5.23 As(r)=4.81		Mu=-36.81 As =2.97 As(r)=3.27
	Mu=34.34 As =3.81 As(r)=3.27			Mu=32.31 As =3.81 As(r)=3.27			Mu=54.48 As =3.81 As(r)=3.81	
Vu=-65.76	Vu=5.96	Vu=68.17	Vu=-66.13	Vu=-5.54	Vu=59.23	Vu=-80.81	Vu=-11.11	Vu=64.76

PROYECTO: AGROECOL (CHOCÓ)

V-134/ N+4.00

B= 0.25 H= 0.45 L= 6.85			B= 0.25 H= 0.45 L= 1.43		
Mu=-115.85 As =6.41 As(r)=8.62		Mu=-66.48 As =8.55 As(r)=4.70	Mu=-26.38 As =8.55 As(r)=3.27		Mu=-6.59 As =6.41 As(r)=3.27
	Mu=60.33 As =5.94 As(r)=4.24			Mu=6.59 As =5.94 As(r)=3.27	
Vu=-86.00	Vu=-16.90	Vu=67.78	Vu=-42.00	Vu=-14.38	Vu=18.15

V-135/ N+4.00

B= 0.40 H= 0.60 L= 9.30		
Mu=-94.93 As =1.98 As(r)=7.21		Mu=-156.46 As =5.94 As(r)=7.92
	Mu=177.78 As =11.40 As(r)=9.20	
Vu=-103.26	Vu=11.89	Vu=143.34

V-136/ N+4.00

B= 0.40 H= 0.45 L= 4.05			B= 0.40 H= 0.45 L= 6.05			B= 0.40 H= 0.45 L= 6.60		
Mu=-80.34 As =9.66 As(r)=5.60		Mu=-117.07 As =9.66 As(r)=8.34	Mu=-133.97 As =9.66 As(r)=9.64		Mu=-160.31 As =11.40 As(r)=11.73	Mu=-164.34 As =11.40 As(r)=12.06		Mu=-161.67 As =11.72 As(r)=11.84
	Mu=31.77 As =6.50 As(r)=5.23			Mu=88.48 As =6.50 As(r)=6.20			Mu=97.62 As =6.50 As(r)=6.87	
Vu=-67.12	Vu=35.56	Vu=88.84	Vu=-98.78	Vu=-36.68	Vu=105.52	Vu=-107.15	Vu=-37.69	Vu=107.06

B= 0.40 H= 0.60 L= 9.05			B= 0.40 H= 0.45 L= 6.45			B= 0.40 H= 0.45 L= 1.20		
Mu=-162.61 As =11.72 As(r)=8.24		Mu=-174.37 As =13.46 As(r)=8.87	Mu=-186.18 As =13.46 As(r)=13.87		Mu=-184.18 As =13.46 As(r)=13.70	Mu=-55.60 As =13.46 As(r)=5.23		Mu=-0.00 As =13.46 As(r)=5.23
	Mu=62.99 As =6.50 As(r)=7.21			Mu=97.89 As =6.50 As(r)=6.89			Mu=0.00 As =6.50 As(r)=5.23	
Vu=-79.69	Vu=13.23	Vu=79.87	Vu=-114.96	Vu=-45.50	Vu=113.14	Vu=-52.08	Vu=-36.24	Vu=-20.39

V-210/ N+7.50

B= 0.15 H= 0.45 L= 1.80			B= 0.15 H= 0.45 L= 6.55		
Mu=-1.08 As =2.54 As(r)=1.96		Mu=-14.58 As =2.54 As(r)=1.96	Mu=-29.11 As =2.54 As(r)=2.03		Mu=-18.13 As =2.54 As(r)=1.96
	Mu=0.48 As =2.54 As(r)=1.96			Mu=7.28 As =2.54 As(r)=1.96	
Vu=4.67	Vu=6.69	Vu=8.71	Vu=-12.57	Vu=-5.81	Vu=9.72

PROYECTO: AGROECOL (CHOCÓ)

V-211/ N+7.50

B= 0.40 H= 0.45 L= 1.75			B= 0.40 H= 0.45 L= 6.45		
Mu=-0.00 As =5.94 As(r)=5.23		Mu=-43.13 As =7.92 As(r)=5.23	Mu=-108.51 As =7.92 As(r)=7.69		Mu=-76.66 As =7.92 As(r)=5.33
	Mu=0.00 As =5.08 As(r)=5.23			Mu=27.13 As =5.08 As(r)=5.23	
Vu=15.94	Vu=21.32	Vu=26.70	Vu=-42.05	Vu=-24.03	Vu=32.72

V-212/ N+7.50

B= 0.35 H= 0.45 L= 1.80			B= 0.35 H= 0.60 L= 6.50		
Mu=-0.00 As =5.94 As(r)=4.57		Mu=-54.81 As =7.92 As(r)=4.57	Mu=-156.81 As =11.40 As(r)=7.99		Mu=-215.86 As =11.40 As(r)=11.24
	Mu=0.00 As =7.92 As(r)=4.57			Mu=85.14 As =7.92 As(r)=6.31	
Vu=22.72	Vu=27.43	Vu=32.13	Vu=-77.81	Vu=-56.79	Vu=157.48

V-213/ N+7.50

B= 0.25 H= 0.45 L= 4.75		
Mu=-53.11 As =0.95 As(r)=3.71		Mu=-0.00 As =2.86 As(r)=3.27
	Mu=39.71 As =3.81 As(r)=3.27	
Vu=-53.25	Vu=-12.73	Vu=29.86

V-214/ N+7.50

B= 0.25 H= 0.45 L= 1.88		
Mu=-1.93 As =2.86 As(r)=3.27		Mu=-21.65 As =2.86 As(r)=3.27
	Mu=0.00 As =3.81 As(r)=3.27	
Vu=6.46	Vu=9.82	Vu=13.18

V-215/ N+7.50

B= 0.25 H= 0.45 L= 1.93			B= 0.25 H= 0.45 L= 4.80		
Mu=-1.89 As =2.86 As(r)=3.27		Mu=-19.67 As =3.81 As(r)=3.27	Mu=-51.57 As =3.81 As(r)=3.60		Mu=-0.00 As =2.86 As(r)=3.27
	Mu=0.00 As =3.81 As(r)=3.27			Mu=41.13 As =3.81 As(r)=3.27	
Vu=5.19	Vu=8.57	Vu=12.07	Vu=-54.17	Vu=-12.62	Vu=28.94

PROYECTO: AGROECOL (CHOCÓ)

V-216/ N+7.50

B= 0.15 H= 0.45 L= 6.42			B= 0.15 H= 0.45 L= 4.74		
Mu=-10.38 As =2.54 As(r)=1.96		Mu=-10.25 As =2.54 As(r)=1.96	Mu=-11.94 As =2.54 As(r)=1.96		Mu=-0.93 As =2.54 As(r)=1.96
	Mu=5.16 As =2.54 As(r)=1.96			Mu=2.39 As =2.54 As(r)=1.96	
Vu=-7.25	Vu=1.24	Vu=7.99	Vu=-7.67	Vu=-2.54	Vu=3.70

V-217/ N+7.50

B= 0.35 H= 0.45 L= 6.32			B= 0.35 H= 0.45 L= 6.67			B= 0.35 H= 0.45 L= 6.55		
Mu=-62.18 As =9.66 As(r)=4.57		Mu=-34.46 As =9.66 As(r)=4.57	Mu=-44.62 As =9.66 As(r)=4.57		Mu=-66.42 As =9.66 As(r)=4.62	Mu=-79.28 As =9.66 As(r)=5.56		Mu=-108.36 As =9.66 As(r)=7.75
	Mu=15.54 As =5.08 As(r)=4.57			Mu=16.61 As =5.08 As(r)=4.57			Mu=42.76 As =5.08 As(r)=4.57	
Vu=-27.06	Vu=-11.82	Vu=20.12	Vu=-24.40	Vu=-8.37	Vu=37.66	Vu=-42.08	Vu=-26.32	Vu=86.81

V-218/ N+7.50

B= 0.35 H= 0.45 L= 6.32			B= 0.35 H= 0.45 L= 6.67			B= 0.35 H= 0.45 L= 6.55		
Mu=-59.77 As =9.66 As(r)=4.57		Mu=-38.79 As =9.66 As(r)=4.57	Mu=-45.03 As =9.66 As(r)=4.57		Mu=-34.31 As =9.66 As(r)=4.57	Mu=-49.53 As =9.66 As(r)=4.57		Mu=-53.19 As =9.66 As(r)=4.57
	Mu=14.94 As =6.50 As(r)=4.57			Mu=14.12 As =6.50 As(r)=4.57			Mu=13.30 As =6.50 As(r)=4.57	
Vu=-26.53	Vu=-11.29	Vu=21.63	Vu=-24.19	Vu=-8.16	Vu=21.01	Vu=-24.40	Vu=-8.75	Vu=24.29

V-219/ N+7.50

B= 0.15 H= 0.45 L= 6.47			B= 0.15 H= 0.45 L= 6.82		
Mu=-11.12 As =1.90 As(r)=1.96		Mu=-10.76 As =2.54 As(r)=1.96	Mu=-12.17 As =2.54 As(r)=1.96		Mu=-9.89 As =2.54 As(r)=1.96
	Mu=5.38 As =1.98 As(r)=1.96			Mu=7.09 As =1.98 As(r)=1.96	
Vu=-7.40	Vu=1.49	Vu=8.06	Vu=-8.88	Vu=-2.01	Vu=7.53

V-220/ N+7.50

B= 0.40 H= 0.45 L= 6.55		
Mu=-71.17 As =5.08 As(r)=5.23		Mu=-61.73 As =5.08 As(r)=5.23
	Mu=17.79 As =5.08 As(r)=5.23	
Vu=-30.61	Vu=-12.60	Vu=27.74

PROYECTO: AGROECOL (CHOCÓ)

V-221/ N+7.50

B= 0.30 H= 0.45 L= 1.55			B= 0.30 H= 0.45 L= 6.50			B= 0.30 H= 0.45 L= 1.75		
Mu=-0.00 As =1.63 As(r)=3.92		Mu=-22.45 As =6.50 As(r)=3.92	Mu=-80.52 As =6.50 As(r)=5.70		Mu=-75.36 As =6.50 As(r)=5.31	Mu=-30.13 As =6.50 As(r)=3.92		Mu=-0.43 As =6.50 As(r)=3.92
	Mu=0.00 As =5.08 As(r)=3.92			Mu=20.13 As =5.08 As(r)=3.92			Mu=0.00 As =5.08 As(r)=3.92	
Vu=0.00	Vu=12.93	Vu=19.86	Vu=-38.34	Vu=-14.44	Vu=36.87	Vu=-22.55	Vu=-14.42	Vu=-7.25

V-222/ N+7.50

B= 0.30 H= 0.45 L= 0.15			B= 0.30 H= 0.45 L= 1.30			B= 0.30 H= 0.45 L= 6.60		
Mu=-0.00 As =1.70 As(r)=3.92		Mu=-0.24 As =6.81 As(r)=3.92	Mu=-9.91 As =6.81 As(r)=3.92		Mu=-39.63 As =6.81 As(r)=3.92	Mu=-89.94 As =6.81 As(r)=6.42		Mu=-86.61 As =6.81 As(r)=6.16
	Mu=0.00 As =3.92 As(r)=3.92			Mu=9.91 As =5.23 As(r)=3.92			Mu=29.80 As =6.72 As(r)=3.92	
Vu=0.00	Vu=0.74	Vu=1.47	Vu=18.07	Vu=25.19	Vu=34.63	Vu=-55.70	Vu=-9.77	Vu=54.78

B= 0.30 H= 0.45 L= 1.80		
Mu=-51.30 As =6.81 As(r)=3.92		Mu=-0.23 As =6.81 As(r)=3.92
	Mu=0.00 As =5.23 As(r)=3.92	
Vu=-35.89	Vu=-24.72	Vu=-15.66

V-223/ N+7.50

B= 0.15 H= 0.45 L= 9.22			B= 0.15 H= 0.45 L= 6.63			B= 0.15 H= 0.45 L= 1.30		
Mu=-17.07 As =0.81 As(r)=1.96		Mu=-14.46 As =3.25 As(r)=1.96	Mu=-25.89 As =3.25 As(r)=1.96		Mu=-14.01 As =3.25 As(r)=1.96	Mu=-7.61 As =3.25 As(r)=1.96		Mu=-1.90 As =3.25 As(r)=1.96
	Mu=12.57 As =2.54 As(r)=1.96			Mu=6.47 As =2.54 As(r)=1.96			Mu=1.90 As =2.54 As(r)=1.96	
Vu=-19.21	Vu=5.41	Vu=9.58	Vu=-14.00	Vu=-4.02	Vu=9.57	Vu=-6.62	Vu=-4.37	Vu=3.55

B= 0.15 H= 0.45 L= 0.40		
Mu=-0.38 As =3.25 As(r)=1.96		Mu=-0.00 As =2.44 As(r)=1.96
	Mu=0.00 As =2.54 As(r)=1.96	
Vu=-1.30	Vu=-0.65	Vu=0.00

PROYECTO: AGROECOL (CHOCÓ)

V-224/ N+7.50

B= 0.40 H= 0.45 L= 6.05			B= 0.40 H= 0.45 L= 6.55			B= 0.40 H= 0.60 L= 9.00		
Mu=-57.03 As =7.92 As(r)=5.23		Mu=-62.94 As =7.92 As(r)=5.23	Mu=-68.08 As =7.92 As(r)=5.23		Mu=-110.57 As =11.40 As(r)=7.84	Mu=-229.89 As =11.40 As(r)=11.90		Mu=-281.11 As =15.52 As(r)=14.80
	Mu=22.03 As =5.08 As(r)=5.23			Mu=27.64 As =5.08 As(r)=5.23			Mu=198.72 As =6.14 As(r)=10.19	
Vu=-35.97	Vu=-9.86	Vu=46.21	Vu=-51.63	Vu=12.06	Vu=64.71	Vu=-120.52	Vu=-53.64	Vu=225.16

B= 0.40 H= 0.45 L= 6.45			B= 0.40 H= 0.45 L= 1.20			B= 0.40 H= 0.45 L= 0.40		
Mu=-114.16 As =15.52 As(r)=8.12		Mu=-71.61 As =8.24 As(r)=5.23	Mu=-53.03 As =8.24 As(r)=5.23		Mu=-13.26 As =8.24 As(r)=5.23	Mu=-1.00 As =8.24 As(r)=5.23		Mu=-0.00 As =6.18 As(r)=5.23
	Mu=28.54 As =5.08 As(r)=5.23			Mu=13.26 As =5.08 As(r)=5.23			Mu=0.00 As =5.08 As(r)=5.23	
Vu=-58.85	Vu=-15.68	Vu=44.95	Vu=-43.66	Vu=-33.95	Vu=-24.24	Vu=-3.48	Vu=-1.74	Vu=0.00

V-225/ N+7.50

B= 0.40 H= 0.60 L= 9.30		
Mu=-59.26 As =1.98 As(r)=7.21		Mu=-104.53 As =5.94 As(r)=7.21
	Mu=221.31 As =11.40 As(r)=11.43	
Vu=-90.00	Vu=-28.14	Vu=171.28

V-226/ N+7.50

B= 0.40 H= 0.45 L= 6.05			B= 0.40 H= 0.45 L= 6.60			B= 0.40 H= 0.60 L= 9.05		
Mu=-49.70 As =8.24 As(r)=5.23		Mu=-53.61 As =8.24 As(r)=5.23	Mu=-44.16 As =8.24 As(r)=5.23		Mu=-63.47 As =8.24 As(r)=5.23	Mu=-63.65 As =8.24 As(r)=7.21		Mu=-72.60 As =9.66 As(r)=7.21
	Mu=20.52 As =6.50 As(r)=5.23			Mu=15.87 As =6.50 As(r)=5.23			Mu=46.44 As =7.56 As(r)=7.21	
Vu=-33.21	Vu=9.73	Vu=36.24	Vu=-30.16	Vu=7.22	Vu=36.00	Vu=-39.26	Vu=7.13	Vu=39.86

B= 0.40 H= 0.45 L= 6.45			B= 0.40 H= 0.45 L= 1.20			B= 0.40 H= 0.45 L= 0.40		
Mu=-75.37 As =9.66 As(r)=5.24		Mu=-63.03 As =6.50 As(r)=5.23	Mu=-31.13 As =6.50 As(r)=5.23		Mu=-7.78 As =6.50 As(r)=5.23	Mu=-1.00 As =6.50 As(r)=5.23		Mu=-0.00 As =4.88 As(r)=5.23
	Mu=18.84 As =6.50 As(r)=5.23			Mu=7.78 As =6.50 As(r)=5.23			Mu=0.00 As =6.50 As(r)=5.23	
Vu=-39.85	Vu=-11.07	Vu=34.99	Vu=-25.65	Vu=-19.18	Vu=-12.70	Vu=-3.48	Vu=-1.74	Vu=0.00

PROYECTO: AGROECOL (CHOCÓ)

Columna F-7

Nivel	H Libre	Losa	B	H	M1	M2	P	V1	V2	Cuantia	m/mr	Col/Vig Eje ppal	Col/vig Eje sec
N+4.00					192.60	59.12				8/#8 #7 (1.8%)	1.00	1.20	2.43
	3.55	.45	.50	.40			-137.13	95.27	60.02				
		1.00			188.48	-57.67				8/#8 #7 (1.8%)	0.97		

Columna G-7

Nivel	H Libre	Losa	B	H	M1	M2	P	V1	V2	Cuantia	m/mr	Col/Vig Eje ppal	Col/vig Eje sec
N+4.00					187.96	0.57				8/#8 #7 (1.8%)	0.85	1.20	2.42
	3.55	.45	.50	.40			-194.33	92.07	54.51				
		1.00			180.34	34.76				8/#8 #7 (1.8%)	0.89		

Columna F-6

Nivel	H Libre	Losa	B	H	M1	M2	P	V1	V2	Cuantia	m/mr	Col/Vig Eje ppal	Col/vig Eje sec
N+7.50					64.40	57.85				8/#5 #6 (1.2%)	0.72	1.93	1.26
	3.05	.45	.40	.40			-52.28	53.91	34.29				
					111.08	-62.19				8/#5 #6 (1.2%)	1.06		
N+4.00					130.04	73.21				8/#5 #6 (1.2%)	1.13	1.33	1.26
	3.55	.45	.40	.40			-341.94	75.73	37.71				
		1.00			112.06	-77.64				8/#5 #6 (1.2%)	1.05		

Columna G-6

Nivel	H Libre	Losa	B	H	M1	M2	P	V1	V2	Cuantia	m/mr	Col/Vig Eje ppal	Col/vig Eje sec
N+7.50					-62.42	5.69				8/#5 #6 (1.2%)	0.51	1.92	1.21
	3.05	.45	.40	.40			-70.40	47.54	29.75				
					104.94	-4.60				8/#5 #6 (1.2%)	0.88		
N+4.00					154.74	-12.45				8/#5 #6 (1.2%)	0.97	1.32	1.36
	3.55	.45	.40	.40			-398.81	74.20	33.80				
		1.00			142.10	24.09				8/#5 #6 (1.2%)	0.97		

PROYECTO: AGROECOL (CHOCÓ)

Columna B-5

Nivel	H Libre	Losa	B	H	M1	M2	P	V1	V2	Cuantia	m/mr	Col/Vig Eje ppal	Col/vig Eje sec
N+7.50					70.72	39.94				14/#5 #4 (1.1%)	0.53	1.21	1.29
	3.05	.45	.50	.40			-66.61	45.66	35.72				
					-90.81	-64.64				14/#5 #4 (1.1%)	0.69		
N+4.00					135.56	84.21				14/#5 #4 (1.1%)	0.95	1.94	1.46
	3.55	.45	.50	.40			-296.38	70.97	80.29				
		1.00			-94.10	-191.61				14/#5 #4 (1.1%)	1.06		

Columna D-5

Nivel	H Libre	Losa	B	H	M1	M2	P	V1	V2	Cuantia	m/mr	Col/Vig Eje ppal	Col/vig Eje sec
N+7.50					67.97	37.24				12/#7 (2.9%)	0.41	1.26	1.67
	3.05	.45	.40	.40			-119.37	33.45	37.45				
					-49.16	-65.99				12/#7 (2.9%)	0.45		
N+4.00					77.31	68.83				12/#7 (2.9%)	0.60	1.53	1.36
	3.55	.45	.40	.40			-569.83	46.53	49.97				
		1.00			103.50	-56.56				12/#7 (2.9%)	0.66		

Columna F-5

Nivel	H Libre	Losa	B	H	M1	M2	P	V1	V2	Cuantia	m/mr	Col/Vig Eje ppal	Col/vig Eje sec
N+7.50					40.77	54.45				12/#7 (2.9%)	0.37	1.26	1.53
	3.05	.45	.40	.40			-125.98	37.48	31.67				
					-50.32	-56.42				12/#7 (2.9%)	0.42		
N+4.00					100.66	35.33				12/#7 (2.9%)	0.57	1.34	1.44
	3.55	.45	.40	.40			-667.32	53.89	35.88				
		1.00			114.93	-32.24				12/#7 (2.9%)	0.62		

PROYECTO: AGROECOL (CHOCÓ)

Columna 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+7.50					-44.65	-40.49				8/#8 (2.5%)	0.35	1.99	1.26
	3.05	.45	.40	.40			-91.39	44.55	20.22				
					90.72	27.07				8/#8 (2.5%)	0.49		
N+4.00					143.34	-17.90				8/#8 (2.5%)	0.70	2.63	2.02
	3.55	.45	.40	.40			-443.23	68.45	27.09				
		1.00			130.48	26.71				8/#8 (2.5%)	0.67		

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+7.50					72.49	30.53				14/#5 #4 (1.1%)	0.53	1.21	1.29
	3.05	.45	.50	.40			-69.69	51.21	24.63				
					107.70	4.96				14/#5 #4 (1.1%)	0.75		
N+4.00					145.31	9.19				14/#5 #4 (1.1%)	0.84	1.53	1.46
	3.55	.45	.50	.40			-338.16	72.72	76.29				
		1.00			145.60	-64.66				14/#5 #4 (1.1%)	0.93		

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+7.50					67.12	16.21				12/#7 (2.9%)	0.33	1.38	1.67
	3.05	.45	.40	.40			-117.19	34.36	20.50				
					33.28	27.11				12/#7 (2.9%)	0.24		
N+4.00					-68.50	-39.58				12/#7 (2.9%)	0.45	1.21	1.26
	3.55	.45	.40	.40			-712.05	42.45	39.52				
		1.00			87.44	43.12				12/#7 (2.9%)	0.55		

PROYECTO: AGROECOL (CHOCÓ)

Columna F-4

Nivel	H Libre	Losa	B	H	M1	M2	P	V1	V2	Cuantia	m/mr	Col/Vig Eje ppal	Col/vig Eje sec
N+7.50					44.25	189.01				14/#8 (3.5%)	0.49	2.03	1.63
	2.90	.60	.50	.40			-245.33	37.45	102.02				
					-23.94	-168.25				14/#8 (3.5%)	0.41		
N+4.00					22.74	153.47				14/#8 (3.5%)	0.42	1.74	1.23
	3.40	.60	.50	.40			-974.98	49.98	77.23				
		1.00			111.42	-76.15				14/#8 (3.5%)	0.51		

Columna G-4

Nivel	H Libre	Losa	B	H	M1	M2	P	V1	V2	Cuantia	m/mr	Col/Vig Eje ppal	Col/vig Eje sec
N+7.50					-60.62	70.28				12/#8 (3.8%)	0.45	2.52	1.22
	2.90	.60	.40	.40			-151.79	61.32	34.52				
					90.74	-50.55				12/#8 (3.8%)	0.48		
N+4.00					129.22	-27.51				12/#8 (3.8%)	0.57	2.86	1.83
	3.40	.60	.40	.40			-523.79	61.58	30.73				
		1.00			117.13	31.42				12/#8 (3.8%)	0.52		

Columna F-2

Nivel	H Libre	Losa	B	H	M1	M2	P	V1	V2	Cuantia	m/mr	Col/Vig Eje ppal	Col/vig Eje sec
N+7.50					141.97	-136.61				14/#8 (3.5%)	0.65	1.24	1.25
	2.90	.60	.50	.40			-322.59	80.04	131.31				
					138.19	137.82				14/#8 (3.5%)	0.64		
N+4.00					145.17	-62.32				14/#8 (3.5%)	0.59	1.62	1.24
	3.40	.60	.50	.40			-838.22	75.63	90.77				
		1.00			157.38	1.05				14/#8 (3.5%)	0.52		

PROYECTO: AGROECOL (CHOCÓ)

Columna G-2

Nivel	H Libre	Losa	B	H	M1	M2	P	V1	V2	Cuantia	m/mr	Col/Vig Eje ppal	Col/vig Eje sec
N+7.50					211.15	-93.31				16/#6 #5 (1.5%)	0.77	1.65	1.20
	2.90	.60	.50	.50			-246.95	111.11	57.68				
					178.34	52.74				16/#6 #5 (1.5%)	0.61		
N+4.00					232.91	-43.86				16/#6 #5 (1.5%)	0.70	2.07	2.04
	3.40	.60	.50	.50			-679.14	124.55	58.54				
		1.00			265.36	64.83				16/#6 #5 (1.5%)	0.82		

Columna F-1

Nivel	H Libre	Losa	B	H	M1	M2	P	V1	V2	Cuantia	m/mr	Col/Vig Eje ppal	Col/vig Eje sec
N+7.50					105.16	24.44				12/#6 #5 (1.0%)	0.41	1.59	1.77
	3.05	.45	.60	.50			-125.22	64.54	20.38				
					124.01	18.93				12/#6 #5 (1.0%)	0.47		
N+4.00					238.66	-10.18				12/#6 #5 (1.0%)	0.80	2.25	2.07
	3.55	.45	.60	.50			-372.49	145.34	98.67				
		1.00			323.22	-68.50				12/#6 #5 (1.0%)	1.11		

Columna G-1

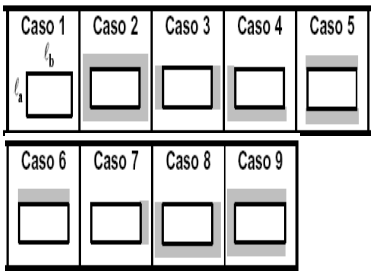
Nivel	H Libre	Losa	B	H	M1	M2	P	V1	V2	Cuantia	m/mr	Col/Vig Eje ppal	Col/vig Eje sec
N+7.50					101.25	-27.41				12/#6 #5 (1.0%)	0.40	2.54	1.76
	3.05	.45	.60	.50			-115.15	56.28	24.17				
					100.10	78.01				12/#6 #5 (1.0%)	0.46		
N+4.00					239.69	-95.55				12/#6 #5 (1.0%)	0.83	2.18	2.61
	3.55	.45	.60	.50			-454.05	140.89	93.39				
		1.00			310.06	107.92				12/#6 #5 (1.0%)	1.18		

6. DISEÑO DE ELEMENTOS COMPLEMENTARIOS

DISEÑO DE ELEMENTOS
COMPLEMENTARIOS

PROYECTO: PROYECTO: SEDE EDUCATIVA AGROECOL UNIÓN PANAMERICANA (CHOCÓ)
DISEÑO PLACA MACIZA (EN UNA DIRECCIÓN)

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 =	**1.30**	m	fy =	**420**	MPa
lb =	**3.25**	m	f'c =	**21.1**	MPa
Relación m =	**0.4**				

h = l/20 (0.4+Fy/700) = 0.07 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
Muros divisorios		2.00	kN/m²
Acabados	0.05x20	1.10	kN/m²
Carga Muerta Total		5.50	kN/m²
Carga Viva		2.00	kN/m²
Carga Última		9.80	kN/m²

DISEÑO A MOMENTO FLECTOR

Mu_a =	**2.07**	kN.m	*Cuantía:*	0.0020	*As =*	1.40 cm²/m	***Transversal***
			Cuantía:	0.0018	*As =*	1.26 cm²/m	***Longitudinal***

Distribución de refuerzo:

Malla electrosoldada ø 4 mm c/.15 Transversal
Malla electrosoldada ø 4 mm c/.15 Longitudinal

REVISIÓN A CORTANTE

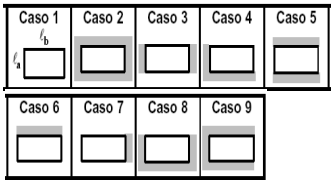
Coeficientes de relación de carga en las dos direcciones para cortante:

R= 6.37 **kN**

ϕvc =	**0.574**	**MPa**	
ϕvu =	**0.091**	**MPa**	**OK**

PROYECTO: PROYECTO: SEDE EDUCATIVA AGROECOL UNIÓN PANAMERICANA (CHOCÓ)
DISEÑO PLACA MACIZA TANQUES

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 =	**3.15**	m	fy =	**420**	MPa
lb =	**4.10**	m	f'c =	**21.1**	MPa
Relación m =	**0.77**				

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

Teniendo en cuenta que la relación m es mayor de 0.5, la placa maciza trabaja en dos direcciones

Cargas

Peso propio de la losa	0.15x1.0x24	3.60	kN/m²
Muros divisorios		2.00	kN/m²
Acabados	0.05x20	1.10	kN/m²
Carga Muerta Total		6.70	kN/m²
Carga Viva		5.00	kN/m²
Carga Última		16.04	kN/m²

Tipo de soporte CASO Nº 9

DISEÑO A MOMENTO FLECTOR

Coeficientes para momento positivo por carga muerta y viva:

C_{aD} =	0.031						
C_{bD} =	0.007						
C_{aV} =	0.046						
C_{bV} =	0.013						
Mua =	**4.34**	kN.m	*Cuantía:*	0.0020	*As =*	2.40	cm²/m
Mu_b =	**1.88**	kN.m	*Cuantía:*	0.0020	*As =*	2.40	cm²/m

Coeficientes para momento negativo por carga última:

C_a =	0.078	Mu_a =	**12.41**	kN.m	*Cuantía:*	0.0021	*As =*	2.53	cm²/m
C_b =	0.014	Mu_b =	**3.77**	kN.m	*Cuantía:*	0.0020	*As =*	2.40	cm²/m

Distribución de refuerzo inferior:

Sentido La *Malla electrosoldada Ø 6 mm c/.15 inferior*

Sentido Lb *Malla electrosoldada Ø 6 mm c/.15 inferior*

Distribución de refuerzo superior:

Sentido La *Malla electrosoldada Ø 6 mm c/.15 superior*

Sentido Lb *Malla electrosoldada Ø 6 mm c/.15 superior*

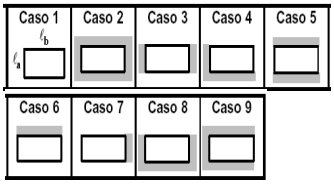
REVISIÓN A CORTANTE

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

W_a =	0.86		
W_b =	0.14		
$\phi v c$ =	**0.574**	**MPa**	
$\phi v u_a$ =	**0.189**	**MPa**	**OK**
$\phi v u_b$ =	**0.024**	**MPa**	**OK**

PROYECTO: PROYECTO: SEDE EDUCATIVA AGROECOL UNIÓN PANAMERICANA (CHOCÓ)
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 =	**3.22**	m	fy =	**420**	MPa
lb =	**3.25**	m	f'c =	**21.1**	MPa
Relación m =	**0.99**				

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

Teniendo en cuenta que la relación m es mayor de 0.5, la placa maciza trabaja en dos direcciones

Cargas

Peso propio de la losa	0.1x1.0x24	2.40	kN/m²
Muros divisorios		2.00	kN/m²
Acabados	0.05x20	1.10	kN/m²
Carga Muerta Total		5.50	kN/m²
Carga Viva		2.00	kN/m²
Carga Última		9.80	kN/m²

Tipo de soporte CASO Nº 2

DISEÑO A MOMENTO FLECTOR

Coeficientes para momento positivo por carga muerta y viva:

C_{aD} =	0.018
C_{bD} =	0.018
C_{aV} =	0.027
C_{bV} =	0.027

Mua =	**1.59**	kN.m	*Cuantía:*	0.0020	*As =*	1.40	cm²/m
Mu_b =	**1.62**	kN.m	*Cuantía:*	0.0020	*As =*	1.40	cm²/m

Coeficientes para momento negativo por carga última:

C_a =	0.045	Mu_a =	**4.57**	kN.m	*Cuantía:*	0.0023	*As =*	1.60	cm²/m
C_b =	0.045	Mu_b =	**4.66**	kN.m	*Cuantía:*	0.0023	*As =*	1.63	cm²/m

Distribución de refuerzo inferior:

Sentido La *Malla electrosoldada Ø 6 mm c/.15 inferior*

Sentido Lb *Malla electrosoldada Ø 6 mm c/.15 inferior*

Distribución de refuerzo superior:

Sentido La *Malla electrosoldada Ø 6 mm c/.15 superior*

Sentido Lb *Malla electrosoldada Ø 6 mm c/.15 superior*

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**
$\phi v u_b$ =	**0.079**	**MPa**	**OK**

PROYECTO:I.E. AGROECOL (CHOCÓ)
DISEÑO MIEMBROS ENSAMBLADOS

MATERIALES

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

CARGAS

V = 7.83 KN

Pernos Φ = 6.35 mm
Agujeros Φ = 9.5 mm

Espesor platina = 6.35 mm

DATOS DEL ELEMENTO

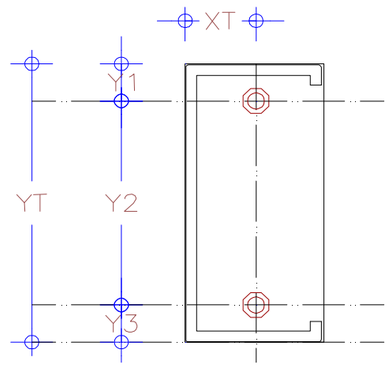
X1 = 40 mm
t = 6.35 mm
XT = 40 mm

Y1 = 35 mm
Y2 = 150 mm
Y3 = 35 mm

YT = 220 mm

A_g = 1174.75 mm^2

A_e = 1024 mm^2



FLUENCIA EN LA SECCIÓN BRUTA

Se debe cumplir:

$$Pu < 0.90\ F_y\ A_g$$

Pu < 266 kN
OK

$A_{g\ Diseño}$ = 35 mm^2
OK

FRACTURA EN LA SECCIÓN EFECTIVA

Se debe cumplir:

$$Pu < 0.75\ F_u\ A_e$$

Pu < 307 kN
OK

$A_{e\ Diseño}$ = 27 mm^2
OK

Resistencia al desgarre de un bloque por tensión y cortante

A_{nv} = 1024 mm^2
A_{nt} = 224 mm^2
$F_u\ A_{nt}$ = - KN
$0.6\ F_u\ A_{nv}$ = 246 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} = 1397 mm^2
A_{gt} = 254 mm^2

Por lo tanto,

P_u = 226 kN

OK

Memorias de Cálculo

PROGRAMA DE DISENO Y CALCULO ESTRUCTURAL
ARQUIMET 2.0

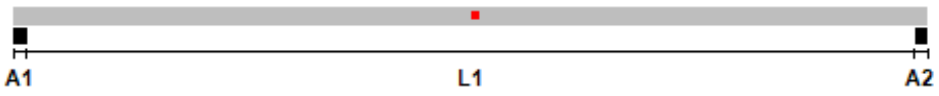
Proyecto: AGROECOL (2) Fecha: OCTUBRE DE 2016

Elementos calculados con el programa de diseño Arquimet 2.0 de ACESCO

REPORTE DE CORREAS

PHR C con atiesador 220 x 80 x 20 (3.00 mm)
con Fy = 35.15 Kgf/mm² cada 1.60 m con arriostramiento cada L/2.

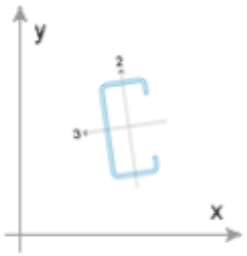
SECCION LONGITUDINAL

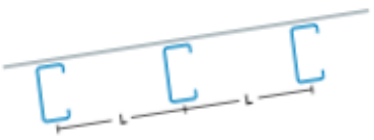


L1	6.82 m
A1	0.10 m
A2	0.10 m

CONFIGURACION	
TIPO DE CARGA	DISTRIBUIDA
Carga muerta	0.30 KN/m²
Peso propio correa	0.09 KN/m
Carga viva	0.50 KN/m²
Carga granizo	0.00 KN/m²
Viento compresión (Perpendicular)	0.40 KN/m²
Viento succión (Perpendicular)	0.40 KN/m²
Pendiente sección transversal	8.531° = 15.0000%

SECCION TRANSVERSAL





L = 1.60 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)	24.6636	4.9590	17.4144	4.9590
Calculado (KN.m)	1.5400E-06	1.2258E-07	13.5683	0.4370

REPORTE CORTANTE		
Ejes locales	2	3
Resistente (KN)	99.2653	75.4562
Calculado (KN)	7.8288	0.5070

REPORTE DEFLEXION		
Deflexiones máximas	Instantanea	Permanente
Admisible (m)	0.0256	0.0000
Calculado (m)	0.0134	0.0000

Elementos calculados con el programa de diseño Arquimet 2.0 de ACESCO

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

REACCIONES - EJES GLOBALES (KN-m)

Elementos calculados con el programa de diseño Arquimet 2.0 de ACESCO

APOYO 1		
Combinacion	Rx	Ry
Muerta	-0.1820	1.9579
Viva de Cub.	-0.2538	2.7299
Granizo	0.0000	0.0000
Viento Comp.	-0.3285	2.1899
Viento Succion	0.3285	-2.1899
Comb. 1	-0.2548	2.7411
Comb. 2	-0.3453	3.7145
Comb. 3	-0.2184	2.3495
Comb. 4	-0.7888	7.8124
Comb. 5	-0.3827	3.4445
Comb. 6	-0.7888	7.8124
Comb. 7	-0.3827	3.4445
Comb. 8	-0.6738	5.9044
Comb. 9	-0.5469	4.5394
Comb. 10	-0.6738	5.9044
Comb. 11	-0.5469	4.5394
Comb. 12	-0.4923	3.9520
Comb. 13	-0.4923	3.9520

APOYO 2		
Combinacion	Rx	Ry
Muerta	-0.1820	1.9579
Viva de Cub.	-0.2538	2.7299
Granizo	0.0000	0.0000
Viento Comp.	-0.3285	2.1899
Viento Succion	0.3285	-2.1899
Comb. 1	-0.2548	2.7411
Comb. 2	-0.3453	3.7145
Comb. 3	-0.2184	2.3495
Comb. 4	-0.7888	7.8124
Comb. 5	-0.3827	3.4445
Comb. 6	-0.7888	7.8124
Comb. 7	-0.3827	3.4445
Comb. 8	-0.6738	5.9044
Comb. 9	-0.5469	4.5394
Comb. 10	-0.6738	5.9044
Comb. 11	-0.5469	4.5394
Comb. 12	-0.4923	3.9520
Comb. 13	-0.4923	3.9520

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	0.1104	1.9633	-1.9154E-08	-6.1292E-07
Viva de Cub.	0.1540	2.7374	-9.5768E-09	7.6614E-08
Granizo	0.0000	0.0000	0.0000	0.0000
Viento Comp.	0.0000	2.2144	0.0000	-8.0445E-07
Viento Succion	0.0000	2.2144	0.0000	-8.0445E-07
Comb. 1	0.1546	2.7486	-2.6815E-08	-8.5808E-07
Comb. 2	0.2095	3.7246	-2.7773E-08	-6.9719E-07
Comb. 3	0.1325	2.3559	-2.2984E-08	-7.3550E-07
Comb. 4	0.3789	7.8429	-3.8307E-08	-1.0151E-06
Comb. 5	0.1325	3.4631	-2.2984E-08	-1.1377E-06
Comb. 6	0.3789	7.8429	-3.8307E-08	-1.0151E-06
Comb. 7	0.1325	3.4631	-2.2984E-08	-1.1377E-06
Comb. 8	0.2095	5.9390	-2.7773E-08	-1.5016E-06
Comb. 9	0.1325	4.5703	-2.2984E-08	-1.5400E-06
Comb. 10	0.2095	5.9390	-2.7773E-08	-1.5016E-06
Comb. 11	0.1325	4.5703	-2.2984E-08	-1.5400E-06
Comb. 12	0.0994	3.9813	-1.7238E-08	-1.3561E-06
Comb. 13	0.0994	3.9813	-1.7238E-08	-1.3561E-06

APOYO 2				
Combinacion	R2	R3	M2	M3
Muerta	0.1104	1.9633	0.0000	-3.0646E-07
Viva de Cub.	0.1540	2.7374	-7.6614E-08	1.2258E-06
Granizo	0.0000	0.0000	0.0000	0.0000
Viento Comp.	0.0000	2.2144	0.0000	-3.0646E-07
Viento Succion	0.0000	2.2144	0.0000	-3.0646E-07
Comb. 1	0.1546	2.7486	0.0000	-4.2904E-07
Comb. 2	0.2095	3.7246	-3.8307E-08	2.4517E-07
Comb. 3	0.1325	2.3559	0.0000	-3.6775E-07
Comb. 4	0.3789	7.8429	-1.2258E-07	1.4404E-06
Comb. 5	0.1325	3.4631	0.0000	-5.2098E-07
Comb. 6	0.3789	7.8429	-1.2258E-07	1.4404E-06
Comb. 7	0.1325	3.4631	0.0000	-5.2098E-07
Comb. 8	0.2095	5.9390	-3.8307E-08	-6.1292E-08
Comb. 9	0.1325	4.5703	0.0000	-6.7421E-07
Comb. 10	0.2095	5.9390	-3.8307E-08	-6.1292E-08
Comb. 11	0.1325	4.5703	0.0000	-6.7421E-07
Comb. 12	0.0994	3.9813	0.0000	-5.8227E-07
Comb. 13	0.0994	3.9813	0.0000	-5.8227E-07

PROYECTO: I.E. AGROECOL (CHOCÓ)
CALCULO DE DEFLEXIONES
V-115 EJES 4-8
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=	60	**cm**
fy=	420	**MPa**	d=	55	**cm**
			b=	40	**cm**

As=	1548 **mm²**		15.48 **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	**1548** mm^2	nAs =	14340.42	mm^2
d'	50 mm	5	cm	

Profundidad del eje neutro:

x=	144.5 **mm**		14.45 **cm**

PROYECTO: I.E. AGROECOL (CHOCÓ)
CALCULO DE DEFLEXIONES
V-115 EJES 4-8
MOMENTO DE INERCIA DE LA SECCION TRANSFORMADA FISURADA

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

I cr= 291994.80 **cm^4** 0.00292 **m^4**

MOMENTO DE INERCIA SECCIÓN TOTAL DE CONCRETO

Ig= 720000 **cm^4** 0.00720 **m^4**
Yt= 45.55 **cm**

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

Mcr= 50.82 **kN-m**

Ma = Momento máximo presente en la viga

Ma= **291.7** **kN-m**

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

Ie= 294258.1 **cm^4** 29.426 ***OK***

PROYECTO: I.E. AGROECOL (CHOCÓ)
CALCULO DE DEFLEXIONES
V-115 EJES 4-8
MOMENTO NEGATIVO

f'c=	**21.1**	**MPa**	h=	**60**	**cm**
fy=	**420**	**MPa**	d=	55	**cm**
			b=	**40**	**cm**

As=	**3060**	**mm²**	30.6 **cm²**
n=	**9.3**		
As'=	**1548**	**mm²**	15.48 **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'	**1548** mm^2	(2n-1)A's =	27132.84	mm^2
As	**3060** mm^2	nAs =	28347.34	mm^2
d'	**50** mm	5	cm	

Profundidad del eje neutro:

x=	185.3	**mm**	18.53 **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=	511541.00	**cm⁴**	0.00512 **m⁴**

PROYECTO: I.E. AGROECOL (CHOCÓ)
CALCULO DE DEFLEXIONES
V-115 EJES 4-8
MOMENTO DE INERCIA SECCIÓN TOTAL DE CONCRETO

Ig= 720000 **cm^4** 0.00720 **m^4**
Yt= 41.47 **cm**

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

Mcr= 55.83 **kN-m**

Ma = Momento máximo presente en la viga

Ma= **515.7** **kN-m**

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

Ie= 511805.5 **cm^4** 51.181 ***OK***

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

Ie= 403031.81 **cm^4** 40.303 **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 **4.82** **kN/m**
E **21589** **MPa**

δ= 0.0026 m

DEFLEXIÓN INMEDIATA POR :

CARGA MUERTA 80%	0.002 m	0.212 mm
CARGA VIVA 20%	0.000 m	0.048 mm

DEFLEXIÓN ADICIONAL LARGO PLAZO (5 AÑOS O MAS)

PROYECTO: I.E. AGROECOL (CHOCÓ)
CALCULO DE DEFLEXIONES
V-115 EJES 4-8

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= 0.0029 m

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

	L=	**9.00**	**m**	
DEFLEXION LIMITE	L/480	**0.0188**	**m**	
DEFLEXION LARGO PLAZO		**0.0034**	**m**	***OK***

7. DISEÑO DE ELEMENTOS NO ESTRUCTURALES

DISEÑO DE ELEMENTOS NO ESTRUCTURALES

DISEÑO DE ELEMENTOS NO ESTRUCTURALES

Units: kN*m

STORY DATA

Story	Height	Elevation	SimilarTo
N+7.50	3.50	7.45	None
N+4.00	4.00	3.95	N+7.50
BASE	0.00	-0.05	None

CENTER MASS RIGIDITY

Story	Diaphragm	MassX	MassY	XCM	YCM	CumMassX	CumMassY	XCCM	YCCM	XCR	YCR
N+4.00	D1	269.4971	269.4971	17.968	16.826	269.4971	269.4971	17.968	16.826	18.443	18.232
N+7.50	D2	110.6984	110.6984	18.275	20.007	110.6984	110.6984	18.275	20.007	18.769	18.04

STORY SHEARS

Story	Load	Loc	P	VX	VY	T	MX	MY
N+7.50	SISDISX	Top	0.00	259.59	31.94	5789.65	0.00	0.00
N+7.50	SISDISX	Bottom	0.00	259.59	31.94	5789.65	111.80	908.56
N+7.50	SISDISY	Top	0.00	24.83	257.04	4901.90	0.00	0.00
N+7.50	SISDISY	Bottom	0.00	24.83	257.04	4901.90	899.63	86.90
N+4.00	SISDISX	Top	0.00	595.03	76.51	12240.24	111.80	908.56
N+4.00	SISDISX	Bottom	0.00	595.03	76.51	12240.24	417.78	3263.12
N+4.00	SISDISY	Top	0.00	76.51	597.78	11537.36	899.63	86.90
N+4.00	SISDISY	Bottom	0.00	76.51	597.78	11537.36	3254.41	388.71

$$F_p = \frac{a_x a_p}{R_p} gM_p \geq \frac{A_a I}{2} gM_p \qquad a_x = \frac{C_{vx} V_s}{m_x g} \leq 2S_a \qquad C_{vx} = \frac{m_x h_x^k}{\sum_{i=1}^{n} (m_i h_i^k)}$$

$$V_s = S_a gM$$

g: 9.81 m/s^2
Sa: 0.300 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: 4.00 m
Carga 7.8 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+7.50	259.59	269.50	0.600	1.0	6	0.780	1.560	1.560
N+4.00	335.44	110.70	0.600	1.0	6	0.780	1.560	1.560

	Sección Vigas V.			As. (cm2)		Separación column.		Fl. 1/4"
Story	b	d	ρ	neces.	ubicado	S max	S escogida	S estribos
N+7.50	0.15	0.21	0.00057	0.18	0.71	3.99	4.00	0.188
N+4.00	0.15	0.21	0.00057	0.18	0.71	3.99	4.00	0.188

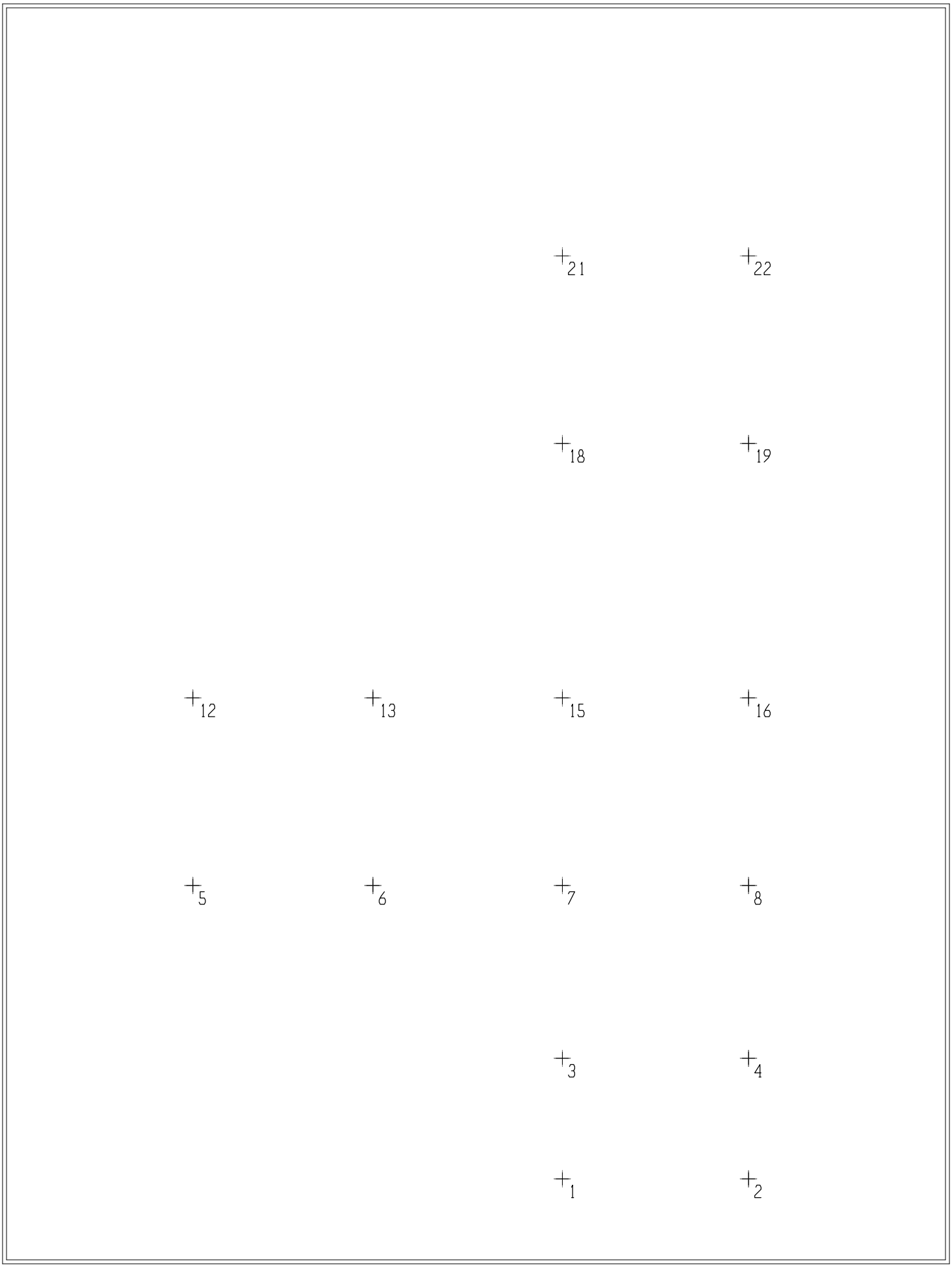
DISEÑO PARA ANTEPECHOS

Story	Fx	Wx	ax	ap	Rp	Fp	M	V
N+7.50	259.59	269.50	0.600	2.5	6	1.950	3.900	3.900
N+4.00	335.44	110.70	0.600	2.5	6	1.950	3.900	3.900

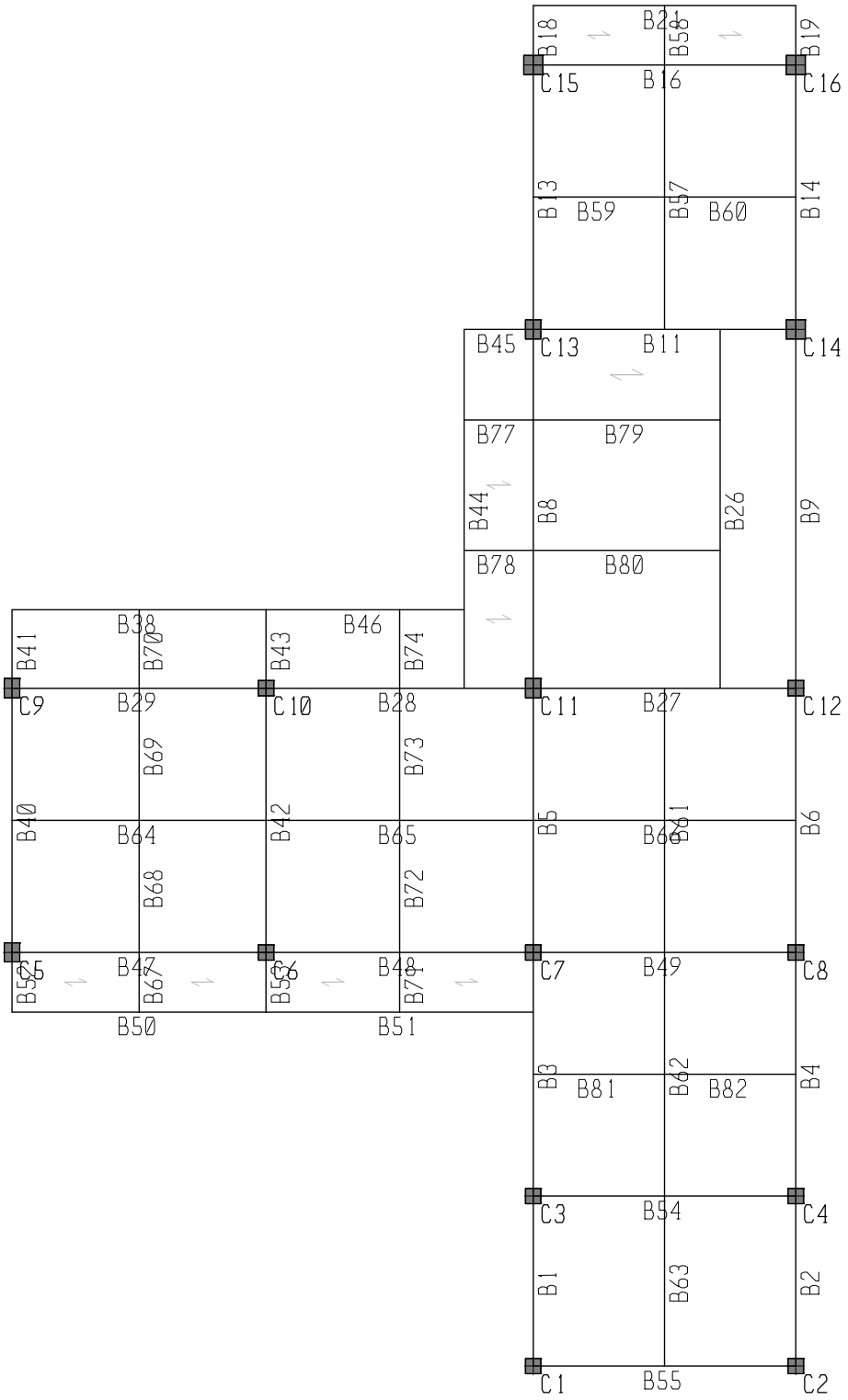
	Sección columneta			As. (cm2)		Separación column.		Fl. 1/4"
Story	b	d	ρ	neces.	ubicado	S max	S escogida	S estribos
N+7.50	0.15	0.21	0.00143	0.45	1.29	2.87	2.90	0.188
N+4.00	0.15	0.21	0.00143	0.45	1.29	2.87	2.90	0.188

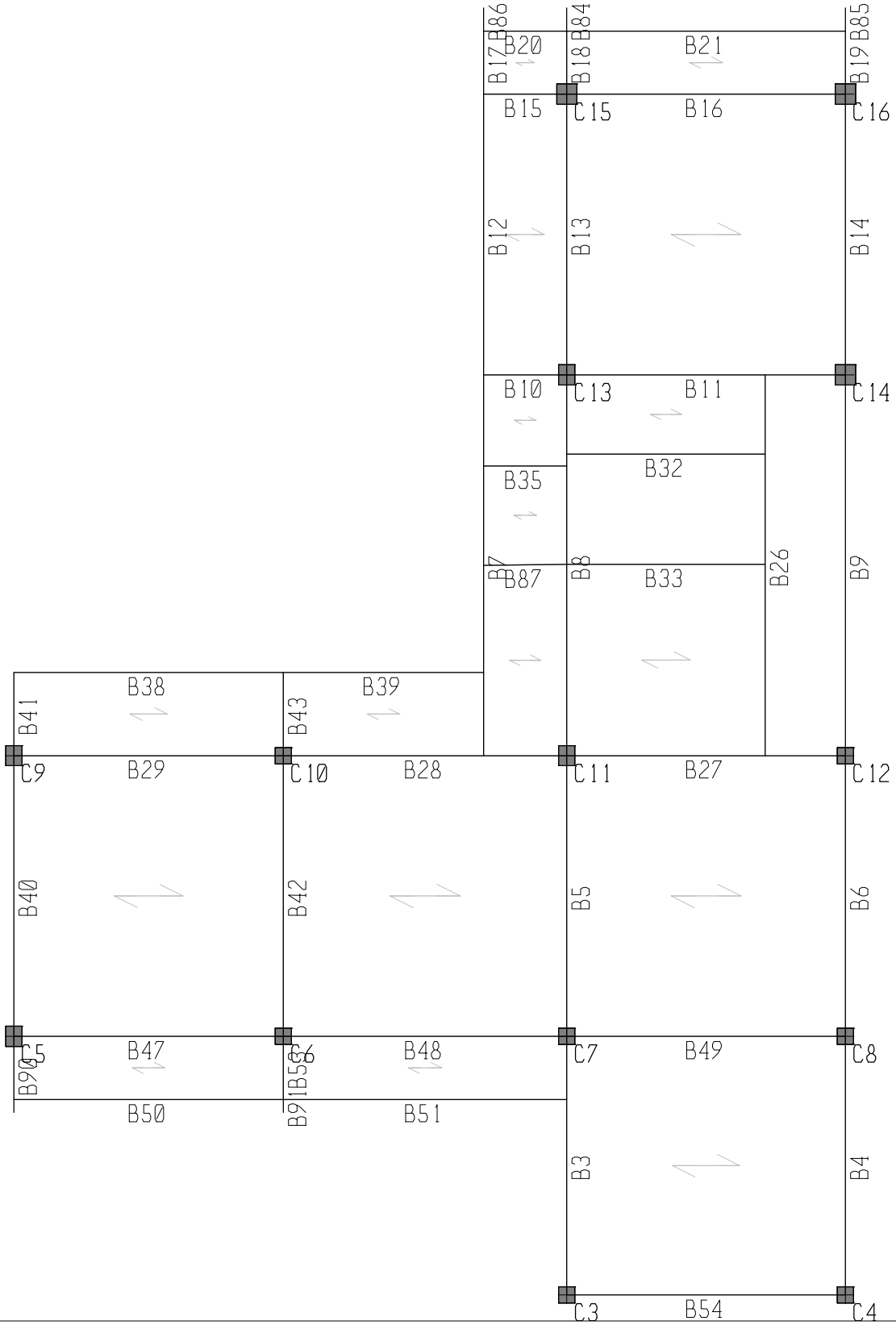
8. ANEXOS DE COMPUTADOR

ANEXOS DE COMPUTADOR


21
22
18
19
12
13
15
16
5
6
7
8
3
4
1
2

ETABS


B18
B21
B58
B19
C15
B16
C16
B13
B59
B57
B60
B14
B45
C13
B11
C14
B77
B79
B44
B8
B26
B9
B78
B80
B38
B46
B41
B70
B43
B74
C9
B29
C10
B28
C11
B27
C12
B69
B73
B40
B42
B5
B61
B6
B64
B65
B66
B68
B72
B67
B71
C7
B49
C8
B50
B51
B3
B81
B62
B82
B4
C3
B54
C4
B1
B63
B2
C1
B55
C2


B86
B84
B85
B17
B20
B18
B21
B19
B15
C15
B16
C16
B12
B13
B14
B10
C13
B11
C14
B32
B35
B7
B87
B8
B33
B26
B9
B38
B39
B41
B43
C9
B29
C10
B28
C11
B27
C12
B40
B42
B5
B6
C5
B47
C6
B48
C7
B49
C8
B90
B91
B50
B51
B3
B4
C3
B54
C4

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S T O R Y D A T A

STORY	SIMILAR TO	HEIGHT	ELEVATION
N+7.50	None	3.500	7.450
N+4.00	N+7.50	4.000	3.950
BASE	None		-0.050

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

POINT	X	Y	DZ-BELOW
1	18.290	0.000	0.000
2	25.240	0.000	0.000
3	18.290	4.500	0.000
4	25.240	4.500	0.000
5	4.500	10.950	0.000
6	11.220	10.950	0.000
7	18.290	10.950	0.000
8	25.240	10.950	0.000
12	4.500	17.950	0.000
13	11.220	17.950	0.000
14	16.215	17.950	0.000
15	18.290	17.950	0.000
16	25.240	17.950	0.000
17	16.215	27.450	0.000
18	18.290	27.450	0.000
19	25.240	27.450	0.000
20	16.215	34.450	0.000
21	18.290	34.450	0.000
22	25.240	34.450	0.000
23	16.215	36.025	0.000
24	18.290	36.025	0.000
25	25.240	36.025	0.000
30	23.240	17.950	0.000
31	23.240	27.450	0.000
32	18.290	22.725	0.000
34	18.290	25.475	0.000
36	23.240	25.475	0.000
37	23.240	22.725	0.000
38	18.290	25.175	0.000
40	16.215	25.175	0.000
42	11.220	20.025	0.000
44	4.500	20.025	0.000
45	16.215	20.025	0.000
46	16.465	17.950	0.000
47	16.465	27.450	0.000
48	16.465	20.025	0.000
49	4.500	9.375	0.000
50	11.220	9.375	0.000
51	18.290	9.375	0.000
54	21.765	27.450	0.000
55	21.765	34.450	0.000
56	21.765	36.025	0.000
57	18.290	30.950	0.000
58	21.765	30.950	0.000
59	25.240	30.950	0.000
60	21.765	17.950	0.000
61	21.765	10.950	0.000
62	21.765	4.500	0.000
63	21.765	0.000	0.000
64	4.500	14.450	0.000
65	11.220	14.450	0.000
66	18.290	14.450	0.000
67	25.240	14.450	0.000
68	7.860	9.375	0.000
69	7.860	10.950	0.000
70	7.860	14.450	0.000
71	7.860	17.950	0.000
72	7.860	20.025	0.000
73	14.755	9.375	0.000
74	14.755	10.950	0.000
75	14.755	14.450	0.000
76	14.755	17.950	0.000

77	14.755	20.025	0.000
78	18.290	21.600	0.000
80	18.290	25.050	0.000
82	16.465	25.050	0.000
83	16.465	21.600	0.000
84	23.240	25.050	0.000
85	23.240	21.600	0.000
86	18.290	7.725	0.000
87	21.765	7.725	0.000
88	25.240	7.725	0.000
89	18.290	36.600	0.000
90	25.240	36.600	0.000
91	16.215	36.600	0.000
92	16.215	22.700	0.000
93	4.500	9.050	0.000
94	11.220	9.050	0.000
96	21.765	14.450	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
C1	1	1	Below
C2	2	2	Below
C3	3	3	Below
C4	4	4	Below
C5	5	5	Below
C6	6	6	Below
C7	7	7	Below
C8	8	8	Below
C9	12	12	Below
C10	13	13	Below
C11	15	15	Below
C12	16	16	Below
C13	18	18	Below
C14	19	19	Below
C15	21	21	Below
C16	22	22	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
B1	1	3
B2	2	4
B3	3	7
B4	4	8
B5	7	15
B6	8	16
B7	14	17
B8	15	18
B9	16	19
B10	17	18
B11	18	19
B12	17	20
B13	18	21
B14	19	22
B15	20	21
B16	21	22
B17	20	23
B18	21	24
B19	22	25
B20	23	24
B21	24	25
B26	30	31
B27	15	16
B28	13	15
B29	12	13
B32	34	36
B33	32	37
B35	40	38
B38	44	42
B39	42	45
B40	5	12

B41	12	44
B42	6	13
B43	13	42
B44	46	47
B45	47	18
B46	42	48
B47	5	6
B48	6	7
B49	7	8
B50	49	50
B51	50	51
B52	49	5
B53	50	6
B54	3	4
B55	1	2
B57	54	55
B58	55	56
B59	57	58
B60	58	59
B61	60	61
B62	61	62
B63	62	63
B64	64	65
B65	65	66
B66	66	67
B67	68	69
B68	69	70
B69	70	71
B70	71	72
B71	73	74
B72	74	75
B73	75	76
B74	76	77
B77	82	80
B78	83	78
B79	80	84
B80	78	85
B81	86	87
B82	87	88
B84	24	89
B85	25	90
B86	23	91
B87	92	32
B90	93	5
B91	94	50

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+7.50	D2	21	22	18	19	12
		13	15	16	5	6
		7	8	3	4	24
		25	89	90	91	14
		17	20	23	30	31
		34	36	32	37	92
		38	40	44	42	45
		49	50	51	93	94
N+4.00	D1	21	22	18	19	12
		13	15	16	5	6
		7	8	3	4	1
		2	24	25	46	47
		44	42	48	49	50
		51	30	31	54	55
		56	57	58	59	60
		61	62	63	64	65
		66	67	68	69	70
		71	72	73	74	75
		76	77	78	80	82
		83	84	85	86	87
		88	96			

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	21538000.000	0.2000	9.9000E-06	8974166.667
OTHER	Iso	None	All	199947978.80	0.3000	1.1700E-05	76903068.77

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

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

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
VIG30X45	CONC21	Rectangular		Yes
COL40X40	CONC21	Rectangular	Yes	
VIG15X45	CONC21	Rectangular		Yes
VIG40X45	CONC21	Rectangular		Yes
VIG25X45	CONC21	Rectangular		Yes
VIG35X45	CONC21	Rectangular		Yes
COL50X40	CONC21	Rectangular	Yes	
COL50X50	CONC21	Rectangular	Yes	
COL40X50	CONC21	Rectangular	Yes	
VIG40X60	CONC21	Rectangular		Yes
VIG35X60	CONC21	Rectangular		Yes
COL50X60	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
VIG30X45	0.4500	0.3000	0.0000	0.0000	0.0000	0.0000
COL40X40	0.4000	0.4000	0.0000	0.0000	0.0000	0.0000
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
VIG25X45	0.4500	0.2500	0.0000	0.0000	0.0000	0.0000
VIG35X45	0.4500	0.3500	0.0000	0.0000	0.0000	0.0000
COL50X40	0.4000	0.5000	0.0000	0.0000	0.0000	0.0000
COL50X50	0.5000	0.5000	0.0000	0.0000	0.0000	0.0000
COL40X50	0.5000	0.4000	0.0000	0.0000	0.0000	0.0000
VIG40X60	0.6000	0.4000	0.0000	0.0000	0.0000	0.0000
VIG35X60	0.6000	0.3500	0.0000	0.0000	0.0000	0.0000
COL50X60	0.5000	0.6000	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	TORSIONAL	MOMENTS OF INERTIA			SHEAR AREAS

FRAME SECTION NAME	AREA	CONSTANT	I33	I22	A2	A3
VIG30X45	0.1350	0.0024	0.0023	0.0010	0.1125	0.1125
COL40X40	0.1600	0.0036	0.0021	0.0021	0.1333	0.1333
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
VIG25X45	0.1125	0.0015	0.0019	0.0006	0.0938	0.0938
VIG35X45	0.1575	0.0034	0.0027	0.0016	0.1313	0.1313
COL50X40	0.2000	0.0055	0.0027	0.0042	0.1667	0.1667
COL50X50	0.2500	0.0088	0.0052	0.0052	0.2083	0.2083
COL40X50	0.2000	0.0055	0.0042	0.0027	0.1667	0.1667
VIG40X60	0.2400	0.0075	0.0072	0.0032	0.2000	0.2000
VIG35X60	0.2100	0.0055	0.0063	0.0021	0.1750	0.1750
COL50X60	0.3000	0.0124	0.0063	0.0090	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

	SECTION MODULI		PLASTIC MODULI		RADIUS OF GYRATION	
FRAME SECTION NAME	S33	S22	Z33	Z22	R33	R22
VIG30X45	0.0101	0.0068	0.0152	0.0101	0.1299	0.0866
COL40X40	0.0107	0.0107	0.0160	0.0160	0.1155	0.1155
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
VIG25X45	0.0084	0.0047	0.0127	0.0070	0.1299	0.0722
VIG35X45	0.0118	0.0092	0.0177	0.0138	0.1299	0.1010
COL50X40	0.0133	0.0167	0.0200	0.0250	0.1155	0.1443
COL50X50	0.0208	0.0208	0.0313	0.0313	0.1443	0.1443
COL40X50	0.0167	0.0133	0.0250	0.0200	0.1443	0.1155
VIG40X60	0.0240	0.0160	0.0360	0.0240	0.1732	0.1155
VIG35X60	0.0210	0.0123	0.0315	0.0184	0.1732	0.1010
COL50X60	0.0250	0.0300	0.0375	0.0450	0.1443	0.1732

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
VIG30X45	140.1300	14.0130
COL40X40	201.6000	20.1600
VIG15X45	154.5237	15.4524
VIG40X45	583.5240	58.3524
VIG25X45	297.1759	29.7176
VIG35X45	328.3308	32.8331
COL50X40	182.4000	18.2400
COL50X50	45.0000	4.5000
COL40X50	0.0000	0.0000
VIG40X60	328.3200	32.8320
VIG35X60	70.0560	7.0056
COL50X60	108.0000	10.8000

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
COL40X40	Rectangular	Ties	#9/Design	3/3	N/A	0.0500
COL50X40	Rectangular	Ties	#9/Design	3/3	N/A	0.0457
COL50X50	Rectangular	Ties	#9/Design	3/3	N/A	0.0457
COL40X50	Rectangular	Ties	#9/Design	3/3	N/A	0.0500
COL50X60	Rectangular	Ties	#9/Design	3/3	N/A	0.0457

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
VIG30X45	0.0500	0.0500	0.000	0.000	0.000	0.000
VIG15X45	0.0500	0.0500	0.000	0.000	0.000	0.000
VIG40X45	0.0450	0.0450	0.000	0.000	0.000	0.000
VIG25X45	0.0457	0.0457	0.000	0.000	0.000	0.000
VIG35X45	0.0457	0.0457	0.000	0.000	0.000	0.000

VIG40X60	0.0600	0.0600	0.000	0.000	0.000	0.000
VIG35X60	0.0457	0.0457	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
CUBLIV	CONC21	Membrane	Yes	0.0130	0.0130	111.3133	11.1313
CUBMACSAL1	CONC21	Membrane	Yes	0.2290	0.2290	316.0365	31.6036
CUBMACSAL2	CONC21	Membrane	No	0.2290	0.2290	1665.3423	166.5342
CUBMACTAN1	CONC21	Membrane	Yes	0.1960	0.1960	45.9875	4.5987
CUBMACTAN2	CONC21	Membrane	No	0.1960	0.1960	211.1508	21.1151

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: 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	0.0200	0.0000	0.0200

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	0.0200	0.0000	0.0200

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
CIM1	ADD	DEAD	Static	1.0000
		LIVE	Static	1.0000
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
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
CIM2	ADD	DEAD	Static	1.0000
		LIVE	Static	0.7500
		SISDISX	Spectra	0.5250
		SISDISY	Spectra	0.1575
CIM3	ADD	DEAD	Static	1.0000
		LIVE	Static	0.7500
		SISDISX	Spectra	0.1575
		SISDISY	Spectra	0.5250
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

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\dyein_000\desktop\cristian\agroecol\correccion\modelo\agroecol2\derivas.txt
DATA TYPE: Period vs Acceleration
NUMBER OF HEADER LINES = 0

PERIOD	ACCEL
0.0000	1.1250
0.0700	1.1250
0.1300	1.1250
0.2000	1.1250
0.2700	1.1250
0.5200	1.1250
0.7700	1.1250
1.0300	1.1250
1.2800	1.1250
1.5300	0.9420
1.7800	0.8100
2.0300	0.7110
2.2800	0.6330
2.5200	0.5700
2.7700	0.5190
3.0200	0.4760
3.2700	0.4400
3.5200	0.4090
3.7700	0.3820
4.0200	0.3580
4.2700	0.3380
4.5200	0.3190
4.7600	0.3020
5.0100	0.2870
5.2600	0.2740
5.5100	0.2610
5.7600	0.2500
6.7600	0.1820
7.7600	0.1380

FUNCTION NAME: DISENO

FILE NAME: c:\users\dyein_000\desktop\cristian\agroecol\correccion\modelo\agroecol2\diseño.txt
DATA TYPE: Period vs Acceleration
NUMBER OF HEADER LINES = 0

PERIOD	ACCEL
0.0000	0.1786
0.0700	0.1786
0.1300	0.1786
0.2000	0.1786
0.2700	0.1786
0.5200	0.1786
0.7700	0.1786
1.0300	0.1786
1.2800	0.1786
1.5300	0.1495
1.7800	0.1286
2.0300	0.1128
2.2800	0.1004
2.5200	0.0905
2.7700	0.0824
3.0200	0.0756
3.2700	0.0699
3.5200	0.0649
3.7700	0.0606
4.0200	0.0569
4.2700	0.0536
4.5200	0.0506
4.7600	0.0480
5.0100	0.0456
5.2600	0.0434
5.5100	0.0415
5.7600	0.0397
6.7600	0.0288
7.7600	0.0219

FUNCTION NAME: UMBRAL

FILE NAME: c:\users\dyein_000\desktop\cristian\agroecol\correccion\modelo\agroecol2\umbral.txt
DATA TYPE: Period vs Acceleration
NUMBER OF HEADER LINES = 0

PERIOD	ACCEL
0.0000	0.1000
0.0500	0.1400
0.1000	0.1800
0.1500	0.2200
0.2000	0.2600
0.2500	0.3000
0.4900	0.3000
0.7300	0.3000
0.9800	0.3000
1.2200	0.3000
1.4600	0.3000
1.7000	0.3000
1.9500	0.3000
2.1900	0.3000
2.7800	0.2360
3.3800	0.1940
3.9700	0.1650
4.5600	0.1440
5.1600	0.1270
5.7500	0.1140
6.3400	0.1030
6.9400	0.0950
7.5300	0.0870
8.1300	0.0810
8.7200	0.0750
9.3100	0.0700
9.9100	0.0660

10.5000	0.0630
11.5000	0.0520
12.5000	0.0440

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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+7.50	C3	Column	Rectangular	None	COL40X40	Conc Frame	COL40X40
N+7.50	C4	Column	Rectangular	None	COL40X40	Conc Frame	COL40X40
N+7.50	C5	Column	Rectangular	None	COL50X40	Conc Frame	COL50X40
N+7.50	C6	Column	Rectangular	None	COL40X40	Conc Frame	COL40X40
N+7.50	C7	Column	Rectangular	None	COL40X40	Conc Frame	COL40X40
N+7.50	C8	Column	Rectangular	None	COL40X40	Conc Frame	COL40X40
N+7.50	C9	Column	Rectangular	None	COL50X40	Conc Frame	COL50X40
N+7.50	C10	Column	Rectangular	None	COL40X40	Conc Frame	COL40X40
N+7.50	C11	Column	Rectangular	None	COL50X40	Conc Frame	COL50X40
N+7.50	C12	Column	Rectangular	None	COL40X40	Conc Frame	COL40X40
N+7.50	C13	Column	Rectangular	None	COL50X40	Conc Frame	COL50X40
N+7.50	C14	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+7.50	C15	Column	Rectangular	None	COL50X60	Conc Frame	COL50X60
N+7.50	C16	Column	Rectangular	None	COL50X60	Conc Frame	COL50X60
N+4.00	C1	Column	Rectangular	None	COL50X40	Conc Frame	COL50X40
N+4.00	C2	Column	Rectangular	None	COL50X40	Conc Frame	COL50X40
N+4.00	C3	Column	Rectangular	None	COL40X40	Conc Frame	COL40X40
N+4.00	C4	Column	Rectangular	None	COL40X40	Conc Frame	COL40X40
N+4.00	C5	Column	Rectangular	None	COL50X40	Conc Frame	COL50X40
N+4.00	C6	Column	Rectangular	None	COL40X40	Conc Frame	COL40X40
N+4.00	C7	Column	Rectangular	None	COL40X40	Conc Frame	COL40X40
N+4.00	C8	Column	Rectangular	None	COL40X40	Conc Frame	COL40X40
N+4.00	C9	Column	Rectangular	None	COL50X40	Conc Frame	COL50X40
N+4.00	C10	Column	Rectangular	None	COL40X40	Conc Frame	COL40X40
N+4.00	C11	Column	Rectangular	None	COL50X40	Conc Frame	COL50X40
N+4.00	C12	Column	Rectangular	None	COL40X40	Conc Frame	COL40X40
N+4.00	C13	Column	Rectangular	None	COL50X40	Conc Frame	COL50X40
N+4.00	C14	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+4.00	C15	Column	Rectangular	None	COL50X60	Conc Frame	COL50X60
N+4.00	C16	Column	Rectangular	None	COL50X60	Conc Frame	COL50X60
N+7.50	B3	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+7.50	B4	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+7.50	B5	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+7.50	B6	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+7.50	B7	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+7.50	B8	Beam	Rectangular	None	VIG40X60	Conc Frame	VIG40X60
N+7.50	B9	Beam	Rectangular	None	VIG40X60	Conc Frame	VIG40X60
N+7.50	B10	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+7.50	B11	Beam	Rectangular	None	VIG35X60	Conc Frame	VIG35X60
N+7.50	B12	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+7.50	B13	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+7.50	B14	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+7.50	B15	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+7.50	B16	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+7.50	B17	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+7.50	B18	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+7.50	B19	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+7.50	B20	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+7.50	B21	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+7.50	B26	Beam	Rectangular	None	VIG40X60	Conc Frame	VIG40X60
N+7.50	B27	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+7.50	B28	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+7.50	B29	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+7.50	B32	Beam	Rectangular	None	VIG25X45	Conc Frame	VIG25X45
N+7.50	B33	Beam	Rectangular	None	VIG25X45	Conc Frame	VIG25X45
N+7.50	B35	Beam	Rectangular	None	VIG25X45	Conc Frame	VIG25X45
N+7.50	B38	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+7.50	B39	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+7.50	B40	Beam	Rectangular	None	VIG30X45	Conc Frame	VIG30X45
N+7.50	B41	Beam	Rectangular	None	VIG30X45	Conc Frame	VIG30X45
N+7.50	B42	Beam	Rectangular	None	VIG30X45	Conc Frame	VIG30X45
N+7.50	B43	Beam	Rectangular	None	VIG30X45	Conc Frame	VIG30X45
N+7.50	B47	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+7.50	B48	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+7.50	B49	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+7.50	B50	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+7.50	B51	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45

N+7.50	B53	Beam	Rectangular	None	VIG30X45	Conc Frame	VIG30X45
N+7.50	B54	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+7.50	B84	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+7.50	B85	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+7.50	B86	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+7.50	B87	Beam	Rectangular	None	VIG25X45	Conc Frame	VIG25X45
N+7.50	B90	Beam	Rectangular	None	VIG30X45	Conc Frame	VIG30X45
N+7.50	B91	Beam	Rectangular	None	VIG30X45	Conc Frame	VIG30X45
N+4.00	B1	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+4.00	B2	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+4.00	B3	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+4.00	B4	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+4.00	B5	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+4.00	B6	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+4.00	B8	Beam	Rectangular	None	VIG40X60	Conc Frame	VIG40X60
N+4.00	B9	Beam	Rectangular	None	VIG40X60	Conc Frame	VIG40X60
N+4.00	B11	Beam	Rectangular	None	VIG35X60	Conc Frame	VIG35X60
N+4.00	B13	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+4.00	B14	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+4.00	B16	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+4.00	B18	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+4.00	B19	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+4.00	B21	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+4.00	B26	Beam	Rectangular	None	VIG40X60	Conc Frame	VIG40X60
N+4.00	B27	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+4.00	B28	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+4.00	B29	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+4.00	B38	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+4.00	B40	Beam	Rectangular	None	VIG30X45	Conc Frame	VIG30X45
N+4.00	B41	Beam	Rectangular	None	VIG30X45	Conc Frame	VIG30X45
N+4.00	B42	Beam	Rectangular	None	VIG30X45	Conc Frame	VIG30X45
N+4.00	B43	Beam	Rectangular	None	VIG30X45	Conc Frame	VIG30X45
N+4.00	B44	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+4.00	B45	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+4.00	B46	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+4.00	B47	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+4.00	B48	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+4.00	B49	Beam	Rectangular	None	VIG35X45	Conc Frame	VIG35X45
N+4.00	B50	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+4.00	B51	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+4.00	B52	Beam	Rectangular	None	VIG30X45	Conc Frame	VIG30X45
N+4.00	B53	Beam	Rectangular	None	VIG30X45	Conc Frame	VIG30X45
N+4.00	B54	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+4.00	B55	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+4.00	B57	Beam	Rectangular	None	VIG25X45	Conc Frame	VIG25X45
N+4.00	B58	Beam	Rectangular	None	VIG25X45	Conc Frame	VIG25X45
N+4.00	B59	Beam	Rectangular	None	VIG25X45	Conc Frame	VIG25X45
N+4.00	B60	Beam	Rectangular	None	VIG25X45	Conc Frame	VIG25X45
N+4.00	B61	Beam	Rectangular	None	VIG25X45	Conc Frame	VIG25X45
N+4.00	B62	Beam	Rectangular	None	VIG25X45	Conc Frame	VIG25X45
N+4.00	B63	Beam	Rectangular	None	VIG25X45	Conc Frame	VIG25X45
N+4.00	B64	Beam	Rectangular	None	VIG25X45	Conc Frame	VIG25X45
N+4.00	B65	Beam	Rectangular	None	VIG25X45	Conc Frame	VIG25X45
N+4.00	B66	Beam	Rectangular	None	VIG25X45	Conc Frame	VIG25X45
N+4.00	B67	Beam	Rectangular	None	VIG25X45	Conc Frame	VIG25X45
N+4.00	B68	Beam	Rectangular	None	VIG25X45	Conc Frame	VIG25X45
N+4.00	B69	Beam	Rectangular	None	VIG25X45	Conc Frame	VIG25X45
N+4.00	B70	Beam	Rectangular	None	VIG25X45	Conc Frame	VIG25X45
N+4.00	B71	Beam	Rectangular	None	VIG25X45	Conc Frame	VIG25X45
N+4.00	B72	Beam	Rectangular	None	VIG25X45	Conc Frame	VIG25X45
N+4.00	B73	Beam	Rectangular	None	VIG25X45	Conc Frame	VIG25X45
N+4.00	B74	Beam	Rectangular	None	VIG25X45	Conc Frame	VIG25X45
N+4.00	B77	Beam	Rectangular	None	VIG25X45	Conc Frame	VIG25X45
N+4.00	B78	Beam	Rectangular	None	VIG25X45	Conc Frame	VIG25X45
N+4.00	B79	Beam	Rectangular	None	VIG25X45	Conc Frame	VIG25X45
N+4.00	B80	Beam	Rectangular	None	VIG25X45	Conc Frame	VIG25X45
N+4.00	B81	Beam	Rectangular	None	VIG25X45	Conc Frame	VIG25X45
N+4.00	B82	Beam	Rectangular	None	VIG25X45	Conc Frame	VIG25X45

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+7.50	B5	Force	Gravity	0.000	7.000	2.670	2.670
DEAD	N+7.50	B8	Force	Gravity	0.000	9.500	2.670	2.670

DEAD	N+7.50	B13	Force	Gravity	0.000	7.000	2.670	2.670
DEAD	N+7.50	B18	Force	Gravity	0.000	1.575	2.670	2.670
DEAD	N+7.50	B26	Force	Gravity	0.000	9.500	2.670	2.670
DEAD	N+7.50	B42	Force	Gravity	0.000	7.000	2.670	2.670
DEAD	N+4.00	B1	Force	Gravity	0.000	4.500	5.950	5.950
DEAD	N+4.00	B2	Force	Gravity	0.000	4.500	5.950	5.950
DEAD	N+4.00	B3	Force	Gravity	0.000	6.450	5.950	5.950
DEAD	N+4.00	B4	Force	Gravity	0.000	6.450	5.950	5.950
DEAD	N+4.00	B6	Force	Gravity	0.000	7.000	5.950	5.950
DEAD	N+4.00	B8	Force	Gravity	0.000	9.500	5.950	5.950
DEAD	N+4.00	B9	Force	Gravity	0.000	9.500	5.950	5.950
DEAD	N+4.00	B13	Force	Gravity	0.000	7.000	5.950	5.950
DEAD	N+4.00	B14	Force	Gravity	0.000	7.000	5.950	5.950
DEAD	N+4.00	B16	Force	Gravity	0.000	6.950	5.950	5.950
DEAD	N+4.00	B28	Force	Gravity	0.000	7.070	5.950	5.950
DEAD	N+4.00	B29	Force	Gravity	0.000	6.720	5.950	5.950
DEAD	N+4.00	B40	Force	Gravity	0.000	7.000	5.950	5.950
DEAD	N+4.00	B47	Force	Gravity	0.000	6.720	5.950	5.950
DEAD	N+4.00	B48	Force	Gravity	0.000	7.070	5.950	5.950
DEAD	N+4.00	B55	Force	Gravity	0.000	6.950	5.950	5.950

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+7.50	F40	Floor	Gravity	0.5000
LIVE	N+7.50	F41	Floor	Gravity	0.5000
LIVE	N+7.50	F42	Floor	Gravity	0.5000
LIVE	N+7.50	F43	Floor	Gravity	0.5000
LIVE	N+7.50	F44	Floor	Gravity	0.5000
LIVE	N+7.50	F45	Floor	Gravity	0.5000
LIVE	N+7.50	F46	Floor	Gravity	0.5000
LIVE	N+7.50	F47	Floor	Gravity	0.5000
LIVE	N+7.50	F48	Floor	Gravity	0.5000
LIVE	N+7.50	F49	Floor	Gravity	0.5000
LIVE	N+7.50	F50	Floor	Gravity	0.5000
LIVE	N+7.50	F51	Floor	Gravity	0.5000
LIVE	N+7.50	F52	Floor	Gravity	0.5000
LIVE	N+7.50	F53	Floor	Gravity	0.5000
LIVE	N+7.50	F54	Floor	Gravity	0.5000
LIVE	N+7.50	F55	Floor	Gravity	0.5000
LIVE	N+7.50	F56	Floor	Gravity	5.0000
LIVE	N+7.50	F57	Floor	Gravity	5.0000
LIVE	N+4.00	F2	Floor	Gravity	2.0000
LIVE	N+4.00	F3	Floor	Gravity	2.0000
LIVE	N+4.00	F4	Floor	Gravity	2.0000
LIVE	N+4.00	F5	Floor	Gravity	2.0000
LIVE	N+4.00	F6	Floor	Gravity	2.0000
LIVE	N+4.00	F7	Floor	Gravity	2.0000
LIVE	N+4.00	F8	Floor	Gravity	5.0000
LIVE	N+4.00	F9	Floor	Gravity	2.0000
LIVE	N+4.00	F10	Floor	Gravity	2.0000
LIVE	N+4.00	F11	Floor	Gravity	2.0000
LIVE	N+4.00	F12	Floor	Gravity	5.0000
LIVE	N+4.00	F13	Floor	Gravity	5.0000
LIVE	N+4.00	F14	Floor	Gravity	5.0000
LIVE	N+4.00	F15	Floor	Gravity	5.0000
LIVE	N+4.00	F16	Floor	Gravity	5.0000
LIVE	N+4.00	F17	Floor	Gravity	5.0000
LIVE	N+4.00	F18	Floor	Gravity	2.0000
LIVE	N+4.00	F19	Floor	Gravity	2.0000
LIVE	N+4.00	F20	Floor	Gravity	2.0000
LIVE	N+4.00	F21	Floor	Gravity	2.0000
LIVE	N+4.00	F22	Floor	Gravity	2.0000
LIVE	N+4.00	F23	Floor	Gravity	2.0000
LIVE	N+4.00	F24	Floor	Gravity	2.0000
LIVE	N+4.00	F25	Floor	Gravity	2.0000
LIVE	N+4.00	F26	Floor	Gravity	2.0000
LIVE	N+4.00	F27	Floor	Gravity	2.0000
LIVE	N+4.00	F28	Floor	Gravity	2.0000
LIVE	N+4.00	F29	Floor	Gravity	2.0000
LIVE	N+4.00	F30	Floor	Gravity	2.0000
LIVE	N+4.00	F31	Floor	Gravity	2.0000
LIVE	N+4.00	F32	Floor	Gravity	2.0000
LIVE	N+4.00	F33	Floor	Gravity	2.0000
LIVE	N+4.00	F34	Floor	Gravity	5.0000

LIVE	N+4.00	F35	Floor	Gravity	5.0000
LIVE	N+4.00	F36	Floor	Gravity	2.0000
LIVE	N+4.00	F37	Floor	Gravity	2.0000
LIVE	N+4.00	F38	Floor	Gravity	2.0000
LIVE	N+4.00	F39	Floor	Gravity	2.0000

Diseños & Estructuras

FUERZAS EN VIGAS

BEAM FORCES
UNID: kN-m

Story	Beam	Load	Loc	P	V2	T	M3
N+4.00	B1	ENVOLVENTE MAX	0	0	3.51	2.379	57.995
N+4.00	B1	ENVOLVENTE MAX	2.25	0	38.89	2.379	31.616
N+4.00	B1	ENVOLVENTE MAX	4.5	0	92.16	2.379	14.927
N+4.00	B1	ENVOLVENTE MIN	0	0	-69.91	-1.948	-87.527
N+4.00	B1	ENVOLVENTE MIN	2.25	0	-21.06	-1.948	5.75
N+4.00	B1	ENVOLVENTE MIN	4.5	0	9.9	-1.948	-124.704
N+4.00	B2	ENVOLVENTE MAX	0	0	0.35	0.885	50.864
N+4.00	B2	ENVOLVENTE MAX	2.25	0	35.56	0.885	31.766
N+4.00	B2	ENVOLVENTE MAX	4.5	0	88.84	0.885	8.995
N+4.00	B2	ENVOLVENTE MIN	0	0	-67.12	-2.945	-80.341
N+4.00	B2	ENVOLVENTE MIN	2.25	0	-18.09	-2.945	6.48
N+4.00	B2	ENVOLVENTE MIN	4.5	0	12.86	-2.945	-117.067
N+7.50	B3	ENVOLVENTE MAX	0	0	-6.86	3.056	17.411
N+7.50	B3	ENVOLVENTE MAX	3.225	0	9.24	3.056	22.031
N+7.50	B3	ENVOLVENTE MAX	4.875	0	22.81	3.056	20.645
N+7.50	B3	ENVOLVENTE MAX	4.875	0	28.39	7.515	20.022
N+7.50	B3	ENVOLVENTE MAX	6.45	0	46.21	7.515	4.548
N+7.50	B3	ENVOLVENTE MIN	0	0	-35.97	-3.418	-57.027
N+7.50	B3	ENVOLVENTE MIN	3.225	0	-9.86	-3.418	8.404
N+7.50	B3	ENVOLVENTE MIN	4.875	0	-1.84	-3.418	-7.002
N+7.50	B3	ENVOLVENTE MIN	4.875	0	3.59	-0.167	-6.744
N+7.50	B3	ENVOLVENTE MIN	6.45	0	12.81	-0.167	-62.943
N+4.00	B3	ENVOLVENTE MAX	0	0	-48.82	21.855	-34.692
N+4.00	B3	ENVOLVENTE MAX	3.225	0	-6.15	21.855	94.774
N+4.00	B3	ENVOLVENTE MAX	3.225	0	47.36	-21.39	93.816
N+4.00	B3	ENVOLVENTE MAX	4.875	0	79.38	-21.39	27.618
N+4.00	B3	ENVOLVENTE MAX	4.875	0	94.79	5.699	30.387
N+4.00	B3	ENVOLVENTE MAX	6.45	0	148.79	5.699	-66.11
N+4.00	B3	ENVOLVENTE MIN	0	0	-103.05	-6.814	-143.446
N+4.00	B3	ENVOLVENTE MIN	3.225	0	-40.95	-6.814	52.422
N+4.00	B3	ENVOLVENTE MIN	3.225	0	7.64	-46.589	52.34
N+4.00	B3	ENVOLVENTE MIN	4.875	0	29.62	-46.589	-15.809
N+4.00	B3	ENVOLVENTE MIN	4.875	0	41.35	-23.932	-13.269
N+4.00	B3	ENVOLVENTE MIN	6.45	0	75.81	-23.932	-205.264
N+7.50	B4	ENVOLVENTE MAX	0	0	-6.78	0.951	16.625
N+7.50	B4	ENVOLVENTE MAX	3.225	0	9.73	0.951	20.521
N+7.50	B4	ENVOLVENTE MAX	6.45	0	36.24	0.951	6.273
N+7.50	B4	ENVOLVENTE MIN	0	0	-33.21	-1.903	-49.698
N+7.50	B4	ENVOLVENTE MIN	3.225	0	-7.52	-1.903	7.326
N+7.50	B4	ENVOLVENTE MIN	6.45	0	8.17	-1.903	-53.612
N+4.00	B4	ENVOLVENTE MAX	0	0	-46.62	0.21	-32.876
N+4.00	B4	ENVOLVENTE MAX	3.225	0	-3.95	0.21	88.483
N+4.00	B4	ENVOLVENTE MAX	3.225	0	43.43	24.337	87.729
N+4.00	B4	ENVOLVENTE MAX	6.45	0	105.52	24.337	-45.319
N+4.00	B4	ENVOLVENTE MIN	0	0	-98.78	-24.481	-133.967
N+4.00	B4	ENVOLVENTE MIN	3.225	0	-36.68	-24.481	47.688
N+4.00	B4	ENVOLVENTE MIN	3.225	0	9.14	-0.013	48.067
N+4.00	B4	ENVOLVENTE MIN	6.45	0	51.81	-0.013	-160.31
N+7.50	B5	ENVOLVENTE MAX	0	0	-19.26	3.675	-5.878
N+7.50	B5	ENVOLVENTE MAX	3.5	0	12.06	3.675	25.037
N+7.50	B5	ENVOLVENTE MAX	7	0	64.71	3.675	-27.176
N+7.50	B5	ENVOLVENTE MIN	0	0	-51.63	0.48	-68.081
N+7.50	B5	ENVOLVENTE MIN	3.5	0	-2.95	0.48	10.915
N+7.50	B5	ENVOLVENTE MIN	7	0	25.96	0.48	-110.571
N+4.00	B5	ENVOLVENTE MAX	0	0	-72.81	7.025	-78.074
N+4.00	B5	ENVOLVENTE MAX	3.5	0	-28.91	7.025	182.764
N+4.00	B5	ENVOLVENTE MAX	3.5	0	97.71	7.858	185.244
N+4.00	B5	ENVOLVENTE MAX	7	0	173.07	7.858	-108.05
N+4.00	B5	ENVOLVENTE MIN	0	0	-151.23	-11.566	-231.22
N+4.00	B5	ENVOLVENTE MIN	3.5	0	-78.24	-11.566	99.618
N+4.00	B5	ENVOLVENTE MIN	3.5	0	38	-13.023	100.941
N+4.00	B5	ENVOLVENTE MIN	7	0	81.9	-13.023	-298.046
N+7.50	B6	ENVOLVENTE MAX	0	0	-10.75	-1.846	-0.764
N+7.50	B6	ENVOLVENTE MAX	3.5	0	7.22	-1.846	13.377
N+7.50	B6	ENVOLVENTE MAX	7	0	36	-1.846	-15.707
N+7.50	B6	ENVOLVENTE MIN	0	0	-30.16	-7.076	-44.161
N+7.50	B6	ENVOLVENTE MIN	3.5	0	-2.33	-7.076	5.916
N+7.50	B6	ENVOLVENTE MIN	7	0	14.69	-7.076	-63.466
N+4.00	B6	ENVOLVENTE MAX	0	0	-54.38	0.505	-50.307
N+4.00	B6	ENVOLVENTE MAX	3.5	0	-6.88	0.505	97.619
N+4.00	B6	ENVOLVENTE MAX	3.5	0	37.6	22.597	97.329
N+4.00	B6	ENVOLVENTE MAX	7	0	107.06	22.597	-58.122
N+4.00	B6	ENVOLVENTE MIN	0	0	-107.15	-21.486	-164.338
N+4.00	B6	ENVOLVENTE MIN	3.5	0	-37.69	-21.486	53.351
N+4.00	B6	ENVOLVENTE MIN	3.5	0	8.38	0.083	53.03
N+4.00	B6	ENVOLVENTE MIN	7	0	55.88	0.083	-161.672
N+7.50	B7	ENVOLVENTE MAX	0	0	-8.91	1.44	-3.504
N+7.50	B7	ENVOLVENTE MAX	2.075	0	-3.83	1.44	14.309
N+7.50	B7	ENVOLVENTE MAX	2.075	0	-1	1.599	14.711
N+7.50	B7	ENVOLVENTE MAX	4.75	0	5.41	1.599	10.548
N+7.50	B7	ENVOLVENTE MAX	4.75	0	0.94	-0.019	13.635
N+7.50	B7	ENVOLVENTE MAX	7.225	0	7.83	-0.019	6.362
N+7.50	B7	ENVOLVENTE MAX	7.225	0	3.09	-0.666	1.661

N+7.50	B7	ENVOLVENTE MAX	9.5	0	9.58	-0.666	-6.452
N+7.50	B7	ENVOLVENTE MIN	0	0	-19.21	0.071	-17.066
N+7.50	B7	ENVOLVENTE MIN	2.075	0	-6.96	0.071	3.623
N+7.50	B7	ENVOLVENTE MIN	2.075	0	-4.43	-0.096	3.118
N+7.50	B7	ENVOLVENTE MIN	4.75	0	1.47	-0.096	5.455
N+7.50	B7	ENVOLVENTE MIN	4.75	0	-1.37	-0.719	6.697
N+7.50	B7	ENVOLVENTE MIN	7.225	0	3.11	-0.719	0.426
N+7.50	B7	ENVOLVENTE MIN	7.225	0	0.14	-2.489	-3.316
N+7.50	B7	ENVOLVENTE MIN	9.5	0	4.12	-2.489	-14.462
N+7.50	B8	ENVOLVENTE MAX	0	0	-55.11	22.943	-65.518
N+7.50	B8	ENVOLVENTE MAX	4.75	0	-14.38	22.943	198.717
N+7.50	B8	ENVOLVENTE MAX	4.775	0	-14.17	22.943	200.035
N+7.50	B8	ENVOLVENTE MAX	4.775	0	20.62	-2.13	196.344
N+7.50	B8	ENVOLVENTE MAX	7.225	0	67.28	-2.13	106.508
N+7.50	B8	ENVOLVENTE MAX	7.225	0	80.21	13.983	112.665
N+7.50	B8	ENVOLVENTE MAX	7.525	0	84	13.983	93.627
N+7.50	B8	ENVOLVENTE MAX	7.525	0	136.08	-6.388	91.386
N+7.50	B8	ENVOLVENTE MAX	9.5	0	225.16	-6.388	-92.306
N+7.50	B8	ENVOLVENTE MIN	0	0	-120.52	3.921	-229.894
N+7.50	B8	ENVOLVENTE MIN	4.75	0	-53.64	3.921	97.288
N+7.50	B8	ENVOLVENTE MIN	4.775	0	-53.32	3.921	97.906
N+7.50	B8	ENVOLVENTE MIN	4.775	0	-0.54	-10.94	95.703
N+7.50	B8	ENVOLVENTE MIN	7.225	0	26.57	-10.94	27.171
N+7.50	B8	ENVOLVENTE MIN	7.225	0	33.11	3.562	29.457
N+7.50	B8	ENVOLVENTE MIN	7.525	0	35.67	3.562	13.513
N+7.50	B8	ENVOLVENTE MIN	7.525	0	57.2	-43.405	12.277
N+7.50	B8	ENVOLVENTE MIN	9.5	0	93.45	-43.405	-281.113
N+4.00	B8	ENVOLVENTE MAX	0	0	-129.28	28.485	-172.98
N+4.00	B8	ENVOLVENTE MAX	3.65	0	-57.86	28.485	305.384
N+4.00	B8	ENVOLVENTE MAX	3.65	0	4.94	3.577	293.318
N+4.00	B8	ENVOLVENTE MAX	4.75	0	32.58	3.577	291.726
N+4.00	B8	ENVOLVENTE MAX	7.1	0	110.84	3.577	154.036
N+4.00	B8	ENVOLVENTE MAX	7.1	0	201.49	15.346	158.327
N+4.00	B8	ENVOLVENTE MAX	9.5	0	313.21	15.346	-169.392
N+4.00	B8	ENVOLVENTE MIN	0	0	-283.93	2.004	-515.715
N+4.00	B8	ENVOLVENTE MIN	3.65	0	-151.45	2.004	138.344
N+4.00	B8	ENVOLVENTE MIN	3.65	0	-29.92	-3.771	130.884
N+4.00	B8	ENVOLVENTE MIN	4.75	0	-5.72	-3.771	145.425
N+4.00	B8	ENVOLVENTE MIN	7.1	0	41.38	-3.771	31.239
N+4.00	B8	ENVOLVENTE MIN	7.1	0	82.77	-20.514	33.377
N+4.00	B8	ENVOLVENTE MIN	9.5	0	144.16	-20.514	-503.683
N+7.50	B9	ENVOLVENTE MAX	0	0	-17.49	2.603	2.192
N+7.50	B9	ENVOLVENTE MAX	4.75	0	7.13	2.603	46.437
N+7.50	B9	ENVOLVENTE MAX	9.5	0	39.86	2.603	4.497
N+7.50	B9	ENVOLVENTE MIN	0	0	-39.26	-2.111	-63.652
N+7.50	B9	ENVOLVENTE MIN	4.75	0	-6.43	-2.111	26.787
N+7.50	B9	ENVOLVENTE MIN	9.5	0	18.29	-2.111	-72.595
N+4.00	B9	ENVOLVENTE MAX	0	0	-36.83	8.993	-21.007
N+4.00	B9	ENVOLVENTE MAX	4.75	0	13.23	8.993	62.994
N+4.00	B9	ENVOLVENTE MAX	9.5	0	79.87	8.993	-11.958
N+4.00	B9	ENVOLVENTE MIN	0	0	-79.69	-0.34	-162.609
N+4.00	B9	ENVOLVENTE MIN	4.75	0	-12.94	-0.34	35.031
N+4.00	B9	ENVOLVENTE MIN	9.5	0	37.22	-0.34	-174.368
N+7.50	B10	ENVOLVENTE MAX	0	0	22.72	14.69	2.15
N+7.50	B10	ENVOLVENTE MAX	1.038	0	27.43	14.69	-12.216
N+7.50	B10	ENVOLVENTE MAX	2.075	0	32.13	14.69	-28.797
N+7.50	B10	ENVOLVENTE MIN	0	0	10.69	-1.657	0.665
N+7.50	B10	ENVOLVENTE MIN	1.038	0	14.22	-1.657	-23.918
N+7.50	B10	ENVOLVENTE MIN	2.075	0	17.75	-1.657	-54.815
N+7.50	B11	ENVOLVENTE MAX	0	0	-11.64	24.12	21.738
N+7.50	B11	ENVOLVENTE MAX	3.475	0	4.12	24.12	85.138
N+7.50	B11	ENVOLVENTE MAX	4.95	0	10.81	24.12	154.262
N+7.50	B11	ENVOLVENTE MAX	4.95	0	145.38	-30.552	166.6
N+7.50	B11	ENVOLVENTE MAX	6.95	0	157.48	-30.552	22.09
N+7.50	B11	ENVOLVENTE MIN	0	0	-77.81	8.586	-156.807
N+7.50	B11	ENVOLVENTE MIN	3.475	0	-56.79	8.586	34.733
N+7.50	B11	ENVOLVENTE MIN	4.95	0	-47.87	8.586	23.789
N+7.50	B11	ENVOLVENTE MIN	4.95	0	38.86	-80.413	29.283
N+7.50	B11	ENVOLVENTE MIN	6.95	0	47.93	-80.413	-215.859
N+4.00	B11	ENVOLVENTE MAX	0	0	-29.38	-1.74	45.058
N+4.00	B11	ENVOLVENTE MAX	3.475	0	1.31	-1.74	174.96
N+4.00	B11	ENVOLVENTE MAX	3.475	0	52.61	93.461	174.728
N+4.00	B11	ENVOLVENTE MAX	4.95	0	70.88	93.461	204.453
N+4.00	B11	ENVOLVENTE MAX	4.95	0	206.5	-19.849	217.97
N+4.00	B11	ENVOLVENTE MAX	6.95	0	235.2	-19.849	37.086
N+4.00	B11	ENVOLVENTE MIN	0	0	-157.02	-28.34	-295.562
N+4.00	B11	ENVOLVENTE MIN	3.475	0	-110.06	-28.34	93.67
N+4.00	B11	ENVOLVENTE MIN	3.475	0	-36.51	49.905	94.651
N+4.00	B11	ENVOLVENTE MIN	4.95	0	-24.44	49.905	14.934
N+4.00	B11	ENVOLVENTE MIN	4.95	0	53.68	-71.476	19.489
N+4.00	B11	ENVOLVENTE MIN	6.95	0	72.3	-71.476	-375.485
N+7.50	B12	ENVOLVENTE MAX	0	0	-5.53	0.157	-8.057
N+7.50	B12	ENVOLVENTE MAX	3.5	0	0.59	0.157	5.64
N+7.50	B12	ENVOLVENTE MAX	7	0	9.57	0.157	4.054
N+7.50	B12	ENVOLVENTE MIN	0	0	-14	-0.497	-25.891
N+7.50	B12	ENVOLVENTE MIN	3.5	0	-4.02	-0.497	0.585
N+7.50	B12	ENVOLVENTE MIN	7	0	3.11	-0.497	-14.012
N+7.50	B13	ENVOLVENTE MAX	0	0	-21.45	1.122	-23.15
N+7.50	B13	ENVOLVENTE MAX	3.5	0	5	1.122	16.351
N+7.50	B13	ENVOLVENTE MAX	7	0	44.95	1.122	9.069

N+7.50	B13	ENVOLVENTE MIN	0	0	-58.85	-8.272	-114.157
N+7.50	B13	ENVOLVENTE MIN	3.5	0	-15.68	-8.272	5.561
N+7.50	B13	ENVOLVENTE MIN	7	0	13.99	-8.272	-71.613
N+4.00	B13	ENVOLVENTE MAX	0	0	-52.19	25.886	-54.644
N+4.00	B13	ENVOLVENTE MAX	3.5	0	-4.69	25.886	90.116
N+4.00	B13	ENVOLVENTE MAX	3.5	0	37.28	3.856	89.981
N+4.00	B13	ENVOLVENTE MAX	7	0	106.74	3.856	-11.7
N+4.00	B13	ENVOLVENTE MIN	0	0	-126.01	6.76	-229.506
N+4.00	B13	ENVOLVENTE MIN	3.5	0	-56.56	6.76	44.775
N+4.00	B13	ENVOLVENTE MIN	3.5	0	-3.87	-38.821	46.978
N+4.00	B13	ENVOLVENTE MIN	7	0	43.63	-38.821	-172.963
N+7.50	B14	ENVOLVENTE MAX	0	0	-9.84	6.513	-0.611
N+7.50	B14	ENVOLVENTE MAX	3.5	0	7.19	6.513	13.78
N+7.50	B14	ENVOLVENTE MAX	7	0	34.99	6.513	14.271
N+7.50	B14	ENVOLVENTE MIN	0	0	-39.85	0.107	-75.369
N+7.50	B14	ENVOLVENTE MIN	3.5	0	-11.07	0.107	4.005
N+7.50	B14	ENVOLVENTE MIN	7	0	6.93	0.107	-63.029
N+4.00	B14	ENVOLVENTE MAX	0	0	-49.57	-1.197	-37.619
N+4.00	B14	ENVOLVENTE MAX	3.5	0	-2.07	-1.197	97.889
N+4.00	B14	ENVOLVENTE MAX	3.5	0	43.68	33.197	100.081
N+4.00	B14	ENVOLVENTE MAX	7	0	113.14	33.197	-23.259
N+4.00	B14	ENVOLVENTE MIN	0	0	-114.96	-25.419	-186.184
N+4.00	B14	ENVOLVENTE MIN	3.5	0	-45.5	-25.419	51.549
N+4.00	B14	ENVOLVENTE MIN	3.5	0	0.11	-3.617	52.95
N+4.00	B14	ENVOLVENTE MIN	7	0	47.61	-3.617	-184.178
N+7.50	B15	ENVOLVENTE MAX	0	0	15.94	3.041	1.417
N+7.50	B15	ENVOLVENTE MAX	1.038	0	21.32	3.041	-4.731
N+7.50	B15	ENVOLVENTE MAX	2.075	0	26.7	3.041	-14.067
N+7.50	B15	ENVOLVENTE MIN	0	0	2.95	-7.023	0.11
N+7.50	B15	ENVOLVENTE MIN	1.038	0	6.98	-7.023	-18.223
N+7.50	B15	ENVOLVENTE MIN	2.075	0	11.01	-7.023	-43.132
N+7.50	B16	ENVOLVENTE MAX	0	0	2.8	1.391	38.14
N+7.50	B16	ENVOLVENTE MAX	3.475	0	16.31	1.391	8.112
N+7.50	B16	ENVOLVENTE MAX	6.95	0	32.72	1.391	59.963
N+7.50	B16	ENVOLVENTE MIN	0	0	-42.05	-1.447	-108.507
N+7.50	B16	ENVOLVENTE MIN	3.475	0	-24.03	-1.447	4.819
N+7.50	B16	ENVOLVENTE MIN	6.95	0	-8.92	-1.447	-76.658
N+4.00	B16	ENVOLVENTE MAX	0	0	-42.92	21.815	15.989
N+4.00	B16	ENVOLVENTE MAX	3.475	0	4.13	21.815	150.073
N+4.00	B16	ENVOLVENTE MAX	3.475	0	82.3	-3.482	150.163
N+4.00	B16	ENVOLVENTE MAX	6.95	0	151.07	-3.482	27.421
N+4.00	B16	ENVOLVENTE MIN	0	0	-155.09	1.497	-280.131
N+4.00	B16	ENVOLVENTE MIN	3.475	0	-86.31	1.497	79.261
N+4.00	B16	ENVOLVENTE MIN	3.475	0	-7.69	-19.534	78.96
N+4.00	B16	ENVOLVENTE MIN	6.95	0	39.36	-19.534	-265.227
N+7.50	B17	ENVOLVENTE MAX	0	0	0.4	1.081	1.633
N+7.50	B17	ENVOLVENTE MAX	0.788	0	1.78	1.081	0.933
N+7.50	B17	ENVOLVENTE MAX	1.575	0	3.55	1.081	-0.322
N+7.50	B17	ENVOLVENTE MIN	0	0	-6.62	0.104	-7.609
N+7.50	B17	ENVOLVENTE MIN	0.788	0	-4.37	0.104	-3.442
N+7.50	B17	ENVOLVENTE MIN	1.575	0	-2.52	0.104	-1.572
N+7.50	B18	ENVOLVENTE MAX	0	0	-17.13	14.618	-18.063
N+7.50	B18	ENVOLVENTE MAX	0.788	0	-11.18	14.618	-6.915
N+7.50	B18	ENVOLVENTE MAX	1.575	0	-5.23	14.618	0.521
N+7.50	B18	ENVOLVENTE MIN	0	0	-43.66	-6.674	-53.026
N+7.50	B18	ENVOLVENTE MIN	0.788	0	-33.95	-6.674	-22.468
N+7.50	B18	ENVOLVENTE MIN	1.575	0	-24.24	-6.674	-0.534
N+4.00	B18	ENVOLVENTE MAX	0	0	-22.65	38.415	-19.172
N+4.00	B18	ENVOLVENTE MAX	0.788	0	-12.83	38.415	-5.201
N+4.00	B18	ENVOLVENTE MAX	1.575	0	-3	38.415	2.005
N+4.00	B18	ENVOLVENTE MIN	0	0	-53.11	-15.445	-57.222
N+4.00	B18	ENVOLVENTE MIN	0.788	0	-37.27	-15.445	-21.634
N+4.00	B18	ENVOLVENTE MIN	1.575	0	-21.43	-15.445	0.5
N+7.50	B19	ENVOLVENTE MAX	0	0	-9.62	12.001	-9.844
N+7.50	B19	ENVOLVENTE MAX	0.788	0	-5.79	12.001	-3.778
N+7.50	B19	ENVOLVENTE MAX	1.575	0	-1.96	12.001	-0.611
N+7.50	B19	ENVOLVENTE MIN	0	0	-25.65	-18.127	-31.131
N+7.50	B19	ENVOLVENTE MIN	0.788	0	-19.18	-18.127	-13.479
N+7.50	B19	ENVOLVENTE MIN	1.575	0	-12.7	-18.127	-1.095
N+4.00	B19	ENVOLVENTE MAX	0	0	-22.36	17.085	-18.743
N+4.00	B19	ENVOLVENTE MAX	0.788	0	-12.53	17.085	-5.006
N+4.00	B19	ENVOLVENTE MAX	1.575	0	-2.7	17.085	1.821
N+4.00	B19	ENVOLVENTE MIN	0	0	-52.08	-34.961	-55.605
N+4.00	B19	ENVOLVENTE MIN	0.788	0	-36.24	-34.961	-20.833
N+4.00	B19	ENVOLVENTE MIN	1.575	0	-20.39	-34.961	0.633
N+7.50	B20	ENVOLVENTE MAX	0	0	4.67	-0.081	-0.104
N+7.50	B20	ENVOLVENTE MAX	1.038	0	6.69	-0.081	0.483
N+7.50	B20	ENVOLVENTE MAX	2.075	0	8.71	-0.081	-0.124
N+7.50	B20	ENVOLVENTE MIN	0	0	-1.68	-1.251	-1.081
N+7.50	B20	ENVOLVENTE MIN	1.038	0	-0.17	-1.251	-6.6
N+7.50	B20	ENVOLVENTE MIN	2.075	0	1.34	-1.251	-14.584
N+7.50	B21	ENVOLVENTE MAX	0	0	-1.63	0.187	6.458
N+7.50	B21	ENVOLVENTE MAX	3.475	0	3.43	0.187	4.331
N+7.50	B21	ENVOLVENTE MAX	6.95	0	9.72	0.187	12.001
N+7.50	B21	ENVOLVENTE MIN	0	0	-12.57	-0.032	-29.109
N+7.50	B21	ENVOLVENTE MIN	3.475	0	-5.81	-0.032	2.232
N+7.50	B21	ENVOLVENTE MIN	6.95	0	-0.28	-0.032	-18.127
N+4.00	B21	ENVOLVENTE MAX	0	0	-3	2.005	15.445
N+4.00	B21	ENVOLVENTE MAX	3.475	0	2.07	2.005	28.865
N+4.00	B21	ENVOLVENTE MAX	3.475	0	13.64	-0.633	29.182

N+4.00	B21	ENVOLVENTE MAX	6.95	0	20.39	-0.633	17.085
N+4.00	B21	ENVOLVENTE MIN	0	0	-21.43	0.5	-38.415
N+4.00	B21	ENVOLVENTE MIN	3.475	0	-14.67	0.5	12.49
N+4.00	B21	ENVOLVENTE MIN	3.475	0	-2.37	-1.821	12.641
N+4.00	B21	ENVOLVENTE MIN	6.95	0	2.7	-1.821	-34.961
N+7.50	B26	ENVOLVENTE MAX	0	0	-46.46	9.718	-22.351
N+7.50	B26	ENVOLVENTE MAX	4.75	0	-7.12	9.718	221.314
N+7.50	B26	ENVOLVENTE MAX	4.775	0	-6.92	9.718	222.013
N+7.50	B26	ENVOLVENTE MAX	4.775	0	3.12	-1.2	222.403
N+7.50	B26	ENVOLVENTE MAX	7.525	0	54.74	-1.2	145.584
N+7.50	B26	ENVOLVENTE MAX	7.525	0	84.6	-5.289	148.149
N+7.50	B26	ENVOLVENTE MAX	9.5	0	171.28	-5.289	-39.648
N+7.50	B26	ENVOLVENTE MIN	0	0	-90	5.585	-59.261
N+7.50	B26	ENVOLVENTE MIN	4.75	0	-28.14	5.585	102.888
N+7.50	B26	ENVOLVENTE MIN	4.775	0	-27.81	5.585	103.07
N+7.50	B26	ENVOLVENTE MIN	4.775	0	-0.66	-3.447	103.353
N+7.50	B26	ENVOLVENTE MIN	7.525	0	28.21	-3.447	57.469
N+7.50	B26	ENVOLVENTE MIN	7.525	0	37.61	-12.544	58.523
N+7.50	B26	ENVOLVENTE MIN	9.5	0	73.29	-12.544	-104.533
N+4.00	B26	ENVOLVENTE MAX	0	0	-58.14	18.779	-45.525
N+4.00	B26	ENVOLVENTE MAX	3.65	0	-22.75	18.779	176.625
N+4.00	B26	ENVOLVENTE MAX	3.65	0	-0.12	9.853	179.986
N+4.00	B26	ENVOLVENTE MAX	4.75	0	11.89	9.853	177.778
N+4.00	B26	ENVOLVENTE MAX	7.1	0	49.22	9.853	103.926
N+4.00	B26	ENVOLVENTE MAX	7.1	0	68.57	-4.324	102.523
N+4.00	B26	ENVOLVENTE MAX	9.5	0	143.34	-4.324	-73.954
N+4.00	B26	ENVOLVENTE MIN	0	0	-103.26	10.325	-94.933
N+4.00	B26	ENVOLVENTE MIN	3.65	0	-45.41	10.325	97.111
N+4.00	B26	ENVOLVENTE MIN	3.65	0	-6.92	2.622	99.004
N+4.00	B26	ENVOLVENTE MIN	4.75	0	2.57	2.622	98.207
N+4.00	B26	ENVOLVENTE MIN	7.1	0	26.47	2.622	49.704
N+4.00	B26	ENVOLVENTE MIN	7.1	0	36.1	-13.748	48.674
N+4.00	B26	ENVOLVENTE MIN	9.5	0	77.92	-13.748	-156.463
N+7.50	B27	ENVOLVENTE MAX	0	0	-14.93	-4.746	-8.369
N+7.50	B27	ENVOLVENTE MAX	3.475	0	-3.11	-4.746	42.757
N+7.50	B27	ENVOLVENTE MAX	4.95	0	1.91	-4.746	73.501
N+7.50	B27	ENVOLVENTE MAX	4.95	0	77.74	43.989	81.907
N+7.50	B27	ENVOLVENTE MAX	6.95	0	86.81	43.989	-17.454
N+7.50	B27	ENVOLVENTE MIN	0	0	-42.08	-15.901	-79.284
N+7.50	B27	ENVOLVENTE MIN	3.475	0	-26.32	-15.901	22.878
N+7.50	B27	ENVOLVENTE MIN	4.95	0	-19.63	-15.901	23.817
N+7.50	B27	ENVOLVENTE MIN	4.95	0	33	17.462	29.617
N+7.50	B27	ENVOLVENTE MIN	6.95	0	39.8	17.462	-108.365
N+4.00	B27	ENVOLVENTE MAX	0	0	-66.84	17.129	-76.104
N+4.00	B27	ENVOLVENTE MAX	3.475	0	-17.26	17.129	144.018
N+4.00	B27	ENVOLVENTE MAX	3.475	0	20.73	-31.64	141.92
N+4.00	B27	ENVOLVENTE MAX	4.95	0	46.12	-31.64	125.92
N+4.00	B27	ENVOLVENTE MAX	4.95	0	143.65	39.518	144.007
N+4.00	B27	ENVOLVENTE MAX	6.95	0	169.32	39.518	-42.711
N+4.00	B27	ENVOLVENTE MIN	0	0	-151.01	-0.37	-266.048
N+4.00	B27	ENVOLVENTE MIN	3.475	0	-69.63	-0.37	78.832
N+4.00	B27	ENVOLVENTE MIN	3.475	0	-12.7	-58.873	78.872
N+4.00	B27	ENVOLVENTE MIN	4.95	0	3.08	-58.873	40.3
N+4.00	B27	ENVOLVENTE MIN	4.95	0	61.67	13.641	51.318
N+4.00	B27	ENVOLVENTE MIN	6.95	0	78.02	13.641	-222.798
N+7.50	B28	ENVOLVENTE MAX	0	0	-6.95	-0.801	5.313
N+7.50	B28	ENVOLVENTE MAX	3.535	0	5.08	-0.801	14.28
N+7.50	B28	ENVOLVENTE MAX	4.995	0	11.05	-0.801	20.69
N+7.50	B28	ENVOLVENTE MAX	4.995	0	28.25	7.967	21.745
N+7.50	B28	ENVOLVENTE MAX	7.07	0	37.66	7.967	-2.736
N+7.50	B28	ENVOLVENTE MIN	0	0	-24.4	-9.472	-44.615
N+7.50	B28	ENVOLVENTE MIN	3.535	0	-8.37	-9.472	8.589
N+7.50	B28	ENVOLVENTE MIN	4.995	0	-2.75	-9.472	-2.43
N+7.50	B28	ENVOLVENTE MIN	4.995	0	6.38	2.33	-1.973
N+7.50	B28	ENVOLVENTE MIN	7.07	0	13.44	2.33	-66.423
N+4.00	B28	ENVOLVENTE MAX	0	0	-75.88	7.139	-82.203
N+4.00	B28	ENVOLVENTE MAX	3.535	0	-16.66	7.139	173.823
N+4.00	B28	ENVOLVENTE MAX	3.535	0	56.37	-16.696	174.053
N+4.00	B28	ENVOLVENTE MAX	5.245	0	97.38	-16.696	68.307
N+4.00	B28	ENVOLVENTE MAX	5.245	0	154.62	18.297	73.459
N+4.00	B28	ENVOLVENTE MAX	7.07	0	192.21	18.297	-87.026
N+4.00	B28	ENVOLVENTE MIN	0	0	-177.04	-8.954	-273.35
N+4.00	B28	ENVOLVENTE MIN	3.535	0	-72.35	-8.954	79.963
N+4.00	B28	ENVOLVENTE MIN	3.535	0	12.21	-33.511	83.627
N+4.00	B28	ENVOLVENTE MIN	5.245	0	38.04	-33.511	1.558
N+4.00	B28	ENVOLVENTE MIN	5.245	0	61.07	-2.762	4.519
N+4.00	B28	ENVOLVENTE MIN	7.07	0	85.28	-2.762	-276.843
N+7.50	B29	ENVOLVENTE MAX	0	0	-4.79	1.574	10.173
N+7.50	B29	ENVOLVENTE MAX	3.36	0	6.64	1.574	7.574
N+7.50	B29	ENVOLVENTE MAX	6.72	0	20.12	1.574	17.264
N+7.50	B29	ENVOLVENTE MIN	0	0	-27.06	-2.15	-62.177
N+7.50	B29	ENVOLVENTE MIN	3.36	0	-11.82	-2.15	2.658
N+7.50	B29	ENVOLVENTE MIN	6.72	0	1.37	-2.15	-34.463
N+4.00	B29	ENVOLVENTE MAX	0	0	-60.29	17.071	-26.219
N+4.00	B29	ENVOLVENTE MAX	3.36	0	-4.98	17.071	168.598
N+4.00	B29	ENVOLVENTE MAX	3.36	0	81.62	-1.641	172.511
N+4.00	B29	ENVOLVENTE MAX	6.72	0	174.56	-1.641	-68.216
N+4.00	B29	ENVOLVENTE MIN	0	0	-155.08	-3.265	-218.332
N+4.00	B29	ENVOLVENTE MIN	3.36	0	-63.65	-3.265	73.691
N+4.00	B29	ENVOLVENTE MIN	3.36	0	15.47	-10.834	75.4

N+7.50	B29	ENVOLVENTE MIN	6.72	0	70.77	-10.834	-267.218
N+7.50	B32	ENVOLVENTE MAX	0	0	-19.96	2.565	-14.231
N+7.50	B32	ENVOLVENTE MAX	2.475	0	-3.54	2.565	39.705
N+7.50	B32	ENVOLVENTE MAX	4.95	0	29.86	2.565	9.97
N+7.50	B32	ENVOLVENTE MIN	0	0	-53.25	0.966	-53.107
N+7.50	B32	ENVOLVENTE MIN	2.475	0	-12.73	0.966	10.87
N+7.50	B32	ENVOLVENTE MIN	4.95	0	8.02	0.966	3.216
N+7.50	B33	ENVOLVENTE MAX	0	0	-21.74	0.851	-18.863
N+7.50	B33	ENVOLVENTE MAX	2.475	0	-5.32	0.851	41.129
N+7.50	B33	ENVOLVENTE MAX	4.95	0	28.94	0.851	12.502
N+7.50	B33	ENVOLVENTE MIN	0	0	-54.17	-0.11	-51.568
N+7.50	B33	ENVOLVENTE MIN	2.475	0	-12.62	-0.11	12.236
N+7.50	B33	ENVOLVENTE MIN	4.95	0	8.43	-0.11	6.96
N+7.50	B35	ENVOLVENTE MAX	0	0	6.46	6.615	-0.49
N+7.50	B35	ENVOLVENTE MAX	1.038	0	9.82	6.615	-3.668
N+7.50	B35	ENVOLVENTE MAX	2.075	0	13.18	6.615	-8.965
N+7.50	B35	ENVOLVENTE MIN	0	0	1.25	1.827	-1.927
N+7.50	B35	ENVOLVENTE MIN	1.038	0	3.77	1.827	-9.796
N+7.50	B35	ENVOLVENTE MIN	2.075	0	6.29	1.827	-21.65
N+7.50	B38	ENVOLVENTE MAX	0	0	-3.69	0.035	0.146
N+7.50	B38	ENVOLVENTE MAX	3.36	0	1.24	0.035	5.16
N+7.50	B38	ENVOLVENTE MAX	6.72	0	7.99	0.035	-3.357
N+7.50	B38	ENVOLVENTE MIN	0	0	-7.25	-0.431	-10.378
N+7.50	B38	ENVOLVENTE MIN	3.36	0	-0.74	-0.431	2.262
N+7.50	B38	ENVOLVENTE MIN	6.72	0	4.16	-0.431	-10.254
N+4.00	B38	ENVOLVENTE MAX	0	0	-9.53	1.773	5.378
N+4.00	B38	ENVOLVENTE MAX	3.36	0	11.78	1.773	24.781
N+4.00	B38	ENVOLVENTE MAX	3.36	0	3.64	-1.645	21.172
N+4.00	B38	ENVOLVENTE MAX	6.72	0	41.7	-1.645	-16.407
N+4.00	B38	ENVOLVENTE MIN	0	0	-31.08	0.19	-19.025
N+4.00	B38	ENVOLVENTE MIN	3.36	0	1.3	0.19	3.81
N+4.00	B38	ENVOLVENTE MIN	3.36	0	-2.33	-3.602	4.983
N+4.00	B38	ENVOLVENTE MIN	6.72	0	14.93	-3.602	-50.08
N+7.50	B39	ENVOLVENTE MAX	0	0	-4.24	0.543	-3.719
N+7.50	B39	ENVOLVENTE MAX	2.498	0	-0.6	0.543	2.324
N+7.50	B39	ENVOLVENTE MAX	4.995	0	3.7	0.543	0.939
N+7.50	B39	ENVOLVENTE MIN	0	0	-7.67	-0.647	-11.937
N+7.50	B39	ENVOLVENTE MIN	2.498	0	-2.54	-0.647	0.463
N+7.50	B39	ENVOLVENTE MIN	4.995	0	1.67	-0.647	-0.93
N+7.50	B40	ENVOLVENTE MAX	0	0	-0.3	0.476	28.53
N+7.50	B40	ENVOLVENTE MAX	3.5	0	13.21	0.476	14.222
N+7.50	B40	ENVOLVENTE MAX	7	0	36.87	0.476	32.031
N+7.50	B40	ENVOLVENTE MIN	0	0	-38.34	-0.889	-80.52
N+7.50	B40	ENVOLVENTE MIN	3.5	0	-14.44	-0.889	5.732
N+7.50	B40	ENVOLVENTE MIN	7	0	-0.7	-0.889	-75.36
N+4.00	B40	ENVOLVENTE MAX	0	0	-36.56	18.139	4.317
N+4.00	B40	ENVOLVENTE MAX	3.5	0	7.51	18.139	94.081
N+4.00	B40	ENVOLVENTE MAX	3.5	0	49.81	-1.062	94.427
N+4.00	B40	ENVOLVENTE MAX	7	0	114.69	-1.062	4.025
N+4.00	B40	ENVOLVENTE MIN	0	0	-113.08	1.097	-193.613
N+4.00	B40	ENVOLVENTE MIN	3.5	0	-48.2	1.097	54.591
N+4.00	B40	ENVOLVENTE MIN	3.5	0	-7.36	-15.859	54.558
N+4.00	B40	ENVOLVENTE MIN	7	0	36.72	-15.859	-199.343
N+7.50	B41	ENVOLVENTE MAX	0	0	-11.7	10.378	-16.071
N+7.50	B41	ENVOLVENTE MAX	1.038	0	-7.69	10.378	-6.001
N+7.50	B41	ENVOLVENTE MAX	2.075	0	-3.69	10.378	0.035
N+7.50	B41	ENVOLVENTE MIN	0	0	-22.55	-0.146	-30.134
N+7.50	B41	ENVOLVENTE MIN	1.038	0	-14.42	-0.146	-11.483
N+7.50	B41	ENVOLVENTE MIN	2.075	0	-7.25	-0.146	-0.431
N+4.00	B41	ENVOLVENTE MAX	0	0	-20.91	19.025	-30.083
N+4.00	B41	ENVOLVENTE MAX	1.038	0	-15.22	19.025	-10.881
N+4.00	B41	ENVOLVENTE MAX	2.075	0	-9.53	19.025	1.773
N+4.00	B41	ENVOLVENTE MIN	0	0	-54.86	-5.378	-88.064
N+4.00	B41	ENVOLVENTE MIN	1.038	0	-42.97	-5.378	-35.959
N+4.00	B41	ENVOLVENTE MIN	2.075	0	-31.08	-5.378	0.19
N+7.50	B42	ENVOLVENTE MAX	0	0	-16.18	0.361	-0.018
N+7.50	B42	ENVOLVENTE MAX	3.5	0	9.21	0.361	29.803
N+7.50	B42	ENVOLVENTE MAX	7	0	54.78	0.361	0.574
N+7.50	B42	ENVOLVENTE MIN	0	0	-55.7	-0.44	-89.943
N+7.50	B42	ENVOLVENTE MIN	3.5	0	-9.77	-0.44	12.037
N+7.50	B42	ENVOLVENTE MIN	7	0	15.98	-0.44	-86.61
N+4.00	B42	ENVOLVENTE MAX	0	0	-64.17	5.181	-55.62
N+4.00	B42	ENVOLVENTE MAX	3.5	0	-23.69	5.181	177.105
N+4.00	B42	ENVOLVENTE MAX	3.5	0	85.99	5.918	179.191
N+4.00	B42	ENVOLVENTE MAX	7	0	153.13	5.918	-64.752
N+4.00	B42	ENVOLVENTE MIN	0	0	-143.8	-5.524	-225.421
N+4.00	B42	ENVOLVENTE MIN	3.5	0	-77.59	-5.524	97.611
N+4.00	B42	ENVOLVENTE MIN	3.5	0	26.41	-4.373	98.265
N+4.00	B42	ENVOLVENTE MIN	7	0	66.89	-4.373	-253.273
N+7.50	B43	ENVOLVENTE MAX	0	0	-18.93	6.161	-28.991
N+7.50	B43	ENVOLVENTE MAX	1.038	0	-14.2	6.161	-11.806
N+7.50	B43	ENVOLVENTE MAX	2.075	0	-9.47	6.161	0.522
N+7.50	B43	ENVOLVENTE MIN	0	0	-35.89	-4.116	-51.302
N+7.50	B43	ENVOLVENTE MIN	1.038	0	-24.72	-4.116	-19.857
N+7.50	B43	ENVOLVENTE MIN	2.075	0	-15.66	-4.116	-0.231
N+4.00	B43	ENVOLVENTE MAX	0	0	-47.56	11.65	-78.048
N+4.00	B43	ENVOLVENTE MAX	1.038	0	-39.21	11.65	-32.117
N+4.00	B43	ENVOLVENTE MAX	2.075	0	-30.86	11.65	6.132
N+4.00	B43	ENVOLVENTE MIN	0	0	-123.42	-6.257	-208.995
N+4.00	B43	ENVOLVENTE MIN	1.038	0	-103.68	-6.257	-88.473

N+4.00	B43	ENVOLVENTE MIN	2.075	0	-83.93	-6.257	2.44
N+4.00	B44	ENVOLVENTE MAX	0	0	-22.76	5.568	-16.214
N+4.00	B44	ENVOLVENTE MAX	2.075	0	-5.21	5.568	25.783
N+4.00	B44	ENVOLVENTE MAX	2.075	0	-1.38	1.161	24.2
N+4.00	B44	ENVOLVENTE MAX	3.65	0	20.84	1.161	12.178
N+4.00	B44	ENVOLVENTE MAX	3.65	0	-6.98	0.853	19.742
N+4.00	B44	ENVOLVENTE MAX	4.75	0	-0.41	0.853	36.022
N+4.00	B44	ENVOLVENTE MAX	7.1	0	28.33	0.853	15.993
N+4.00	B44	ENVOLVENTE MAX	7.1	0	6.12	0.764	14.546
N+4.00	B44	ENVOLVENTE MAX	9.5	0	28.57	0.764	-5.476
N+4.00	B44	ENVOLVENTE MIN	0	0	-59.96	2.639	-49.979
N+4.00	B44	ENVOLVENTE MIN	2.075	0	-13.07	2.639	4.756
N+4.00	B44	ENVOLVENTE MIN	2.075	0	-4.12	-3.328	2.268
N+4.00	B44	ENVOLVENTE MIN	3.65	0	6.12	-3.328	0.015
N+4.00	B44	ENVOLVENTE MIN	3.65	0	-24.32	-0.169	5.278
N+4.00	B44	ENVOLVENTE MIN	4.75	0	-8.79	-0.169	14.866
N+4.00	B44	ENVOLVENTE MIN	7.1	0	8.46	-0.169	0.876
N+4.00	B44	ENVOLVENTE MIN	7.1	0	-0.77	-0.731	-1.672
N+4.00	B44	ENVOLVENTE MIN	9.5	0	9.45	-0.731	-31.25
N+4.00	B45	ENVOLVENTE MAX	0	0	28.57	-5.476	0.731
N+4.00	B45	ENVOLVENTE MAX	0.913	0	38.78	-5.476	-9.945
N+4.00	B45	ENVOLVENTE MAX	1.825	0	49	-5.476	-25.949
N+4.00	B45	ENVOLVENTE MIN	0	0	9.45	-31.25	-0.764
N+4.00	B45	ENVOLVENTE MIN	0.913	0	14.61	-31.25	-30.257
N+4.00	B45	ENVOLVENTE MIN	1.825	0	19.77	-31.25	-71.229
N+4.00	B46	ENVOLVENTE MAX	0	0	-15.6	2.745	-18.289
N+4.00	B46	ENVOLVENTE MAX	2.623	0	-1.02	2.745	16.03
N+4.00	B46	ENVOLVENTE MAX	3.535	0	3.86	2.745	17.063
N+4.00	B46	ENVOLVENTE MAX	3.535	0	-0.89	-0.66	13.095
N+4.00	B46	ENVOLVENTE MAX	5.245	0	9.86	-0.66	8.762
N+4.00	B46	ENVOLVENTE MIN	0	0	-42.23	0.546	-53.849
N+4.00	B46	ENVOLVENTE MIN	2.623	0	-7.28	0.546	3.741
N+4.00	B46	ENVOLVENTE MIN	3.535	0	-2.17	0.546	4.15
N+4.00	B46	ENVOLVENTE MIN	3.535	0	-5.1	-3.033	3.994
N+4.00	B46	ENVOLVENTE MIN	5.245	0	2.46	-3.033	1.517
N+7.50	B47	ENVOLVENTE MAX	0	0	-3.87	1.779	13.593
N+7.50	B47	ENVOLVENTE MAX	3.36	0	7.56	1.779	8.298
N+7.50	B47	ENVOLVENTE MAX	6.72	0	21.63	1.779	17.629
N+7.50	B47	ENVOLVENTE MIN	0	0	-26.53	-1.86	-59.77
N+7.50	B47	ENVOLVENTE MIN	3.36	0	-11.29	-1.86	2.839
N+7.50	B47	ENVOLVENTE MIN	6.72	0	1.32	-1.86	-38.795
N+4.00	B47	ENVOLVENTE MAX	0	0	-50.37	0.186	-14.984
N+4.00	B47	ENVOLVENTE MAX	3.36	0	-6.98	0.186	136.496
N+4.00	B47	ENVOLVENTE MAX	3.36	0	74.19	14.479	137.637
N+4.00	B47	ENVOLVENTE MAX	6.72	0	137.68	14.479	-44.055
N+4.00	B47	ENVOLVENTE MIN	0	0	-124.26	-25.497	-188.985
N+4.00	B47	ENVOLVENTE MIN	3.36	0	-60.77	-25.497	67.444
N+4.00	B47	ENVOLVENTE MIN	3.36	0	12.19	2.673	66.531
N+4.00	B47	ENVOLVENTE MIN	6.72	0	55.57	2.673	-221.556
N+7.50	B48	ENVOLVENTE MAX	0	0	-6.36	1.433	7.02
N+7.50	B48	ENVOLVENTE MAX	3.535	0	5.67	1.433	13.227
N+7.50	B48	ENVOLVENTE MAX	7.07	0	21.01	1.433	13.901
N+7.50	B48	ENVOLVENTE MIN	0	0	-24.19	-2.71	-45.032
N+7.50	B48	ENVOLVENTE MIN	3.535	0	-8.16	-2.71	8.236
N+7.50	B48	ENVOLVENTE MIN	7.07	0	4.56	-2.71	-34.313
N+4.00	B48	ENVOLVENTE MAX	0	0	-58.52	2.096	-56.704
N+4.00	B48	ENVOLVENTE MAX	3.535	0	-12.12	2.096	122.849
N+4.00	B48	ENVOLVENTE MAX	3.535	0	58.61	17.004	122.696
N+4.00	B48	ENVOLVENTE MAX	7.07	0	126.73	17.004	-60.338
N+4.00	B48	ENVOLVENTE MIN	0	0	-126.09	-15.579	-209.852
N+4.00	B48	ENVOLVENTE MIN	3.535	0	-57.97	-15.579	65.578
N+4.00	B48	ENVOLVENTE MIN	3.535	0	13.8	6.211	67.28
N+4.00	B48	ENVOLVENTE MIN	7.07	0	60.21	6.211	-214.622
N+7.50	B49	ENVOLVENTE MAX	0	0	-3.41	0.746	11.839
N+7.50	B49	ENVOLVENTE MAX	3.475	0	8.53	0.746	8.031
N+7.50	B49	ENVOLVENTE MAX	6.95	0	24.29	0.746	17.054
N+7.50	B49	ENVOLVENTE MIN	0	0	-24.4	-0.561	-49.53
N+7.50	B49	ENVOLVENTE MIN	3.475	0	-8.75	-0.561	3.14
N+7.50	B49	ENVOLVENTE MIN	6.95	0	3.07	-0.561	-53.195
N+4.00	B49	ENVOLVENTE MAX	0	0	-68.73	7.222	-72.751
N+4.00	B49	ENVOLVENTE MAX	3.475	0	-27.12	7.222	177.426
N+4.00	B49	ENVOLVENTE MAX	3.475	0	66.9	4.588	175.935
N+4.00	B49	ENVOLVENTE MAX	6.95	0	134.42	4.588	-20.972
N+4.00	B49	ENVOLVENTE MIN	0	0	-155.41	-3.687	-258.706
N+4.00	B49	ENVOLVENTE MIN	3.475	0	-87.88	-3.687	93.77
N+4.00	B49	ENVOLVENTE MIN	3.475	0	13.64	-4.191	95.516
N+4.00	B49	ENVOLVENTE MIN	6.95	0	55.25	-4.191	-192.873
N+7.50	B50	ENVOLVENTE MAX	0	0	-3.44	0.314	1.126
N+7.50	B50	ENVOLVENTE MAX	3.36	0	1.49	0.314	5.235
N+7.50	B50	ENVOLVENTE MAX	6.72	0	8.06	0.314	-3.205
N+7.50	B50	ENVOLVENTE MIN	0	0	-7.4	-0.116	-11.12
N+7.50	B50	ENVOLVENTE MIN	3.36	0	-0.9	-0.116	1.987
N+7.50	B50	ENVOLVENTE MIN	6.72	0	4	-0.116	-10.764
N+4.00	B50	ENVOLVENTE MAX	0	0	-3.4	-0.458	9.303
N+4.00	B50	ENVOLVENTE MAX	3.36	0	1.5	-0.458	26.736
N+4.00	B50	ENVOLVENTE MAX	3.36	0	13.64	2.452	26.316
N+4.00	B50	ENVOLVENTE MAX	6.72	0	20.17	2.452	-10.552
N+4.00	B50	ENVOLVENTE MIN	0	0	-14.35	-2.945	-14.993
N+4.00	B50	ENVOLVENTE MIN	3.36	0	-7.82	-2.945	8.014
N+4.00	B50	ENVOLVENTE MIN	3.36	0	4.26	1.292	9.446

N+7.50	B50	ENVOLVENTE MIN	6.72	0	9.16	1.292	-33.028
N+7.50	B51	ENVOLVENTE MAX	0	0	-4.16	0.274	-2.704
N+7.50	B51	ENVOLVENTE MAX	3.535	0	1	0.274	7.091
N+7.50	B51	ENVOLVENTE MAX	7.07	0	7.53	0.274	2.176
N+7.50	B51	ENVOLVENTE MIN	0	0	-8.88	-0.639	-12.172
N+7.50	B51	ENVOLVENTE MIN	3.535	0	-2.01	-0.639	2.872
N+7.50	B51	ENVOLVENTE MIN	7.07	0	3.48	-0.639	-9.887
N+4.00	B51	ENVOLVENTE MAX	0	0	-8.41	-0.603	-11.01
N+4.00	B51	ENVOLVENTE MAX	3.535	0	-3.26	-0.603	21.438
N+4.00	B51	ENVOLVENTE MAX	3.535	0	12.02	3.787	18.19
N+4.00	B51	ENVOLVENTE MAX	7.07	0	18.89	3.787	-8.205
N+4.00	B51	ENVOLVENTE MIN	0	0	-18.87	-2.675	-33.805
N+4.00	B51	ENVOLVENTE MIN	3.535	0	-11.99	-2.675	8.913
N+4.00	B51	ENVOLVENTE MIN	3.535	0	3.1	1.522	9.216
N+4.00	B51	ENVOLVENTE MIN	7.07	0	8.26	1.522	-39.089
N+4.00	B52	ENVOLVENTE MAX	0	0	14.35	9.303	2.945
N+4.00	B52	ENVOLVENTE MAX	0.788	0	28.79	9.303	-4.075
N+4.00	B52	ENVOLVENTE MAX	1.575	0	43.29	9.303	-17.193
N+4.00	B52	ENVOLVENTE MIN	0	0	3.4	-14.993	0.458
N+4.00	B52	ENVOLVENTE MIN	0.788	0	12.24	-14.993	-15.665
N+4.00	B52	ENVOLVENTE MIN	1.575	0	21.08	-14.993	-44.018
N+7.50	B53	ENVOLVENTE MAX	0	0	18.07	5.937	0.392
N+7.50	B53	ENVOLVENTE MAX	0.788	0	25.19	5.937	-9.876
N+7.50	B53	ENVOLVENTE MAX	1.575	0	34.63	5.937	-23.148
N+7.50	B53	ENVOLVENTE MIN	0	0	11.12	-6.844	-0.188
N+7.50	B53	ENVOLVENTE MIN	0.788	0	14.94	-6.844	-16.39
N+7.50	B53	ENVOLVENTE MIN	1.575	0	18.76	-6.844	-39.634
N+4.00	B53	ENVOLVENTE MAX	0	0	38.57	10.499	5.048
N+4.00	B53	ENVOLVENTE MAX	0.788	0	65.75	10.499	-16.951
N+4.00	B53	ENVOLVENTE MAX	1.575	0	95.4	10.499	-49.728
N+4.00	B53	ENVOLVENTE MIN	0	0	18.03	-11.733	1.933
N+4.00	B53	ENVOLVENTE MIN	0.788	0	33.76	-11.733	-37.231
N+4.00	B53	ENVOLVENTE MIN	1.575	0	49.48	-11.733	-98.879
N+7.50	B54	ENVOLVENTE MAX	0	0	-3.12	1.419	17.608
N+7.50	B54	ENVOLVENTE MAX	3.475	0	10.4	1.419	8.15
N+7.50	B54	ENVOLVENTE MAX	6.95	0	27.74	1.419	23.481
N+7.50	B54	ENVOLVENTE MIN	0	0	-30.61	-1.19	-71.168
N+7.50	B54	ENVOLVENTE MIN	3.475	0	-12.6	-1.19	1.618
N+7.50	B54	ENVOLVENTE MIN	6.95	0	1.59	-1.19	-61.731
N+4.00	B54	ENVOLVENTE MAX	0	0	-50.25	6.896	-8.877
N+4.00	B54	ENVOLVENTE MAX	3.475	0	-9.11	6.896	209.264
N+4.00	B54	ENVOLVENTE MAX	3.475	0	80.72	5.906	209.403
N+4.00	B54	ENVOLVENTE MAX	6.95	0	156.68	5.906	-3.38
N+4.00	B54	ENVOLVENTE MIN	0	0	-161.08	-6.533	-247.091
N+4.00	B54	ENVOLVENTE MIN	3.475	0	-85.12	-6.533	93.091
N+4.00	B54	ENVOLVENTE MIN	3.475	0	8.14	-5.751	93.837
N+4.00	B54	ENVOLVENTE MIN	6.95	0	49.29	-5.751	-233.732
N+4.00	B55	ENVOLVENTE MAX	0	0	-30.81	1.713	32.939
N+4.00	B55	ENVOLVENTE MAX	3.475	0	14.09	1.713	141.397
N+4.00	B55	ENVOLVENTE MAX	3.475	0	50.44	17.996	141.485
N+4.00	B55	ENVOLVENTE MAX	6.95	0	125.4	17.996	36.725
N+4.00	B55	ENVOLVENTE MIN	0	0	-126.56	-19.477	-190.776
N+4.00	B55	ENVOLVENTE MIN	3.475	0	-51.6	-19.477	57.572
N+4.00	B55	ENVOLVENTE MIN	3.475	0	-15.52	-0.417	57.541
N+4.00	B55	ENVOLVENTE MIN	6.95	0	29.38	-0.417	-185.453
N+4.00	B57	ENVOLVENTE MAX	0	0	-43.96	0.988	-54.445
N+4.00	B57	ENVOLVENTE MAX	3.5	0	-5.16	0.988	60.325
N+4.00	B57	ENVOLVENTE MAX	3.5	0	1.68	2.525	56.763
N+4.00	B57	ENVOLVENTE MAX	7	0	67.78	2.525	-12.612
N+4.00	B57	ENVOLVENTE MIN	0	0	-86	-1.424	-115.852
N+4.00	B57	ENVOLVENTE MIN	3.5	0	-16.9	-1.424	31.513
N+4.00	B57	ENVOLVENTE MIN	3.5	0	-6.84	-3.014	27.284
N+4.00	B57	ENVOLVENTE MIN	7	0	33.19	-3.014	-66.481
N+4.00	B58	ENVOLVENTE MAX	0	0	-18.72	2.684	-6.389
N+4.00	B58	ENVOLVENTE MAX	0.788	0	-3.27	2.684	2.271
N+4.00	B58	ENVOLVENTE MAX	1.575	0	18.15	2.684	-1.235
N+4.00	B58	ENVOLVENTE MIN	0	0	-42	-3.153	-26.375
N+4.00	B58	ENVOLVENTE MIN	0.788	0	-14.38	-3.153	-4.784
N+4.00	B58	ENVOLVENTE MIN	1.575	0	5.72	-3.153	-3.724
N+4.00	B59	ENVOLVENTE MAX	0	0	-29.29	0.593	-2.958
N+4.00	B59	ENVOLVENTE MAX	1.738	0	-10.14	0.593	51.272
N+4.00	B59	ENVOLVENTE MAX	3.475	0	10.33	0.593	59.188
N+4.00	B59	ENVOLVENTE MIN	0	0	-66.11	-2.662	-64.653
N+4.00	B59	ENVOLVENTE MIN	1.738	0	-33.79	-2.662	13.361
N+4.00	B59	ENVOLVENTE MIN	3.475	0	-3.53	-2.662	31.648
N+4.00	B60	ENVOLVENTE MAX	0	0	1.79	3.134	58.998
N+4.00	B60	ENVOLVENTE MAX	1.738	0	31.05	3.134	57.283
N+4.00	B60	ENVOLVENTE MAX	3.475	0	63.58	3.134	2.408
N+4.00	B60	ENVOLVENTE MIN	0	0	-11.89	0.01	28.444
N+4.00	B60	ENVOLVENTE MIN	1.738	0	9.58	0.01	13.032
N+4.00	B60	ENVOLVENTE MIN	3.475	0	28.74	0.01	-58.604
N+4.00	B61	ENVOLVENTE MAX	0	0	-34.86	3.249	-35.15
N+4.00	B61	ENVOLVENTE MAX	3.5	0	5.96	3.249	33.498
N+4.00	B61	ENVOLVENTE MAX	3.5	0	-0.39	1.044	34.04
N+4.00	B61	ENVOLVENTE MAX	7	0	68.17	1.044	-38.945
N+4.00	B61	ENVOLVENTE MIN	0	0	-65.76	-0.215	-71.83
N+4.00	B61	ENVOLVENTE MIN	3.5	0	1.9	-0.215	17.346
N+4.00	B61	ENVOLVENTE MIN	3.5	0	-3.88	-1.792	17.659
N+4.00	B61	ENVOLVENTE MIN	7	0	36.13	-1.792	-79.727
N+4.00	B62	ENVOLVENTE MAX	0	0	-36.41	2.105	-40.652

N+4.00	B62	ENVOLVENTE MAX	3.225	0	-2.85	2.105	32.309
N+4.00	B62	ENVOLVENTE MAX	3.225	0	1.37	2.019	32.429
N+4.00	B62	ENVOLVENTE MAX	6.45	0	59.23	2.019	-28.576
N+4.00	B62	ENVOLVENTE MIN	0	0	-66.13	-0.707	-82.34
N+4.00	B62	ENVOLVENTE MIN	3.225	0	-5.54	-0.707	18.854
N+4.00	B62	ENVOLVENTE MIN	3.225	0	-2.9	-1.677	20.297
N+4.00	B62	ENVOLVENTE MIN	6.45	0	31.94	-1.677	-61.805
N+4.00	B63	ENVOLVENTE MAX	0	0	-26.42	0.395	-24.838
N+4.00	B63	ENVOLVENTE MAX	2.25	0	-0.63	0.395	54.484
N+4.00	B63	ENVOLVENTE MAX	4.5	0	64.76	0.395	1.47
N+4.00	B63	ENVOLVENTE MIN	0	0	-80.81	-0.273	-67.935
N+4.00	B63	ENVOLVENTE MIN	2.25	0	-11.11	-0.273	12.47
N+4.00	B63	ENVOLVENTE MIN	4.5	0	17.46	-0.273	-36.812
N+4.00	B64	ENVOLVENTE MAX	0	0	-29.51	2.638	-2.572
N+4.00	B64	ENVOLVENTE MAX	3.36	0	9.64	2.638	57.11
N+4.00	B64	ENVOLVENTE MAX	3.36	0	10.66	1.899	54.035
N+4.00	B64	ENVOLVENTE MAX	6.72	0	75.24	1.899	-41.206
N+4.00	B64	ENVOLVENTE MIN	0	0	-57.57	-2.807	-33.586
N+4.00	B64	ENVOLVENTE MIN	3.36	0	2.71	-2.807	26.82
N+4.00	B64	ENVOLVENTE MIN	3.36	0	2.65	-1.147	28.313
N+4.00	B64	ENVOLVENTE MIN	6.72	0	38.73	-1.147	-87.598
N+4.00	B65	ENVOLVENTE MAX	0	0	-38.95	1.325	-43.499
N+4.00	B65	ENVOLVENTE MAX	3.535	0	0.7	1.325	41.6
N+4.00	B65	ENVOLVENTE MAX	3.535	0	9.84	2.153	46.723
N+4.00	B65	ENVOLVENTE MAX	7.07	0	81.57	2.153	-55.955
N+4.00	B65	ENVOLVENTE MIN	0	0	-72.56	-2.478	-86.496
N+4.00	B65	ENVOLVENTE MIN	3.535	0	-0.93	-2.478	22.291
N+4.00	B65	ENVOLVENTE MIN	3.535	0	3.87	-0.235	24.783
N+4.00	B65	ENVOLVENTE MIN	7.07	0	43.37	-0.235	-113.223
N+4.00	B66	ENVOLVENTE MAX	0	0	-43.5	0.557	-51.34
N+4.00	B66	ENVOLVENTE MAX	3.475	0	-5.19	0.557	63.309
N+4.00	B66	ENVOLVENTE MAX	3.475	0	-0.67	0.691	65.964
N+4.00	B66	ENVOLVENTE MAX	6.95	0	63.09	0.691	-0.342
N+4.00	B66	ENVOLVENTE MIN	0	0	-86.45	-1.794	-114.784
N+4.00	B66	ENVOLVENTE MIN	3.475	0	-17.85	-1.794	33.259
N+4.00	B66	ENVOLVENTE MIN	3.475	0	-10.23	-0.895	32.111
N+4.00	B66	ENVOLVENTE MIN	6.95	0	30.54	-0.895	-43.319
N+4.00	B67	ENVOLVENTE MAX	0	0	-3.8	3.246	-1.805
N+4.00	B67	ENVOLVENTE MAX	0.788	0	15.41	3.246	3.577
N+4.00	B67	ENVOLVENTE MAX	1.575	0	40.71	3.246	-2.855
N+4.00	B67	ENVOLVENTE MIN	0	0	-20.42	-2.234	-5.3
N+4.00	B67	ENVOLVENTE MIN	0.788	0	0.67	-2.234	-7.476
N+4.00	B67	ENVOLVENTE MIN	1.575	0	15.67	-2.234	-29.572
N+4.00	B68	ENVOLVENTE MAX	0	0	-31.23	2.837	-5.423
N+4.00	B68	ENVOLVENTE MAX	1.75	0	-11.85	2.837	51.561
N+4.00	B68	ENVOLVENTE MAX	3.5	0	9.41	2.837	58.243
N+4.00	B68	ENVOLVENTE MIN	0	0	-67.01	-0.891	-69.467
N+4.00	B68	ENVOLVENTE MIN	1.75	0	-34.58	-0.891	11.754
N+4.00	B68	ENVOLVENTE MIN	3.5	0	-4.52	-0.891	32.072
N+4.00	B69	ENVOLVENTE MAX	0	0	9.13	0.661	57.045
N+4.00	B69	ENVOLVENTE MAX	1.75	0	41.08	0.661	40.181
N+4.00	B69	ENVOLVENTE MAX	3.5	0	75.01	0.661	-13.672
N+4.00	B69	ENVOLVENTE MIN	0	0	-5.19	-2.94	32.054
N+4.00	B69	ENVOLVENTE MIN	1.75	0	14.18	-2.94	6.757
N+4.00	B69	ENVOLVENTE MIN	3.5	0	33.56	-2.94	-93.052
N+4.00	B70	ENVOLVENTE MAX	0	0	-14.16	4.399	-15.207
N+4.00	B70	ENVOLVENTE MAX	1.038	0	-6.32	4.399	-3.664
N+4.00	B70	ENVOLVENTE MAX	2.075	0	1.53	4.399	-2.102
N+4.00	B70	ENVOLVENTE MIN	0	0	-48.76	-1.964	-66.307
N+4.00	B70	ENVOLVENTE MIN	1.038	0	-29.69	-1.964	-24.639
N+4.00	B70	ENVOLVENTE MIN	2.075	0	-13.29	-1.964	-4.795
N+4.00	B71	ENVOLVENTE MAX	0	0	-9.26	1.105	-3.111
N+4.00	B71	ENVOLVENTE MAX	0.788	0	9.55	1.105	1.207
N+4.00	B71	ENVOLVENTE MAX	1.575	0	38.29	1.105	-6.737
N+4.00	B71	ENVOLVENTE MIN	0	0	-21.35	-4.05	-5.814
N+4.00	B71	ENVOLVENTE MIN	0.788	0	2.24	-4.05	-2.48
N+4.00	B71	ENVOLVENTE MIN	1.575	0	17.93	-4.05	-20.425
N+4.00	B72	ENVOLVENTE MAX	0	0	-30.22	0.034	-11.358
N+4.00	B72	ENVOLVENTE MAX	1.75	0	-10.82	0.034	42.836
N+4.00	B72	ENVOLVENTE MAX	3.5	0	12.42	0.034	44.346
N+4.00	B72	ENVOLVENTE MIN	0	0	-61.03	-3.15	-52.502
N+4.00	B72	ENVOLVENTE MIN	1.75	0	-26.32	-3.15	15.374
N+4.00	B72	ENVOLVENTE MIN	3.5	0	1.83	-3.15	24.573
N+4.00	B73	ENVOLVENTE MAX	0	0	3.59	4.049	41.465
N+4.00	B73	ENVOLVENTE MAX	1.75	0	37.14	4.049	23.133
N+4.00	B73	ENVOLVENTE MAX	3.5	0	72.81	4.049	-30.274
N+4.00	B73	ENVOLVENTE MIN	0	0	-3.29	0.429	23.346
N+4.00	B73	ENVOLVENTE MIN	1.75	0	16.11	0.429	6.543
N+4.00	B73	ENVOLVENTE MIN	3.5	0	35.51	0.429	-88.519
N+4.00	B74	ENVOLVENTE MAX	0	0	-15.89	5.806	-20.012
N+4.00	B74	ENVOLVENTE MAX	1.038	0	-8.13	5.806	-6.671
N+4.00	B74	ENVOLVENTE MAX	2.075	0	-0.36	5.806	-2.305
N+4.00	B74	ENVOLVENTE MIN	0	0	-44.25	0.052	-57.372
N+4.00	B74	ENVOLVENTE MIN	1.038	0	-25.42	0.052	-18.627
N+4.00	B74	ENVOLVENTE MIN	2.075	0	-7.31	0.052	-4.679
N+4.00	B77	ENVOLVENTE MAX	0	0	24.24	3.949	0.077
N+4.00	B77	ENVOLVENTE MAX	0.913	0	33.28	3.949	-7.383
N+4.00	B77	ENVOLVENTE MAX	1.825	0	42.31	3.949	-19.007
N+4.00	B77	ENVOLVENTE MIN	0	0	5.98	0.047	-0.729
N+4.00	B77	ENVOLVENTE MIN	0.913	0	10.26	0.047	-25.517

N+4.00	B77	ENVOLVENTE MIN	1.825	0	14.53	0.047	-60.927
N+4.00	B78	ENVOLVENTE MAX	0	0	45.16	-4.307	3.524
N+4.00	B78	ENVOLVENTE MAX	0.913	0	48.12	-4.307	-13.823
N+4.00	B78	ENVOLVENTE MAX	1.825	0	51.07	-4.307	-30.601
N+4.00	B78	ENVOLVENTE MIN	0	0	14.67	-8.704	-0.673
N+4.00	B78	ENVOLVENTE MIN	0.913	0	16.89	-8.704	-39.279
N+4.00	B78	ENVOLVENTE MIN	1.825	0	19.1	-8.704	-84.534
N+4.00	B79	ENVOLVENTE MAX	0	0	-23.68	-0.16	-11.326
N+4.00	B79	ENVOLVENTE MAX	2.475	0	-3.91	-0.16	38.208
N+4.00	B79	ENVOLVENTE MAX	4.95	0	22.22	-0.16	22.574
N+4.00	B79	ENVOLVENTE MIN	0	0	-51.19	-2.385	-69.073
N+4.00	B79	ENVOLVENTE MIN	2.475	0	-18.5	-2.385	14.192
N+4.00	B79	ENVOLVENTE MIN	4.95	0	7.07	-2.385	7.973
N+4.00	B80	ENVOLVENTE MAX	0	0	-42.3	3.539	-35.916
N+4.00	B80	ENVOLVENTE MAX	2.475	0	-8.42	3.539	54.484
N+4.00	B80	ENVOLVENTE MAX	4.95	0	41.64	3.539	12.115
N+4.00	B80	ENVOLVENTE MIN	0	0	-84.76	0.825	-98.398
N+4.00	B80	ENVOLVENTE MIN	2.475	0	-22.08	0.825	25.974
N+4.00	B80	ENVOLVENTE MIN	4.95	0	19.6	0.825	4.514
N+4.00	B81	ENVOLVENTE MAX	0	0	-33.77	1.546	-15.111
N+4.00	B81	ENVOLVENTE MAX	1.738	0	-14.69	1.546	48.507
N+4.00	B81	ENVOLVENTE MAX	3.475	0	4.38	1.546	71.687
N+4.00	B81	ENVOLVENTE MIN	0	0	-71.91	-0.897	-65.455
N+4.00	B81	ENVOLVENTE MIN	1.738	0	-36.88	-0.897	16.095
N+4.00	B81	ENVOLVENTE MIN	3.475	0	-5.44	-0.897	34.901
N+4.00	B82	ENVOLVENTE MAX	0	0	1.06	0.853	72.393
N+4.00	B82	ENVOLVENTE MAX	1.738	0	31.44	0.853	61.922
N+4.00	B82	ENVOLVENTE MAX	3.475	0	65.69	0.853	0.21
N+4.00	B82	ENVOLVENTE MIN	0	0	-8.9	-1.158	33.269
N+4.00	B82	ENVOLVENTE MIN	1.738	0	11.24	-1.158	19.192
N+4.00	B82	ENVOLVENTE MIN	3.475	0	30.32	-1.158	-48.805
N+7.50	B84	ENVOLVENTE MAX	0	0	-2.24	0	-0.643
N+7.50	B84	ENVOLVENTE MAX	0.288	0	-1.12	0	-0.161
N+7.50	B84	ENVOLVENTE MAX	0.575	0	0	0	0
N+7.50	B84	ENVOLVENTE MIN	0	0	-3.48	0	-1
N+7.50	B84	ENVOLVENTE MIN	0.288	0	-1.74	0	-0.25
N+7.50	B84	ENVOLVENTE MIN	0.575	0	0	0	0
N+7.50	B85	ENVOLVENTE MAX	0	0	-2.24	0	-0.643
N+7.50	B85	ENVOLVENTE MAX	0.288	0	-1.12	0	-0.161
N+7.50	B85	ENVOLVENTE MAX	0.575	0	0	0	0
N+7.50	B85	ENVOLVENTE MIN	0	0	-3.48	0	-1
N+7.50	B85	ENVOLVENTE MIN	0.288	0	-1.74	0	-0.25
N+7.50	B85	ENVOLVENTE MIN	0.575	0	0	0	0
N+7.50	B86	ENVOLVENTE MAX	0	0	-0.84	0	-0.241
N+7.50	B86	ENVOLVENTE MAX	0.288	0	-0.42	0	-0.06
N+7.50	B86	ENVOLVENTE MAX	0.575	0	0	0	0
N+7.50	B86	ENVOLVENTE MIN	0	0	-1.3	0	-0.375
N+7.50	B86	ENVOLVENTE MIN	0.288	0	-0.65	0	-0.094
N+7.50	B86	ENVOLVENTE MIN	0.575	0	0	0	0
N+7.50	B87	ENVOLVENTE MAX	0	0	5.19	-0.79	-0.405
N+7.50	B87	ENVOLVENTE MAX	1.038	0	8.57	-0.79	-4.319
N+7.50	B87	ENVOLVENTE MAX	2.075	0	12.07	-0.79	-10.83
N+7.50	B87	ENVOLVENTE MIN	0	0	2.46	-3.065	-1.894
N+7.50	B87	ENVOLVENTE MIN	1.038	0	4.99	-3.065	-9.032
N+7.50	B87	ENVOLVENTE MIN	2.075	0	7.51	-3.065	-19.673
N+7.50	B90	ENVOLVENTE MAX	0	0	0	0	0
N+7.50	B90	ENVOLVENTE MAX	0.325	0	1.47	0	-0.154
N+7.50	B90	ENVOLVENTE MAX	0.325	0	8.66	1.126	-0.038
N+7.50	B90	ENVOLVENTE MAX	0.95	0	12.93	1.126	-3.713
N+7.50	B90	ENVOLVENTE MAX	1.9	0	19.86	1.126	-11.917
N+7.50	B90	ENVOLVENTE MIN	0	0	0	0	0
N+7.50	B90	ENVOLVENTE MIN	0.325	0	0.95	0	-0.24
N+7.50	B90	ENVOLVENTE MIN	0.325	0	4.39	-11.12	-0.519
N+7.50	B90	ENVOLVENTE MIN	0.95	0	6.8	-11.12	-7.088
N+7.50	B90	ENVOLVENTE MIN	1.9	0	10.47	-11.12	-22.449
N+7.50	B91	ENVOLVENTE MAX	0	0	0	0	0
N+7.50	B91	ENVOLVENTE MAX	0.163	0	0.74	0	-0.039
N+7.50	B91	ENVOLVENTE MAX	0.325	0	1.47	0	-0.154
N+7.50	B91	ENVOLVENTE MIN	0	0	0	0	0
N+7.50	B91	ENVOLVENTE MIN	0.163	0	0.47	0	-0.06
N+7.50	B91	ENVOLVENTE MIN	0.325	0	0.95	0	-0.24

FUERZAS EN COLUMNAS

COLUMN FORCES
UNID: kN-m

Story	Column	Load	Loc	P	V2	V3	T	M2	M3
N+4.00	C1	ENVOLVENTE MAX	0.000	-67.000	35.270	42.760	3.013	111.348	106.762
N+4.00	C1	ENVOLVENTE MAX	2.000	-58.360	35.270	42.760	3.013	30.409	47.746
N+4.00	C1	ENVOLVENTE MAX	4.000	-49.720	35.270	42.760	3.013	106.988	192.602
N+4.00	C1	ENVOLVENTE MIN	0.000	-197.100	-95.270	-60.020	-2.923	-133.087	-188.476
N+4.00	C1	ENVOLVENTE MIN	2.000	-185.580	-95.270	-60.020	-2.923	-17.631	-9.469
N+4.00	C1	ENVOLVENTE MIN	4.000	-174.060	-95.270	-60.020	-2.923	-59.693	-34.334
N+4.00	C2	ENVOLVENTE MAX	0.000	-58.670	92.070	37.550	3.013	98.933	180.338
N+4.00	C2	ENVOLVENTE MAX	2.000	-50.030	92.070	37.550	3.013	28.432	8.578
N+4.00	C2	ENVOLVENTE MAX	4.000	-41.390	92.070	37.550	3.013	98.313	37.173
N+4.00	C2	ENVOLVENTE MIN	0.000	-203.210	-37.000	-54.510	-2.923	-119.715	-110.838

N+7.50	C2	ENVOLVENTE MIN	2.000	-191.690	-37.000	-54.510	-2.923	-15.296	-49.222
N+4.00	C2	ENVOLVENTE MIN	4.000	-180.170	-37.000	-54.510	-2.923	-51.258	-187.961
N+7.50	C3	ENVOLVENTE MAX	0.000	-30.960	-1.650	10.720	1.987	19.089	-25.950
N+7.50	C3	ENVOLVENTE MAX	1.750	-24.910	-1.650	10.720	1.987	1.257	-5.062
N+7.50	C3	ENVOLVENTE MAX	3.500	-18.860	-1.650	10.720	1.987	57.851	74.184
N+7.50	C3	ENVOLVENTE MIN	0.000	-73.820	-53.910	-34.290	-1.805	-62.185	-115.308
N+7.50	C3	ENVOLVENTE MIN	1.750	-65.760	-53.910	-34.290	-1.805	-3.112	-38.968
N+7.50	C3	ENVOLVENTE MIN	3.500	-57.690	-53.910	-34.290	-1.805	-18.464	-20.986
N+4.00	C3	ENVOLVENTE MAX	0.000	-190.370	26.650	28.580	1.984	66.033	80.458
N+4.00	C3	ENVOLVENTE MAX	2.000	-183.450	26.650	28.580	1.984	9.808	36.627
N+4.00	C3	ENVOLVENTE MAX	4.000	-176.540	26.650	28.580	1.984	73.213	155.517
N+4.00	C3	ENVOLVENTE MIN	0.000	-416.290	-75.730	-37.710	-1.925	-77.642	-147.433
N+4.00	C3	ENVOLVENTE MIN	2.000	-407.070	-75.730	-37.710	-1.925	-3.161	-5.454
N+4.00	C3	ENVOLVENTE MIN	4.000	-397.860	-75.730	-37.710	-1.925	-48.311	-26.197
N+7.50	C4	ENVOLVENTE MAX	0.000	-25.850	47.540	9.700	1.987	17.553	104.938
N+7.50	C4	ENVOLVENTE MAX	1.750	-19.800	47.540	9.700	1.987	1.399	39.557
N+7.50	C4	ENVOLVENTE MAX	3.500	-13.750	47.540	9.700	1.987	49.716	23.218
N+7.50	C4	ENVOLVENTE MIN	0.000	-71.690	0.490	-29.750	-1.805	-54.429	23.986
N+7.50	C4	ENVOLVENTE MIN	1.750	-63.620	0.490	-29.750	-1.805	-3.186	5.304
N+7.50	C4	ENVOLVENTE MIN	3.500	-55.560	0.490	-29.750	-1.805	-16.414	-62.420
N+4.00	C4	ENVOLVENTE MAX	0.000	-184.050	74.200	25.840	1.984	59.551	142.103
N+4.00	C4	ENVOLVENTE MAX	2.000	-177.140	74.200	25.840	1.984	8.676	4.428
N+4.00	C4	ENVOLVENTE MAX	4.000	-170.230	74.200	25.840	1.984	65.877	24.339
N+4.00	C4	ENVOLVENTE MIN	0.000	-402.610	-26.580	-33.800	-1.925	-69.333	-82.004
N+4.00	C4	ENVOLVENTE MIN	2.000	-393.390	-26.580	-33.800	-1.925	-2.541	-39.578
N+4.00	C4	ENVOLVENTE MIN	4.000	-384.170	-26.580	-33.800	-1.925	-43.826	-154.738
N+7.50	C5	ENVOLVENTE MAX	0.000	-39.390	-5.550	7.780	3.017	-13.131	-32.676
N+7.50	C5	ENVOLVENTE MAX	1.750	-31.830	-5.550	7.780	3.017	7.340	-0.098
N+7.50	C5	ENVOLVENTE MAX	3.500	-24.270	-5.550	7.780	3.017	62.258	70.718
N+7.50	C5	ENVOLVENTE MIN	0.000	-94.800	-45.660	-35.720	-2.741	-66.954	-90.811
N+7.50	C5	ENVOLVENTE MIN	1.750	-84.720	-45.660	-35.720	-2.741	-38.530	-33.767
N+7.50	C5	ENVOLVENTE MIN	3.500	-74.640	-45.660	-35.720	-2.741	-44.552	-14.961
N+4.00	C5	ENVOLVENTE MAX	0.000	-181.640	30.440	52.970	3.013	155.627	91.669
N+4.00	C5	ENVOLVENTE MAX	2.000	-173.000	30.440	52.970	3.013	54.340	36.190
N+4.00	C5	ENVOLVENTE MAX	4.000	-164.360	30.440	52.970	3.013	130.099	135.556
N+4.00	C5	ENVOLVENTE MIN	0.000	-381.440	-70.970	-80.290	-2.923	-191.609	-148.372
N+4.00	C5	ENVOLVENTE MIN	2.000	-369.920	-70.970	-80.290	-2.923	-35.676	-11.837
N+4.00	C5	ENVOLVENTE MIN	4.000	-358.400	-70.970	-80.290	-2.923	-56.789	-30.147
N+7.50	C6	ENVOLVENTE MAX	0.000	-70.560	26.230	4.480	1.987	-8.918	41.580
N+7.50	C6	ENVOLVENTE MAX	1.750	-64.510	26.230	4.480	1.987	-4.934	9.664
N+7.50	C6	ENVOLVENTE MAX	3.500	-58.460	26.230	4.480	1.987	54.905	67.974
N+7.50	C6	ENVOLVENTE MIN	0.000	-134.790	-33.450	-37.450	-1.805	-76.390	-49.157
N+7.50	C6	ENVOLVENTE MIN	1.750	-126.720	-33.450	-37.450	-1.805	-22.676	-4.616
N+7.50	C6	ENVOLVENTE MIN	3.500	-118.660	-33.450	-37.450	-1.805	-24.818	-50.299
N+4.00	C6	ENVOLVENTE MAX	0.000	-345.360	46.530	21.020	1.984	63.938	102.209
N+4.00	C6	ENVOLVENTE MAX	2.000	-338.450	46.530	21.020	1.984	26.804	9.630
N+4.00	C6	ENVOLVENTE MAX	4.000	-331.530	46.530	21.020	1.984	98.065	78.714
N+4.00	C6	ENVOLVENTE MIN	0.000	-637.280	-45.420	-49.970	-1.925	-101.895	-103.503
N+4.00	C6	ENVOLVENTE MIN	2.000	-628.060	-45.420	-49.970	-1.925	-6.856	-13.148
N+4.00	C6	ENVOLVENTE MIN	4.000	-618.850	-45.420	-49.970	-1.925	-20.212	-84.455
N+7.50	C7	ENVOLVENTE MAX	0.000	-79.390	22.480	18.580	1.987	24.732	29.029
N+7.50	C7	ENVOLVENTE MAX	1.750	-73.340	22.480	18.580	1.987	1.533	2.045
N+7.50	C7	ENVOLVENTE MAX	3.500	-67.290	22.480	18.580	1.987	54.452	63.831
N+7.50	C7	ENVOLVENTE MIN	0.000	-140.410	-37.480	-31.670	-1.805	-56.417	-67.422
N+7.50	C7	ENVOLVENTE MIN	1.750	-132.340	-37.480	-31.670	-1.805	-10.325	-14.198
N+7.50	C7	ENVOLVENTE MIN	3.500	-124.280	-37.480	-31.670	-1.805	-40.351	-49.746
N+4.00	C7	ENVOLVENTE MAX	0.000	-421.830	41.030	26.380	1.984	63.136	95.266
N+4.00	C7	ENVOLVENTE MAX	2.000	-414.920	41.030	26.380	1.984	12.466	15.121
N+4.00	C7	ENVOLVENTE MAX	4.000	-408.000	41.030	26.380	1.984	68.311	100.658
N+4.00	C7	ENVOLVENTE MIN	0.000	-734.990	-53.890	-35.880	-1.925	-75.240	-114.926
N+4.00	C7	ENVOLVENTE MIN	2.000	-725.780	-53.890	-35.880	-1.925	-5.561	-9.053
N+4.00	C7	ENVOLVENTE MIN	4.000	-716.560	-53.890	-35.880	-1.925	-42.397	-68.862
N+7.50	C8	ENVOLVENTE MAX	0.000	-46.310	44.550	19.530	1.987	28.456	97.885
N+7.50	C8	ENVOLVENTE MAX	1.750	-40.260	44.550	19.530	1.987	3.557	35.342
N+7.50	C8	ENVOLVENTE MAX	3.500	-34.210	44.550	19.530	1.987	38.266	14.572
N+7.50	C8	ENVOLVENTE MIN	0.000	-94.600	5.120	-20.220	-1.805	-33.086	31.843
N+7.50	C8	ENVOLVENTE MIN	1.750	-86.540	5.120	-20.220	-1.805	-6.986	7.467
N+7.50	C8	ENVOLVENTE MIN	3.500	-78.470	5.120	-20.220	-1.805	-40.495	-58.683
N+4.00	C8	ENVOLVENTE MAX	0.000	-238.460	68.450	25.560	1.984	59.475	130.481
N+4.00	C8	ENVOLVENTE MAX	2.000	-231.550	68.450	25.560	1.984	8.654	2.431
N+4.00	C8	ENVOLVENTE MAX	4.000	-224.640	68.450	25.560	1.984	47.877	13.917
N+4.00	C8	ENVOLVENTE MIN	0.000	-447.710	-21.290	-27.090	-1.925	-60.808	-71.260
N+4.00	C8	ENVOLVENTE MIN	2.000	-438.490	-21.290	-27.090	-1.925	-6.929	-37.532
N+4.00	C8	ENVOLVENTE MIN	4.000	-429.280	-21.290	-27.090	-1.925	-43.093	-143.339
N+7.50	C9	ENVOLVENTE MAX	0.000	-38.310	-8.770	24.630	3.017	40.725	-39.582
N+7.50	C9	ENVOLVENTE MAX	1.750	-30.750	-8.770	24.630	3.017	31.502	-3.731
N+7.50	C9	ENVOLVENTE MAX	3.500	-23.190	-8.770	24.630	3.017	53.012	72.493
N+7.50	C9	ENVOLVENTE MIN	0.000	-98.090	-51.210	-13.840	-2.741	0.344	-107.701
N+7.50	C9	ENVOLVENTE MIN	1.750	-88.010	-51.210	-13.840	-2.741	-9.307	-38.587
N+7.50	C9	ENVOLVENTE MIN	3.500	-77.930	-51.210	-13.840	-2.741	-49.692	-9.845
N+4.00	C9	ENVOLVENTE MAX	0.000	-187.230	23.700	76.290	3.013	187.084	77.375
N+4.00	C9	ENVOLVENTE MAX	2.000	-178.590	23.700	76.290	3.013	35.641	38.293
N+4.00	C9	ENVOLVENTE MAX	4.000	-169.950	23.700	76.290	3.013	60.976	145.312
N+4.00	C9	ENVOLVENTE MIN	0.000	-426.400	-72.720	-55.070	-2.923	-159.796	-145.596
N+4.00	C9	ENVOLVENTE MIN	2.000	-414.880	-72.720	-55.070	-2.923	-50.797	-8.486
N+4.00	C9	ENVOLVENTE MIN	4.000	-403.360	-72.720	-55.070	-2.923	-118.577	-17.476
N+7.50	C10	ENVOLVENTE MAX	0.000	-70.820	21.730	20.500	1.987	38.127	33.277
N+7.50	C10	ENVOLVENTE MAX	1.750	-64.780	21.730	20.500	1.987	14.485	7.329
N+7.50	C10	ENVOLVENTE MAX	3.500	-58.730	21.730	20.500	1.987	36.373	67.118
N+7.50	C10	ENVOLVENTE MIN	0.000	-133.720	-34.360	-12.790	-1.805	-9.656	-53.266

N+7.50	C10	ENVOLVENTE MIN	1.750	-125.660	-34.360	-12.790	-1.805	0.492	-5.210
N+7.50	C10	ENVOLVENTE MIN	3.500	-117.590	-34.360	-12.790	-1.805	-34.890	-42.891
N+4.00	C10	ENVOLVENTE MAX	0.000	-379.090	39.830	39.520	1.984	88.616	89.338
N+4.00	C10	ENVOLVENTE MAX	2.000	-372.180	39.830	39.520	1.984	9.882	9.716
N+4.00	C10	ENVOLVENTE MAX	4.000	-365.270	39.830	39.520	1.984	32.605	73.993
N+4.00	C10	ENVOLVENTE MIN	0.000	-780.300	-42.450	-25.600	-1.925	-70.232	-95.823
N+4.00	C10	ENVOLVENTE MIN	2.000	-771.080	-42.450	-25.600	-1.925	-19.339	-10.969
N+4.00	C10	ENVOLVENTE MIN	4.000	-761.870	-42.450	-25.600	-1.925	-69.901	-70.014
N+7.50	C11	ENVOLVENTE MAX	0.000	-150.820	19.850	-3.790	3.017	-13.497	29.755
N+7.50	C11	ENVOLVENTE MAX	1.750	-143.260	19.850	-3.790	3.017	11.696	15.924
N+7.50	C11	ENVOLVENTE MAX	3.500	-135.700	19.850	-3.790	3.017	189.005	81.102
N+7.50	C11	ENVOLVENTE MIN	0.000	-274.850	-37.450	-102.020	-2.741	-168.247	-50.140
N+7.50	C11	ENVOLVENTE MIN	1.750	-264.770	-37.450	-102.020	-2.741	-8.264	-5.515
N+7.50	C11	ENVOLVENTE MIN	3.500	-254.690	-37.450	-102.020	-2.741	-0.397	-39.898
N+4.00	C11	ENVOLVENTE MAX	0.000	-586.370	49.980	40.560	3.013	108.465	110.939
N+4.00	C11	ENVOLVENTE MAX	2.000	-577.730	49.980	40.560	3.013	35.616	13.590
N+4.00	C11	ENVOLVENTE MAX	4.000	-569.090	49.980	40.560	3.013	153.468	82.538
N+4.00	C11	ENVOLVENTE MIN	0.000	-1097.350	-48.990	-77.230	-2.923	-155.499	-113.457
N+4.00	C11	ENVOLVENTE MIN	2.000	-1085.830	-48.990	-77.230	-2.923	-9.318	-18.074
N+4.00	C11	ENVOLVENTE MIN	4.000	-1074.310	-48.990	-77.230	-2.923	-53.836	-88.987
N+7.50	C12	ENVOLVENTE MAX	0.000	-93.930	61.320	17.300	1.987	31.181	112.556
N+7.50	C12	ENVOLVENTE MAX	1.750	-87.880	61.320	17.300	1.987	9.977	20.665
N+7.50	C12	ENVOLVENTE MAX	3.500	-81.830	61.320	17.300	1.987	70.277	-13.886

N+7.50	C12	ENVOLVENTE MIN	0	-169.54	16.96	-34.52	-1.805	-50.55	45.031
N+7.50	C12	ENVOLVENTE MIN	1.750	-161.480	16.960	-34.520	-1.805	0.786	-0.074
N+7.50	C12	ENVOLVENTE MIN	3.5	-153.41	16.96	-34.52	-1.805	-29.384	-102.52
N+4.00	C12	ENVOLVENTE MAX	0	-297.55	61.58	30.73	1.984	66.415	117.133
N+4.00	C12	ENVOLVENTE MAX	2.000	-290.640	61.580	30.730	1.984	5.749	1.709
N+4.00	C12	ENVOLVENTE MAX	4	-283.730	61.580	30.730	1.984	54.122	7.273
N+4.00	C12	ENVOLVENTE MIN	0	-524.720	-17.310	-29.590	-1.925	-64.239	-62.005
N+4.00	C12	ENVOLVENTE MIN	2	-515.500	-17.310	-29.590	-1.925	-5.855	-35.119
N+4.00	C12	ENVOLVENTE MIN	4	-506.290	-17.310	-29.590	-1.925	-56.509	-129.221
N+7.50	C13	ENVOLVENTE MAX	0	-177.790	18.770	131.310	3.017	217.276	18.257
N+7.50	C13	ENVOLVENTE MAX	1.75	-170.230	18.770	131.310	3.017	8.741	2.035
N+7.50	C13	ENVOLVENTE MAX	3.5	-162.670	18.770	131.310	3.017	-13.268	141.969
N+7.50	C13	ENVOLVENTE MIN	0	-394.300	-80.040	12.380	-2.741	29.952	-138.193
N+7.50	C13	ENVOLVENTE MIN	1.75	-384.220	-80.040	12.380	-2.741	-12.982	-14.758
N+7.50	C13	ENVOLVENTE MIN	3.5	-374.140	-80.040	12.380	-2.741	-242.442	-47.479
N+4.00	C13	ENVOLVENTE MAX	0	-474.230	45.400	90.770	3.013	174.828	113.339
N+4.00	C13	ENVOLVENTE MAX	2	-465.590	45.400	90.770	3.013	3.995	25.094
N+4.00	C13	ENVOLVENTE MAX	4	-456.950	45.400	90.770	3.013	39.943	145.166
N+4.00	C13	ENVOLVENTE MIN	0	-1021.490	-75.630	-35.480	-2.923	-102.012	-157.381
N+4.00	C13	ENVOLVENTE MIN	2	-1009.970	-75.630	-35.480	-2.923	-41.759	-8.661
N+4.00	C13	ENVOLVENTE MIN	4	-998.450	-75.630	-35.480	-2.923	-188.287	-68.258
N+7.50	C14	ENVOLVENTE MAX	0	-110.400	111.110	57.680	4.852	73.555	178.340
N+7.50	C14	ENVOLVENTE MAX	1.75	-100.950	111.110	57.680	4.852	3.828	30.646
N+7.50	C14	ENVOLVENTE MAX	3.5	-91.500	111.110	57.680	4.852	30.108	23.506
N+7.50	C14	ENVOLVENTE MIN	0	-246.950	3.770	-15.690	-4.408	-25.275	36.112
N+7.50	C14	ENVOLVENTE MIN	1.75	-234.350	3.770	-15.690	-4.408	-29.033	-17.240
N+7.50	C14	ENVOLVENTE MIN	3.5	-221.750	3.770	-15.690	-4.408	-128.798	-211.146
N+4.00	C14	ENVOLVENTE MAX	0	-317.730	124.550	58.540	4.844	139.484	265.360
N+4.00	C14	ENVOLVENTE MAX	2	-306.930	124.550	58.540	4.844	23.164	26.375
N+4.00	C14	ENVOLVENTE MAX	4	-296.130	124.550	58.540	4.844	89.949	73.693
N+4.00	C14	ENVOLVENTE MIN	0	-679.140	-68.630	-55.860	-4.701	-134.343	-200.883
N+4.00	C14	ENVOLVENTE MIN	2	-664.740	-68.630	-55.860	-4.701	-23.377	-73.745
N+4.00	C14	ENVOLVENTE MIN	4	-650.340	-68.630	-55.860	-4.701	-95.516	-232.910
N+7.50	C15	ENVOLVENTE MAX	0	-79.070	8.550	20.380	6.836	65.451	-43.704
N+7.50	C15	ENVOLVENTE MAX	1.75	-67.730	8.550	20.380	6.836	51.506	8.934
N+7.50	C15	ENVOLVENTE MAX	3.5	-56.390	8.550	20.380	6.836	49.468	105.159
N+7.50	C15	ENVOLVENTE MIN	0	-170.540	-64.540	-5.920	-6.210	-10.234	-124.015
N+7.50	C15	ENVOLVENTE MIN	1.75	-155.420	-64.540	-5.920	-6.210	-21.587	-78.663
N+7.50	C15	ENVOLVENTE MIN	3.5	-140.300	-64.540	-5.920	-6.210	-44.848	-76.897
N+4.00	C15	ENVOLVENTE MAX	0	-228.620	84.040	98.670	6.826	249.295	251.951
N+4.00	C15	ENVOLVENTE MAX	2	-215.660	84.040	98.670	6.826	55.314	91.244
N+4.00	C15	ENVOLVENTE MAX	4	-202.700	84.040	98.670	6.826	69.524	238.663
N+4.00	C15	ENVOLVENTE MIN	0	-505.620	-145.340	-69.880	-6.623	-210.534	-342.795
N+4.00	C15	ENVOLVENTE MIN	2	-488.340	-145.340	-69.880	-6.623	-74.116	-59.487
N+4.00	C15	ENVOLVENTE MIN	4	-471.060	-145.340	-69.880	-6.623	-145.888	-84.305
N+7.50	C16	ENVOLVENTE MAX	0	-38.760	56.280	24.170	6.836	78.012	100.103
N+7.50	C16	ENVOLVENTE MAX	1.75	-27.420	56.280	24.170	6.836	47.322	65.821
N+7.50	C16	ENVOLVENTE MAX	3.5	-16.080	56.280	24.170	6.836	31.539	71.805
N+7.50	C16	ENVOLVENTE MIN	0	-115.150	-10.700	-1.480	-6.210	-6.443	29.979
N+7.50	C16	ENVOLVENTE MIN	1.75	-100.030	-10.700	-1.480	-6.210	-15.457	-15.501
N+7.50	C16	ENVOLVENTE MIN	3.5	-84.910	-10.700	-1.480	-6.210	-39.377	-101.246
N+4.00	C16	ENVOLVENTE MAX	0	-185.960	140.890	93.390	6.826	230.155	323.967
N+4.00	C16	ENVOLVENTE MAX	2	-173.000	140.890	93.390	6.826	47.708	52.915
N+4.00	C16	ENVOLVENTE MAX	4	-160.040	140.890	93.390	6.826	59.544	84.512
N+4.00	C16	ENVOLVENTE MIN	0	-454.050	-87.410	-61.140	-6.623	-185.696	-265.207
N+4.00	C16	ENVOLVENTE MIN	2	-436.770	-87.410	-61.140	-6.623	-67.746	-101.125
N+4.00	C16	ENVOLVENTE MIN	4	-419.490	-87.410	-61.140	-6.623	-144.080	-239.692

8. VERIFICACIONES

VERIFICACIONES

Diseños & Estructuras

PROYECTO: AGROECOL
RESISTENCIA A CORTANTE PARA VIGAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3.1 (a)

f'c = 21.1 MPa
fy = 420 MPa
Φ Cortante = 0.75
Estribos Φ = 9.5 mm
Av = 71 mm²
R= 6.30

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)															
	ELEMENTO												Combinaciones para resistencias nominales a momento															
	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
N+4.00	B1	0.000	4.500	VIG40X45	0.40	0.40	-12.141	-4.036	5.035	67.411	-5.035	-67.411	14.596	16.194	21.016	22.614	7.665	8.145	29.066	29.545	6.918	8.516	13.338	14.936	0.013	0.467	21.387	21.867
	B1	4.500					-45.654	-13.903	4.036	54.805	-4.036	-54.805	65.437	66.719	70.657	71.938	59.796	60.181	77.195	77.579	37.838	39.119	43.058	44.339	32.197	32.582	49.596	49.980
N+4.00	B2	0.000	4.500	VIG40X45	0.40	0.40	-11.993	-4.291	10.267	58.578	-10.267	-58.578	14.263	17.523	19.842	23.102	8.896	9.873	27.492	28.470	6.375	9.634	11.953	15.213	1.007	1.985	19.603	20.581
	B2	4.500					-45.026	-13.517	8.469	46.978	-8.469	-46.978	63.967	66.655	68.441	71.130	59.688	60.495	74.602	75.408	36.942	39.631	41.416	44.105	32.663	33.470	47.577	48.384
N+7.50	B3	0.000	6.450	VIG40X45	0.40	0.40	-17.283	-3.320	2.446	32.233	-2.446	-32.233	22.136	22.913	25.206	25.983	18.827	19.060	29.059	29.292	13.632	14.408	16.701	17.478	10.322	10.555	20.555	20.788
	B3	6.450					-23.578	-8.882	2.313	25.074	-2.313	-25.074	35.614	36.349	38.002	38.737	33.085	33.306	41.045	41.266	19.659	20.393	22.047	22.781	17.130	17.350	25.090	25.310
N+4.00	B3	0.000	6.450	VIG40X45	0.40	0.40	-77.093	-16.242	3.492	33.644	-3.492	-33.644	106.597	107.706	109.801	110.910	103.247	103.580	113.928	114.260	67.227	68.336	70.432	71.540	63.877	64.210	74.558	74.890
	B3	6.450					-117.198	-25.259	2.816	38.523	-2.816	-38.523	163.615	164.509	167.284	168.178	159.648	159.916	171.877	172.145	103.197	104.091	106.866	107.760	99.229	99.498	111.459	111.727
N+7.50	B4	0.000	6.450	VIG40X45	0.40	0.40	-14.209	-3.235	5.880	27.649	-5.880	-27.649	18.036	19.903	20.669	22.536	15.617	16.177	24.395	24.955	10.538	12.405	13.171	15.038	8.119	8.679	16.897	17.457
	B4	6.450					-19.197	-7.026	4.826	22.102	-4.826	-22.102	28.244	29.776	30.349	31.881	26.324	26.784	33.341	33.800	15.459	16.991	17.564	19.096	13.539	13.999	20.556	21.015
N+4.00	B4	0.000	6.450	VIG40X45	0.40	0.40	-72.005	-15.633	6.645	29.935	-6.645	-29.935	99.559	101.668	102.410	104.519	96.971	97.604	106.474	107.107	62.324	64.434	65.175	67.285	59.736	60.369	69.240	69.873
	B4	6.450					-90.038	-16.550	7.239	33.544	-7.239	-33.544	121.849	124.147	125.044	127.342	118.926	119.616	129.575	130.265	78.288	80.586	81.482	83.781	75.365	76.054	86.014	86.703
N+7.50	B5	0.000	7.000	VIG40X45	0.40	0.40	-29.842	-11.291	1.666	20.480	-1.666	-20.480	45.862	46.391	47.812	48.341	43.771	43.930	50.273	50.432	25.618	26.147	27.569	28.097	23.528	23.686	30.029	30.188
	B5	7.000					-55.899	-20.358	1.776	22.601	-1.776	-22.601	86.079	86.642	88.231	88.795	83.765	83.934	90.940	91.109	48.951	49.515	51.103	51.667	46.637	46.806	53.812	53.981
N+4.00	B5	0.000	7.000	VIG40X45	0.40	0.40	-131.983	-32.129	3.929	39.532	-3.929	-39.532	188.002	189.250	191.767	193.015	184.047	184.421	196.596	196.971	116.279	117.526	120.044	121.291	112.323	112.697	124.873	125.247
	B5	7.000					-169.440	-50.271	3.062	43.528	-3.062	-43.528	251.040	252.012	255.186	256.158	246.544	246.836	260.362	260.654	149.937	150.909	154.083	155.055	145.441	145.733	159.259	159.551
N+7.50	B6	0.000	7.000	VIG40X45	0.40	0.40	-18.211	-6.682	3.236	14.655	-3.236	-14.655	27.324	28.351	28.719	29.747	26.055	26.363	30.707	31.015	15.178	16.206	16.574	17.601	13.910	14.218	18.562	18.870
	B6	7.000					-33.555	-8.707	2.883	13.628	-2.883	-13.628	47.866	48.782	49.164	50.080	46.673	46.947	50.999	51.273	29.093	30.008	30.391	31.306	27.899	28.174	32.225	32.500
N+4.00	B6	0.000	7.000	VIG40X45	0.40	0.40	-93.871	-17.516	7.573	31.905	-7.573	-31.905	127.440	129.844	130.478	132.883	124.736	125.458	134.865	135.586	81.763	84.167	84.801	87.205	79.059	79.780	89.188	89.909
	B6	7.000					-97.470	-15.106	5.685	27.896	-5.685	-27.896	129.839	131.644	132.496	134.301	127.371	127.913	136.227	136.769	85.492	87.297	88.149	89.954	83.024	83.566	91.880	92.422
N+7.50	B7	0.000	9.500	VIG15X45	0.15	0.40	-8.577	-2.557	0.579	4.042	-0.579	-4.042	12.565	12.749	12.950	13.134	12.180	12.235	13.463	13.519	7.435	7.619	7.820	8.004	7.050	7.105	8.333	8.388
	B7	9.500					-9.006	-2.002	1.284	1.228	-1.284	-1.228	12.547	12.955	12.664	13.071	12.553	12.675	12.943	13.065	7.843	8.251	7.960	8.368	7.849	7.972	8.239	8.361
N+7.50	B8	0.000	9.500	VIG40X60	0.40	0.55	-120.160	-43.075	5.088	41.100	-5.088	-41.100	184.502	186.117	188.417	190.032	180.501	180.985	193.549	194.033	105.379	106.994	109.294	110.909	101.378	101.862	114.426	114.910
	B8	9.500					-148.886	-60.758	3.829	40.543	-3.829	-40.543	236.883	238.098	240.744	241.960	232.803	233.168	245.674	246.039	131.459	132.675	135.320	136.536	127.380	127.744	140.250	140.615
N+4.00	B8	0.000	9.500	VIG40X60	0.40	0.55	-283.702	-92.922	9.772	79.420	-9.772	-79.420	428.031	431.134	435.595	438.697	420.293	421.223	445.505	446.436	249.999	253.101	257.563	260.665	242.260	243.191	267.473	268.403
	B8	9.500					-276.389	-92.660	8.292	76.870	-8.292	-76.870	419.350	421.983	426.671	429.303	411.730	412.520	436.134	436.923	243.773	246.406	251.094	253.727	236.154	236.943	260.557	261.347
N+7.50	B9	0.000	9.500	VIG40X60	0.40	0.55	-29.704	0.918	6.127	27.087	-6.127	-27.087	32.464	34.409	35.044	36.989	30.136	30.719	38.735	39.318	24.471	26.416	27.051	28.996	22.142	22.726	30.741	31.325
	B9	9.500					-33.917	3.128	7.907	32.650	-7.907	-32.650	34.763	37.273	37.872	40.382	32.013	32.766	42.378	43.131	27.715	30.226	30.825	33.335	24.966	25.719	35.331	36.084
N+4.00	B9	0.000	9.500	VIG40X60	0.40	0.55	-86.095	-2.816	10.095	53.450	-10.095	-53.450	101.982	105.187	107.073	110.278	97.165	98.127	114.133	115.095	73.338	76.543	78.428	81.633	68.521	69.482	85.489	86.450
	B9	9.500					-88.120	-1.274	11.774	63.817	-11.774	-63.817	102.110	105.848	108.188	111.926	96.328	97.449	116.587	117.708	74.400	78.138	80.478	84.216	68.618	69.739	88.877	89.998
N+7.50	B10	0.000	2.075	VIG35X45	0.35	0.40	1.115	0.473	0.064	0.319	-0.064	-0.319	1.836	1.816	1.806	1.786	1.865	1.859	1.763	1.757	1.029	1.009	0.998	0.978	1.057	1.051	0.956	0.950
	B10	2.075					-36.268	-7.058	1.419	3.419	-1.419	-3.419	50.192	50.642	50.517	50.968	49.969	50.104	51.055	51.190	32.253	32.704	32.579	33.029	32.031	32.166	33.116	33.251
N+7.50	B11	0.000	6.950	VIG35X60	0.35	0.55	-58.560	-12.092	67.812	22.101	-67.812	-22.101	70.548	92.075	72.653	94.180	75.627	82.085	82.643	89.101	40.888	62.415	42.993	64.520	45.967	52.425	52.983	59.441
	B11	6.950					-76.229	-33.687	82.846	26.170	-82.846	-26.170	110.765	137.066	113.258	139.558	117.063	124.953	125.371	133.261	54.210	80.510	56.702	83.002	60.507	68.397	68.815	76.705
N+4.00	B11	0.000	6.950	VIG35X60	0.35	0.55	-104.651	-30.737	129.049	33.984	-129.049	-33.984	134.216	175.184	137.453	178.420	144.779	157.069	155.567	167.858	72.084	113.052	75.320	116.288	82.646	94.937	93.435	105.725
	B11	6.950					-145.671	-32.490	156.730	38.199	-156.730	-38.199	180.598	230.354	184.236	233.992	193.769	208.695	205.895	220.822	104.407	154.163	108.045	157.801	117.577	132.504	129.704	144.631
N+7.50	B12	0.000	7.000	VIG15X45	0.15	0.40	-13.955	-4.642	1.178	4.149	-1.178	-4.149	21.003	21.377	21.399	21.773	20.673	20.786	21.990	22.103	12.175	12.549	12.570	12.944	11.845	11.957	13.162	13.274
	B12	7.000					-4.524	-0.457	2.430	7.397	-2.430	-7.397	5.148	5.919	5.852	6.624	4.596	4.827	6.944	7.176	3.334	4.105	4.038	4.810	2.782	3.013	5.130	5.361
N+7.50	B13	0.000	7.000	VIG40X45	0.40	0.40	-56.306	-19.065	2.011	26.921	-2.011	-26.921	85.031	85.669	87.595	88.233	82.263	82.455	90.810	91.001	49.074	49.713	51.638	52.277	46.306	46.498	54.853	55.044
	B13	7.000					-27.285	-5.244	2.329	32.928	-2.329	-32.928	36.048	36.788	39.184	39.924	32.648	32.870	43.102	43.324	22.619	23.358	25.755	26.494	19.219	19.441	29.672	29.894
N+4.00	B13	0.000	7.000	VIG40X45	0.40	0.40	-122.548	-26.799	7.923	53.273	-7.923	-53.273	170.062	172.577	175.136	177.651	165.023	165.778	181.935	182.690	106.499	109.014	111.572	114.088	101.460	102.214	118.372	119.127
	B13	7.000					-81.380	-13.765	4.540	60.180	-4.540	-60.180	107.835	109.276	113.566	115.007	101.652	102.085	120.757	121.190	69.656	71.097	75.387	76.828	63.473	63.906	82.578	83.011
N+7.50	B14	0.000	7.000	VIG40X45	0.40	0.40	-31.680	-9.452	5.990	26.104	-5.990	-26.104	45.274	47.176	47.760	49.662	43.039	43.610	51.326	51.897	26.318	28.220	28.804	30.706	24.083	24.654	32.370	32.941
	B14	7.000					-20.356	-6.012	6.719	30.575	-6.719	-30.575	27.917	30.050	30.829	32.962	25.266	25.906	34.972	35.612	15.798	17.931	18.710	20.843	13.147	13.787	22.854	23.494
N+4.00	B14	0.000	7.000	VIG40X45	0.40	0.40	-99.304	-15.266	11.378	48.341	-11.378	-48.341	130.323	133.935	134.927	138.539	126.216	127.299	141.562	142.646	85.266	88.878	89.870	93.482	81.159	82.242	96.505	97.589
	B14	7.000					-90.270	-17.869	10.092	54.957	-10.092	-54.957	121.974	125.178	127.208	130.412	116.989	117.950	134.436	135.397	77.024	80.228	82.258	85.462	72.039	73.000	89.486	90.447
N+7.50	B15	0.000	2.075	VIG40X45	0.40	0.40	0.650	0.160	0.320	0.379	-0.320	-0.379	1.009	0.907	0.973	0.871	1.015	0.985	0.895	0.865	0.654	0.552	0.618	0.516	0.660	0.630	0.540	0.510
	B15	2.075					-25.593	-3.454	6.047	7.152	-6.047	-7.152	32.865	34.785	33.546	35.466	32.742	33.318	35.013	35.589	21.733	23.653	22.414	24.334	21.611	22.186	23.881	24.457
N+7.50	B16	0.000	6.950	VIG40X45	0.40	0.40	-32.112	-2.932	58.702	27.795	-58.702	-27.795	30.825	49.461	33.472	52.108	34.259	39.850	43.083	48.674	18.259	36.895	20.907	39.542	21.694	27.284	30.517	36.108
	B16	6.950					-8.467	1.086	59.078	28.351	-59.078	-28.351	1.653	17.102	1.047	19.802	1.761	7.387	10.761	16.388	3.107	15.648	0.407	18.348	0.307	5.933	9.307	14.934
N+4.00	B16	0.000	6.950	VIG40X45	0.40	0.40	-114.680	-23.315	106.589	42.039	-106.589	-42.039	142.010	175.848	146.014	179.852	149.182	159.334	162.528	172.680	84.291	118.129	88.295	122.133	91.463	101.615	104.809	114.961
	B16	6.950					-103.043	-21.417	105.595	48.545	-105.595	-48.545	125.996	159.518	130.619	164.141	132.335	142.391	147.746	157.802	73.666	107.188	78.289	111.811	80.005	90.061	95.416	105.473
N+7.50	B17	0.000	1.575	VIG15X45	0.15	0.40	-2.729	-0.246	3.148	3.137	-3.148	-3.137	2.872	3.871	3.170	4.170	2.873	3.173	3.869	4.169	1.807	2.806	2.106	3.105	1.808	2.108	2.804	3.104
	B17	1.575					-0.872	-0.064	0.400	0.209	-0.400	-0.209	1.037	1.164	1.057	1.184	1.058	1.096	1.125	1.163	0.711	0.838	0.731	0.858	0.733	0.771	0.799	0.837
N+7.50	B18	0.000	1.575	VIG40X45	0.40	0.40	-32.225	-3.416	9.078	6.207	-9.078	-6.207	40.349	43.231	40.941	43.823	40.668	41.533	42.639	43.504	27.266	30.148	27.857	30.739	27.585	28.450	29.555	30.420
	B18	1.575					-0.042	0.076	0.438	0.192	-0.438	-0.192	0.104	0.035	0.086	0.053	0.077	0.035	0.016	0.026	0.041	0.098	0.023	0.116	0.014	0.028	0.047	0.089

Diseños & Estructuras

PROYECTO: AGROECOL
RESISTENCIA A CORTANTE PARA VIGAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3.1 (a)

f'c = **21.1** MPa
fy = **420** MPa
$\Phi_{Cortante}$ = **0.75**
Estribos Φ = **9.5** mm
Av = **71** mm^2
R= **6.30**

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)															
48.036	17.785	18.425	20.372	21.012	14.991	15.183	23.613	23.805	9.946	10.586	12.532	13.172	7.158	7.344	15.774	15.966
72.912																
48.392	17.385	18.706	19.619	20.940	15.241	15.637	22.687	23.084	9.626	10.948	11.860	13.182	7.482	7.879	14.929	15.325
72.568																
29.632	8.954	9.188	9.800	10.034	8.048	8.119	10.869	10.939	5.161	5.396	6.008	6.242	4.256	4.326	7.077	7.147
42.728																
98.744	41.893	42.204	42.959	43.269	40.759	40.852	44.311	44.404	26.422	26.733	27.488	27.798	25.288	25.381	28.840	28.933
148.664																
28.024	7.175	7.702	7.910	8.437	6.503	6.661	8.951	9.109	4.031	4.557	4.765	5.292	3.358	3.516	5.807	5.965
31.744																
94.596	34.327	35.010	35.264	35.947	33.472	33.677	36.597	36.802	21.800	22.484	22.738	23.421	20.946	21.151	24.070	24.275
101.528																
51.632	18.849	19.005	19.435	19.591	18.219	18.266	20.173	20.220	10.653	10.809	11.239	11.395	10.024	10.070	11.977	12.024
64.704																
151.232	62.720	63.037	63.850	64.168	61.513	61.608	65.280	65.375	38.031	38.348	39.161	39.478	36.823	36.918	40.590	40.685
173.072																
29.328	10.741	11.019	11.126	11.404	10.390	10.473	11.672	11.756	6.324	6.602	6.709	6.987	5.973	6.056	7.255	7.339
35.524																
104.640	36.754	37.355	37.568	38.169	36.015	36.196	38.727	38.908	23.894	24.495	24.707	25.308	23.155	23.335	25.867	26.047
104.696																
19.200	2.643	2.706	2.696	2.758	2.604	2.622	2.780	2.798	1.608	1.670	1.661	1.723	1.568	1.587	1.744	1.763
9.080																
120.516	44.356	44.654	45.175	45.473	43.506	43.595	46.234	46.323	24.930	25.228	25.749	26.047	24.080	24.169	26.808	26.897
225.164																
283.928	89.198	89.802	90.765	91.369	87.581	87.762	92.804	92.985	51.976	52.580	53.543	54.146	50.359	50.540	55.582	55.763
313.204																
32.672	7.077	7.545	7.675	8.144	6.542	6.683	8.538	8.679	5.493	5.962	6.092	6.561	4.959	5.099	6.955	7.096
32.992																
66.748	21.483	22.214	22.659	23.390	20.368	20.587	24.286	24.506	15.551	16.282	16.727	17.458	14.436	14.655	18.354	18.574
66.752																
22.716	25.074	25.281	25.216	25.423	24.980	25.042	25.455	25.517	16.040	16.247	16.182	16.389	15.946	16.008	16.420	16.483
32.136																
60.788	26.088	32.970	26.750	33.631	27.725	29.790	29.930	31.995	13.683	20.565	14.345	21.226	15.320	17.384	17.525	19.589
152.516																
125.928	45.297	58.351	46.286	59.340	48.712	52.628	52.009	55.925	25.394	38.448	26.384	39.437	28.809	32.725	32.106	36.022
204.584																
13.636	3.736	3.900	3.893	4.057	3.610	3.659	4.134	4.183	2.216	2.379	2.373	2.536	2.090	2.139	2.613	2.662
8.504																
56.040	17.297	17.494	18.111	18.308	16.416	16.475	19.130	19.189	10.242	10.439	11.056	11.253	9.361	9.420	12.075	12.134
39.772																
116.028	39.700	40.265	41.243	41.808	38.097	38.266	43.242	43.411	25.165	25.730	26.708	27.274	23.562	23.731	28.707	28.877
96.344																
35.148	10.456	11.032	11.227	11.803	9.758	9.931	12.328	12.501	6.017	6.593	6.788	7.364	5.319	5.492	7.889	8.062
29.704																
105.552	36.042	37.016	37.448	38.422	34.744	35.036	39.428	39.720	23.184	24.158	24.590	25.563	21.885	22.177	26.570	26.862
104.276																
12.588	16.325	17.201	16.636	17.512	16.269	16.532	17.305	17.568	10.789	11.665	11.100	11.976	10.733	10.996	11.769	12.032
23.340																
23.020	4.673	9.577	4.967	10.347	5.183	6.797	7.747	9.361	3.074	7.560	3.067	8.329	3.166	4.780	5.730	7.344
13.004																
129.720	38.562	48.254	39.803	49.495	40.506	43.414	44.644	47.551	22.728	32.420	23.969	33.661	24.672	27.579	28.809	31.717
124.856																
4.084	2.482	3.197	2.684	3.399	2.496	2.711	3.170	3.385	1.599	2.314	1.801	2.516	1.613	1.828	2.288	2.502
0.884																
38.844	25.685	27.471	26.049	27.858	25.870	26.393	27.082	27.638	17.338	19.204	17.701	19.591	17.523	18.081	18.795	19.371
17.288																

Diseños & Estructuras

PROYECTO: AGROECOL
RESISTENCIA A CORTANTE PARA VIGAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3.1 (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)	
65.821	66.461	68.408	69.048	63.027	63.219	71.649	71.841	57.982	58.622	60.568	61.208	55.194	55.380	63.810	64.002						
72.912	72.912	72.912	72.912	72.912	72.912	72.912	72.912	72.912	72.912	72.912	72.912	72.912	72.912	72.912	72.912						
65.777	67.098	68.011	69.332	63.633	64.029	71.079	71.476	58.018	59.340	60.252	61.574	55.874	56.271	63.321	63.717	72.9	**0.10**	178.92	91.87	270.79	**OK**
72.568	72.568	72.568	72.568	72.568	72.568	72.568	72.568	72.568	72.568	72.568	72.568	72.568	72.568	72.568	72.568	72.6	**0.10**	178.92	91.87	270.79	**OK**
38.586	38.820	39.432	39.666	37.680	37.751	40.501	40.571	34.793	35.028	35.640	35.874	33.888	33.958	36.709	36.779	42.7	**0.10**	178.92	91.87	270.79	**OK**
42.728	42.728	42.728	42.728	42.728	42.728	42.728	42.728	42.728	42.728	42.728	42.728	42.728	42.728	42.728	42.728						
140.637	140.948	141.703	142.013	139.503	139.596	143.055	143.148	125.166	125.477	126.232	126.542	124.032	124.125	127.584	127.677	148.7	**0.10**	178.92	91.87	270.79	**OK**
148.664	148.664	148.664	148.664	148.664	148.664	148.664	148.664	148.664	148.664	148.664	148.664	148.664	148.664	148.664	148.664						
35.199	35.726	35.934	36.461	34.527	34.685	36.975	37.133	32.055	32.581	32.789	33.316	31.382	31.540	33.831	33.989	37.1	**0.10**	178.92	91.87	270.79	**OK**
31.744	31.744	31.744	31.744	31.744	31.744	31.744	31.744	31.744	31.744	31.744	31.744	31.744	31.744	31.744	31.744						
128.923	129.606	129.860	130.543	128.068	128.273	131.193	131.398	116.396	117.080	117.334	118.017	115.542	115.747	118.666	118.871	131.4	**0.10**	178.92	91.87	270.79	**OK**
101.528	101.528	101.528	101.528	101.528	101.528	101.528	101.528	101.528	101.528	101.528	101.528	101.528	101.528	101.528	101.528						
70.481	70.637	71.067	71.223	69.851	69.898	71.805	71.852	62.285	62.441	62.871	63.027	61.656	61.702	63.609	63.656	71.9	**0.10**	178.92	91.87	270.79	**OK**
64.704	64.704	64.704	64.704	64.704	64.704	64.704	64.704	64.704	64.704	64.704	64.704	64.704	64.704	64.704	64.704						
213.952	214.269	215.082	215.400	212.745	212.840	216.512	216.607	189.263	189.580	190.393	190.710	188.055	188.150	191.822	191.917	216.6	**0.10**	178.92	91.87	270.79	**OK**
173.072	173.072	173.072	173.072	173.072	173.072	173.072	173.072	173.072	173.072	173.072	173.072	173.072	173.072	173.072	173.072						
40.069	40.347	40.454	40.732	39.718	39.801	41.000	41.084	35.652	35.930	36.037	36.315	35.301	35.384	36.583	36.667	41.1	**0.10**	178.92	91.87	270.79	**OK**
35.524	35.524	35.524	35.524	35.524	35.524	35.524	35.524	35.524	35.524	35.524	35.524	35.524	35.524	35.524	35.524						
141.394	141.995	142.208	142.809	140.655	140.836	143.367	143.548	128.534	129.135	129.347	129.948	127.795	127.975	130.507	130.687	143.5	**0.10**	178.92	91.87	270.79	**OK**
104.696	104.696	104.696	104.696	104.696	104.696	104.696	104.696	104.696	104.696	104.696	104.696	104.696	104.696	104.696	104.696						
21.843	21.906	21.896	21.958	21.804	21.822	21.980	21.998	20.808	20.870	20.861	20.923	20.768	20.787	20.944	20.963	22.0	**0.10**	178.92	34.45	213.37	**OK**
9.080	9.080	9.080	9.080	9.080	9.080	9.080	9.080	9.080	9.080	9.080	9.080	9.080	9.080	9.080	9.080						
164.872	165.170	165.691	165.989	164.022	164.111	166.750	166.839	145.446	145.744	146.265	146.563	144.596	144.685	147.324	147.413	225.2	**0.14**	178.92	126.32	305.24	**OK**
225.164	225.164	225.164	225.164	225.164	225.164	225.164	225.164	225.164	225.164	225.164	225.164	225.164	225.164	225.164	225.164						
373.126	373.730	374.693	375.297	371.509	371.690	376.732	376.913	335.904	336.508	337.471	338.074	334.287	334.468	339.510	339.691	376.9	**0.14**	268.38	126.32	394.70	**OK**
313.204	313.204	313.204	313.204	313.204	313.204	313.204	313.204	313.204	313.204	313.204	313.204	313.204	313.204	313.204	313.204						
39.749	40.217	40.347	40.816	39.214	39.355	41.210	41.351	38.165	38.634	38.764	39.233	37.631	37.771	39.627	39.768	41.4	**0.14**	178.92	126.32	305.24	**OK**
32.992	32.992	32.992	32.992	32.992	32.992	32.992	32.992	32.992	32.992	32.992	32.992	32.992	32.992	32.992	32.992						
88.231	88.962	89.407	90.138	87.116	87.335	91.034	91.254	82.299	83.030	83.475	84.206	81.184	81.403	85.102	85.322	91.3	**0.14**	178.92	126.32	305.24	**OK**
66.752	66.752	66.752	66.752	66.752	66.752	66.752	66.752	66.752	66.752	66.752	66.752	66.752	66.752	66.752	66.752						
47.790	47.997	47.932	48.139	47.696	47.758	48.171	48.233	38.756	38.963	38.898	39.105	38.662	38.724	39.136	39.199	48.2	**0.10**	178.92	80.39	259.31	**OK**
32.136	32.136	32.136	32.136	32.136	32.136	32.136	32.136	32.136	32.136	32.136	32.136	32.136	32.136	32.136	32.136						
86.876	93.758	87.538	94.419	88.513	90.578	90.718	92.783	74.471	81.353	75.133	82.014	76.108	78.172	78.313	80.377	152.5	**0.14**	178.92	110.53	289.45	**OK**
152.516	152.516	152.516	152.516	152.516	152.516	152.516	152.516	152.516	152.516	152.516	152.516	152.516	152.516	152.516	152.516						
171.225	184.279	172.214	185.268	174.640	178.556	177.937	181.853	151.322	164.376	152.312	165.365	154.737	158.653	158.034	161.950	204.6	**0.14**	178.92	110.53	289.45	**OK**
204.584	204.584	204.584	204.584	204.584	204.584	204.584	204.584	204.584	204.584	204.584	204.584	204.584	204.584	204.584	204.584						
17.372	17.536	17.529	17.693	17.246	17.295	17.770	17.819	15.852	16.015	16.009	16.172	15.726	15.775	16.249	16.298	17.8	**0.10**	178.92	34.45	213.37	**OK**
8.504	8.504	8.504	8.504	8.504	8.504	8.504	8.504	8.504	8.504	8.504	8.504	8.504	8.504	8.504	8.504						
73.337	73.534	74.151	74.348	72.456	72.515	75.170	75.229	66.282	66.479	67.096	67.293	65.401	65.460	68.115	68.174	75.2	**0.10**	178.92	91.87	270.79	**OK**
39.772	39.772	39.772	39.772	39.772	39.772	39.772	39.772	39.772	39.772	39.772	39.772	39.772	39.772	39.772	39.772						
155.728	156.293	157.271	157.836	154.125	154.294	159.270	159.439	141.193	141.758	142.736	143.302	139.590	139.759	144.735	144.905	159.4	**0.10**	178.92	91.87	270.79	**OK**
96.344	96.344	96.344	96.344	96.344	96.344	96.344	96.344	96.344	96.344	96.344	96.344	96.344	96.344	96.344	96.344						
45.604	46.180	46.375	46.951	44.906	45.079	47.476	47.649	41.165	41.741	41.936	42.512	40.467	40.640	43.037	43.210	47.6	**0.10**	178.92	91.87	270.79	**OK**
29.704	29.704	29.704	29.704	29.704	29.704	29.704	29.704	29.704	29.704	29.704	29.704	29.704	29.704	29.704	29.704						
141.594	142.568	143.000	143.974	140.296	140.588	144.980	145.272	128.736	129.710	130.142	131.115	127.437	127.729	132.122	132.414	145.3	**0.10**	178.92	91.87	270.79	**OK**
104.276	104.276	104.276	104.276	104.276	104.276	104.276	104.276	104.276	104.276	104.276	104.276	104.276	104.276	104.276	104.276						
28.913	29.789	29.224	30.100	28.857	29.120	29.893	30.156	23.377	24.253	23.688	24.564	23.321	23.584	24.357	24.620	30.2	**0.10**	178.92	91.87	270.79	**OK**
23.340	23.340	23.340	23.340	23.340	23.340	23.340	23.340	23.340	23.340	23.340	23.340	23.340	23.340	23.340	23.340						
27.693	32.597	27.987	33.367	28.203	29.817	30.767	32.381	26.094	30.580	26.087	31.349	26.186	27.800	28.750	30.364	33.4	**0.10**	178.92	91.87	270.79	**OK**
13.004	13.004	13.004	13.004	13.004	13.004	13.004	13.004	13.004	13.004	13.004	13.004	13.004	13.004	13.004	13.004						
168.282	177.974	169.523	179.215	170.226	173.134	174.364	177.271	152.448	162.140	153.689	163.381	154.392	157.299	158.529	161.437	179.2	**0.10**	178.92	91.87	270.79	**OK**
124.856	124.856	124.856	124.856	124.856	124.856	124.856	124.856	124.856	124.856	124.856	124.856	124.856	124.856	124.856	124.856						
6.566	7.281	6.768	7.483	6.580	6.795	7.254	7.469	5.683	6.398	5.885	6.600	5.697	5.912	6.372	6.586	7.5	**0.10**	178.92	34.45	213.37	**OK**
0.884	0.884	0.884	0.884	0.884	0.884	0.884	0.884	0.884	0.884	0.884	0.884	0.884	0.884	0.884	0.884						
64.529	66.315	64.893	66.702	64.714	65.237	65.926	66.482	56.182	58.048	56.545	58.435	56.367	56.925	57.639	58.215	66.7	**0.10**	178.92	91.87	270.79	**OK**
17.288	17.288	17.288	17.288	17.288	17.288	17.288	17.288	17.288	17.288	17.288	17.288	17.288	17.288	17.288	17.288						

Diseños & Estructuras

PROYECTO: AGROECOL
RESISTENCIA A CORTANTE PARA VIGAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3.1 (a)

f'c = 21.1 MPa
fy = 420 MPa
Φ Cortante = 0.75
Estribos Φ = 9.5 mm
Av = 71 mm²
R= 6.30

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)														
	ELEMENTO												Combinaciones para resistencias nominales a momento														
	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
N+4.00	B18	0.000	1.575	VIG40X45	0.40	0.40	-33.311	-6.441	8.822	6.621	-8.822	-6.621	44.699	47.499	45.329	48.130	44.943	45.783	47.045	47.885	28.264	31.065	28.895	31.696	28.509	29.349	30.611	31.451
	B18	1.575					1.061	0.277	0.107	0.422	-0.107	-0.422	1.587	1.553	1.547	1.513	1.622	1.612	1.488	1.478	0.992	0.958	0.952	0.918	1.027	1.017	0.893	0.883
N+7.50	B19	0.000	1.575	VIG40X45	0.40	0.40	-18.591	-1.935	5.931	3.187	-5.931	-3.187	23.151	25.034	23.455	25.337	23.456	24.021	24.468	25.033	15.639	17.522	15.942	17.825	15.944	16.508	16.955	17.520
	B19	1.575					-0.782	-0.012	0.078	0.049	-0.078	-0.049	0.936	0.960	0.940	0.965	0.939	0.946	0.954	0.962	0.689	0.714	0.694	0.719	0.692	0.700	0.708	0.715
N+4.00	B19	0.000	1.575	VIG40X45	0.40	0.40	-32.382	-6.346	9.282	3.726	-9.282	-3.726	43.554	46.500	43.908	46.855	44.171	45.055	45.354	46.238	27.493	30.440	27.848	30.795	28.110	28.994	29.293	30.177
	B19	1.575					1.044	0.262	0.114	0.272	-0.114	-0.272	1.546	1.510	1.520	1.484	1.563	1.553	1.477	1.466	0.971	0.934	0.945	0.909	0.988	0.977	0.902	0.891
N+7.50	B20	0.000	2.075	VIG15X45	0.15	0.40	-0.534	-0.064	0.093	0.348	-0.093	-0.348	0.673	0.703	0.707	0.736	0.645	0.654	0.756	0.764	0.449	0.479	0.482	0.512	0.421	0.430	0.531	0.540
	B20	2.075					-6.684	-0.672	4.762	3.765	-4.762	-3.765	7.758	9.269	8.116	9.628	7.868	8.322	9.064	9.517	5.080	6.592	5.439	6.951	5.191	5.645	6.386	6.840
N+7.50	B21	0.000	6.950	VIG15X45	0.15	0.40	-10.379	-0.856	13.628	7.235	-13.628	-7.235	10.803	15.129	11.492	15.818	11.513	12.811	13.810	15.108	6.833	11.160	7.522	11.849	7.544	8.842	9.841	11.138
	B21	6.950					-2.997	0.168	12.711	6.623	-12.711	-6.623	1.095	5.131	1.726	5.761	1.772	2.982	3.874	5.085	0.364	4.400	0.995	5.030	1.041	2.251	3.143	4.354
N+4.00	B21	0.000	6.950	VIG15X45	0.15	0.40	-10.192	-1.567	21.176	11.472	-21.176	-11.472	9.890	16.612	10.982	17.705	10.968	12.985	14.610	16.627	5.265	11.988	6.358	13.080	6.343	8.360	9.985	12.002
	B21	6.950					-7.912	-1.261	21.552	8.845	-21.552	-8.845	6.913	13.755	7.756	14.598	8.325	10.378	11.133	13.186	3.279	10.121	4.121	10.963	4.691	6.743	7.498	9.551
N+7.50	B26	0.000	9.500	VIG40X60	0.40	0.55	-31.270	-13.585	1.204	5.432	-1.204	-5.432	50.659	51.041	51.177	51.559	50.189	50.304	51.914	52.029	27.693	28.075	28.211	28.593	27.223	27.338	28.948	29.063
	B26	9.500					-54.718	-24.294	2.092	8.970	-2.092	-8.970	89.196	89.861	90.051	90.715	88.432	88.631	91.280	91.479	48.487	49.151	49.341	50.005	47.723	47.922	50.570	50.770
N+4.00	B26	0.000	9.500	VIG40X60	0.40	0.55	-60.204	-14.029	2.506	7.908	-2.506	-7.908	85.499	86.295	86.253	87.048	84.899	85.138	87.410	87.648	53.409	54.205	54.162	54.958	52.809	53.048	55.320	55.558
	B26	9.500					-98.875	-22.780	5.328	13.435	-5.328	-13.435	139.945	141.636	141.224	142.915	139.044	139.551	143.309	143.816	87.502	89.193	88.782	90.473	86.601	87.109	90.866	91.374
N+7.50	B27	0.000	6.950	VIG35X45	0.35	0.40	-39.002	-5.749	26.418	1.049	-26.418	-1.049	48.308	56.695	48.408	56.795	51.127	53.643	51.460	53.976	30.859	39.245	30.958	39.345	33.677	36.193	34.010	36.526
	B27	6.950					-53.608	-13.243	30.197	1.985	-30.197	-1.985	72.685	82.271	72.874	82.460	75.820	78.695	76.450	79.326	43.360	52.946	43.549	53.135	46.494	49.370	47.124	50.000
N+4.00	B27	0.000	6.950	VIG35X45	0.35	0.40	-143.145	-41.547	51.643	3.611	-51.643	-3.611	204.952	221.346	205.296	221.690	210.289	215.207	211.435	216.353	120.461	136.856	120.805	137.200	125.798	130.717	126.944	131.863
	B27	6.950					-114.169	-25.755	59.087	3.182	-59.087	-3.182	153.227	171.985	153.530	172.288	159.439	165.066	160.449	166.077	93.222	111.979	93.525	112.283	99.433	105.061	100.444	106.071
N+7.50	B28	0.000	7.070	VIG35X45	0.35	0.40	-18.601	-0.240	21.776	0.926	-21.776	-0.926	19.061	25.974	19.149	26.062	21.377	23.451	21.671	23.745	13.240	20.153	13.328	20.242	15.557	17.631	15.851	17.925
	B28	7.070					-29.662	-6.869	23.531	1.429	-23.531	-1.429	38.660	46.130	38.796	46.267	41.116	43.357	41.570	43.811	22.893	30.363	23.029	30.499	25.348	27.589	25.802	28.043
N+4.00	B28	0.000	7.070	VIG35X45	0.35	0.40	-143.868	-53.431	44.943	7.781	-44.943	-7.781	218.568	232.836	219.309	233.577	222.697	226.978	225.168	229.448	121.977	136.244	122.718	136.986	126.106	130.386	128.576	132.856
	B28	7.070					-148.634	-51.738	46.307	1.457	-46.307	-1.457	222.679	237.380	222.818	237.518	227.662	232.073	228.125	232.535	126.351	141.052	126.490	141.190	131.334	135.744	131.797	136.207
N+7.50	B29	0.000	6.720	VIG35X45	0.35	0.40	-22.317	-5.137	29.670	1.964	-29.670	-1.964	27.114	36.533	27.301	36.720	30.193	33.019	30.816	33.642	15.282	24.701	15.469	24.888	18.361	21.186	18.984	21.810
	B29	6.720					-9.537	2.830	25.369	1.595	-25.369	-1.595	4.512	12.565	4.664	12.717	7.153	9.569	7.660	10.076	4.481	12.534	4.632	12.686	7.122	9.538	7.628	10.045
N+4.00	B29	0.000	6.720	VIG35X45	0.35	0.40	-100.085	-34.373	60.430	11.425	-60.430	-11.425	144.339	163.523	145.427	164.611	149.784	155.539	153.411	159.166	79.940	99.125	81.028	100.213	85.385	91.141	89.012	94.768
	B29	6.720					-136.174	-49.468	52.596	5.813	-52.596	-5.813	204.251	220.949	204.805	221.502	209.450	214.459	211.295	216.304	113.931	130.628	114.485	131.182	119.129	124.138	120.975	125.984
N+7.50	B32	0.000	4.950	VIG25X45	0.25	0.40	-26.400	-11.899	8.977	1.840	-8.977	-1.840	42.066	44.916	42.242	45.092	42.859	43.714	43.444	44.299	22.247	25.097	22.423	25.273	23.040	23.895	23.625	24.480
	B32	4.950					6.444	-0.347	2.250	1.114	-2.250	-1.114	7.796	7.082	7.690	6.976	7.670	7.455	7.316	7.102	6.210	5.496	6.104	5.389	6.084	5.869	5.730	5.516
N+7.50	B33	0.000	4.950	VIG25X45	0.25	0.40	-27.668	-11.480	5.696	1.140	-5.696	-1.140	43.723	45.531	43.832	45.640	44.229	44.772	44.591	45.134	23.943	25.751	24.051	25.860	24.449	24.991	24.811	25.353
	B33	4.950					8.930	0.101	0.402	0.956	-0.402	-0.956	10.926	10.799	10.835	10.708	10.988	10.950	10.684	10.646	8.146	8.019	8.055	7.928	8.208	8.170	7.904	7.866
N+7.50	B35	0.000	2.075	VIG25X45	0.25	0.40	-0.934	-0.456	0.062	0.331	-0.062	-0.331	1.551	1.571	1.583	1.602	1.521	1.527	1.626	1.632	0.815	0.835	0.847	0.866	0.785	0.791	0.890	0.896
	B35	2.075					-13.248	-2.795	2.153	2.312	-2.153	-2.312	18.241	18.924	18.461	19.144	18.223	18.428	18.957	19.162	11.471	12.155	11.692	12.375	11.454	11.659	12.188	12.393
N+7.50	B38	0.000	6.720	VIG15X45	0.15	0.40	-4.575	-0.625	4.148	0.383	-4.148	-0.383	5.438	6.755	5.475	6.792	5.857	6.252	5.978	6.373	3.441	4.758	3.477	4.794	3.859	4.254	3.981	4.376
	B38	6.720					-6.343	-0.290	2.216	0.454	-2.216	-0.454	7.528	8.232	7.571	8.275	7.724	7.935	7.868	8.079	5.335	6.039	5.379	6.082	5.531	5.742	5.675	5.886
N+4.00	B38	0.000	6.720	VIG15X45	0.15	0.40	-4.473	-4.254	8.513	2.969	-8.513	-2.969	8.129	10.831	8.412	11.114	8.745	9.556	9.687	10.498	2.533	5.236	2.816	5.518	3.149	3.960	4.092	4.902
	B38	6.720					-24.547	-12.889	4.537	3.828	-4.537	-3.828	41.443	42.883	41.808	43.248	41.522	41.954	42.737	43.169	21.190	22.630	21.554	22.995	21.269	21.701	22.484	22.916
N+7.50	B39	0.000	4.995	VIG15X45	0.15	0.40	-7.069	-0.811	2.164	1.599	-2.164	-1.599	8.874	9.561	9.026	9.713	8.937	9.143	9.445	9.651	5.942	6.629	6.095	6.782	6.005	6.211	6.513	6.719
	B39	4.995					0.075	-0.148	0.591	0.695	-0.591	-0.695	0.069	0.119	0.003	0.185	0.080	0.024	0.140	0.196	0.194	0.007	0.128	0.059	0.206	0.150	0.015	0.071
N+7.50	B40	0.000	7.000	VIG30X45	0.30	0.40	-21.628	-6.572	14.012	43.791	-14.012	-43.791	28.216	32.664	32.387	36.835	24.907	26.242	38.809	40.144	15.156	19.604	19.326	23.775	11.847	13.181	25.749	27.083
	B40	7.000					-17.719	-6.120	13.748	43.853	-13.748	-43.853	23.112	27.477	27.289	31.653	19.767	21.077	33.689	34.998	11.677	16.041	15.853	20.218	8.332	9.641	22.253	23.563
N+4.00	B40	0.000	7.000	VIG30X45	0.30	0.40	-83.959	-12.981	18.674	74.279	-18.674	-74.279	107.231	113.159	114.305	120.233	101.052	102.831	124.633	126.411	69.062	74.990	76.136	82.064	62.884	64.662	86.464	88.243
	B40	7.000					-83.855	-19.223	16.225	74.627	-16.225	-74.627	113.720	118.871	120.827	125.978	107.231	108.776	130.922	132.467	69.340	74.491	76.448	81.599	62.851	64.397	86.542	88.088
N+7.50	B41	0.000	2.075	VIG30X45	0.30	0.40	-20.178	-3.700	2.007	0.276	-2.007	-0.276	27.582	28.219	27.608	28.245	27.774	27.965	27.862	28.053	17.828	18.466	17.855	18.492	18.021	18.212	18.108	18.300
	B41	2.075					-0.198	0.020	0.070	0.192	-0.070	-0.192	0.197	0.220	0.216	0.238	0.184	0.190	0.245	0.251	0.158	0.180	0.176	0.198	0.144	0.151	0.205	0.212
N+4.00	B41	0.000	2.075	VIG30X45	0.30	0.40	-41.048	-24.254	4.232	5.591	-4.232	-5.591	72.574	73.917	73.106	74.450	72.423	72.826	74.198	74.601	36.005	37.349	36.538	37.881	35.854	36.257	37.629	38.032
	B41	2.075					0.947	-0.027	0.140	0.620	-0.140	-0.620	1.161	1.117	1.102	1.058	1.214	1.201	1.018	1.004	0.904	0.860	0.845	0.801	0.957	0.944	0.761	0.747
N+7.50	B42	0.000	7.000	VIG30X45	0.30	0.40	-36.304	-13.722	6.924	30.579	-6.924	-30.579	54.732	56.930	57.644	59.842	52.103	52.763	61.811	62.470	30.118	32.317	33.031	35.229	27.490	28.150	37.198	37.857
	B42	7.000					-35.515	-11.455	6.972	30.446	-6.972	-30.446	51.517	53.730	54.416	56.629	48.908	49.572	58.574	59.238	29.407	31.620	32.307	34.520	26.799	27.463	36.464	37.128
N+4.00	B42	0.000	7.000	VIG30X45	0.30	0.40	-120.022	-28.996	7.647	50.105	-7.647	-50.105	169.423	171.850	174.195	176.622	164.705	165.433	180.611	181.340	104.420	106.848	109.192	111.620	99.702	100.431	115.609	116.337
	B42	7.000					-130.001	-45.023	9.580	49.375	-9.580	-49.375	197.152	200.194	201.855	204.896	192.731	193.643	208.405	209.318	113.129	116.170	117.831	120.873	108.707	109.620	124.382	125.294
N+7.50	B43	0.000	2.075	VIG30X45	0.30	0.40	-33.896	-6.642	0.814	1.271	-0.814	-1.271	47.127	47.386	47.249	47.507	47.077	47.154	47.480	47.558	30.317	30.575	30.438	30.696	30.266	30.343	30.669	30.747
	B43	2.075					0.217	-0.165	0.100	0.297	-0.100	-0.297	0.125	0.094	0.097	0.065	0.147	0.138	0.053	0.043	0.225	0.194	0.197	0.165	0.247	0.238	0.153	0.143
N+4.00	B43	0.000	2.075	VIG30X45	0.30	0.40	-97.997	-57.125	2.373	9.438	-2.373	-9.438	173.895	174.649	174.794	175.547	173.110	173.336	176.106	176.332	87.371	88.125	88.270	89.023	86.586	86.812	89.582	89.808
	B43	2.075					3.254	1.392	0.206	0.426	-0.206	-0.426	5.350	5.284	5.309	5.244	5.374	5.355	5.239	5.219	2.982	2.916	2.941	2.876	3.006	2.986	2.871	2.851

PROYECTO: AGROECOL
RESISTENCIA A CORTANTE PARA VIGAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3.1 (a)

f'c = **21.1** MPa
fy = **420** MPa
$\Phi_{Cortante}$ = **0.75**
Estribos Φ = **9.5** mm
Av = **71** mm^2
R= **6.30**

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	$V_m = M_{nI} + M_{nr} / l_n$															
	COMBDIS3	COMBDIS4	COMBDIS5	COMBDIS6	COMBDIS7	COMBDIS8	COMBDIS9	COMBDIS10	COMBDIS11	COMBDIS12	COMBDIS13	COMBDIS14	COMBDIS15	COMBDIS16	COMBDIS17	COMBDIS18
(kN)	(kN)															
50.500	29.388	31.144	29.763	31.519	29.565	30.092	30.815	31.342	18.575	20.332	18.950	20.707	18.753	19.280	20.002	20.529
15.528																
22.816	15.293	16.504	15.489	16.700	15.489	15.852	16.141	16.504	10.367	11.578	10.563	11.774	10.562	10.926	11.215	11.578
8.220																
49.656	28.635	30.483	28.843	30.691	29.038	29.592	29.734	30.288	18.072	19.920	18.281	20.129	18.475	19.030	19.171	19.726
14.696																
2.000	4.063	4.806	4.252	4.995	4.103	4.326	4.732	4.955	2.665	3.408	2.854	3.596	2.705	2.927	3.334	3.557
6.032																
8.268	1.712	2.915	1.902	3.105	1.912	2.272	2.545	2.905	1.036	2.239	1.226	2.429	1.235	1.596	1.868	2.229
5.244																
15.528	2.418	4.369	2.696	4.648	2.776	3.362	3.704	4.290	1.229	3.181	1.508	3.459	1.588	2.173	2.516	3.101
14.696																
89.996	14.722	14.832	14.866	14.976	14.592	14.625	15.073	15.106	8.019	8.129	8.163	8.273	7.889	7.922	8.370	8.403
171.268																
103.252	23.731	23.993	23.945	24.207	23.573	23.651	24.286	24.365	14.833	15.095	15.047	15.309	14.675	14.753	15.388	15.467
143.328																
36.308	17.409	19.995	17.451	20.037	18.266	19.041	18.404	19.180	10.679	13.265	10.720	13.306	11.535	12.311	11.674	12.450
85.228																
150.252	51.537	56.594	51.630	56.688	53.198	54.716	53.509	55.026	30.746	35.804	30.839	35.897	32.407	33.925	32.718	34.235
165.292																
18.132	8.164	10.199	8.196	10.230	8.839	9.450	8.945	9.555	5.111	7.145	5.142	7.177	5.786	6.396	5.892	6.502
33.144																
177.028	62.411	66.509	62.536	66.633	63.700	64.929	64.115	65.344	35.124	39.222	35.249	39.346	36.413	37.642	36.828	38.057
192.204																
19.424	4.706	7.306	4.757	7.357	5.557	6.337	5.726	6.506	2.941	5.541	2.991	5.591	3.792	4.572	3.960	4.740
11.056																
153.316	51.874	57.213	52.118	57.457	53.457	55.059	54.272	55.874	28.850	34.189	29.094	34.434	30.434	32.036	31.248	32.850
174.560																
53.248	10.073	10.505	10.087	10.519	10.208	10.337	10.254	10.384	5.749	6.180	5.763	6.194	5.884	6.013	5.930	6.060
29.868																
54.176	11.040	11.380	11.044	11.383	11.155	11.257	11.167	11.269	6.483	6.822	6.486	6.826	6.597	6.699	6.609	6.711
28.940																
5.564	9.538	9.877	9.660	9.998	9.515	9.617	9.920	10.021	5.921	6.260	6.042	6.381	5.898	6.000	6.303	6.404
12.296																
6.296	1.930	2.230	1.941	2.242	2.021	2.111	2.060	2.151	1.306	1.607	1.318	1.618	1.397	1.488	1.437	1.527
6.772																
31.072	7.377	7.993	7.473	8.090	7.480	7.665	7.801	7.986	3.530	4.147	3.627	4.243	3.634	3.819	3.955	4.140
41.704																
6.784	1.790	1.938	1.808	1.982	1.805	1.835	1.919	1.971	1.229	1.329	1.246	1.370	1.243	1.273	1.307	1.359
2.936																
28.188	7.333	8.592	8.525	9.784	6.382	6.760	10.357	10.735	3.833	5.092	5.026	6.285	2.883	3.260	6.857	7.235
26.652																
95.880	31.564	33.147	33.590	35.173	29.755	30.230	36.508	36.983	19.772	21.354	21.798	23.380	17.962	18.437	24.715	25.190
98.792																
22.560	13.388	13.705	13.409	13.727	13.474	13.569	13.545	13.641	8.668	8.986	8.690	9.007	8.754	8.850	8.826	8.921
6.296																
54.864	35.535	36.161	35.763	36.389	35.488	35.676	36.248	36.436	17.788	18.414	18.016	18.642	17.741	17.928	18.501	18.689
31.072																
53.820	15.178	15.809	16.009	16.639	14.430	14.619	17.198	17.387	8.504	9.134	9.334	9.964	7.756	7.945	10.523	10.712
52.504																
141.788	52.368	53.149	53.721	54.503	51.062	51.297	55.574	55.808	31.078	31.860	32.432	33.213	29.773	30.007	34.284	34.519
153.124																
35.896	22.772	22.882	22.817	22.926	22.759	22.791	22.908	22.940	14.719	14.828	14.764	14.873	14.705	14.738	14.854	14.887
13.544																
123.412	86.383	86.715	86.797	87.128	86.017	86.116	87.395	87.495	43.544	43.875	43.957	44.289	43.177	43.276	44.556	44.655
83.936																

Diseños & Estructuras

PROYECTO: AGROECOL
RESISTENCIA A CORTANTE PARA VIGAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3.1 (a)

f'c = **21.1** MPa
fy = **420** MPa
$\Phi_{Cortante}$ = **0.75**
Estribos Φ = **9.5** mm
Av = **71** mm^2
R= **6.30**

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)	
79.888	81.644	80.263	82.019	80.065	80.592	81.315	81.842	69.075	70.832	69.450	71.207	69.253	69.780	70.502	71.029		82.0	**0.10**	178.92	91.87	270.79	**OK**
15.528	15.528	15.528	15.528	15.528	15.528	15.528	15.528	15.528	15.528	15.528	15.528	15.528	15.528	15.528	15.528							
38.109	39.320	38.305	39.516	38.305	38.668	38.957	39.320	33.183	34.394	33.379	34.590	33.378	33.742	34.031	34.394		39.5	**0.10**	178.92	91.87	270.79	**OK**
8.220	8.220	8.220	8.220	8.220	8.220	8.220	8.220	8.220	8.220	8.220	8.220	8.220	8.220	8.220	8.220							
78.291	80.139	78.499	80.347	78.694	79.248	79.390	79.944	67.728	69.576	67.937	69.785	68.131	68.686	68.827	69.382		80.3	**0.10**	178.92	91.87	270.79	**OK**
14.696	14.696	14.696	14.696	14.696	14.696	14.696	14.696	14.696	14.696	14.696	14.696	14.696	14.696	14.696	14.696							
6.063	6.806	6.252	6.995	6.103	6.326	6.732	6.955	4.665	5.408	4.854	5.596	4.705	4.927	5.334	5.557		7.0	**0.10**	178.92	34.45	213.37	**OK**
6.032	6.032	6.032	6.032	6.032	6.032	6.032	6.032	6.032	6.032	6.032	6.032	6.032	6.032	6.032	6.032							
9.980	11.183	10.170	11.373	10.180	10.540	10.813	11.173	9.304	10.507	9.494	10.697	9.503	9.864	10.136	10.497		11.4	**0.10**	178.92	34.45	213.37	**OK**
5.244	5.244	5.244	5.244	5.244	5.244	5.244	5.244	5.244	5.244	5.244	5.244	5.244	5.244	5.244	5.244							
17.946	19.897	18.224	20.176	18.304	18.890	19.232	19.818	16.757	18.709	17.036	18.987	17.116	17.701	18.044	18.629		20.2	**0.10**	178.92	34.45	213.37	**OK**
14.696	14.696	14.696	14.696	14.696	14.696	14.696	14.696	14.696	14.696	14.696	14.696	14.696	14.696	14.696	14.696							
104.718	104.828	104.862	104.972	104.588	104.621	105.069	105.102	98.015	98.125	98.159	98.269	97.885	97.918	98.366	98.399		171.3	**0.14**	178.92	126.32	305.24	**OK**
171.268	171.268	171.268	171.268	171.268	171.268	171.268	171.268	171.268	171.268	171.268	171.268	171.268	171.268	171.268	171.268							
126.983	127.245	127.197	127.459	126.825	126.903	127.538	127.617	118.085	118.347	118.299	118.561	117.927	118.005	118.640	118.719		143.3	**0.14**	178.92	126.32	305.24	**OK**
143.328	143.328	143.328	143.328	143.328	143.328	143.328	143.328	143.328	143.328	143.328	143.328	143.328	143.328	143.328	143.328							
53.717	56.303	53.759	56.345	54.574	55.349	54.712	55.488	46.987	49.573	47.028	49.614	47.843	48.619	47.982	48.758		85.2	**0.10**	178.92	80.39	259.31	**OK**
85.228	85.228	85.228	85.228	85.228	85.228	85.228	85.228	85.228	85.228	85.228	85.228	85.228	85.228	85.228	85.228							
201.789	206.846	201.882	206.940	203.450	204.968	203.761	205.278	180.998	186.056	181.091	186.149	182.659	184.177	182.970	184.487		206.9	**0.10**	178.92	80.39	259.31	**OK**
165.292	165.292	165.292	165.292	165.292	165.292	165.292	165.292	165.292	165.292	165.292	165.292	165.292	165.292	165.292	165.292							
26.296	28.331	26.328	28.362	26.971	27.582	27.077	27.687	23.243	25.277	23.274	25.309	23.918	24.528	24.024	24.634		33.1	**0.10**	178.92	80.39	259.31	**OK**
33.144	33.144	33.144	33.144	33.144	33.144	33.144	33.144	33.144	33.144	33.144	33.144	33.144	33.144	33.144	33.144							
239.439	243.537	239.564	243.661	240.728	241.957	241.143	242.372	212.152	216.250	212.277	216.374	213.441	214.670	213.856	215.085		243.7	**0.10**	178.92	80.39	259.31	**OK**
192.204	192.204	192.204	192.204	192.204	192.204	192.204	192.204	192.204	192.204	192.204	192.204	192.204	192.204	192.204	192.204							
24.130	26.730	24.181	26.781	24.981	25.761	25.150	25.930	22.365	24.965	22.415	25.015	23.216	23.996	23.384	24.164		26.8	**0.10**	178.92	80.39	259.31	**OK**
11.056	11.056	11.056	11.056	11.056	11.056	11.056	11.056	11.056	11.056	11.056	11.056	11.056	11.056	11.056	11.056							
205.190	210.529	205.434	210.773	206.773	208.375	207.588	209.190	182.166	187.505	182.410	187.750	183.750	185.352	184.564	186.166		210.8	**0.10**	178.92	80.39	259.31	**OK**
174.560	174.560	174.560	174.560	174.560	174.560	174.560	174.560	174.560	174.560	174.560	174.560	174.560	174.560	174.560	174.560							
63.321	63.753	63.335	63.767	63.456	63.585	63.502	63.632	58.997	59.428	59.011	59.442	59.132	59.261	59.178	59.308		63.8	**0.10**	178.92	57.42	236.34	**OK**
29.868	29.868	29.868	29.868	29.868	29.868	29.868	29.868	29.868	29.868	29.868	29.868	29.868	29.868	29.868	29.868							
65.216	65.556	65.220	65.559	65.331	65.433	65.343	65.445	60.659	60.998	60.662	61.002	60.773	60.875	60.785	60.887		65.6	**0.10**	178.92	57.42	236.34	**OK**
28.940	28.940	28.940	28.940	28.940	28.940	28.940	28.940	28.940	28.940	28.940	28.940	28.940	28.940	28.940	28.940							
15.102	15.441	15.224	15.562	15.079	15.181	15.484	15.585	11.485	11.824	11.606	11.945	11.462	11.564	11.867	11.968		15.6	**0.10**	178.92	57.42	236.34	**OK**
12.296	12.296	12.296	12.296	12.296	12.296	12.296	12.296	12.296	12.296	12.296	12.296	12.296	12.296	12.296	12.296							
8.226	8.526	8.237	8.538	8.317	8.407	8.356	8.447	7.602	7.903	7.614	7.914	7.693	7.784	7.733	7.823		8.5	**0.10**	178.92	34.45	213.37	**OK**
6.772	6.772	6.772	6.772	6.772	6.772	6.772	6.772	6.772	6.772	6.772	6.772	6.772	6.772	6.772	6.772							
38.449	39.065	38.545	39.162	38.552	38.737	38.873	39.058	34.602	35.219	34.699	35.315	34.706	34.891	35.027	35.212		41.7	**0.10**	178.92	34.45	213.37	**OK**
41.704	41.704	41.704	41.704	41.704	41.704	41.704	41.704	41.704	41.704	41.704	41.704	41.704	41.704	41.704	41.704							
8.574	8.722	8.592	8.766	8.589	8.619	8.703	8.755	8.013	8.113	8.030	8.154	8.027	8.057	8.091	8.143		8.8	**0.10**	178.92	34.45	213.37	**OK**
2.936	2.936	2.936	2.936	2.936	2.936	2.936	2.936	2.936	2.936	2.936	2.936	2.936	2.936	2.936	2.936							
35.521	36.780	36.713	37.972	34.570	34.948	38.545	38.923	32.021	33.280	33.214	34.473	31.071	31.448	35.045	35.423		38.9	**0.10**	178.92	68.90	247.82	**OK**
26.652	26.652	26.652	26.652	26.652	26.652	26.652	26.652	26.652	26.652	26.652	26.652	26.652	26.652	26.652	26.652							
127.444	129.027	129.470	131.053	125.635	126.110	132.388	132.863	115.652	117.234	117.678	119.260	113.842	114.317	120.595	121.070		132.9	**0.10**	178.92	68.90	247.82	**OK**
98.792	98.792	98.792	98.792	98.792	98.792	98.792	98.792	98.792	98.792	98.792	98.792	98.792	98.792	98.792	98.792							
35.948	36.265	35.969	36.287	36.034	36.129	36.105	36.201	31.228	31.546	31.250	31.567	31.314	31.410	31.386	31.481		36.3	**0.10**	178.92	68.90	247.82	**OK**
6.296	6.296	6.296	6.296	6.296	6.296	6.296	6.296	6.296	6.296	6.296	6.296	6.296	6.296	6.296	6.296							
90.399	91.025	90.627	91.253	90.352	90.540	91.112	91.300	72.652	73.278	72.880	73.506	72.605	72.792	73.365	73.553		91.3	**0.10**	178.92	68.90	247.82	**OK**
31.072	31.072	31.072	31.072	31.072	31.072	31.072	31.072	31.072	31.072	31.072	31.072	31.072	31.072	31.072	31.072							
68.998	69.629	69.829	70.459	68.250	68.439	71.018	71.207	62.324	62.954	63.154	63.784	61.576	61.765	64.343	64.532		71.2	**0.10**	178.92	68.90	247.82	**OK**
52.504	52.504	52.504	52.504	52.504	52.504	52.504	52.504	52.504	52.504	52.504	52.504	52.504	52.504	52.504	52.504							
194.156	194.937	195.509	196.291	192.850	193.085	197.362	197.596	172.866	173.648	174.220	175.001	171.561	171.795	176.072	176.307		197.6	**0.10**	178.92	68.90	247.82	**OK**
153.124	153.124	153.124	153.124	153.124	153.124	153.124	153.124	153.124	153.124	153.124	153.124	153.124	153.124	153.124	153.124							
58.668	58.778	58.713	58.822	58.655	58.687	58.804	58.836	50.615	50.724	50.660	50.769	50.601	50.634	50.750	50.783		58.8	**0.10**	178.92	68.90	247.82	**OK**
13.544	13.544	13.544	13.544	13.544	13.544	13.544	13.544	13.544	13.544	13.544	13.544	13.544	13.544	13.544	13.544							
209.795	210.127	210.209	210.540	209.429	209.528	210.807	210.907	166.956	167.287	167.369	167.701	166.589	166.688	167.968	168.067		210.9	**0.10**	178.92	68.90	247.82	**OK**
83.936	83.936	83.936	83.936	83.936	83.936	83.936	83.936	83.936	83.936	83.936	83.936	83.936	83.936	83.936	83.936							

PROYECTO: AGROECOL
RESISTENCIA A CORTANTE PARA VIGAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3.1 (a)

f'c = 21.1 MPa
fy = 420 MPa
$\Phi_{Cortante}$ = 0.75
Estribos Φ = 9.5 mm
Av = 71 mm^2
R= 6.30

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)														
	ELEMENTO												Combinaciones para resistencias nominales a momento														
	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
N+4.00	B44	0.000	9.500	VIG15X45	0.15	0.40	-24.059	-13.193	0.702	5.229	-0.702	-5.229	41.703	41.926	42.201	42.424	41.200	41.267	42.860	42.927	21.293	21.516	21.791	22.014	20.790	20.857	22.450	22.517
	B44	9.500					-13.770	-7.808	3.351	5.913	-3.351	-5.913	23.519	24.582	24.082	25.145	23.234	23.553	25.111	25.430	11.580	12.643	12.143	13.206	11.295	11.614	13.172	13.491
N+4.00	B45	0.000	1.825	VIG35X45	0.35	0.40	0.186	-0.423	0.475	0.296	-0.475	-0.296	0.110	0.261	0.138	0.289	0.130	0.175	0.224	0.269	0.257	0.106	0.229	0.078	0.237	0.192	0.143	0.098
	B45	1.825					-34.783	-18.431	4.965	1.299	-4.965	-1.299	59.321	60.897	59.444	61.021	59.728	60.201	60.140	60.613	30.455	32.031	30.578	32.155	30.862	31.335	31.274	31.747
N+4.00	B46	0.000	5.245	VIG15X45	0.15	0.40	-26.797	-13.558	3.898	4.659	-3.898	-4.659	44.874	46.111	45.318	46.555	44.789	45.160	46.268	46.640	23.277	24.514	23.720	24.958	23.192	23.563	24.671	25.042
	B46	5.245					3.822	2.254	1.627	0.985	-1.627	-0.985	7.146	6.629	7.052	6.535	7.074	6.919	6.762	6.607	3.745	3.228	3.651	3.135	3.674	3.519	3.361	3.206
N+7.50	B47	0.000	6.720	VIG35X45	0.35	0.40	-20.416	-3.304	29.356	8.705	-29.356	-8.705	22.729	32.048	23.558	32.877	25.024	27.819	27.787	30.583	13.300	22.620	14.129	23.449	15.595	18.391	18.358	21.154
	B47	6.720					-10.891	1.705	25.173	7.526	-25.173	-7.526	7.010	15.002	7.727	15.718	8.971	11.368	11.360	13.758	5.448	13.439	6.165	14.156	7.409	9.806	9.798	12.195
N+4.00	B47	0.000	6.720	VIG35X45	0.35	0.40	-88.381	-18.370	61.219	11.131	-61.219	-11.131	114.180	133.614	115.240	134.675	119.745	125.576	123.279	129.109	69.296	88.730	70.356	89.790	74.861	80.691	78.395	84.225
	B47	6.720					-115.720	-22.598	53.126	23.225	-53.126	-23.225	151.923	168.789	154.135	171.001	155.246	160.305	162.619	167.678	94.609	111.475	96.821	113.687	97.932	102.991	105.305	110.364
N+7.50	B48	0.000	7.070	VIG35X45	0.35	0.40	-17.698	-0.847	20.985	6.541	-20.985	-6.541	18.442	25.104	19.065	25.727	20.047	22.046	22.124	24.122	12.286	18.948	12.909	19.571	13.891	15.889	15.967	17.966
	B48	7.070					-10.642	1.936	21.472	6.689	-21.472	-6.689	7.108	13.924	7.745	14.561	8.750	10.795	10.874	12.919	5.851	12.668	6.488	13.305	7.494	9.539	9.617	11.662
N+4.00	B48	0.000	7.070	VIG35X45	0.35	0.40	-115.868	-23.234	44.995	8.605	-44.995	-8.605	154.724	169.008	155.543	169.827	158.767	163.052	161.499	165.784	96.729	111.014	97.549	111.833	100.773	105.058	103.504	107.790
	B48	7.070					-118.760	-25.563	42.022	15.082	-42.022	-15.082	160.687	174.027	162.123	175.463	163.680	167.682	168.468	172.470	99.496	112.836	100.932	114.272	102.489	106.491	107.277	111.279
N+7.50	B49	0.000	6.950	VIG35X45	0.35	0.40	-17.740	-0.438	25.445	7.866	-25.445	-7.866	17.313	25.390	18.062	26.139	19.266	21.689	21.763	24.186	11.553	19.630	12.302	20.379	13.506	15.929	16.003	18.426
	B49	6.950					-16.433	-1.633	29.094	9.165	-29.094	-9.165	16.298	25.534	17.171	26.407	18.512	21.283	21.422	24.193	9.735	18.971	10.608	19.844	11.950	14.720	14.859	17.630
N+4.00	B49	0.000	6.950	VIG35X45	0.35	0.40	-140.484	-36.440	49.641	13.480	-49.641	-13.480	196.499	212.258	197.783	213.542	200.517	205.245	204.797	209.524	117.914	133.673	119.198	134.957	121.932	126.660	126.211	130.939
	B49	6.950					-90.709	-23.356	55.786	16.264	-55.786	-16.264	122.577	140.287	124.126	141.836	126.969	132.282	132.132	137.445	72.009	89.719	73.558	91.267	76.400	81.713	81.563	86.876
N+7.50	B50	0.000	6.720	VIG15X45	0.15	0.40	-4.515	-0.511	4.639	1.837	-4.639	-1.837	5.105	6.578	5.280	6.753	5.417	5.858	6.000	6.441	3.240	4.712	3.415	4.887	3.551	3.993	4.134	4.576
	B50	6.720					-6.605	-0.098	2.499	0.802	-2.499	-0.802	7.589	8.382	7.666	8.459	7.778	8.016	8.032	8.270	5.510	6.303	5.586	6.379	5.698	5.936	5.953	6.191
N+4.00	B50	0.000	6.720	VIG15X45	0.15	0.40	-2.549	-0.336	9.707	6.301	-9.707	-6.301	1.554	4.636	2.154	5.236	1.932	2.857	3.933	4.857	0.453	3.535	1.053	4.135	0.832	1.756	2.832	3.756
	B50	6.720					-19.210	-3.239	5.942	2.652	-5.942	-2.652	25.222	27.108	25.474	27.360	25.587	26.153	26.429	26.995	16.220	18.106	16.472	18.358	16.585	17.151	17.427	17.993
N+7.50	B51	0.000	7.070	VIG15X45	0.15	0.40	-6.861	-0.468	2.778	2.310	-2.778	-2.310	8.150	9.032	8.370	9.252	8.202	8.467	8.936	9.200	5.624	6.506	5.844	6.726	5.676	5.941	6.409	6.674
	B51	7.070					-4.213	1.138	4.919	3.499	-4.919	-3.499	2.970	4.532	3.303	4.865	3.128	3.596	4.239	4.707	2.844	4.406	3.178	4.739	3.002	3.471	4.113	4.581
N+4.00	B51	0.000	7.070	VIG15X45	0.15	0.40	-19.775	-3.287	3.971	5.597	-3.971	-5.597	26.120	27.381	26.653	27.914	25.939	26.318	27.716	28.095	16.901	18.161	17.434	18.694	16.720	17.098	18.497	18.875
	B51	7.070					-19.902	-5.499	8.540	3.892	-8.540	-3.892	27.841	30.552	28.211	30.922	28.357	29.170	29.593	30.406	16.371	19.082	16.742	19.453	16.887	17.701	18.123	18.936
N+4.00	B52	0.000	1.575	VIG30X45	0.30	0.40	1.455	0.347	0.254	0.775	-0.254	-0.775	2.170	2.090	2.096	2.016	2.228	2.204	1.982	1.958	1.387	1.306	1.313	1.232	1.445	1.420	1.199	1.174
	B52	1.575					-26.522	-5.515	3.177	5.724	-3.177	-5.724	36.565	37.573	37.110	38.118	36.282	36.584	38.099	38.401	23.093	24.102	23.638	24.647	22.810	23.113	24.627	24.930
N+7.50	B53	0.000	1.575	VIG30X45	0.30	0.40	0.130	-0.069	0.026	0.267	-0.026	-0.267	0.104	0.096	0.078	0.070	0.131	0.128	0.046	0.043	0.134	0.126	0.108	0.100	0.161	0.158	0.076	0.073
	B53	1.575					-26.887	-4.606	0.101	1.020	-0.101	-1.020	36.806	36.838	36.903	36.935	36.704	36.713	37.027	37.037	24.134	24.166	24.231	24.263	24.032	24.041	24.355	24.365
N+4.00	B53	0.000	1.575	VIG30X45	0.30	0.40	3.008	0.664	0.128	0.736	-0.128	-0.736	4.329	4.288	4.259	4.218	4.397	4.384	4.163	4.151	2.763	2.722	2.692	2.652	2.830	2.818	2.596	2.584
	B53	1.575					-64.235	-13.623	2.576	7.311	-2.576	-7.311	89.948	90.766	90.644	91.462	89.422	89.667	91.743	91.988	57.054	57.872	57.751	58.569	56.528	56.774	58.849	59.095
N+7.50	B54	0.000	6.950	VIG40X45	0.40	0.40	-23.214	-4.812	32.848	18.841	-32.848	-18.841	26.558	36.986	28.352	38.780	28.114	31.242	34.095	37.224	14.781	25.209	16.576	27.004	16.338	19.466	22.319	25.447
	B54	6.950					-17.310	-1.898	33.363	18.991	-33.363	-18.991	16.470	27.061	18.279	28.870	18.067	21.244	24.096	27.273	9.379	19.970	11.188	21.779	10.976	14.153	17.005	20.182
N+4.00	B54	0.000	6.950	VIG40X45	0.40	0.40	-99.184	-47.681	69.542	36.156	-69.542	-36.156	153.942	176.018	157.385	179.462	157.651	164.274	169.129	175.752	76.505	98.582	79.949	102.026	80.215	86.838	91.693	98.316
	B54	6.950					-92.011	-43.889	69.318	33.705	-69.318	-33.705	141.694	163.700	144.904	166.910	145.651	152.253	156.351	162.953	70.202	92.208	73.412	95.418	74.159	80.761	84.859	91.461
N+4.00	B55	0.000	6.950	VIG40X45	0.40	0.40	-60.960	-29.821	75.342	41.535	-75.342	-41.535	89.036	112.954	92.992	116.910	92.792	99.968	105.978	113.154	40.927	64.845	44.883	68.801	44.683	51.859	57.869	65.045
	B55	6.950					-57.737	-27.480	75.223	44.883	-75.223	-44.883	82.687	106.567	86.962	110.842	86.058	93.222	100.307	107.471	37.886	61.766	42.160	66.041	41.257	48.421	55.506	62.670
N+4.00	B57	0.000	7.000	VIG25X45	0.25	0.40	-71.678	-18.649	2.668	9.265	-2.668	-9.265	103.798	104.645	104.680	105.527	103.065	103.319	106.006	106.260	63.646	64.493	64.528	65.375	62.913	63.167	65.854	66.108
	B57	7.000					-32.827	-10.156	2.015	16.328	-2.015	-16.328	48.451	49.091	50.006	50.646	46.861	47.053	52.044	52.236	28.447	29.087	30.002	30.642	26.857	27.049	32.040	32.232
N+4.00	B58	0.000	1.575	VIG25X45	0.25	0.40	-13.481	-4.453	0.677	5.541	-0.677	-5.541	20.259	20.474	20.787	21.002	19.718	19.783	21.477	21.542	11.762	11.977	12.289	12.504	11.221	11.286	12.980	13.045
	B58	1.575					-2.105	-0.539	0.079	0.636	-0.079	-0.636	3.022	3.047	3.083	3.108	2.960	2.968	3.162	3.170	1.852	1.877	1.912	1.937	1.790	1.797	1.992	1.999
N+4.00	B59	0.000	3.475	VIG25X45	0.25	0.40	-27.764	-9.306	19.953	6.922	-19.953	-6.922	39.126	45.460	39.785	46.120	40.574	42.474	42.771	44.672	21.491	27.825	22.150	28.484	22.939	24.839	25.136	27.036
	B59	3.475					35.600	10.292	0.202	0.331	-0.202	-0.331	53.060	52.996	53.028	52.964	53.074	53.055	52.969	52.950	32.088	32.024	32.056	31.992	32.102	32.083	31.997	31.978

Diseños & Estructuras

PROYECTO: AGROECOL
RESISTENCIA A CORTANTE PARA VIGAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3.1 (a)

f'c = **21.1** MPa
fy = **420** MPa
$\Phi_{Cortante}$ = **0.75**
Estribos Φ = **9.5** mm
Av = **71** mm^2
R= **6.30**

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	$V_m = M_{nI} + M_{nr} / l_n$															
	COMBDIS3	COMBDIS4	COMBDIS5	COMBDIS6	COMBDIS7	COMBDIS8	COMBDIS9	COMBDIS10	COMBDIS11	COMBDIS12	COMBDIS13	COMBDIS14	COMBDIS15	COMBDIS16	COMBDIS17	COMBDIS18
(kN)	(kN)															
59.952	6.865	7.001	6.977	7.113	6.783	6.823	7.155	7.196	3.460	3.596	3.572	3.707	3.377	3.418	3.750	3.790
28.568																
28.568	32.565	33.511	32.648	33.594	32.799	33.083	33.076	33.360	16.828	17.609	16.881	17.662	17.041	17.275	17.215	17.449
49.000																
42.232	9.918	10.055	9.985	10.122	9.888	9.929	10.111	10.152	5.152	5.289	5.219	5.356	5.122	5.163	5.345	5.386
9.876																
18.144	4.425	7.001	4.655	7.232	5.059	5.831	5.825	6.598	2.790	5.366	3.020	5.596	3.423	4.196	4.190	4.963
12.336																
114.368	39.599	45.000	40.086	45.487	40.921	42.542	42.544	44.165	24.391	29.792	24.878	30.279	25.713	27.334	27.336	28.957
126.344																
17.856	3.614	5.520	3.792	5.698	4.073	4.645	4.667	5.239	2.565	4.472	2.744	4.650	3.025	3.597	3.619	4.191
14.208																
120.548	44.613	48.520	44.932	48.839	45.608	46.780	46.671	47.844	27.755	31.662	28.074	31.981	28.750	29.922	29.813	30.986
122.532																
15.712	4.836	7.327	5.069	7.561	5.436	6.183	6.214	6.961	3.063	5.554	3.296	5.788	3.663	4.410	4.441	5.188
15.812																
153.724	45.910	50.726	46.318	51.134	47.120	48.565	48.479	49.924	27.327	32.143	27.735	32.550	28.537	29.982	29.896	31.340
130.084																
6.252	1.889	2.226	1.926	2.264	1.963	2.065	2.088	2.189	1.302	1.639	1.339	1.677	1.376	1.478	1.501	1.602
6.804																
11.256	3.984	4.724	4.111	4.851	4.095	4.317	4.518	4.740	2.481	3.220	2.608	3.347	2.592	2.814	3.015	3.237
18.808																
7.688	1.573	1.919	1.651	1.997	1.603	1.706	1.863	1.967	1.198	1.543	1.276	1.622	1.227	1.331	1.488	1.592
6.052																
17.280	7.632	8.194	7.760	8.322	7.680	7.848	8.106	8.274	4.706	5.268	4.834	5.396	4.754	4.922	5.180	5.348
17.800																
11.256	24.594	25.183	24.893	25.482	24.451	24.627	25.448	25.625	15.543	16.132	15.842	16.431	15.400	15.576	16.397	16.574
43.300																
15.764	23.435	23.450	23.480	23.495	23.387	23.391	23.539	23.543	15.408	15.423	15.453	15.469	15.360	15.365	15.512	15.516
34.640																
36.088	59.858	60.352	60.256	60.749	59.567	59.715	60.892	61.041	37.979	38.472	38.377	38.870	37.688	37.836	39.013	39.161
95.404																
19.704	6.191	9.215	6.709	9.734	6.645	7.552	8.373	9.280	3.476	6.501	3.995	7.019	3.930	4.837	5.658	6.565
16.320																
160.732	42.538	48.880	43.495	49.838	43.641	45.544	46.832	48.735	21.109	27.452	22.066	28.409	22.212	24.115	25.403	27.306
156.556																
117.480	24.708	31.586	25.893	32.770	25.734	27.797	29.681	31.745	11.340	18.217	12.524	19.402	12.366	14.429	16.313	18.376
115.316																
85.992	21.750	21.962	22.098	22.310	21.418	21.482	22.579	22.642	13.156	13.368	13.504	13.717	12.824	12.888	13.985	14.049
67.788																
42.004	14.782	14.934	15.155	15.308	14.399	14.445	15.644	15.690	8.643	8.796	9.017	9.169	8.261	8.307	9.506	9.552
16.712																
66.112	26.528	28.333	26.709	28.513	26.949	27.490	27.551	28.093	15.418	17.223	15.599	17.403	15.839	16.380	16.441	16.983
4.300																

Diseños & Estructuras

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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)	
66.817	66.953	66.929	67.065	66.735	66.775	67.107	67.148	63.412	63.548	63.524	63.659	63.329	63.370	63.702	63.742						
28.568	28.568	28.568	28.568	28.568	28.568	28.568	28.568	28.568	28.568	28.568	28.568	28.568	28.568	28.568	28.568						
61.133	62.079	61.216	62.162	61.367	61.651	61.644	61.928	45.396	46.177	45.449	46.230	45.609	45.843	45.783	46.017						
49.000	49.000	49.000	49.000	49.000	49.000	49.000	49.000	49.000	49.000	49.000	49.000	49.000	49.000	49.000	49.000						
52.150	52.287	52.217	52.354	52.120	52.161	52.343	52.384	47.384	47.521	47.451	47.588	47.354	47.395	47.577	47.618						
9.876	9.876	9.876	9.876	9.876	9.876	9.876	9.876	9.876	9.876	9.876	9.876	9.876	9.876	9.876	9.876						
22.569	25.145	22.799	25.376	23.203	23.975	23.969	24.742	20.934	23.510	21.164	23.740	21.567	22.340	22.334	23.107						
12.336	12.336	12.336	12.336	12.336	12.336	12.336	12.336	12.336	12.336	12.336	12.336	12.336	12.336	12.336	12.336						
153.967	159.368	154.454	159.855	155.289	156.910	156.912	158.533	138.759	144.160	139.246	144.647	140.081	141.702	141.704	143.325						
126.344	126.344	126.344	126.344	126.344	126.344	126.344	126.344	126.344	126.344	126.344	126.344	126.344	126.344	126.344	126.344						
21.470	23.376	21.648	23.554	21.929	22.501	22.523	23.095	20.421	22.328	20.600	22.506	20.881	21.453	21.475	22.047						
14.208	14.208	14.208	14.208	14.208	14.208	14.208	14.208	14.208	14.208	14.208	14.208	14.208	14.208	14.208	14.208						
165.161	169.068	165.480	169.387	166.156	167.328	167.219	168.392	148.303	152.210	148.622	152.529	149.298	150.470	150.361	151.534						
122.532	122.532	122.532	122.532	122.532	122.532	122.532	122.532	122.532	122.532	122.532	122.532	122.532	122.532	122.532	122.532						
20.548	23.039	20.781	23.273	21.148	21.895	21.926	22.673	18.775	21.266	19.008	21.500	19.375	20.122	20.153	20.900						
15.812	15.812	15.812	15.812	15.812	15.812	15.812	15.812	15.812	15.812	15.812	15.812	15.812	15.812	15.812	15.812						
199.634	204.450	200.042	204.858	200.844	202.289	202.203	203.648	181.051	185.867	181.459	186.274	182.261	183.706	183.620	185.064						
130.084	130.084	130.084	130.084	130.084	130.084	130.084	130.084	130.084	130.084	130.084	130.084	130.084	130.084	130.084	130.084						
8.141	8.478	8.178	8.516	8.215	8.317	8.340	8.441	7.554	7.891	7.591	7.929	7.628	7.730	7.753	7.854						
6.804	6.804	6.804	6.804	6.804	6.804	6.804	6.804	6.804	6.804	6.804	6.804	6.804	6.804	6.804	6.804						
15.240	15.980	15.367	16.107	15.351	15.573	15.774	15.996	13.737	14.476	13.864	14.603	13.848	14.070	14.271	14.493						
18.808	18.808	18.808	18.808	18.808	18.808	18.808	18.808	18.808	18.808	18.808	18.808	18.808	18.808	18.808	18.808						
9.261	9.607	9.339	9.685	9.291	9.394	9.551	9.655	8.886	9.231	8.964	9.310	8.915	9.019	9.176	9.280						
6.052	6.052	6.052	6.052	6.052	6.052	6.052	6.052	6.052	6.052	6.052	6.052	6.052	6.052	6.052	6.052						
24.912	25.474	25.040	25.602	24.960	25.128	25.386	25.554	21.986	22.548	22.114	22.676	22.034	22.202	22.460	22.628						
17.800	17.800	17.800	17.800	17.800	17.800	17.800	17.800	17.800	17.800	17.800	17.800	17.800	17.800	17.800	17.800						
35.850	36.439	36.149	36.738	35.707	35.883	36.704	36.881	26.799	27.388	27.098	27.687	26.656	26.832	27.653	27.830						
43.300	43.300	43.300	43.300	43.300	43.300	43.300	43.300	43.300	43.300	43.300	43.300	43.300	43.300	43.300	43.300						
39.199	39.214	39.244	39.259	39.151	39.155	39.303	39.307	31.172	31.187	31.217	31.233	31.124	31.129	31.276	31.280						
34.640	34.640	34.640	34.640	34.640	34.640	34.640	34.640	34.640	34.640	34.640	34.640	34.640	34.640	34.640	34.640						
95.946	96.440	96.344	96.837	95.655	95.803	96.980	97.129	74.067	74.560	74.465	74.958	73.776	73.924	75.101	75.249						
95.404	95.404	95.404	95.404	95.404	95.404	95.404	95.404	95.404	95.404	95.404	95.404	95.404	95.404	95.404	95.404						
25.895	28.919	26.413	29.438	26.349	27.256	28.077	28.984	23.180	26.205	23.699	26.723	23.634	24.541	25.362	26.269						
16.320	16.320	16.320	16.320	16.320	16.320	16.320	16.320	16.320	16.320	16.320	16.320	16.320	16.320	16.320	16.320						
203.270	209.612	204.227	210.570	204.373	206.276	207.564	209.467	181.841	188.184	182.798	189.141	182.944	184.847	186.135	188.038						
156.556	156.556	156.556	156.556	156.556	156.556	156.556	156.556	156.556	156.556	156.556	156.556	156.556	156.556	156.556	156.556						
142.188	149.066	143.373	150.250	143.214	145.277	147.161	149.225	128.820	135.697	130.004	136.882	129.846	131.909	133.793	135.856						
115.316	115.316	115.316	115.316	115.316	115.316	115.316	115.316	115.316	115.316	115.316	115.316	115.316	115.316	115.316	115.316						
107.742	107.954	108.090	108.302	107.410	107.474	108.571	108.634	99.148	99.360	99.496	99.709	98.816	98.880	99.977	100.041						
67.788	67.788	67.788	67.788	67.788	67.788	67.788	67.788	67.788	67.788	67.788	67.788	67.788	67.788	67.788	67.788						
56.786	56.938	57.159	57.312	56.403	56.449	57.648	57.694	50.647	50.800	51.021	51.173	50.265	50.311	51.510	51.556						
16.712	16.712	16.712	16.712	16.712	16.712	16.712	16.712	16.712	16.712	16.712	16.712	16.712	16.712	16.712	16.712						
92.640	94.445	92.821	94.625	93.061	93.602	93.663	94.205	81.530	83.335	81.711	83.515	81.951	82.492	82.553	83.095						
4.300	4.300	4.300	4.300	4.300	4.300	4.300	4.300	4.300	4.300	4.300	4.300	4.300	4.300	4.300	4.300						
																67.1	**0.10**	178.92	34.45	213.37	**OK**
																62.2	**0.10**	178.92	80.39	259.31	**OK**
																52.4	**0.10**	178.92	34.45	213.37	**OK**
																25.4	**0.10**	178.92	80.39	259.31	**OK**
																159.9	**0.10**	178.92	80.39	259.31	**OK**
																23.6	**0.10**	178.92	80.39	259.31	**OK**
																169.4	**0.10**	178.92	80.39	259.31	**OK**
																23.3	**0.10**	178.92	80.39	259.31	**OK**
																204.9	**0.10**	178.92	80.39	259.31	**OK**
																8.5	**0.10**	178.92	34.45	213.37	**OK**
																18.8	**0.10**	178.92	34.45	213.37	**OK**
																9.7	**0.10**	178.92	34.45	213.37	**OK**
																25.6	**0.10**	178.92	34.45	213.37	**OK**
																43.3	**0.10**	178.92	68.90	247.82	**OK**
																39.3	**0.10**	178.92	68.90	247.82	**OK**
																97.1	**0.10**	178.92	68.90	247.82	**OK**
																29.4	**0.10**	178.92	91.87	270.79	**OK**
																210.6	**0.10**	178.92	91.87	270.79	**OK**
																150.3	**0.10**	178.92	91.87	270.79	**OK**
																108.6	**0.10**	178.92	57.42	236.34	**OK**
																57.7	**0.10**	178.92	57.42	236.34	**OK**
																94.6	**0.10**	178.92	57.42	236.34	**OK**

Diseños & Estructuras

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Vu = Vm + Vg

COMDIS1 = 1.2C.M.+1.0C.V.+1.0Ex+0.3Ey
COMDIS2 = 1.2C.M.+1.0C.V.+1.0Ex+1.0Ey
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)															
	ELEMENTO												Combinaciones para resistencias nominales a momento															
	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
N+4.00	B60	0.000	3.475	VIG25X45	0.25	0.40	35.649	10.137	3.257	1.275	-3.257	-1.275	53.493	52.460	53.372	52.338	53.273	52.963	52.869	52.558	32.662	31.628	32.540	31.506	32.442	32.131	32.037	31.727
	B60	3.475					-23.289	-7.290	21.242	7.086	-21.242	-7.086	31.528	38.271	32.202	38.946	33.101	35.124	35.350	37.373	17.251	23.994	17.926	24.669	18.824	20.847	21.073	23.096
N+4.00	B61	0.000	7.000	VIG25X45	0.25	0.40	-43.825	-12.025	0.376	4.179	-0.376	-4.179	64.356	64.476	64.754	64.874	63.934	63.970	65.260	65.296	39.184	39.303	39.582	39.701	38.761	38.797	40.088	40.124
	B61	7.000					-48.708	-13.298	0.483	4.747	-0.483	-4.747	71.445	71.598	71.897	72.050	70.971	71.017	72.478	72.524	43.534	43.688	43.987	44.140	43.061	43.107	44.568	44.614
N+4.00	B62	0.000	6.450	VIG25X45	0.25	0.40	-49.823	-14.095	0.946	3.904	-0.946	-3.904	73.547	73.847	73.918	74.219	73.218	73.308	74.457	74.547	44.505	44.805	44.876	45.177	44.176	44.266	45.415	45.505
	B62	6.450					-36.527	-11.233	1.149	3.954	-1.149	-3.954	54.695	55.059	55.071	55.436	54.383	54.492	55.638	55.748	32.504	32.868	32.880	33.245	32.192	32.301	33.447	33.557
N+4.00	B63	0.000	4.500	VIG25X45	0.25	0.40	-33.843	-17.077	0.646	5.428	-0.646	-5.428	57.328	57.533	57.845	58.050	56.796	56.858	58.519	58.581	30.098	30.303	30.615	30.820	29.566	29.628	31.290	31.351
	B63	4.500					-11.444	-11.309	1.245	11.396	-1.245	-11.396	24.302	24.697	25.387	25.782	23.174	23.292	26.791	26.910	9.559	9.955	10.645	11.040	8.431	8.550	12.049	12.168
N+4.00	B64	0.000	6.720	VIG25X45	0.25	0.40	-15.143	-4.358	10.530	1.755	-10.530	-1.755	20.775	24.117	20.942	24.285	21.750	22.752	22.307	23.310	11.874	15.217	12.041	15.384	12.849	13.852	13.406	14.409
	B64	6.720					-53.219	-14.834	6.301	1.301	-6.301	-1.301	77.635	79.635	77.759	79.759	78.190	78.790	78.603	79.203	46.835	48.835	46.959	48.959	47.391	47.991	47.804	48.404
N+4.00	B65	0.000	7.070	VIG25X45	0.25	0.40	-52.331	-14.812	3.459	0.465	-3.459	-0.465	77.038	78.136	77.082	78.180	77.371	77.700	77.518	77.848	46.527	47.625	46.571	47.669	46.859	47.189	47.007	47.336
	B65	7.070					-69.634	-18.539	6.485	0.771	-6.485	-0.771	101.034	103.092	101.107	103.166	101.669	102.286	101.913	102.531	61.605	63.663	61.678	63.737	62.239	62.857	62.484	63.102
N+4.00	B66	0.000	6.950	VIG25X45	0.25	0.40	-69.373	-19.710	10.339	2.524	-10.339	-2.524	101.196	104.479	101.437	104.719	102.065	103.049	102.866	103.851	60.674	63.957	60.915	64.197	61.543	62.527	62.344	63.329
	B66	6.950					-18.020	-5.819	15.022	2.846	-15.022	-2.846	24.923	29.692	25.194	29.963	26.276	27.707	27.179	28.610	13.698	18.467	13.969	18.738	15.051	16.482	15.954	17.385
N+4.00	B67	0.000	1.575	VIG25X45	0.25	0.40	-3.062	-0.674	0.218	0.886	-0.218	-0.886	4.272	4.341	4.356	4.425	4.197	4.218	4.479	4.499	2.679	2.748	2.763	2.833	2.605	2.626	2.886	2.907
	B67	1.575					-13.450	-4.182	1.813	8.706	-1.813	-8.706	19.620	20.195	20.449	21.024	18.854	19.026	21.618	21.790	11.403	11.978	12.232	12.807	10.637	10.809	13.401	13.573
N+4.00	B68	0.000	3.500	VIG25X45	0.25	0.40	-31.574	-8.586	4.611	21.609	-4.611	-21.609	44.714	46.178	46.772	48.236	42.825	43.264	49.685	50.124	26.656	28.120	28.714	30.178	24.767	25.206	31.627	32.066
	B68	3.500					37.939	7.948	0.529	1.914	-0.529	-1.914	53.650	53.482	53.468	53.300	53.804	53.753	53.196	53.146	34.320	34.152	34.138	33.970	34.474	34.424	33.866	33.816
N+4.00	B69	0.000	3.500	VIG25X45	0.25	0.40	37.811	7.295	0.798	1.737	-0.798	-1.737	52.878	52.624	52.712	52.459	52.982	52.906	52.430	52.354	34.239	33.986	34.074	33.821	34.344	34.268	33.792	33.716
	B69	3.500					-41.633	-19.296	4.350	22.492	-4.350	-22.492	67.494	68.875	69.636	71.017	65.478	65.893	72.619	73.033	35.708	37.089	37.850	39.231	33.692	34.107	40.833	41.247
N+4.00	B70	0.000	2.075	VIG25X45	0.25	0.40	-28.890	-19.774	1.897	10.225	-1.897	-10.225	53.654	54.256	54.628	55.230	52.729	52.909	55.975	56.155	25.213	25.815	26.187	26.789	24.288	24.468	27.534	27.714
	B70	2.075					-2.935	-0.734	0.099	0.509	-0.099	-0.509	4.216	4.247	4.265	4.296	4.170	4.180	4.332	4.342	2.602	2.633	2.650	2.681	2.556	2.565	2.718	2.727
N+4.00	B71	0.000	1.575	VIG25X45	0.25	0.40	-3.669	-0.882	0.144	0.148	-0.144	-0.148	5.255	5.301	5.269	5.315	5.254	5.268	5.301	5.315	3.272	3.318	3.286	3.332	3.272	3.285	3.319	3.332
	B71	1.575					-11.251	-3.535	2.121	2.753	-2.121	-2.753	16.568	17.242	16.831	17.504	16.498	16.700	17.372	17.574	9.658	10.331	9.920	10.594	9.588	9.790	10.462	10.664
N+4.00	B72	0.000	3.500	VIG25X45	0.25	0.40	-26.736	-7.715	2.737	11.883	-2.737	-11.883	38.798	39.667	39.930	40.799	37.782	38.042	41.554	41.815	23.062	23.931	24.194	25.063	22.046	22.307	25.818	26.079
	B72	3.500					28.469	6.365	0.347	0.945	-0.347	-0.945	40.628	40.518	40.538	40.428	40.694	40.661	40.394	40.361	25.722	25.612	25.632	25.522	25.789	25.756	25.489	25.456
N+4.00	B73	0.000	3.500	VIG25X45	0.25	0.40	27.528	5.269	0.335	1.329	-0.335	-1.329	38.419	38.313	38.292	38.186	38.530	38.498	38.108	38.076	24.892	24.785	24.765	24.659	25.002	24.970	24.580	24.548
	B73	3.500					-46.321	-20.583	1.253	11.039	-1.253	-11.039	75.444	75.841	76.495	76.893	74.356	74.476	77.861	77.980	40.964	41.362	42.016	42.413	39.877	39.996	43.381	43.501
N+4.00	B74	0.000	2.075	VIG25X45	0.25	0.40	-26.395	-16.061	1.486	3.298	-1.486	-3.298	47.342	47.814	47.656	48.128	47.141	47.282	48.188	48.329	23.363	23.834	23.677	24.148	23.161	23.303	24.208	24.350
	B74	2.075					-3.031	-0.619	0.202	0.363	-0.202	-0.363	4.207	4.271	4.241	4.306	4.189	4.208	4.304	4.323	2.679	2.743	2.713	2.777	2.661	2.680	2.776	2.795
N+4.00	B77	0.000	1.825	VIG25X45	0.25	0.40	-0.391	0.170	0.160	0.329	-0.160	-0.329	0.258	0.309	0.289	0.340	0.239	0.255	0.344	0.359	0.311	0.362	0.342	0.393	0.292	0.307	0.397	0.412
	B77	1.825					-27.664	-17.332	4.681	4.032	-4.681	-4.032	49.594	51.080	49.978	51.464	49.666	50.112	50.946	51.392	23.963	25.449	24.347	25.833	24.035	24.481	25.315	25.761
N+4.00	B78	0.000	1.825	VIG25X45	0.25	0.40	0.595	1.602	1.009	0.663	-1.009	-0.663	2.508	2.187	2.445	2.124	2.469	2.373	2.259	2.163	0.727	0.407	0.664	0.344	0.689	0.593	0.478	0.382
	B78	1.825					-37.628	-24.613	2.045	2.650	-2.045	-2.650	69.316	69.965	69.568	70.217	69.249	69.443	70.090	70.285	33.414	34.064	33.667	34.316	33.347	33.542	34.188	34.383
N+4.00	B79	0.000	4.950	VIG25X45	0.25	0.40	-32.125	-12.937	16.565	3.403	-16.565	-3.403	48.696	53.954	49.020	54.278	50.158	51.736	51.238	52.816	26.121	31.380	26.445	31.704	27.584	29.161	28.664	30.241
	B79	4.950					13.573	2.045	3.577	2.219	-3.577	-2.219	19.006	17.870	18.795	17.659	18.855	18.514	18.151	17.810	12.889	11.754	12.678	11.542	12.738	12.398	12.034	11.693
N+4.00	B80	0.000	4.950	VIG25X45	0.25	0.40	-54.017	-20.879	11.701	3.328	-11.701	-3.328	83.684	87.398	84.001	87.715	84.614	85.728	85.670	86.785	46.600	50.314	46.916	50.631	47.530	48.644	48.586	49.701
	B80	4.950					8.387	-0.982	1.106	2.702	-1.106	-2.702	9.387	9.036	9.129	8.778	9.564	9.459	8.706	8.601	7.853	7.501	7.595	7.244	8.030	7.925	7.172	7.067
N+4.00	B81	0.000	3.475	VIG25X45	0.25	0.40	-33.565	-10.079	13.412	5.621	-13.412	-5.621	47.960	52.218	48.496	52.754	48.826	50.103	50.611	51.888	27.812	32.070	28.347	32.605	28.678	29.955	30.462	31.739
	B81	3.475					39.894	14.883	0.238	0.932	-0.238	-0.932	62.838	62.762	62.749	62.674	62.915	62.892	62.619	62.597	35.987	35.911	35.898	35.822	36.064	36.041	35.768	35.745
N+4.00	B82	0.000	3.475	VIG25X45	0.25	0.40	40.350	14.983	2.515	1.772	-2.515	-1.772	63.887	63.088	63.718	62.919	63.804	63.565	63.241	63.002	36.799	36.000	36.630	35.831	36.716	36.477	36.153	35.914
	B82	3.475					-20.218	-6.137	16.504	6.341	-16.504	-6.341	27.477	32.716	28.081	33.320	28.606	30.178	30.619	32.191	15.275	20.514	15.878	21.118	16.404	17.976	18.417	19.989
N+7.50	B84	0.000	0.575	VIG40X45	0.40	0.40	-0.714	0.000	0.000	0.000	0.000	0.000	0.857	0.857	0.857	0.857	0.857	0.857	0.857	0.857	0.643	0.643	0.643	0.643	0.643	0.643	0.643	0.643
	B84	0.575					0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
N+7.50	B85	0.000	0.575	VIG40X45	0.40	0.40	-0.714	0.000	0.000	0.000	0.000	0.000	0.857	0.857	0.857	0.857	0.857	0.857	0.857	0.857	0.643	0.643	0.643	0.643	0.643	0.643	0.643	0.643
	B85	0.575					0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
N+7.50	B86	0.000	0.575	VIG15X45	0.15	0.40	-0.268	0.000	0.000	0.000	0.000	0.000	0.322	0.322	0.322	0.322	0.322	0.322	0.322	0.322	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
	B86	0.575					0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
N+7.50	B87	0.000	2.075	VIG25X45	0.25	0.40	-0.818	-0.571	0.241	0.258	-0.241	-0.258	1.502	1.579	1.527	1.603	1.500	1.523	1.582	1.605	0.686	0.762	0.710	0.787	0.684	0.707	0.766	0.789
	B87	2.075					-12.889	-2.629	0.696	0.249	-0.696	-0.249	17.973	18.194	17.997	18.218	18.023	18.089	18.102	18.168	11.478	11.699	11.501	11.722	11.527	11.594	11.606	11.673
N+7.50	B90	0.000	1.900	VIG30X45	0.30	0.40	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	B90	1.900					-15.333	-2.167	1.649	0.777	-1.649	-0.777	20.268	20.791	20.342	20.865	20.365	20.522	20.611	20.768	13.501	14.024	13.575	14.098	13.598	13.755	13.845	14.002
N+7.50	B91	0.000	0.325	VIG30X45	0.30	0.40	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	B91	0.325					-0.171	0.000	0.000	0.000	0.000	0.000	0.205	0.205	0.205	0.205	0.205	0.205	0.205	0.205	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154

Diseños & Estructuras

PROYECTO: AGROECOL
RESISTENCIA A CORTANTE PARA VIGAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3.1 (a)

f'c = **21.1** MPa
fy = **420** MPa
$\Phi_{Cortante}$ = **0.75**
Estribos Φ = **9.5** mm
Av = **71** mm^2
R= **6.30**

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	$V_m = M_{n1} + M_{n2} / l_n$															
	COMBDIS3	COMBDIS4	COMBDIS5	COMBDIS6	COMBDIS7	COMBDIS8	COMBDIS9	COMBDIS10	COMBDIS11	COMBDIS12	COMBDIS13	COMBDIS14	COMBDIS15	COMBDIS16	COMBDIS17	COMBDIS18
(kN)	(kN)															
6.816	24.467	26.110	24.626	26.269	24.856	25.349	25.387	25.880	14.363	16.006	14.523	16.166	14.753	15.246	15.283	15.776
63.568																
65.764	19.400	19.439	19.522	19.561	19.272	19.284	19.677	19.689	11.817	11.856	11.938	11.977	11.689	11.701	12.094	12.105
68.172																
66.140	19.882	19.985	19.998	20.102	19.783	19.814	20.170	20.201	11.939	12.042	12.055	12.158	11.840	11.871	12.227	12.258
59.236																
80.804	18.140	18.273	18.496	18.629	17.771	17.811	18.958	18.998	8.813	8.946	9.169	9.302	8.444	8.484	9.631	9.671
64.768																
57.564	14.644	15.439	14.688	15.483	14.872	15.111	15.016	15.255	8.736	9.532	8.780	9.575	8.964	9.203	9.109	9.347
75.248																
72.556	25.187	25.633	25.204	25.650	25.324	25.458	25.379	25.513	15.294	15.741	15.311	15.758	15.431	15.565	15.487	15.621
81.572																
86.448	18.147	19.305	18.220	19.379	18.466	18.814	18.712	19.059	10.701	11.860	10.775	11.933	11.021	11.368	11.266	11.613
63.088																
16.996	15.169	15.578	15.749	16.158	14.636	14.758	16.569	16.692	8.941	9.350	9.521	9.930	8.407	8.530	10.341	10.464
39.944																
67.012	28.104	28.474	28.640	29.010	27.608	27.719	29.395	29.506	17.422	17.792	17.958	18.328	16.926	17.037	18.712	18.824
4.228																
3.772	34.392	34.714	34.957	35.279	33.846	33.942	35.728	35.825	19.985	20.307	20.550	20.872	19.439	19.536	21.321	21.418
75.012																
48.772	27.889	28.195	28.382	28.687	27.421	27.513	29.063	29.155	13.405	13.710	13.897	14.203	12.937	13.028	14.579	14.671
10.612																
21.340	13.856	14.313	14.032	14.488	13.811	13.948	14.396	14.533	8.210	8.666	8.385	8.842	8.165	8.302	8.750	8.887
38.288																
61.036	22.693	22.910	22.991	23.207	22.422	22.487	23.414	23.479	13.938	14.155	14.236	14.453	13.667	13.732	14.659	14.724
10.296																
1.464	32.532	32.615	32.796	32.880	32.253	32.278	33.134	33.159	18.816	18.899	19.080	19.163	18.537	18.562	19.418	19.443
72.808																
44.252	24.843	25.101	25.011	25.269	24.737	24.815	25.297	25.375	12.550	12.808	12.718	12.976	12.444	12.522	13.004	13.082
6.580																
24.244	27.316	28.158	27.544	28.386	27.345	27.598	28.104	28.357	13.301	14.143	13.528	14.370	13.330	13.582	14.088	14.341
42.312																
45.152	39.355	39.536	39.459	39.639	39.297	39.352	39.643	39.697	18.708	18.888	18.811	18.992	18.650	18.704	18.995	19.050
51.068																
51.184	13.677	14.510	13.700	14.533	13.942	14.192	14.018	14.268	7.881	8.714	7.904	8.737	8.146	8.396	8.222	8.472
19.352																
84.764	18.802	19.482	18.814	19.494	19.026	19.230	19.066	19.270	11.000	11.680	11.012	11.692	11.224	11.428	11.264	11.468
41.648																
71.912	31.884	33.088	32.013	33.216	32.156	32.517	32.584	32.945	18.359	19.563	18.488	19.691	18.631	18.992	19.059	19.420
1.816																
4.412	26.292	27.570	26.417	27.695	26.593	26.976	27.010	27.394	14.985	16.263	15.110	16.388	15.286	15.670	15.704	16.087
65.684																
2.976	1.490	1.490	1.490	1.490	1.490	1.490	1.490	1.490	1.118	1.118	1.118	1.118	1.118	1.118	1.118	1.118
0.000																
2.976	1.490	1.490	1.490	1.490	1.490	1.490	1.490	1.490	1.118	1.118	1.118	1.118	1.118	1.118	1.118	1.118
0.000																
1.116	0.559	0.559	0.559	0.559	0.559	0.559	0.559	0.559	0.419	0.419	0.419	0.419	0.419	0.419	0.419	0.419
0.000																
5.196	9.386	9.529	9.409	9.552	9.409	9.452	9.486	9.529	5.862	6.005	5.885	6.029	5.885	5.928	5.962	6.005
11.944																
0.000	10.667	10.943	10.706	10.982	10.718	10.801	10.848	10.931	7.106	7.381	7.145	7.420	7.157	7.239	7.287	7.369
19.864																
0.000	0.631	0.631	0.631	0.631	0.631	0.631	0.631	0.631	0.474	0.474	0.474	0.474	0.474	0.474	0.474	0.474
1.260																

Diseños & Estructuras

PROYECTO: AGROECOL
RESISTENCIA A CORTANTE PARA VIGAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3.1 (a)

f'c = **21.1** MPa
fy = **420** MPa
Φ Cortante = **0.75**
Estribos Φ = **9.5** mm
Av = **71** mm^2
R= **6.30**

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)	
31.283	32.926	31.442	33.085	31.672	32.165	32.203	32.696	21.179	22.822	21.339	22.982	21.569	22.062	22.099	22.592		63.6	**0.10**	178.92	57.42	236.34	**OK**
63.568	63.568	63.568	63.568	63.568	63.568	63.568	63.568	63.568	63.568	63.568	63.568	63.568	63.568	63.568	63.568							
85.164	85.203	85.286	85.325	85.036	85.048	85.441	85.453	77.581	77.620	77.702	77.741	77.453	77.465	77.858	77.869		85.5	**0.10**	178.92	57.42	236.34	**OK**
68.172	68.172	68.172	68.172	68.172	68.172	68.172	68.172	68.172	68.172	68.172	68.172	68.172	68.172	68.172	68.172							
86.022	86.125	86.138	86.242	85.923	85.954	86.310	86.341	78.079	78.182	78.195	78.298	77.980	78.011	78.367	78.398		86.3	**0.10**	178.92	57.42	236.34	**OK**
59.236	59.236	59.236	59.236	59.236	59.236	59.236	59.236	59.236	59.236	59.236	59.236	59.236	59.236	59.236	59.236							
98.944	99.077	99.300	99.433	98.575	98.615	99.762	99.802	89.617	89.750	89.973	90.106	89.248	89.288	90.435	90.475		99.8	**0.10**	178.92	57.42	236.34	**OK**
64.768	64.768	64.768	64.768	64.768	64.768	64.768	64.768	64.768	64.768	64.768	64.768	64.768	64.768	64.768	64.768							
72.208	73.003	72.252	73.047	72.436	72.675	72.580	72.819	66.300	67.096	66.344	67.139	66.528	66.767	66.673	66.911		75.2	**0.10**	178.92	57.42	236.34	**OK**
75.248	75.248	75.248	75.248	75.248	75.248	75.248	75.248	75.248	75.248	75.248	75.248	75.248	75.248	75.248	75.248							
97.743	98.189	97.760	98.206	97.880	98.014	97.935	98.069	87.850	88.297	87.867	88.314	87.987	88.121	88.043	88.177		98.2	**0.10**	178.92	57.42	236.34	**OK**
81.572	81.572	81.572	81.572	81.572	81.572	81.572	81.572	81.572	81.572	81.572	81.572	81.572	81.572	81.572	81.572							
104.595	105.753	104.668	105.827	104.914	105.262	105.160	105.507	97.149	98.308	97.223	98.381	97.469	97.816	97.714	98.061		105.8	**0.10**	178.92	57.42	236.34	**OK**
63.088	63.088	63.088	63.088	63.088	63.088	63.088	63.088	63.088	63.088	63.088	63.088	63.088	63.088	63.088	63.088							
32.165	32.574	32.745	33.154	31.632	31.754	33.565	33.688	25.937	26.346	26.517	26.926	25.403	25.526	27.337	27.460		39.9	**0.10**	178.92	57.42	236.34	**OK**
39.944	39.944	39.944	39.944	39.944	39.944	39.944	39.944	39.944	39.944	39.944	39.944	39.944	39.944	39.944	39.944							
95.116	95.486	95.652	96.022	94.620	94.731	96.407	96.518	84.434	84.804	84.970	85.340	83.938	84.049	85.724	85.836		96.5	**0.10**	178.92	57.42	236.34	**OK**
4.228	4.228	4.228	4.228	4.228	4.228	4.228	4.228	4.228	4.228	4.228	4.228	4.228	4.228	4.228	4.228							
38.164	38.486	38.729	39.051	37.618	37.714	39.500	39.597	23.757	24.079	24.322	24.644	23.211	23.308	25.093	25.190		75.0	**0.10**	178.92	57.42	236.34	**OK**
75.012	75.012	75.012	75.012	75.012	75.012	75.012	75.012	75.012	75.012	75.012	75.012	75.012	75.012	75.012	75.012							
76.661	76.967	77.154	77.459	76.193	76.285	77.835	77.927	62.177	62.482	62.669	62.975	61.709	61.800	63.351	63.443		77.9	**0.10**	178.92	57.42	236.34	**OK**
10.612	10.612	10.612	10.612	10.612	10.612	10.612	10.612	10.612	10.612	10.612	10.612	10.612	10.612	10.612	10.612							
35.196	35.653	35.372	35.828	35.151	35.288	35.736	35.873	29.550	30.006	29.725	30.182	29.505	29.642	30.090	30.227		38.3	**0.10**	178.92	57.42	236.34	**OK**
38.288	38.288	38.288	38.288	38.288	38.288	38.288	38.288	38.288	38.288	38.288	38.288	38.288	38.288	38.288	38.288							
83.729	83.946	84.027	84.243	83.458	83.523	84.450	84.515	74.974	75.191	75.272	75.489	74.703	74.768	75.695	75.760		84.5	**0.10**	178.92	57.42	236.34	**OK**
10.296	10.296	10.296	10.296	10.296	10.296	10.296	10.296	10.296	10.296	10.296	10.296	10.296	10.296	10.296	10.296							
33.996	34.079	34.260	34.344	33.717	33.742	34.598	34.623	20.280	20.363	20.544	20.627	20.001	20.026	20.882	20.907		72.8	**0.10**	178.92	57.42	236.34	**OK**
72.808	72.808	72.808	72.808	72.808	72.808	72.808	72.808	72.808	72.808	72.808	72.808	72.808	72.808	72.808	72.808							
69.095	69.353	69.263	69.521	68.989	69.067	69.549	69.627	56.802	57.060	56.970	57.228	56.696	56.774	57.256	57.334		69.6	**0.10**	178.92	57.42	236.34	**OK**
6.580	6.580	6.580	6.580	6.580	6.580	6.580	6.580	6.580	6.580	6.580	6.580	6.580	6.580	6.580	6.580							
51.560	52.402	51.788	52.630	51.589	51.842	52.348	52.601	37.545	38.387	37.772	38.614	37.574	37.826	38.332	38.585		52.6	**0.10**	178.92	57.42	236.34	**OK**
42.312	42.312	42.312	42.312	42.312	42.312	42.312	42.312	42.312	42.312	42.312	42.312	42.312	42.312	42.312	42.312							
84.507	84.688	84.611	84.791	84.449	84.504	84.795	84.849	63.860	64.040	63.963	64.144	63.802	63.856	64.147	64.202		84.8	**0.10**	178.92	57.42	236.34	**OK**
51.068	51.068	51.068	51.068	51.068	51.068	51.068	51.068	51.068	51.068	51.068	51.068	51.068	51.068	51.068	51.068							
64.861	65.694	64.884	65.717	65.126	65.376	65.202	65.452	59.065	59.898	59.088	59.921	59.330	59.580	59.406	59.656		65.7	**0.10**	178.92	57.42	236.34	**OK**
19.352	19.352	19.352	19.352	19.352	19.352	19.352	19.352	19.352	19.352	19.352	19.352	19.352	19.352	19.352	19.352							
103.566	104.246	103.578	104.258	103.790	103.994	103.830	104.034	95.764	96.444	95.776	96.456	95.988	96.192	96.028	96.232		104.3	**0.10**	178.92	57.42	236.34	**OK**
41.648	41.648	41.648	41.648	41.648	41.648	41.648	41.648	41.648	41.648	41.648	41.648	41.648	41.648	41.648	41.648							
103.796	105.000	103.925	105.128	104.068	104.429	104.496	104.857	90.271	91.475	90.400	91.603	90.543	90.904	90.971	91.332		105.1	**0.10**	178.92	57.42	236.34	**OK**
1.816	1.816	1.816	1.816	1.816	1.816	1.816	1.816	1.816	1.816	1.816	1.816	1.816	1.816	1.816	1.816							
30.704	31.982	30.829	32.107	31.005	31.388	31.422	31.806	19.397	20.675	19.522	20.800	19.698	20.082	20.116	20.499		65.7	**0.10**	178.92	57.42	236.34	**OK**
65.684	65.684	65.684	65.684	65.684	65.684	65.684	65.684	65.684	65.684	65.684	65.684	65.684	65.684	65.684	65.684							
4.466	4.466	4.466	4.466	4.466	4.466	4.466	4.466	4.094	4.094	4.094	4.094	4.094	4.094	4.094	4.094		4.5	**0.10**	178.92	91.87	270.79	**OK**
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000							
4.466	4.466	4.466	4.466	4.466	4.466	4.466	4.466	4.094	4.094	4.094	4.094	4.094	4.094	4.094	4.094		4.5	**0.10**	178.92	91.87	270.79	**OK**
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000							
1.675	1.675	1.675	1.675	1.675	1.675	1.675	1.675	1.535	1.535	1.535	1.535	1.535	1.535	1.535	1.535		1.7	**0.10**	178.92	34.45	213.37	**OK**
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000							
14.582	14.725	14.605	14.748	14.605	14.648	14.682	14.725	11.058	11.201	11.081	11.225	11.081	11.124	11.158	11.201		14.7	**0.10**	178.92	57.42	236.34	**OK**
11.944	11.944	11.944	11.944	11.944	11.944	11.944	11.944	11.944	11.944	11.944	11.944	11.944	11.944	11.944	11.944							
10.667	10.943	10.706	10.982	10.718	10.801	10.848	10.931	7.106	7.381	7.145	7.420	7.157	7.239	7.287	7.369		19.9	**0.10**	178.92	68.90	247.82	**OK**
19.864	19.864	19.864	19.864	19.864	19.864	19.864	19.864	19.864	19.864	19.864	19.864	19.864	19.864	19.864	19.864							
0.631	0.631	0.631	0.631	0.631	0.631	0.631	0.631	0.474	0.474	0.474	0.474	0.474	0.474	0.474	0.474		1.3	**0.10**	178.92	68.90	247.82	**OK**
1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260							

Diseños & Estructuras

PROYECTO: AGROECOL
RESISTENCIA A CORTANTE PARA VIGAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3.1 (b)

f'c = 21.0 MPa
fy = 420 MPa
Φ Cortante = 0.75
Estribos Φ = 9.5 mm
Av = 71 mm²
R= 6.30

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 sísmico 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						$2V_E$														$2V_{E\,max}$	S	ΦVs	ΦVc	ΦVn	ΦVn > $2V_{Emax}$
	ELEMENTO												Combinaciones de carga de diseño para el doble del cortante donde se incluya E																			
	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+4.00	B1	0	4.5	VIG40X45	0.40	0.40	-26.95	-9.81	4.02	54.32	0	0	38.925	39.563	41.512	42.150	33.336	33.528	41.959	42.150	21.030	21.668	23.617	24.255	15.441	15.633	24.064	24.255	73.2	**0.10**	178.92	91.65	270.57	OK
	B1	4.5					41.84	14.19	4.02	54.32	0	0	67.623	66.985	65.036	64.398	73.212	73.020	64.589	64.398	40.881	40.243	38.294	37.656	46.470	46.278	37.847	37.656						
N+4.00	B2	0	4.5	VIG40X45	0.40	0.40	-27.06	-9.95	8.32	46.9	0	0	38.868	40.189	41.101	42.422	34.581	34.978	42.026	42.422	20.800	22.121	23.033	24.354	16.513	16.910	23.958	24.354	72.0	**0.10**	178.92	91.65	270.57	OK
	B2	4.5					41.74	14.05	8.32	46.9	0	0	67.692	66.371	65.459	64.138	71.979	71.582	64.534	64.138	41.120	39.799	38.887	37.566	45.407	45.010	37.962	37.566						
N+7.50	B3	0	6.45	VIG40X45	0.40	0.40	-18	-5.02	1.4	18.28	0	0	25.527	25.750	26.398	26.620	23.652	23.718	26.553	26.620	15.107	15.330	15.978	16.200	13.232	13.298	16.133	16.200	40.2	**0.10**	178.92	91.65	270.57	OK
	B3	6.45					23.94	8.75	2.34	16.76	0	0	38.648	38.276	37.849	37.478	40.250	40.138	37.589	37.478	22.716	22.344	21.917	21.546	24.318	24.206	21.657	21.546						
N+4.00	B3	0	6.45	VIG40X45	0.40	0.40	-66.78	-11.63	3.4	21.56	0	0	90.200	90.739	91.226	91.766	88.182	88.344	91.604	91.766	58.536	59.075	59.562	60.102	56.518	56.680	59.940	60.102	140.6	**0.10**	178.92	91.65	270.57	OK
	B3	6.45					97.54	19.76	1.74	23.44	0	0	138.200	137.924	137.084	136.808	140.611	140.529	136.891	136.808	89.178	88.902	88.062	87.786	91.589	91.507	87.869	87.786						
N+7.50	B4	0	6.45	VIG40X45	0.40	0.40	-16.66	-5.02	3.32	15.42	0	0	23.751	24.278	24.485	25.012	22.406	22.564	24.854	25.012	13.733	14.260	14.467	14.994	12.388	12.546	14.836	14.994	30.6	**0.10**	178.92	91.65	270.57	OK
	B4	6.45					18.2	6.19	3.32	15.42	0	0	29.291	28.764	28.557	28.030	30.636	30.478	28.188	28.030	17.641	17.114	16.907	16.380	18.986	18.828	16.538	16.380						
N+4.00	B4	0	6.45	VIG40X45	0.40	0.40	-63.91	-11.19	5.72	20.08	0	0	86.018	86.926	86.974	87.882	84.422	84.695	87.610	87.882	55.655	56.563	56.611	57.519	54.059	54.332	57.247	57.519	98.2	**0.10**	178.92	91.65	270.57	OK
	B4	6.45					69.54	11.3	6.02	19.74	0	0	96.644	95.688	95.704	94.748	98.168	97.881	95.035	94.748	64.482	63.526	63.542	62.586	66.006	65.719	62.873	62.586						
N+7.50	B5	0	7	VIG40X45	0.40	0.40	-28.4	-10.97	0.98	12.3	0	0	44.309	44.464	44.894	45.050	43.051	43.098	45.003	45.050	24.819	24.974	25.404	25.560	23.561	23.608	25.513	25.560	58.6	**0.10**	178.92	91.65	270.57	OK
	B5	7					35.84	13.56	0.98	12.3	0	0	57.309	57.154	56.724	56.568	58.567	58.520	56.615	56.568	32.997	32.842	32.412	32.256	34.255	34.208	32.303	32.256						
N+4.00	B5	0	7	VIG40X45	0.40	0.40	-94.32	-23.78	2.92	23.26	0	0	135.393	135.856	136.501	136.964	133.133	133.272	136.825	136.964	83.317	83.780	84.425	84.888	81.057	81.196	84.749	84.888	159.7	**0.10**	178.92	91.65	270.57	OK
	B5	7					105.36	29.15	2.1	25.22	0	0	157.116	156.783	155.915	155.582	159.685	159.585	155.682	155.582	96.358	96.025	95.157	94.824	98.927	98.827	94.924	94.824						
N+7.50	B6	0	7	VIG40X45	0.40	0.40	-16.72	-5.79	1.74	8.08	0	0	25.193	25.469	25.578	25.854	24.489	24.571	25.771	25.854	14.387	14.663	14.772	15.048	13.683	13.765	14.965	15.048	33.1	**0.10**	178.92	91.65	270.57	OK
	B6	7					21.11	6.37	1.74	8.08	0	0	32.363	32.087	31.978	31.702	33.067	32.985	31.785	31.702	19.660	19.384	19.275	18.999	20.364	20.282	19.082	18.999						
N+4.00	B6	0	7	VIG40X45	0.40	0.40	-71.2	-12	5.64	17.7	0	0	95.702	96.597	96.545	97.440	94.362	94.630	97.171	97.440	62.342	63.237	63.185	64.080	61.002	61.270	63.811	64.080	100.8	**0.10**	178.92	91.65	270.57	OK
	B6	7					72.22	11.27	4.68	16.84	0	0	99.479	98.736	98.677	97.934	100.830	100.607	98.157	97.934	66.543	65.800	65.741	64.998	67.894	67.671	65.221	64.998						
N+7.50	B7	0	9.5	VIG15X45	0.15	0.40	-10.6	-4.05	0.56	1.1	0	0	16.629	16.718	16.681	16.770	16.569	16.595	16.743	16.770	9.399	9.488	9.451	9.540	9.339	9.365	9.513	9.540	16.8	**0.10**	178.92	34.37	213.29	OK
	B7	9.5					5.94	1.22	2.24	0.68	0	0	8.736	8.380	8.704	8.348	8.563	8.456	8.455	8.348	5.734	5.378	5.702	5.346	5.561	5.454	5.453	5.346						
N+7.50	B8	0	9.5	VIG40X60	0.40	0.55	-71.15	-21.96	2.76	17.04	0	0	106.090	106.529	106.902	107.340	104.504	104.635	107.209	107.340	62.785	63.224	63.597	64.035	61.199	61.330	63.904	64.035	196.0	**0.14**	178.92	126.02	304.94	OK
	B8	9.5					115.45	54.14	6.12	19.08	0	0	194.560	193.589	193.651	192.680	196.000	195.709	192.971	192.680	105.785	104.814	104.876	103.905	107.225	106.934	104.196	103.905						
N+4.00	B8	0	9.5	VIG40X60	0.40	0.55	-164.3	-54.23	6.16	35.34	0	0	248.729	249.707	250.412	251.390	245.487	245.780	251.097	251.390	145.209	146.187	146.892	147.870	141.967	142.260	147.577	147.870	283.8	**0.14**	178.92	126.02	304.94	OK
	B8	9.5					181.87	59.35	11.54	35.58	0	0	281.120	279.288	279.426	277.594	283.791	283.242	278.144	277.594	167.209	165.377	165.515	163.683	169.880	169.331	164.233	163.683						
N+7.50	B9	0	9.5	VIG40X60	0.40	0.55	-26.92	-0.23	2.96	12.58	0	0	31.465	31.935	32.064	32.534	30.396	30.537	32.393	32.534	23.159	23.629	23.758	24.228	22.090	22.231	24.087	24.228	35.3	**0.14**	178.92	126.02	304.94	OK
	B9	9.5					27.8	-0.23	2.96	12.58	0	0	34.199	33.729	33.600	33.130	35.268	35.127	33.271	33.130	26.089	25.619	25.490	25.020	27.158	27.017	25.161	25.020						
N+4.00	B9	0	9.5	VIG40X60	0.40	0.55	-55.41	-0.16	4.6	24.68	0	0	64.747	65.477	65.922	66.652	62.515	62.735	66.433	66.652	47.964	48.694	49.139	49.869	45.732	45.952	49.650	49.869	71.0	**0.14**	178.92	126.02	304.94	OK
	B9	9.5					55.84	-0.16	4.6	24.68	0	0	68.753	68.023	67.578	66.848	70.985	70.765	67.067	66.848	52.161	51.431	50.986	50.256	54.393	54.173	50.475	50.256						
N+7.50	B10	0	2.075	VIG35X45	0.35	0.40	14.09	3.63	1.32	3.6	0	0	20.919	20.709	20.748	20.538	21.172	21.109	20.601	20.538	13.062	12.852	12.891	12.681	13.315	13.252	12.744	12.681	30.6	**0.10**	178.92	80.20	259.12	OK
	B10	2.075					21.94	3.63	1.32	3.6	0	0	30.339	30.129	30.168	29.958	30.592	30.529	30.021	29.958	20.127	19.917	19.956	19.746	20.380	20.317	19.809	19.746						
N+7.50	B11	0	6.95	VIG35X60	0.35	0.55	-38.11	-9.41	41.34	13.26	0	0	47.949	54.511	48.580	55.142	51.069	53.037	53.173	55.142	27.106	33.668	27.737	34.299	30.226	32.194	32.330	34.299	140.1	**0.14**	178.92	110.27	289.19	OK
	B11	6.95					81.55	34.16	46.22	15.7	0	0	140.104	132.768	139.357	132.020	136.713	134.512	134.221	132.020	81.479	74.143	80.732	73.395	78.088	75.887	75.596	73.395						
N+4.00	B11	0	6.95	VIG35X60	0.35	0.55	-79.78	-18.87	78.28	21.86	0	0	101.140	113.565	102.181	114.606	107.409	111.136	110.878	114.606	58.336	70.761	59.377	71.802	64.605	68.332	68.074	71.802	202.8	**0.14**	178.92	110.27	289.19	OK
	B11	6.95					133.06	28.07	88.5	21.34	0	0	202.806	188.758	201.790	187.742	195.344	191.129	191.956	187.742	134.818	120.770	133.802	119.754	127.356	123.141	123.968	119.754						
N+7.50	B12	0	7	VIG15X45	0.15	0.40	-8.15	-2.41	1.04	3.3	0	0	11.868	12.033	12.025	12.190	11.617	11.666	12.140	12.190	7.013	7.178	7.170	7.335	6.762	6.811	7.285	7.335	12.2	**0.10**	178.92	34.37	213.29	OK
	B12	7					5.46	1.22	1.04	3.3	0	0	8.094	7.929	7.937	7.772	8.345	8.296	7.822	7.772	5.236	5.071	5.079	4.914	5.487	5.438	4.964	4.914						
N+7.50	B13	0	7	VIG40X45	0.40	0.40	-33.54	-9.87	1.22	17.1	0	0	49.110	49.304	49.924	50.118	47.346	47.404	50.060	50.118	29.178	29.372	29.992	30.186	27.414	27.472	30.128	30.186	50.1	**0.10**	178.92	91.65	270.57	OK
	B13	7					25.25	5.92	1.22	17.1	0	0	37.228	37.034	36.414	36.220	38.992	38.934	36.278	36.220	23.733	23.539	22.919	22.725	25.497	25.439	22.783	22.725						
N+4.00	B13	0	7	VIG40X45	0.40	0.40	-78.29	-13.8	7.44	34.3	0	0	104.934	106.115	106.567	107.748	101.949	102.304	107.394	107.748	67.647	68.828	69.280	70.461	64.662	65.017	70.107	70.461	107.7	**0.10**	178.92	91.65	270.57	OK
	B13	7					66.78	10.13	4.66	31.54	0	0	92.508	91.768	91.006	90.266	95.494	95.272	90.488	90.266	62.344	61.604	60.842	60.102	65.330	65.108	60.324	60.102						
N+7.50	B14	0	7	VIG40X45	0.40	0.40	-20.53	-6.57	3.62	16.2	0	0	29.860	30.435	30.631	31.206	28.462	28.635	31.034	31.206	17.131	17.706	17.902	18.477	15.733	15.906	18.305	18.477	31.2	**0.10**	178.92	91.65	270.57	OK
	B14	7					17.3	5.59	3.62	16.2	0	0	27.696	27.121	26.925	26.350	29.094	28.921	26.522	26.350	16.916	16.341	16.145	15.570	18.314	18.141	15.742	15.570						
N+4.00	B14	0	7	VIG40X45	0.40	0.40	-73	-11.22	8.98	29.56	0	0	95.987	97.412	97.395	98.820	93.700	94.128	98.392	98.820	62.867	64.292	64.275	65.700	60.580	61.008	65.272	65.700	102.1	**0.10**	178.92	91.65	270.57	OK
	B14	7					70.79	12.08	7.02	30.12	0	0	99.577	98.462	98.142	97.028	102.143	101.809	97.362	97.028	66.260	65.145	64.825	63.711	68.826	68.492	64.045	63.711						
N+7.50	B15	0	2.075	VIG40X45	0.40	0.40	8.17	1.74	5.52	7.16	0	0	12.761	11.885	12.420	11.544	12.943	12.681	11.807	11.544	8.570	7.694	8.229	7.353	8.752	8.490	7.616	7.353	23.7	**0.10**	178.92	91.65	270.57	OK
	B15	2.075					17.13	1.74	5.52	7.16	0	0	23.513	22.637	23.172	22.296	23.695	23.433	22.559	22.296	16.634	15.758	16.293	15.417	16.816	16.554	15.680	15.417						
N+7.50	B16	0	6.95	VIG40X45	0.40	0.40	-18.41	-0.58	33.9	16.16	0	0	16.522	21.902	17.291	22.672	18.493	20.107	21.058	22.672	10.419	15.799	11.188	16.569	12.390	14.004	14.955	16.569	22.7	**0.10**	178.92	91.65	270.57	OK
	B16	6.95					11.61	-0.58	33.9	16.16	0	0	19.502	14.122	18.733	13.352	17.531	15.917	14.966	13.352	16.599	11.219	15.830	10.449	14.628	13.014	12.063	10.449						
N+4.00	B16	0	6.95	VIG40X45	0.40	0.40	-86.62	-16.11	63.14	23.12	0	0	108.931	118.953	110.032	120.054	113.377	116.384	117.047	120.054	66.835	76.857	67.936	77.958	71.281	74.288	74.951	77.958	126.8	**0.10**	178.92	91.65	270.57	OK
	B16	6.95					83.26	15.59	61.88	30.86	0	0	126.794	116.972	125.324	115.502	123.347	120.400	118.449	115.502	86.226	76.404	84.756	74.934	82.779	79.832	77.881	74.934						
N+7.50	B17	0	1.575	VIG15X45	0.15	0.40	-2.71	-0.52	4.5	3.92	0	0	2.871	3.585	3.058	3.772	2.935	3.150	3.558	3.772	1.538	2.252	1.725	2.439	1.602	1.817	2.225	2.439	3.8	**0.10**	178.92	34.37	213.29	OK
	B17	1.575					0.35	0.29	4.5	3.92	0	0	1.611	0.897	1.424	0.710	1.547	1.332	0.924	0.710	1.216	0.502	1.029	0.315	1.152	0.937	0.529	0.315						
N+7.50	B18	0	1.575	VIG40X45	0.40	0.40	-27.05	-3.99	12.08	7.8	0	0	34.161	36.079	34.533	36.450	34.637	35.212	35.875	36.450	22.056	23.974	22.428	24.345	22.532	23.107	23.770	24.345	36.5	**0.10**	178.92	91.65	270.57	OK
	B18	1.575					-13.82	-0.44	12.08	7.8	0	0	14.735	16.653	15.107	17.024	15.211	15.786	16.449	17.024	10.149	12.067	10.521	12.438	10.625	11.200	11.863	12.438						
N+4.00	B18	0	1.575	VIG40X45	0.40	0.40	-32.75	-7	11.26	7.9	0	0	44.137	45.924	44.513	46.300	44.510	45.046	45.764	46.300	27.312	29.099	27.688	29.475	27.685	28.221	28.939	29.475	46.3	**0.10**	178.92	91.65	270.57	OK
	B18	1.575					-10.9	-1.53	11.26	7.9	0	0	12.447	14.234	12.823	14.610	12.820	13.356	14.074	14.610	7.647	9.434	8.023	9.810	8.020	8.556	9.274	9.810						
N+7.50	B19	0	1.575	VIG40X45	0.40	0.40	-15.56	-2.59	7.58	3.98	0	0	19.869	21.072	20.059	21.262	20.269	20.630	20.901	21.262	12.611	13.814	12.801	14.004	13.011	13.372	13.643	14.004	21.3	**0.10**	178.92	91.65	270.57	OK
	B19	1.575					-7.05	0.15	7.58	3.98	0	0	6.917	8.120	7.107	8.310	7.317	7.678	7.949	8.310	4.952	6.155	5.142	6.345	5.352	5.713	5.984	6.345						
N+4.00	B19	0	1.575	VIG40X45	0.40	0.40	-32.14	-6.93	11.78	4.56	0	0	43.411	45.281	43.628	45.498	44.213	44.774	44.937	45.498	26.839	28.709	27.056	28.926	27.641	28.202	28.365	28.926	45.5	**0.10**	178.92	91.65	270.57	OK

Diseños & Estructuras

PROYECTO: AGROECOL
RESISTENCIA A CORTANTE PARA VIGAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3.1 (b)

f'c = 21.0 MPa
fy = 420 MPa
Φ Cortante = 0.75
Estribos Φ = 9.5 mm
Av = 71 mm²
R= 6.30

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 sísmico 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						$2V_E$														$2V_{Emax}$	S	ΦVs	ΦVc	ΦVn	ΦVn > $2V_{Emax}$
	ELEMENTO												Combinaciones de carga de diseño para el doble del cortante donde se incluya E																			
	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+7.50	B19	1.575	1.575	VIG40X45	0.40	0.45	-10.3	-1.46	11.78	4.56	0	0	11.733	13.603	11.950	13.820	12.535	13.096	13.259	13.820	7.183	9.053	7.400	9.270	7.985	8.546	8.709	9.270	45.3	0.10	178.92	91.03	270.37	OK
	B20	0	2.075	VIG15X45	0.15	0.40	1.28	0.29	4.5	3.92	0	0	2.727	2.013	2.540	1.826	2.663	2.448	2.040	1.826	2.053	1.339	1.866	1.152	1.989	1.774	1.366	1.152	6.8	0.10	178.92	34.37	213.29	OK
	B20	2.075					4.64	0.29	4.5	3.92	0	0	6.759	6.045	6.572	5.858	6.695	6.480	6.072	5.858	5.077	4.363	4.890	4.176	5.013	4.798	4.390	4.176						
N+7.50	B21	0	6.95	VIG15X45	0.15	0.40	-6.69	-0.15	7.58	3.98	0	0	6.785	7.988	6.975	8.178	7.185	7.546	7.817	8.178	4.628	5.831	4.818	6.021	5.028	5.389	5.660	6.021	8.2	0.10	178.92	34.37	213.29	OK
	B21	6.95					4.57	-0.15	7.58	3.98	0	0	6.727	5.524	6.537	5.334	6.327	5.966	5.695	5.334	5.506	4.303	5.316	4.113	5.106	4.745	4.474	4.113						
N+4.00	B21	0	6.95	VIG15X45	0.15	0.40	-10.9	-1.53	11.26	7.9	0	0	12.447	14.234	12.823	14.610	12.820	13.356	14.074	14.610	7.647	9.434	8.023	9.810	8.020	8.556	9.274	9.810	15.9	0.10	178.92	34.37	213.29	OK
	B21	6.95					10.3	1.46	11.78	4.56	0	0	15.907	14.037	15.690	13.820	15.105	14.544	14.381	13.820	11.357	9.487	11.140	9.270	10.555	9.994	9.831	9.270						
N+7.50	B26	0	9.5	VIG40X60	0.40	0.55	-53.49	-16.13	2.1	2.72	0	0	79.855	80.188	79.985	80.318	79.786	79.886	80.218	80.318	47.678	48.011	47.808	48.141	47.609	47.709	48.041	48.141	146.0	0.14	178.92	126.02	304.94	OK
	B26	9.5					84.63	43.57	4.88	2.94	0	0	146.041	145.266	145.901	145.126	145.825	145.593	145.358	145.126	77.082	76.307	76.942	76.167	76.866	76.634	76.399	76.167						
N+4.00	B26	0	9.5	VIG40X60	0.40	0.55	-67.83	-13.66	4.8	3.4	0	0	94.132	94.894	94.294	95.056	94.288	94.516	94.827	95.056	60.123	60.885	60.285	61.047	60.279	60.507	60.818	61.047	132.5	0.14	178.92	126.02	304.94	OK
	B26	9.5					91.96	20.61	8.48	4.04	0	0	132.500	131.154	132.308	130.962	132.007	131.603	131.366	130.962	84.302	82.956	84.110	82.764	83.809	83.405	83.168	82.764						
N+7.50	B27	0	6.95	VIG35X45	0.35	0.40	-25.43	-3.62	15.72	0.64	0	0	31.610	34.106	31.641	34.136	33.286	34.034	33.387	34.136	20.361	22.857	20.392	22.887	22.037	22.785	22.138	22.887	80.6	0.10	178.92	80.20	259.12	OK
	B27	6.95					54.33	12.52	17.42	2.58	0	0	80.604	77.839	80.481	77.716	78.955	78.126	78.546	77.716	51.785	49.020	51.662	48.897	50.136	49.307	49.727	48.897						
N+4.00	B27	0	6.95	VIG35X45	0.35	0.40	-91.81	-25.05	30.84	2.4	0	0	130.212	135.108	130.327	135.222	133.372	134.841	133.753	135.222	77.619	82.515	77.734	82.629	80.779	82.248	81.160	82.629	157.0	0.10	178.92	80.20	259.12	OK
	B27	6.95					106.69	23.29	35	3.32	0	0	157.032	151.476	156.874	151.318	153.512	151.845	152.985	151.318	101.735	96.179	101.577	96.021	98.215	96.548	97.688	96.021						
N+7.50	B28	0	7.07	VIG35X45	0.35	0.40	-14.83	-0.21	12.64	0.52	0	0	15.975	17.981	16.000	18.006	17.322	17.923	17.404	18.006	11.316	13.322	11.341	13.347	12.663	13.264	12.745	13.347	33.0	0.10	178.92	80.20	259.12	OK
	B28	7.07					22.5	3.84	13.18	1.46	0	0	33.002	30.910	32.932	30.840	31.699	31.072	31.468	30.840	22.412	20.320	22.342	20.250	21.109	20.482	20.878	20.250						
N+4.00	B28	0	7.07	VIG35X45	0.35	0.40	-100.55	-35.23	27.1	7.16	0	0	151.247	155.549	151.588	155.890	153.463	154.753	154.600	155.890	85.852	90.154	86.193	90.495	88.068	89.358	89.205	90.495	173.8	0.10	178.92	80.20	259.12	OK
	B28	7.07					109.73	37.83	26.56	1.34	0	0	173.786	169.570	173.722	169.506	170.983	169.719	170.771	169.506	103.037	98.821	102.973	98.757	100.234	98.970	100.022	98.757						
N+7.50	B29	0	6.72	VIG35X45	0.35	0.40	-14.6	-1.19	16.38	1.06	0	0	16.060	18.660	16.110	18.710	17.762	18.542	17.930	18.710	10.490	13.090	10.540	13.140	12.192	12.972	12.360	13.140	18.7	0.10	178.92	80.20	259.12	OK
	B29	6.72					10.8	-1.19	16.38	1.06	0	0	14.420	11.820	14.370	11.770	12.718	11.938	12.550	11.770	12.370	9.770	12.320	9.720	10.668	9.888	10.500	9.720						
N+4.00	B29	0	6.72	VIG35X45	0.35	0.40	-88.55	-29.41	35.02	12.7	0	0	129.507	135.065	130.111	135.670	131.987	133.654	134.002	135.670	73.532	79.090	74.136	79.695	76.012	77.679	78.027	79.695	160.1	0.10	178.92	80.20	259.12	OK
	B29	6.72					99.8	34.25	35.5	8.64	0	0	160.056	154.421	159.645	154.010	157.072	155.381	155.700	154.010	95.866	90.231	95.455	89.820	92.882	91.191	91.510	89.820						
N+7.50	B32	0	4.95	VIG25X45	0.25	0.40	-24.88	-14.62	4.54	1.08	0	0	43.704	44.425	43.755	44.476	44.088	44.305	44.260	44.476	21.620	22.341	21.671	22.392	22.004	22.221	22.176	22.392	44.5	0.10	178.92	57.28	236.20	OK
	B32	4.95					11.61	9.96	4.54	1.08	0	0	24.664	23.943	24.613	23.892	24.280	24.063	24.108	23.892	11.221	10.500	11.170	10.449	10.837	10.620	10.665	10.449						
N+7.50	B33	0	4.95	VIG25X45	0.25	0.40	-25.64	-14.63	2.44	0.82	0	0	44.972	45.359	45.011	45.398	45.152	45.268	45.282	45.398	22.650	23.037	22.689	23.076	22.830	22.946	22.960	23.076	45.4	0.10	178.92	57.28	236.20	OK
	B33	4.95					10.85	9.95	2.44	0.82	0	0	23.396	23.009	23.357	22.970	23.216	23.100	23.086	22.970	10.191	9.804	10.152	9.765	10.011	9.895	9.881	9.765						
N+7.50	B35	0	2.075	VIG25X45	0.25	0.40	3.13	1.13	2.02	2.54	0	0	5.328	5.007	5.207	4.886	5.385	5.289	4.982	4.886	3.259	2.938	3.138	2.817	3.316	3.220	2.913	2.817	12.1	0.10	178.92	57.28	236.20	OK
	B35	2.075					8.74	1.13	2.02	2.54	0	0	12.060	11.739	11.939	11.618	12.117	12.021	11.714	11.618	8.308	7.987	8.187	7.866	8.365	8.269	7.962	7.866						
N+7.50	B38	0	6.72	VIG15X45	0.15	0.40	-5.18	-0.05	1.9	0.18	0	0	5.956	6.257	5.964	6.266	6.147	6.237	6.176	6.266	4.352	4.653	4.360	4.662	4.543	4.633	4.572	4.662	7.1	0.10	178.92	34.37	213.29	OK
	B38	6.72					5.71	-0.05	1.9	0.18	0	0	7.112	6.811	7.104	6.802	6.921	6.831	6.892	6.802	5.449	5.148	5.441	5.139	5.258	5.168	5.229	5.139						
N+4.00	B38	0	6.72	VIG15X45	0.15	0.40	-13.92	-8.98	3.98	4.8	0	0	24.824	25.455	25.052	25.684	24.733	24.922	25.494	25.684	11.668	12.299	11.896	12.528	11.577	11.766	12.338	12.528	35.8	0.10	178.92	34.37	213.29	OK
	B38	6.72					19.66	11.32	3.14	4.58	0	0	35.629	35.130	35.410	34.912	35.789	35.639	35.062	34.912	18.411	17.912	18.192	17.694	18.571	18.421	17.844	17.694						
N+7.50	B39	0	4.995	VIG15X45	0.15	0.40	-5.48	-0.13	1.1	0.92	0	0	6.488	6.662	6.531	6.706	6.508	6.560	6.654	6.706	4.714	4.888	4.757	4.932	4.734	4.786	4.880	4.932	6.7	0.10	178.92	34.37	213.29	OK
	B39	4.995					2.62	-0.13	1.1	0.92	0	0	3.232	3.058	3.189	3.014	3.212	3.160	3.066	3.014	2.576	2.402	2.533	2.358	2.556	2.504	2.410	2.358						
N+7.50	B40	0	7	VIG30X45	0.30	0.40	-15.57	-5.94	7.94	25.04	0	0	22.171	23.432	23.364	24.624	20.271	20.649	24.246	24.624	11.560	12.821	12.753	14.013	9.660	10.038	13.635	14.013	27.5	0.10	178.92	68.74	247.66	OK
	B40	7					14.45	5.82	7.94	25.04	0	0	25.613	24.352	24.420	23.160	27.513	27.135	23.538	23.160	15.458	14.197	14.265	13.005	17.358	16.980	13.383	13.005						
N+4.00	B40	0	7	VIG30X45	0.30	0.40	-66.46	-10.08	11.58	43.04	0	0	85.944	87.782	87.994	89.832	82.449	83.000	89.281	89.832	55.926	57.764	57.976	59.814	52.431	52.982	59.263	59.814	99.0	0.10	178.92	68.74	247.66	OK
	B40	7					66.42	11.93	8.92	43.44	0	0	95.118	93.703	93.050	91.634	98.954	98.529	92.059	91.634	63.262	61.847	61.194	59.778	67.098	66.673	60.203	59.778						
N+7.50	B41	0	2.075	VIG30X45	0.30	0.40	-14.08	-3.54	1.9	0.18	0	0	20.126	20.427	20.134	20.436	20.317	20.407	20.346	20.436	12.362	12.663	12.370	12.672	12.553	12.643	12.582	12.672	20.4	0.10	178.92	68.74	247.66	OK
	B41	2.075					-5.18	-0.05	1.9	0.18	0	0	5.956	6.257	5.964	6.266	6.147	6.237	6.176	6.266	4.352	4.653	4.360	4.662	4.543	4.633	4.572	4.662						
N+4.00	B41	0	2.075	VIG30X45	0.30	0.40	-26.56	-14.37	3.98	4.8	0	0	45.382	46.013	45.610	46.242	45.291	45.480	46.052	46.242	23.044	23.675	23.272	23.904	22.953	23.142	23.714	23.904	46.2	0.10	178.92	68.74	247.66	OK
	B41	2.075					-13.92	-8.98	3.98	4.8	0	0	24.824	25.455	25.052	25.684	24.733	24.922	25.494	25.684	11.668	12.299	11.896	12.528	11.577	11.766	12.338	12.528						
N+7.50	B42	0	7	VIG30X45	0.30	0.40	-28.33	-12.39	3.98	17.44	0	0	44.924	45.556	45.754	46.386	43.428	43.618	46.196	46.386	24.035	24.667	24.865	25.497	22.539	22.729	25.307	25.497	48.4	0.10	178.92	68.74	247.66	OK
	B42	7					28.1	11.74	3.98	17.44	0	0	46.922	46.290	46.092	45.460	48.418	48.228	45.650	45.460	26.752	26.120	25.922	25.290	28.248	28.058	25.480	25.290						
N+4.00	B42	0	7	VIG30X45	0.30	0.40	-88.41	-22.31	4.18	29.54	0	0	126.332	126.995	127.739	128.402	123.514	123.713	128.203	128.402	77.499	78.162	78.906	79.569	74.681	74.880	79.370	79.569	141.7	0.10	178.92	68.74	247.66	OK
	B42	7					91.39	27.16	6.22	28.86	0	0	139.190	138.202	137.815	136.828	141.705	141.409	137.124	136.828	84.613	83.625	83.238	82.251	87.128	86.832	82.547	82.251						
N+7.50	B43	0	2.075	VIG30X45	0.30	0.40	-21.7	-6.16	0.86	0.94	0	0	32.019	32.155	32.063	32.200	32.010	32.051	32.159	32.200	19.349	19.485	19.393	19.530	19.340	19.381	19.489	19.530	32.2	0.10	178.92	68.74	247.66	OK
	B43	2.075					-11.18	-0.08	0.86	0.94	0	0	13.315	13.451	13.359	13.496	13.306	13.347	13.455	13.496	9.881	10.017	9.925	10.062	9.872	9.913	10.021	10.062						
N+4.00	B43	0	2.075	VIG30X45	0.30	0.40	-58.07	-33.58	2.44	8.68	0	0	102.463	102.851	102.877	103.264	101.770	101.886	103.148	103.264	51.462	51.850	51.876	52.263	50.769	50.885	52.147	52.263	103.3	0.10	178.92	68.74	247.66	OK
	B43	2.075					-39.52	-22.82	2.44	8.68	0	0	69.443	69.831	69.857	70.244	68.750	68.866	70.128	70.244	34.767	35.155	35.181	35.568	34.074	34.190	35.452	35.568						
N+4.00	B44	0	9.5	VIG15X45	0.15	0.40	-26.36	-17.7	1.62	1	0	0	49.027	49.284	49.075	49.332	49.096	49.173	49.255	49.332	23.419	23.676	23.467	23.724	23.488	23.565	23.647	23.724	49.3	0.10	178.92	34.37	213.29	OK
	B44	9.5					13.42	7.79	4.92	1.16	0	0	24.730	23.949	24.675	23.894	24.312	24.078	24.128	23.894	12.914	12.133	12.859	12.078	12.496	12.262	12.312	12.078						
N+4.00	B45	0	1.825	VIG35X45	0.35	0.40	13.42	7.79	4.92	1.16	0	0	24.730	23.949	24.675	23.894	24.312	24.078	24.128	23.894	12.914	12.133	12.859	12.078	12.496	12.262	12.312	12.078	42.7	0.10	178.92	80.20	259.12	OK
	B45	1.825					24.9	11.95	4.92	1.16	0	0	42.666	41.885	42.611	41.830	42.248	42.014	42.064	41.830	23.246	22.465	23.191	22.410	22.828	22.594	22.644	22.410						
N+4.00	B46	0	5.245	VIG15X45	0.15	0.40	-19.86	-11.5	1.46	4.1	0	0	34.905	35.137	35.100	35.332	34.612	34.681	35.262	35.332	17.447	17.679	17.642	17.874	17.154	17.223	17.804	17.874	35.3	0.10	178.92	34.37	213.29	OK
	B46	5.245					4.27	2.97	2.58	0.58	0	0	8.531	8.122	8.504	8.094	8.309	8.186	8.217	8.094	4.280	3.871	4.253	3.843	4.058	3.935	3.966	3.843						
N+7.50	B47	0	6.72	VIG35X45	0.35	0.40	-14.12	-0.75	16.22	4.84	0	0	14.889	17.464	15.119	17.694	16.153	16.926	16.922	17.694	9.903	12.478	10.133	12.708	11.167	11.940	11.936	12.708	17.7	0.10	178.92	80.20	259.12	OK
	B47	6.72					11.28	-0.75	16.22	4.84	0	0	15.591	13.016	15.361	12.786	14.327	13.554	13.558	12.786	12.957	10.382	12.727	10.152	11.693	10.920	10.924	10.152						
N+4.00	B47	0	6.72	VIG35X45	0.35	0.40	-76.4	-14.18	35.16	5.44	0	0	100.020	105.601	100.279	105.860	103.322	104.997	104.186	105.860	62.920	68.501	63.179	68.760	66.222	67.897	67.086	68.760	123.6	0.10	178.92	80.20	259.12	OK
	B47	6.72					84.66	15.47	35.22	20.04	0	0	123.607	118.016	122.652	117.062	121.920	120.243	118.739	117.062	82.739	77.148	81.784	76.194	81.052	79.375	77.871	76.194						

Diseños & Estructuras

PROYECTO: AGROECOL
RESISTENCIA A CORTANTE PARA VIGAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3.1 (b)

f'c = 21.0 MPa
fy = 420 MPa
Φ Cortante = 0.75
Estribos Φ = 9.5 mm
Av = 71 mm²
R= 6.30

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 sísmico 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						$2V_E$														$2V_{Emax}$	S	ΦVs	ΦVc	ΦVn	ΦVn > $2V_{Emax}$
	ELEMENTO												Combinaciones de carga de diseño para el doble del cortante donde se incluya E																			
	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+7.50	B48	0	7.07	VIG35X45	0.35	0.40	-14.36	-0.39	12.02	3.74	0	0	15.536	17.444	15.714	17.622	16.456	17.028	17.050	17.622	10.838	12.746	11.016	12.924	11.758	12.330	12.352	12.924	17.6	**0.10**	178.92	80.20	259.12	OK
	B48	7.07					12.36	-0.39	12.02	3.74	0	0	16.528	14.620	16.350	14.442	15.608	15.036	15.014	14.442	13.210	11.302	13.032	11.124	12.290	11.718	11.696	11.124						
N+4.00	B48	0	7.07	VIG35X45	0.35	0.40	-80.95	-14.63	27.28	4.58	0	0	107.222	111.552	107.440	111.770	109.744	111.043	110.471	111.770	68.307	72.637	68.525	72.855	70.829	72.128	71.556	72.855	117.6	**0.10**	178.92	80.20	259.12	OK
	B48	7.07					81.75	15.27	23.6	10.44	0	0	117.613	113.867	117.116	113.370	116.151	115.027	114.494	113.370	77.818	74.072	77.321	73.575	76.356	75.232	74.699	73.575						
N+7.50	B49	0	6.95	VIG35X45	0.35	0.40	-13.32	0.17	15.7	4.9	0	0	13.089	15.581	13.322	15.814	14.289	15.036	15.066	15.814	9.263	11.755	9.496	11.988	10.463	11.210	11.240	11.988	18.4	**0.10**	178.92	80.20	259.12	OK
	B49	6.95					12.95	0.17	15.7	4.9	0	0	18.435	15.943	18.202	15.710	17.235	16.488	16.458	15.710	14.380	11.888	14.147	11.655	13.180	12.433	12.403	11.655						
N+4.00	B49	0	6.95	VIG35X45	0.35	0.40	-94.85	-24.94	30.82	8.24	0	0	133.476	138.368	133.868	138.760	135.984	137.452	137.292	138.760	80.081	84.973	80.473	85.365	82.589	84.057	83.897	85.365	138.8	**0.10**	178.92	80.20	259.12	OK
	B49	6.95					80.27	21.1	31.24	9.2	0	0	122.821	117.862	122.383	117.424	120.372	118.884	118.912	117.424	77.640	72.681	77.202	72.243	75.191	73.703	73.731	72.243						
N+7.50	B50	0	6.72	VIG15X45	0.15	0.40	-5.13	-0.06	2.12	0.78	0	0	5.842	6.179	5.879	6.216	5.991	6.092	6.115	6.216	4.243	4.580	4.280	4.617	4.392	4.493	4.516	4.617	7.2	**0.10**	178.92	34.37	213.29	OK
	B50	6.72					5.75	-0.06	2.12	0.78	0	0	7.214	6.877	7.177	6.840	7.065	6.964	6.941	6.840	5.549	5.212	5.512	5.175	5.400	5.299	5.276	5.175						
N+4.00	B50	0	6.72	VIG15X45	0.15	0.40	-7.94	-1.08	4.06	6.28	0	0	9.665	10.309	9.964	10.608	9.418	9.611	10.415	10.608	6.203	6.847	6.502	7.146	5.956	6.149	6.953	7.146	18.4	**0.10**	178.92	34.37	213.29	OK
	B50	6.72					13.02	1.99	3.98	3.76	0	0	18.425	17.793	18.246	17.614	18.400	18.211	17.804	17.614	12.529	11.897	12.350	11.718	12.504	12.315	11.908	11.718						
N+7.50	B51	0	7.07	VIG15X45	0.15	0.40	-6.1	-0.23	2.18	1.64	0	0	7.126	7.472	7.204	7.550	7.186	7.290	7.446	7.550	5.066	5.412	5.144	5.490	5.126	5.230	5.386	5.490	7.6	**0.10**	178.92	34.37	213.29	OK
	B51	7.07					5.35	-0.23	2.18	1.64	0	0	6.614	6.268	6.536	6.190	6.554	6.450	6.294	6.190	5.239	4.893	5.161	4.815	5.179	5.075	4.919	4.815						
N+4.00	B51	0	7.07	VIG15X45	0.15	0.40	-12.2	-1.65	1.72	4.62	0	0	15.797	16.070	16.017	16.290	15.475	15.557	16.208	16.290	10.487	10.760	10.707	10.980	10.165	10.247	10.898	10.980	17.2	**0.10**	178.92	34.37	213.29	OK
	B51	7.07					11.86	2.23	4.38	1.56	0	0	17.232	16.536	17.157	16.462	16.918	16.710	16.671	16.462	11.444	10.748	11.369	10.674	11.130	10.922	10.883	10.674						
N+4.00	B52	0	1.575	VIG30X45	0.30	0.40	7.94	1.08	4.06	6.28	0	0	11.551	10.907	11.252	10.608	11.798	11.605	10.801	10.608	8.089	7.445	7.790	7.146	8.336	8.143	7.339	7.146	40.7	**0.10**	178.92	68.74	247.66	OK
	B52	1.575					27.59	6.37	4.06	6.28	0	0	40.421	39.777	40.122	39.478	40.668	40.475	39.671	39.478	25.774	25.130	25.475	24.831	26.021	25.828	25.024	24.831						
N+7.50	B53	0	1.575	VIG30X45	0.30	0.40	12.91	0.17	0.1	0.96	0	0	15.724	15.708	15.678	15.662	15.819	15.814	15.667	15.662	11.681	11.665	11.635	11.619	11.776	11.771	11.624	11.619	31.4	**0.10**	178.92	68.74	247.66	OK
	B53	1.575					21.4	5.6	0.1	0.96	0	0	31.342	31.326	31.296	31.280	31.437	31.432	31.285	31.280	19.322	19.306	19.276	19.260	19.417	19.412	19.265	19.260						
N+4.00	B53	0	1.575	VIG30X45	0.30	0.40	25.22	3.64	3.28	8.34	0	0	34.822	34.301	34.425	33.904	35.384	35.228	34.060	33.904	23.616	23.095	23.219	22.698	24.178	24.022	22.854	22.698	88.2	**0.10**	178.92	68.74	247.66	OK
	B53	1.575					60.17	14.5	3.28	8.34	0	0	87.622	87.101	87.225	86.704	88.184	88.028	86.860	86.704	55.071	54.550	54.674	54.153	55.633	55.477	54.309	54.153						
N+7.50	B54	0	6.95	VIG40X45	0.40	0.40	-15.86	-0.42	19.06	10.88	0	0	15.909	18.934	16.427	19.452	16.817	17.725	18.544	19.452	10.731	13.756	11.249	14.274	11.639	12.547	13.366	14.274	20.1	**0.10**	178.92	91.65	270.57	OK
	B54	6.95					14.16	-0.42	19.06	10.88	0	0	20.115	17.090	19.597	16.572	19.207	18.299	17.480	16.572	16.287	13.262	15.769	12.744	15.379	14.471	13.652	12.744						
N+4.00	B54	0	6.95	VIG40X45	0.40	0.40	-82.13	-38.86	40.7	22.06	0	0	129.905	136.366	130.956	137.416	131.976	133.914	135.478	137.416	66.406	72.867	67.457	73.917	68.477	70.415	71.979	73.917	141.1	**0.10**	178.92	91.65	270.57	OK
	B54	6.95					80.09	37.78	40	18.64	0	0	141.125	134.776	140.237	133.888	138.751	136.847	135.793	133.888	79.318	72.969	78.430	72.081	76.944	75.040	73.986	72.081						
N+4.00	B55	0	6.95	VIG40X45	0.40	0.40	-62.18	-26.79	43.5	22.66	0	0	93.422	100.327	94.501	101.406	95.738	97.809	99.335	101.406	47.978	54.883	49.057	55.962	50.294	52.365	53.891	55.962	107.8	**0.10**	178.92	91.65	270.57	OK
	B55	6.95					61.27	26.12	43.26	27.5	0	0	107.820	100.954	106.511	99.644	106.069	104.009	101.704	99.644	63.319	56.453	62.010	55.143	61.568	59.508	57.203	55.143						
N+4.00	B57	0	7	VIG25X45	0.25	0.40	-52.66	-14.25	1.82	6.32	0	0	76.852	77.141	77.153	77.442	76.352	76.439	77.355	77.442	46.804	47.093	47.105	47.394	46.304	46.391	47.307	47.394	77.4	**0.10**	178.92	57.28	236.20	OK
	B57	7					40.93	11.67	0.96	7	0	0	61.272	61.119	60.938	60.786	61.943	61.897	60.832	60.786	37.323	37.170	36.989	36.837	37.994	37.948	36.883	36.837						
N+4.00	B58	0	1.575	VIG25X45	0.25	0.40	-24.39	-7.96	0.76	6.22	0	0	36.811	36.932	37.107	37.228	36.205	36.241	37.192	37.228	21.534	21.655	21.830	21.951	20.928	20.964	21.915	21.951	37.2	**0.10**	178.92	57.28	236.20	OK
	B58	1.575					9.94	2.99	0.76	6.22	0	0	15.335	15.214	15.039	14.918	15.941	15.905	14.954	14.918	9.363	9.242	9.067	8.946	9.969	9.933	8.982	8.946						
N+4.00	B59	0	3.475	VIG25X45	0.25	0.40	-39.52	-11.68	11.38	3.88	0	0	57.113	58.919	57.298	59.104	57.946	58.488	58.562	59.104	33.577	35.383	33.762	35.568	34.410	34.952	35.026	35.568	59.1	**0.10**	178.92	57.28	236.20	OK
	B59	3.475					3.05	0.4	11.38	3.88	0	0	6.051	4.245	5.866	4.060	5.218	4.676	4.602	4.060	4.736	2.930	4.551	2.745	3.903	3.361	3.287	2.745						
N+4.00	B60	0	3.475	VIG25X45	0.25	0.40	-4.32	-1.02	10.36	3.4	0	0	4.398	6.042	4.560	6.204	5.171	5.664	5.711	6.204	2.082	3.726	2.244	3.888	2.855	3.348	3.395	3.888	58.7	**0.10**	178.92	57.28	236.20	OK
	B60	3.475					38.24	11.05	10.36	3.4	0	0	58.744	57.100	58.582	56.938	57.971	57.478	57.431	56.938	36.222	34.578	36.060	34.416	35.449	34.956	34.909	34.416						
N+4.00	B61	0	7	VIG25X45	0.25	0.40	-39.87	-11.2	0.22	1.98	0	0	58.915	58.950	59.009	59.044	58.719	58.730	59.034	59.044	35.754	35.789	35.848	35.883	35.558	35.569	35.873	35.883	61.6	**0.10**	178.92	57.28	236.20	OK
	B61	7					41.41	11.55	0.16	2.22	0	0	61.373	61.348	61.267	61.242	61.602	61.594	61.250	61.242	37.400	37.375	37.294	37.269	37.629	37.621	37.277	37.269						
N+4.00	B62	0	6.45	VIG25X45	0.25	0.40	-41.25	-10.4	0.5	1.28	0	0	59.760	59.839	59.821	59.900	59.673	59.697	59.876	59.900	36.985	37.064	37.046	37.125	36.898	36.922	37.101	37.125	59.9	**0.10**	178.92	57.28	236.20	OK
	B62	6.45					37.15	9.16	0.98	2.7	0	0	54.024	53.869	53.896	53.740	54.215	54.169	53.787	53.740	33.719	33.564	33.591	33.435	33.910	33.864	33.482	33.435						
N+4.00	B63	0	4.5	VIG25X45	0.25	0.40	-33.63	-25.28	0.78	7.48	0	0	65.156	65.280	65.512	65.636	64.412	64.449	65.599	65.636	29.787	29.911	30.143	30.267	29.043	29.080	30.230	30.267	65.6	**0.10**	178.92	57.28	236.20	OK
	B63	4.5					23.68	22.72	0.78	7.48	0	0	51.616	51.492	51.260	51.136	52.360	52.323	51.173	51.136	21.792	21.668	21.436	21.312	22.536	22.499	21.349	21.312						
N+4.00	B64	0	6.72	VIG25X45	0.25	0.40	-34.93	-9.78	3.72	0.48	0	0	51.083	51.673	51.106	51.696	51.443	51.620	51.519	51.696	30.824	31.414	30.847	31.437	31.184	31.361	31.260	31.437	68.4	**0.10**	178.92	57.28	236.20	OK
	B64	6.72					45.76	12.71	4.58	1.06	0	0	68.399	67.672	68.349	67.622	68.008	67.790	67.840	67.622	41.961	41.234	41.911	41.184	41.570	41.352	41.402	41.184						
N+4.00	B65	0	7.07	VIG25X45	0.25	0.40	-44.09	-12.28	1.38	0.32	0	0	64.954	65.173	64.969	65.188	65.071	65.137	65.122	65.188	39.447	39.666	39.462	39.681	39.564	39.630	39.615	39.681	73.9	**0.10**	178.92	57.28	236.20	OK
	B65	7.07					49.91	13.55	2.92	0.62	0	0	73.935	73.472	73.905	73.442	73.679	73.540	73.581	73.442	45.412	44.949	45.382	44.919	45.156	45.017	45.058	44.919						
N+4.00	B66	0	6.95	VIG25X45	0.25	0.40	-52.2	-14.88	6.48	1.64	0	0	76.413	77.442	76.491	77.520	76.951	77.260	77.211	77.520	45.873	46.902	45.951	46.980	46.411	46.720	46.671	46.980	77.5	**0.10**	178.92	57.28	236.20	OK
	B66	6.95					37.88	11.02	6.68	1.36	0	0	57.601	56.541	57.536	56.476	57.010	56.692	56.794	56.476	35.217	34.157	35.152	34.092	34.626	34.308	34.410	34.092						
N+4.00	B67	0	1.575	VIG25X45	0.25	0.40	-10.07	-3.07	2.02	9.94	0	0	14.360	14.681	14.833	15.154	13.480	13.576	15.058	15.154	8.269	8.590	8.742	9.063	7.389	7.485	8.967	9.063	37.1	**0.10**	178.92	57.28	236.20	OK
	B67	1.575					23.26	7.52	2.02	9.94	0	0	36.226	35.905	35.753	35.432	37.106	37.010	35.528	35.432	21.728	21.407	21.255	20.934	22.608	22.512	21.030	20.934						
N+4.00	B68	0	3.5	VIG25X45	0.25	0.40	-41.39	-10.84	2.62	11.26	0	0	59.556	59.972	60.092	60.508	58.596	58.721	60.383	60.508	36.299	36.715	36.835	37.251	35.339	35.464	37.126	37.251	60.5	**0.10**	178.92	57.28	236.20	OK
	B68	3.5					1.67	1.39	2.62	11.26	0	0	4.346	3.930	3.810	3.394	5.306	5.181	3.519	3.394	2.455	2.039	1.919	1.503	3.415	3.290	1.628	1.503						
N+4.00	B69	0	3.5	VIG25X45	0.25	0.40	1.17	1.48	2.1	11.86	0	0	3.782	3.449	3.217	2.884	4.867	4.767	2.984	2.884	1.951	1.618	1.386	1.053	3.036	2.936	1.153	1.053	68.8	**0.10**	178.92	57.28	236.20	OK
	B69	3.5					44.23	13.71	2.1	11.86	0	0	67.684	67.351	67.119	66.786	68.769	68.669	66.886	66.786	40.705	40.372	40.140	39.807	41.790	41.690	39.907	39.807						
N+4.00	B70	0	2.075	VIG25X45	0.25	0.40	-21.23	-14.56	1.74	9.36	0	0	39.314	39.590	39.760	40.036	38.467	38.550	39.953	40.036	18.385	18.661	18.831	19.107	17.538	17.621	19.024	19.107	40.0	**0.10**	178.92	57.28	236.20	OK
	B70	2.075					-3.79	-3.79	1.74	9.36	0	0	7.616	7.892	8.062	8.338	6.769	6.852	8.255	8.338	2.689	2.965	3.135	3.411	1.842	1.925	3.328	3.411						
N+4.00	B71	0	1.575	VIG25X45	0.25	0.40	-12.61	-3.88	2.78	3.34	0	0	18.412	18.853	18.571	19.012	18.349	18.482	18.880	19.012	10.749	11.190	10.908	11.349	10.686	10.819	11.217	11.349	34.6	**0.10**	178.92	57.28	236.20	OK
	B71	1.575					22.24	7.25	2.78	3.34	0	0	34.538	34.097	34.379	33.938	34.601	34.468	34.070	33.938	20.616	20.175	20.457	20.016	20.679	20.546	20.148	20.016						
N+4.00	B72	0	3.5	VIG25X45	0.25	0.40	-37.33	-10.15	1.66	6.26	0	0	54.384	54.648	54.683	54.946	53.873	53.952	54.867	54.946	33.035	33.299	33.334	33.597	32.524	32.603	33.518	33.597	54.9	**0.10**	178.92	57.28	236.20	OK
	B72	3.5					5.78	2.1	1.66	6.26	0	0	9.598	9.334	9.299	9.036	10.109	10.030	9.115	9.036	5.764	5.500	5.465	5.202	6.275	6.196	5.281	5.202						
N+4.00	B73	0	3.5	VIG25X45	0.25	0.40	-0.46	1.26	0.7	5.56	0	0	1.084	0.973	0.819	0.708	1.624	1.591	0.741	0.708	0.038	0.149	0.303	0.414	0.502	0.469	0.381	0.414	65.6	**0.10**	178.92	57.28	236.20	OK

PROYECTO: AGROECOL
RESISTENCIA A CORTANTE PARA VIGAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3.1 (b)

f'c = 21.0 MPa
fy = 420 MPa
Φ Cortante = 0.75
Estribos Φ = 9.5 mm
Av = 71 mm²
R= 6.30

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 sísmico 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)))

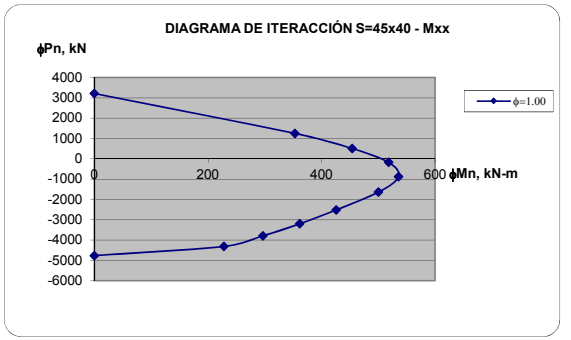
NIVEL	VIGA	LOC.	LONG.	PROPIEDADES DEL ELEMENTO			V2						$2V_E$ Combinaciones de carga de diseño para el doble del cortante donde se incluya E																$2V_{E\,max}$	S	ΦVs	ΦVc	ΦVn	ΦVn > $2V_{Emax}$
	ELEMENTO			SECCION	b	d	C.M.	C.V.	SISMO X	SISMO Y	-SISMO X	-SISMO Y	COMBDIS3	COMBDIS4	COMBDIS5	COMBDIS6	COMBDIS7	COMBDIS8	COMBDIS9	COMBDIS10	COMBDIS11	COMBDIS12	COMBDIS13	COMBDIS14	COMBDIS15	COMBDIS16	COMBDIS17	COMBDIS18						
	No.	(m)	(m)		(m)	(m)	(KN.m)	(KN.m)	(KN.m)	(KN.m)	(KN.m)	(KN.m)																	(kN)	(m)	(kN)	(kN)	(kN)	
N+4.00	B73	3.5	3.5	VIG25X45	0.25	0.40	42.66	13.51	0.7	5.56	0	0	65.078	64.967	64.813	64.702	65.618	65.585	64.735	64.702	38.770	38.659	38.505	38.394	39.310	39.277	38.427	38.394	65.0	0.10	178.92	57.28	236.20	OK
N+4.00	B74	0	2.075	VIG25X45	0.25	0.40	-19.89	-12.74	1.62	3.52	0	0	36.183	36.440	36.351	36.608	35.972	36.049	36.531	36.608	17.476	17.733	17.644	17.901	17.265	17.342	17.824	17.901	36.6	0.10	178.92	57.28	236.20	OK
	B74	2.075					-2.63	-2.14	1.62	3.52	0	0	4.871	5.128	5.039	5.296	4.660	4.737	5.219	5.296	1.942	2.199	2.110	2.367	1.731	1.808	2.290	2.367						
N+4.00	B77	0	1.825	VIG25X45	0.25	0.40	10.19	7.51	4.96	4.76	0	0	20.752	19.965	20.525	19.738	20.730	20.494	19.974	19.738	10.185	9.398	9.958	9.171	10.163	9.927	9.407	9.171	36.3	0.10	178.92	57.28	236.20	OK
	B77	1.825					19.7	11.67	4.96	4.76	0	0	36.324	35.537	36.097	35.310	36.302	36.066	35.546	35.310	18.744	17.957	18.517	17.730	18.722	18.486	17.966	17.730						
N+4.00	B78	0	1.825	VIG25X45	0.25	0.40	18.48	14.36	1.16	3.58	0	0	36.891	36.706	36.720	36.536	37.159	37.104	36.591	36.536	16.987	16.802	16.816	16.632	17.255	17.200	16.687	16.632	43.1	0.10	178.92	57.28	236.20	OK
	B78	1.825					23.41	14.36	1.16	3.58	0	0	42.807	42.622	42.636	42.452	43.075	43.020	42.507	42.452	21.424	21.239	21.253	21.069	21.692	21.637	21.124	21.069						
N+4.00	B79	0	4.95	VIG25X45	0.25	0.40	-31.2	-8.59	8.14	2.18	0	0	44.634	45.926	44.738	46.030	45.296	45.684	45.642	46.030	26.684	27.976	26.788	28.080	27.346	27.734	27.692	28.080	46.0	0.10	178.92	57.28	236.20	OK
	B79	4.95					12.74	2.54	8.14	2.18	0	0	19.224	17.932	19.120	17.828	18.562	18.174	18.216	17.828	12.862	11.570	12.758	11.466	12.200	11.812	11.854	11.466						
N+4.00	B80	0	4.95	VIG25X45	0.25	0.40	-50.25	-15.29	5.14	2.4	0	0	74.660	75.476	74.774	75.590	74.964	75.209	75.345	75.590	44.295	45.111	44.409	45.225	44.599	44.844	44.980	45.225	75.6	0.10	178.92	57.28	236.20	OK
	B80	4.95					25.04	7.25	5.14	2.4	0	0	38.228	37.412	38.114	37.298	37.924	37.679	37.543	37.298	23.466	22.650	23.352	22.536	23.162	22.917	22.781	22.536						
N+4.00	B81	0	3.475	VIG25X45	0.25	0.40	-42.34	-13.19	7.6	3.56	0	0	62.622	63.828	62.792	63.998	63.071	63.433	63.636	63.998	36.730	37.936	36.900	38.106	37.179	37.541	37.744	38.106	64.0	0.10	178.92	57.28	236.20	OK
	B81	3.475					0.06	-1.18	7.6	3.56	0	0	0.268	0.938	0.098	1.108	0.181	0.543	0.746	1.108	1.430	0.224	1.260	0.054	0.981	0.619	0.416	0.054						
N+4.00	B82	0	3.475	VIG25X45	0.25	0.40	-3.77	0.07	8.06	2.8	0	0	3.041	4.321	3.175	4.454	3.626	4.010	4.070	4.454	1.980	3.260	2.114	3.393	2.565	2.949	3.009	3.393	59.8	0.10	178.92	57.28	236.20	OK
	B82	3.475					38.63	12.08	8.06	2.8	0	0	59.849	58.569	59.715	58.436	59.264	58.880	58.820	58.436	36.180	34.900	36.046	34.767	35.595	35.211	35.151	34.767						
N+7.50	B84	0	0.575	VIG40X45	0.40	0.40	-2.48	0	0	0	0	0	2.976	2.976	2.976	2.976	2.976	2.976	2.976	2.976	2.232	2.232	2.232	2.232	2.232	2.232	2.232	2.232	3.0	0.10	178.92	91.65	270.57	OK
	B84	0.575					0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
N+7.50	B85	0	0.575	VIG40X45	0.40	0.40	-2.48	0	0	0	0	0	2.976	2.976	2.976	2.976	2.976	2.976	2.976	2.976	2.232	2.232	2.232	2.232	2.232	2.232	2.232	2.232	3.0	0.10	178.92	91.65	270.57	OK
	B85	0.575					0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
N+7.50	B86	0	0.575	VIG15X45	0.15	0.40	-0.93	0	0	0	0	0	1.116	1.116	1.116	1.116	1.116	1.116	1.116	1.116	0.837	0.837	0.837	0.837	0.837	0.837	0.837	0.837	1.1	0.10	178.92	34.37	213.29	OK
	B86	0.575					0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000						
N+7.50	B87	0	2.075	VIG25X45	0.25	0.40	3.01	0.99	0.44	0.2	0	0	4.681	4.612	4.672	4.602	4.655	4.634	4.623	4.602	2.788	2.719	2.779	2.709	2.762	2.741	2.730	2.709	11.4	0.10	178.92	57.28	236.20	OK
	B87	2.075					8.62	1	0.44	0.2	0	0	11.423	11.354	11.414	11.344	11.397	11.376	11.365	11.344	7.837	7.768	7.828	7.758	7.811	7.790	7.779	7.758						
N+7.50	B90	0	1.9	VIG30X45	0.30	0.40	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	18.6	0.10	178.92	68.74	247.66	OK
	B90	1.9					12.94	2.71	2.12	0.78	0	0	18.612	18.275	18.575	18.238	18.463	18.362	18.339	18.238	12.020	11.683	11.983	11.646	11.871	11.770	11.747	11.646						
N+7.50	B91	0	0.325	VIG30X45	0.30	0.40	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.3	0.10	178.92	68.74	247.66	OK
	B91	0.325					1.05	0	0	0	0	0	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	0.945	0.945	0.945	0.945	0.945	0.945	0.945	0.945						

PROYECTO: AGROECOL (CHOCO)
RESISTENCIA A CORTANTE PARA COLUMNAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3.2 (a) - COLUMNA S=40X40 (12/#8 (3.8%))

f'c =	**21.1**	MPa	**Estribos Φ =**	**9.5**	mm
fy =	**420**	MPa	**Av =**	**71**	mm^2
$\Phi_{Cortante}$ =	**0.75**		**Cantidad de ramas =**	**4**	
bx =	**0.40**	m	**S =**	**0.10**	m
by =	**0.40**	m	**Recub. =**	**0.05**	m
Lcol =	**7.50**	m			

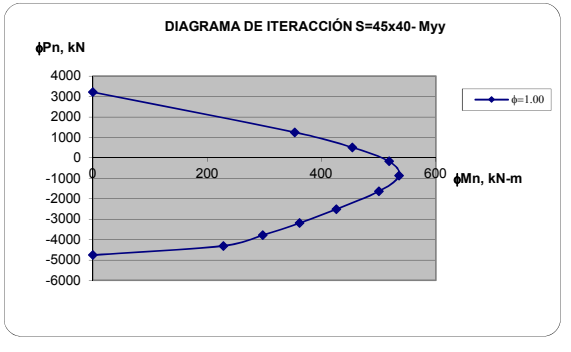
C.21.3.3.2(a) El cortante ΦVn no debe ser menor que la suma del cortante debido a flexión en curvatura inversa asociado con el desarrollo de los momentos nominales de la columna en cada extremo restringido de la longitud libre.

DATOS PARA LOS DIAGRAMAS DE ITERACCIÓN			
No.	**Curve 1**	**0. degrees**	
	P	**M3**	**M2**
1	-4766.00	0.00	0.00
2	-4316.00	228.02	0.00
3	-3792.00	296.85	0.00
4	-3199.00	361.56	0.00
5	-2518.00	425.71	0.00
6	-1641.00	500.21	0.00
7	-882.30	535.61	0.00
8	-177.96	518.06	0.00
9	506.61	453.62	0.00
10	1245.14	353.26	0.00
11	3210.96	0.00	0.00



P_{ua} =	993.34	**kN**
P_{ub} =	970.30	**kN**
ΦM_{na} =	419.40	**kN-m**
ΦM_{nb} =	416.27	**kN-m**
$V_{umáx}$ =	111.42	**kN**
ΦV_s =	313.11	**kN**
ΦV_c =	80.39	**kN**
ΦV_n =	393.50	**kN**
$\Phi V_n > V_{umáx}$ =	OK	

DATOS PARA LOS DIAGRAMAS DE ITERACCIÓN			
No.	**Curve 7**	**90. degrees**	
	P	**M3**	**M2**
1	-4766.00	0.00	0.00
2	-4316.00	0.00	228.02
3	-3792.00	0.00	296.85
4	-3199.00	0.00	361.56
5	-2518.00	0.00	425.71
6	-1641.00	0.00	500.21
7	-882.30	0.00	535.61
8	-177.96	0.00	518.06
9	506.61	0.00	453.62
10	1245.14	0.00	353.26
11	3210.96	0.00	0.00



P_{ua} =	992.62	**kN**
P_{ub} =	969.58	**kN**
ΦM_{na} =	419.30	**kN-m**
ΦM_{nb} =	416.17	**kN-m**
$V_{umáx}$ =	111.40	**kN**
ΦV_s =	313.11	**kN**
ΦV_c =	80.39	**kN**
ΦV_n =	393.50	**kN**
$\Phi V_n > V_{umáx}$ =	OK	

PROYECTO: AGROECOL (CHOCO)
RESISTENCIA A CORTANTE PARA COLUMNAS
CHEQUEO PARA LA CONDICIÓN DESCRITA EN C.21.3.3.2 (b)

f'c =	**21.1**	MPa	**Estribos Φ =**	**9.5**	mm
fy =	**420**	MPa	**Av =**	**71**	mm^2
$\Phi_{Cortante}$ =	**0.75**		**Cantidad de ramas =**	**4**	
bx =	**0.50**	m	**S =**	**0.10**	m
by =	**0.50**	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 la que incluyan E, con E incrementado por medio de Ωo.

Para cortante V2

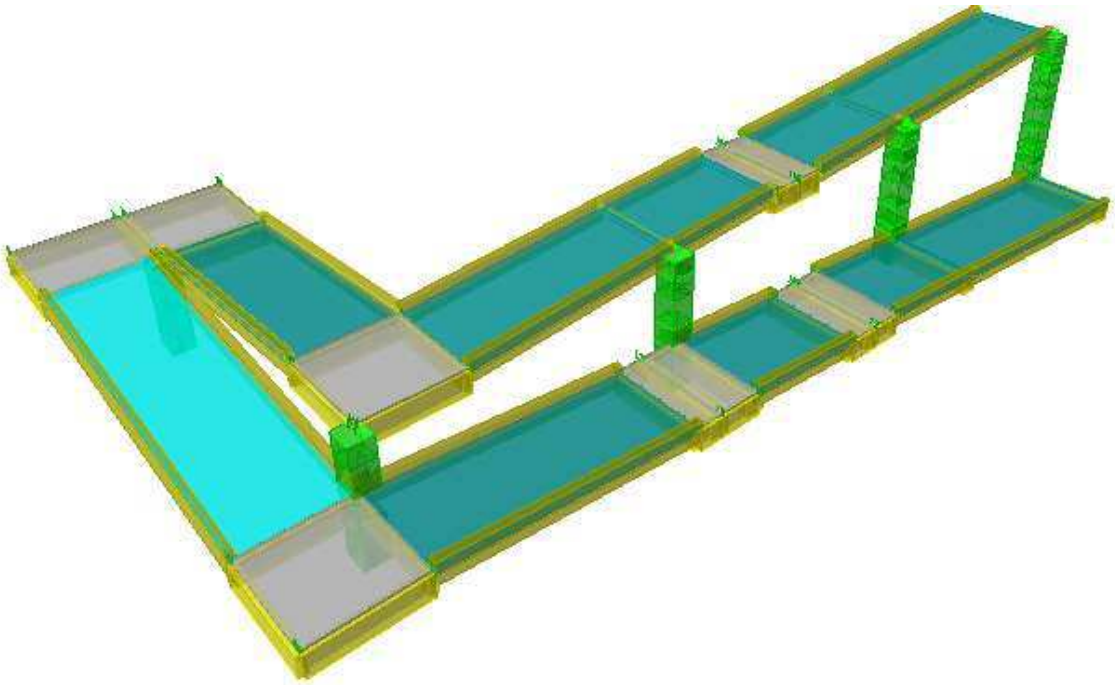
Ω_o*$V_{umáx}$ =	361.29	**kN**
ΦV_s =	402.57	**kN**
ΦV_c =	129.19	**kN**
ΦV_n =	531.76	**kN**
$\Phi V_n > \Omega_o$*$V_{umáx}$ =	OK	

Para cortante V3

Ω_o*$V_{umáx}$ =	260.25	**kN**
ΦV_s =	402.57	**kN**
ΦV_c =	129.19	**kN**
ΦV_n =	531.76	**kN**
$\Phi V_n > \Omega_o$*$V_{umáx}$ =	OK	

PROYECTO: JORNADA UNICO DEL MINISTERIO DE EDUCACION MODULO 2. SEDE EDUCATIVA AGROECOL MUNICIPIO UNION PANAMERICANA (CHOCO)

dye16-2255



MEMORIAS DE ANÁLISIS Y DISEÑO ESTRUCTURAL

BOGOTÁ D.C., 18 DE NOVIEMBRE 2016

TABLA DE CONTENIDO

1. DESCRIPCIÓN DEL PROYECTO

1.1. INTRODUCCIÓN

El presente documento contiene las memorias de análisis y diseño estructural correspondiente al proyecto ***SEDE EDUCATIVA AGROECOL - RAMPA*** ubicado en UNION PANAMERICANA (CHOCO)

1.2. DESCRIPCIÓN ARQUITECTÓNICA

El proyecto se encuentra ubicado en un lote de 380m² de área aproximadamente, en la cual se contempla la construcción un edificio de dos niveles, 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

CHOCÓ, 18 DE NOVIEMBRE 2016 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 SEDE EDUCATIVA AGROECOL-RAMAP ubicado en el municipio UNION PANAMERICANA (CHOCO), 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: SEDE EDUCATIVA AGROECOL - 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 MODAL
CÁLCULO DE DERIVAS MÁXIMAS
VERIFICACIÓN DE IRREGULARIDAD TORSIONAL

PROYECTO: SEDE EDUCATIVA AGROECOL - 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 =	**3.95**	m
α =	**0.90**	
T_a=	**0.16**	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	

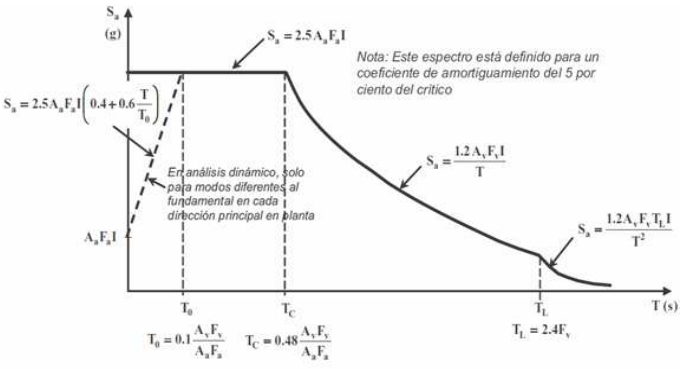
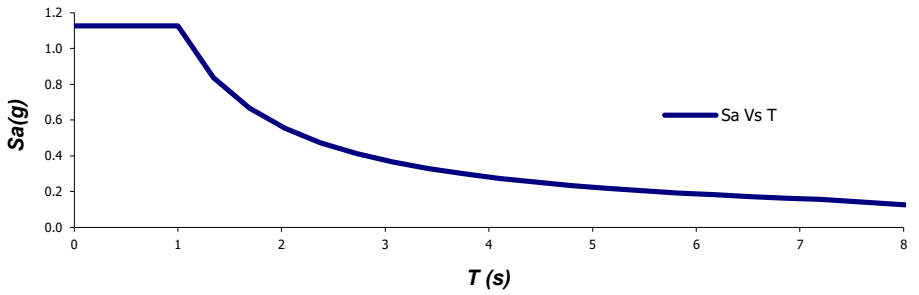


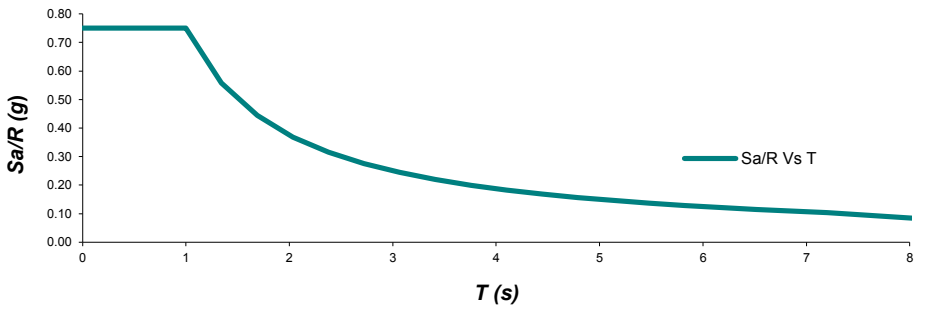
Figura A.2.6-1 — Espectro Elástico de Aceleraciones de Diseño como fracción de g

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: SEDE EDUCATIVA AGROECOL - 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

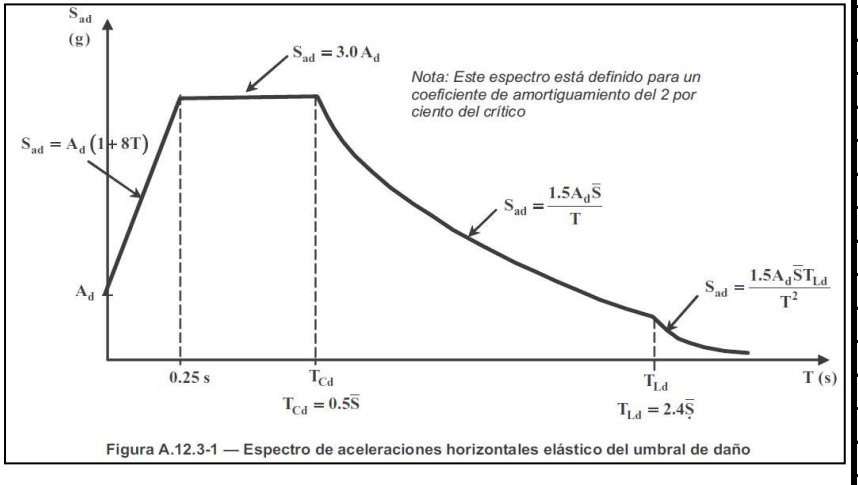
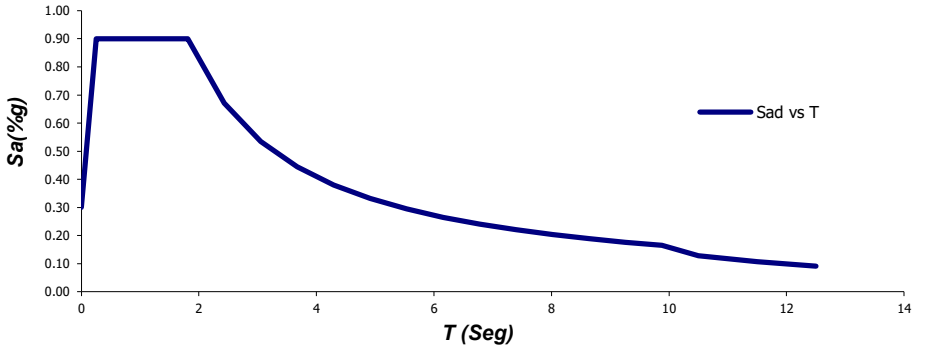


Figura A.12.3-1 — Espectro de aceleraciones horizontales elástico del umbral de daño

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.

PROYECTO: SEDE EDUCATIVA AGROECOL - RAMPA
CALCULO DEL CORTANTE BASAL DE LA ESTRUCTURA (ESPECTRO DE DISEÑO)

CALCULO DEL CORTANTE BASAL DE LA ESTRUCTURA

$H_{edificio}$ =	3.95	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 =	0.16	Seg	
C_u =	1.20		
$C_u T_a$ =	0.19	Seg	
$T_{modelación\ estructural}$ =	0.1700	Seg	
ΔT =	5.05	%	Ok!
$T_{adoptado}$ =	0.17	Seg	
S_a =	0.852		S_a obtenido del espectro de diseño
g =	9.81	m/s^2	
M =	140.40	Ton	Masa obtenida del modelo
V_s =	1173.48	kN	
90% Vs =	1056.13	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
$V_{s(x)}$=	800.52	283.27	849.16	1.244	12.201	Se aplica en SISMO X
$V_{s(y)}$=	283.27	661.97	720.03	1.467	14.389	Se aplica en SISMO Y

MODELO CORREGIDO
Response Espectrum Base Reactions

	F1 (kN)	F2 (kN)	Total (kN)	90% Vs (kN)
$V_{s(x)}$=	800.52	283.27	**849.16**	**1056.1**
$V_{s(y)}$=	283.27	661.97	**720.03**	**1056.1**

PROYECTO: SEDE EDUCATIVA AGROECOL - RAMPA
CALCULO DEL CORTANTE BASAL DE LA ESTRUCTURA (ESPECTRO DE UMBRAL DE DAÑO)

CALCULO DEL CORTANTE BASAL DE LA ESTRUCTURA

$H_{edificio}$=	3.95	m	
Tipo de Perfil:	E		
Ad =	0.09	g	
Fv =	3.00		
C_t =	0.047		
α =	0.90		
T_a =	0.16	Seg	
C_u =	1.20		
$C_u T_a$ =	0.19	Seg	
$T_{modelación\ estructural}$ =	0.17	Seg	
ΔT =	5.05	%	Ok!
$T_{adoptado}$ =	0.1700	Seg	
S_a =	0.900		S_a obtenido del espectro de diseño
g =	9.81	m/s^2	
M =	140.40	Ton	Masa obtenida del modelo
V_s =	1239.59	kN	
90% Vs =	1115.63	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
$V_{s(x)}$=	440.75	156.47	467.70	2.385	23.400	Se aplica en SISMO X
$V_{s(y)}$=	156.47	368.23	400.10	2.788	27.354	Se aplica en SISMO Y

MODELO CORREGIDO
Response Espectrum Base Reactions

	F1 (kN)	F2 (kN)	Total (kN)	90% Vs (kN)
$V_{s(x)}$=	440.75	156.47	**467.70**	**1115.6**
$V_{s(y)}$=	156.47	368.23	**400.10**	**1115.6**

4. DISEÑO DE CIMENTACIÓN

DISEÑO DE CIMENTACIÓN

PROYECTO: SEDE EDUCATIVA AGROECOL - 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	162	CIM1	3.990	-5.360	396.110	-667.146	162.370	-18.993	CIM1	667.146		
BASE	162	CIM2 MAX	79.950	58.650	354.770	-470.950	298.573	13.557	CIM2 MAX	470.95		
BASE	162	CIM2 MIN	-72.920	-68.010	349.300	-701.690	-13.041	-47.044	CIM2 MIN	701.69	CIM1	396.11
BASE	162	CIM3 MAX	41.430	93.930	356.140	-405.315	220.785	4.736	CIM3 MAX	405.315		
BASE	162	CIM3 MIN	-34.400	-103.290	347.930	-767.325	64.747	-38.223	CIM3 MIN	767.325		
BASE	169	CIM1	31.700	-1.750	78.280	77.914	119.877	-15.402	CIM1	119.877		
BASE	169	CIM2 MAX	45.740	19.160	77.810	143.054	156.902	-0.196	CIM2 MAX	156.902		
BASE	169	CIM2 MIN	10.100	-22.230	67.360	-4.207	53.871	-26.895	CIM2 MIN	53.871	CIM1	78.28
BASE	169	CIM3 MAX	39.230	35.680	76.100	204.822	138.924	-4.211	CIM3 MAX	204.822		
BASE	169	CIM3 MIN	16.610	-38.750	69.060	-65.975	71.849	-22.880	CIM3 MIN	71.849		
BASE	170	CIM1	303.550	1.850	348.480	-78.189	98.711	25.790	CIM1	98.711		
BASE	170	CIM2 MAX	344.150	27.960	319.770	-4.097	169.508	67.013	CIM2 MAX	169.508		
BASE	170	CIM2 MIN	190.550	-24.670	306.260	-136.330	0.135	-21.400	CIM2 MIN	136.33	CIM1	348.48
BASE	170	CIM3 MAX	317.350	46.000	318.650	40.088	139.465	62.724	CIM3 MAX	139.465		
BASE	170	CIM3 MIN	217.350	-42.710	307.380	-180.515	30.178	-17.111	CIM3 MIN	180.515		
BASE	171	CIM1	-339.24	5.26	606.17	-195.038	125.924	12.585	CIM1	195.038		
BASE	171	CIM2 MAX	-263.14	36.31	550.88	-114.443	187.791	50.819	CIM2 MAX	187.791		
BASE	171	CIM2 MIN	-334.43	-27.16	528.71	-230.912	33.306	-28.653	CIM2 MIN	230.912	CIM1	606.17
BASE	171	CIM3 MAX	-269.58	46.42	548.13	-76.771	162.654	42.699	CIM3 MAX	162.654		
BASE	171	CIM3 MIN	-327.99	-37.27	531.47	-268.585	58.443	-20.533	CIM3 MIN	268.585		
BASE	174	CIM1	19.94	-60.95	374.96	-7.291	43.476	-5.53	CIM1	43.476		
BASE	174	CIM2 MAX	86.31	-23.48	361.28	37.079	150.466	-0.229	CIM2 MAX	150.466		
BASE	174	CIM2 MIN	-49.79	-85.97	331.3	-52.206	-70.454	-9.92	CIM2 MIN	70.454	CIM1	374.96
BASE	174	CIM3 MAX	74.58	1.45	368.51	69.136	125.26	0.918	CIM3 MAX	125.26		
BASE	174	CIM3 MIN	-38.07	-110.9	324.07	-84.263	-45.247	-11.068	CIM3 MIN	84.263		

DISEÑO VIGAS DE AMARRE

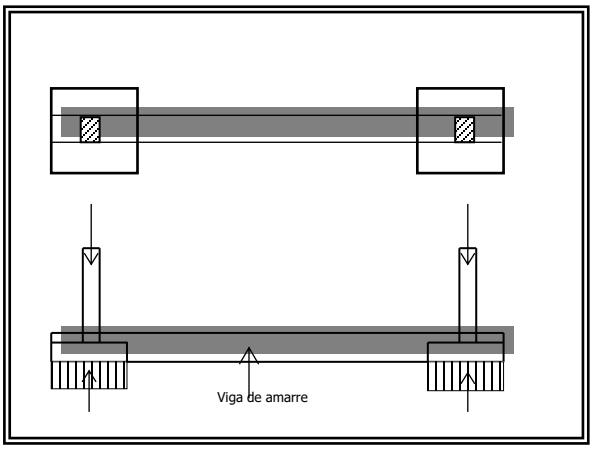
PROYECTO: SEDE EDUCATIVA AGROECOL - RAMPA

VIGA DE AMARRE TIPO

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

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

Pmáx = 606.17 kN



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

Aa = ***0.15***
Paxial = 0.25*Aa*Pmáx
Paxial = *22.7* kN

DISEÑO A TENSIÓN

As = 1.7*22.731375/(0.90*420)
As = **1.02** cm^2

DISEÑO A COMPRESIÓN

P com = 1.7*22.731375
P com = *38.6* 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).

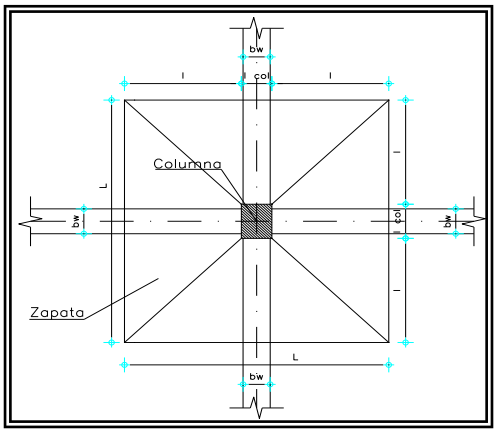
DISEÑO DE ZAPATAS RECTANGULAR

PROYECTO: SEDE EDUCATIVA AGROECOL - RAMPA

ZAPATA TIPO 11 (3 ud)-CIM1

Columna	**b =**	50	cm	**f'c =**	21.1	MPa	**σ =**	0.120	MPa
	t =	50	cm	**fy =**	420	MPa			

PREDIMENSIONAMIENTO



L =	3.500	m	
lcol =	0.500	m	
l =	1.500	m	

Cargas

Mu=	163	kN*m
Pu =	396.11	kN
Pp (10%) =	40	kN
Σ P =	436	kN

Area necesaria $= \frac{\Sigma P}{\sigma} = \frac{435.72}{0.120} =$ 3.63 m²

e =	0.41	m		L=	3.50	m
L =	1.906	m	*Aproximamos*	B=	1.80	m

Carga de diseño = $\frac{Pu}{A\ real} = \frac{396.11}{6.300} =$ 0.063 MPa

Esfuerzos

σmáx=	0.118	MPa	OK
σmin=	-0.026	MPa	OK

DISEÑO DE ZAPATA RECTANGULAR

FLEXIÓN

	M borde de la columna =	171.00	kN*m
Mu =	1,7 * M borde de la columna =	290.70	kN*m

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

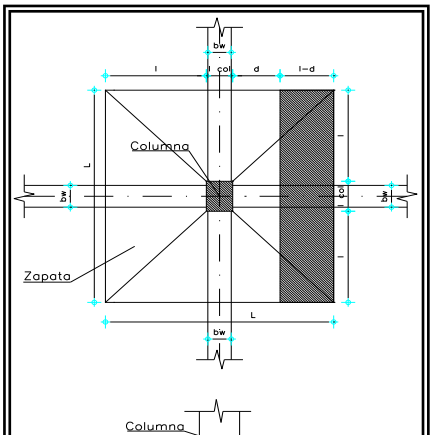
Cuantia = 0.00253982

As = 13.46 cm²/m

Armadura: 24#521c./0.15 long.

12#538c./0.15 Transv.

CORTANTE

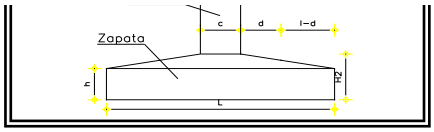


a. En una dirección (d)

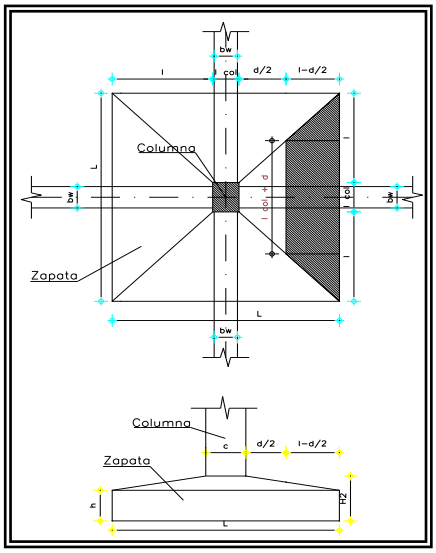
L =	3.50	m	**H =**	0.60	m
l =	1.50	m	**h =**	0.30	m
l - d =	0.97	m	**H-h =**	0.30	m

V (d) =	332.68	kN
Vu (d)=	1.7*V(d)	
Vu (d) =	565.56	kN
h´=	0.43	m

$\upsilon v = \frac{Vu}{L * h'} =$ 0.375 MPa



ϕvc = 0.57 MPa **OK**



b. En dos direcciones (d/2)

ZAPATA TIPO 11 (3 ud)-CI

L =	3.500	m	**H =**	0.60	m
d/2 =	0.265	m	**h =**	0.30	m
l - d/2 =	1.235	m	**H-h =**	0.30	m

V (d/2) =	258.9	kN
Vu (d/2) =	1.5*V(d)	
Vu (d/2) =	388.4	kN
d_1 =	0.48551724	m

$$\nu u = \frac{Vu}{bo \times d_1} = 0.777 \text{ MPa}$$

ϕvc= 1.15 MPa **OK**

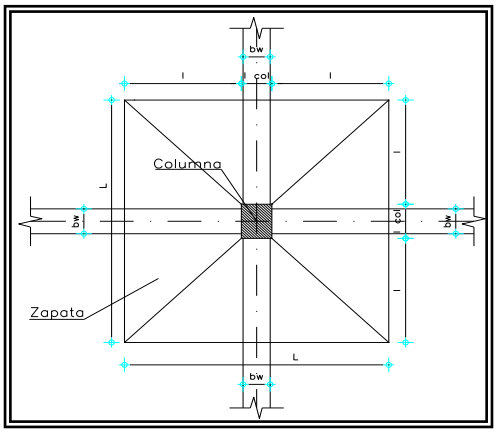
DISEÑO DE ZAPATAS RECTANGULAR

PROYECTO: SEDE EDUCATIVA AGROECOL - RAMPA

ZAPATA TIPO 11 (1 ud)-CIM1

Columna	**b =**	50	cm	**f'c =**	21.1	MPa	**σ =**	0.120	MPa
	t =	50	cm	**fy =**	420	MPa			

PREDIMENSIONAMIENTO



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

Cargas

Mu=	120	kN*m
Pu =	606.10	kN
Pp (10%) =	61	kN
Σ P =	667	kN

Area necesaria = $\frac{\Sigma P}{\sigma} = \frac{666.71}{0.120} =$ 5.56 m²

e =	0.20	m		L=	4.00 m
L =	2.357	m	*Aproximamos*	B=	2.00 m

Carga de diseño = $\frac{Pu}{A\ real} = \frac{606.1}{8.000} =$ 0.076 MPa

Esfuerzos

σmáx=	0.108	MPa	OK
σmin=	0.034	MPa	OK

DISEÑO DE ZAPATA RECTANGULAR

FLEXIÓN

	M borde de la columna =	191.62	kN*m
Mu =	1,7 * M borde de la columna =	325.75	kN*m

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

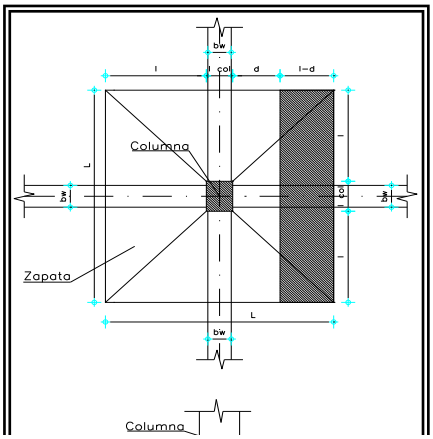
Cuantia = 0.00285699

As = 15.14 cm²/m

Armadura: 31#523c./0.13 long.

16#543c./0.13 Transv.

CORTANTE

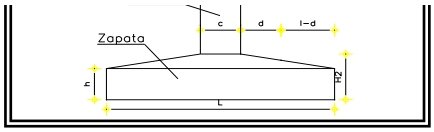


a. En una dirección (d)

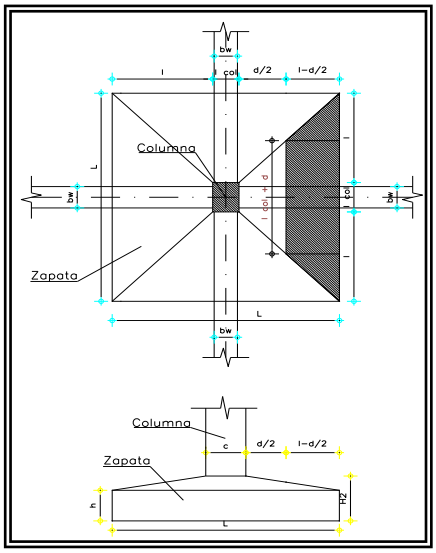
L =	4.00	m		**H =**	0.60 m
l =	1.75	m		**h =**	0.30 m
l - d =	1.22	m		**H-h =**	0.30 m

V (d) =	472.27	kN
Vu (d)=	1.7*V(d)	
Vu (d) =	802.86	kN
h´=	0.45	m

$\upsilon v = \frac{Vu}{L * h'} =$ 0.451 MPa



ϕvc = 0.57 MPa **OK**



b. En dos direcciones (d/2)

ZAPATA TIPO 11 (1 ud)-CI

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) =	352.2	kN
Vu (d/2) =	1.5*V(d)	
Vu (d/2) =	528.4	kN
d_1 =	0.49205882	m

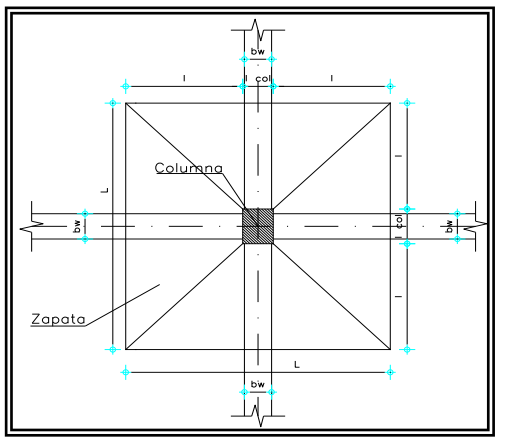
$$\nu u = \frac{Vu}{bo \times d_1} = 1.043 \text{ MPa}$$

ϕvc= 1.15 MPa **OK**

DISEÑO DE ZAPATA CONCENTRICA
PROYECTO: SEDE EDUCATIVA AGROECOL - RAMPA
ZAPATA TIPO 12 (1 Und)-CIM1

Columna	**b =**	**50**	cm	**f'c =**	**21.1**	MPa		**σ =**	**0.120**	MPa
	t =	**50**	cm	**fy =**	**420**	MPa				

PREDIMENSIONAMIENTO



L =	3.00	m	
lcol =	0.50	m	
l =	1.25	m	

Cargas

Mu=	**150.40**	kN*m
Pu =	**394.70**	kN
Pp (10%) =	39.47	kN
Σ P =	434.17	kN

Area necesaria $= \frac{\Sigma P}{\sigma} = \frac{434.17}{0.120} =$ 3.62 m²

e =	0.38	m
L =	1.90	m

Aproximamos = **3.00** m

Carga de diseño = $\frac{Pu}{A\ real} = \frac{394.7}{9.000} =$ 0.044 MPa

Esfuerzos

σmáx=	0.085	MPa	**OK**
σmin=	0.011	MPa	**OK**

DISEÑO DE ZAPATA CONCENTRICA

FLEXIÓN

M borde de la columna = 80.77 kN*m

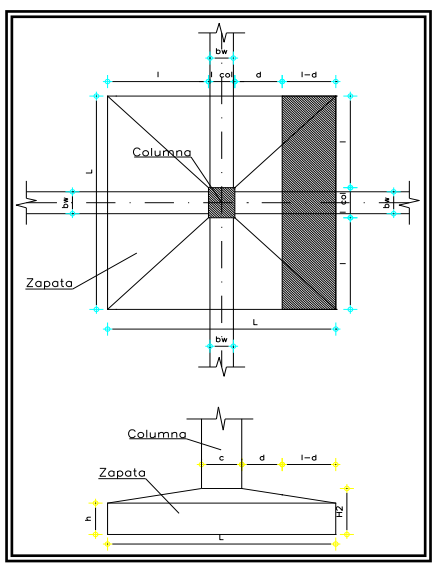
Mu = 1,7 * M borde de la columna = 137.31 kN*m

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

d=	0.33	m
Cuantia =	0.003116	
As =	10.28	cm²/m

Armadura: ***17#533c./0.19 en ambos sentidos***

CORTANTE



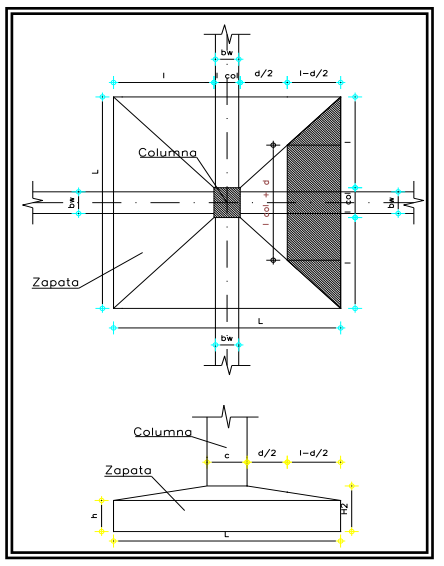
a. En una dirección (d)

L =	3.00	m
l =	1.25	m
l - d =	0.92	m
V (d) =	203.50	kN
Vu (d)=	1.7*V(d)	
Vu (d) =	345.95	kN
h´=	0.31	m

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

$\upsilon\nu = \frac{Vu}{L * h'} =$ 0.376 MPa

ϕvc = 0.574 MPa **OK**



b. En dos direcciones (d/2)

L =	3.00	m
d/2 =	0.17	m
l - d/2 =	1.09	m
V (d/2) =	149.0	kN
Vu (d/2) =	1.5*V(d)	
Vu (d/2) =	223.5	kN
d_1 =	0.320416667	m

ZAPATA TIPO 12 (1 Und)-CIM

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

νu $= \frac{Vu}{bo \times d_1} =$ 0.840 MPa

ϕvc= 1.15 MPa **OK**

5. DISEÑO DE VIGAS Y COLUMNAS

DISEÑO DE VIGAS Y COLUMNAS

PROYECTO: RAMPA AGROECOL (CHOCÓ)

VR-01/ BASE

B= 0.40 H= 0.40 L= 1.90		
Mu=-4.90 As =3.81 As(r)=4.57		Mu=-11.67 As =3.81 As(r)=4.57
	Mu=2.92 As =5.08 As(r)=4.57	
Vu=-8.32	Vu=10.07	Vu=15.51

VR-19/ N+ 0.5

B= 0.40 H= 0.50 L= 2.15		
Mu=-4.55 As =25.40 As(r)=5.89		Mu=-309.47 As =27.10 As(r)=21.37
	Mu=0.00 As =7.92 As(r)=5.89	
Vu=130.16	Vu=136.70	Vu=256.35

VR-17/ N+ 0.76

B= 0.15 H= 0.45 L= 1.95		
Mu=-11.63 As =1.90 As(r)=1.96		Mu=-2.91 As =2.54 As(r)=1.96
	Mu=2.91 As =2.54 As(r)=1.96	
Vu=-13.66	Vu=-7.46	Vu=-2.08

VR-21/ N+ 0.76

B= 0.15 H= 0.45 L= 1.95		
Mu=-8.98 As =1.90 As(r)=1.96		Mu=-2.24 As =2.54 As(r)=1.96
	Mu=2.24 As =2.54 As(r)=1.96	
Vu=-12.12	Vu=-6.59	Vu=2.95

PROYECTO: RAMPA AGROECOL (CHOCÓ)

VR-13/ N+ 0.97

B= 0.15 H= 0.45 L= 1.95		
Mu=-10.20 As =1.90 As(r)=1.96		Mu=-0.00 As =2.54 As(r)=1.96
	Mu=2.15 As =2.54 As(r)=1.96	
Vu=-14.52	Vu=-8.99	Vu=-3.72

VR-14/ N+ 0.97

B= 0.40 H= 0.45 L= 1.88		
Mu=-0.00 As =29.04 As(r)=5.23		Mu=-569.34 As =29.04 As(r)=999.99
	Mu=0.00 As =7.92 As(r)=5.23	
Vu=225.95	Vu=237.97	Vu=451.74

VR-6/ N+ 1.44

B= 0.15 H= 0.45 L= 1.95			B= 0.15 H= 0.45 L= 5.32			B= 0.15 H= 0.45 L= 0.28		
Mu=-0.00 As =7.76 As(r)=1.96		Mu=-22.86 As =7.76 As(r)=1.96	Mu=-87.30 As =7.76 As(r)=6.73		Mu=-349.20 As =14.46 As(r)=999.99	Mu=-363.83 As =14.46 As(r)=999.99		Mu=-419.59 As =14.46 As(r)=999.99
	Mu=1.01 As =0.32 As(r)=1.96			Mu=87.30 As =0.32 As(r)=11.68			Mu=104.90 As =0.32 As(r)=8.41	
Vu=10.41	Vu=12.45	Vu=14.50	Vu=-22.66	Vu=-60.87	Vu=-99.09	Vu=100.85	Vu=101.38	Vu=101.91

B= 0.15 H= 0.45 L= 0.70			B= 0.15 H= 0.45 L= 2.68			B= 0.15 H= 0.45 L= 0.42		
Mu=-551.39 As =14.46 As(r)=999.99		Mu=-670.85 As =14.33 As(r)=999.99	Mu=-126.81 As =11.66 As(r)=10.83		Mu=-31.70 As =7.76 As(r)=2.22	Mu=-20.67 As =7.76 As(r)=1.96		Mu=-5.17 As =7.76 As(r)=1.96
	Mu=167.71 As =0.32 As(r)=13.38			Mu=31.70 As =0.32 As(r)=2.22			Mu=5.17 As =0.32 As(r)=1.96	
Vu=124.82	Vu=125.74	Vu=126.67	Vu=59.76	Vu=40.12	Vu=23.94	Vu=-44.69	Vu=-44.01	Vu=-43.33

B= 0.15 H= 0.45 L= 0.42			B= 0.15 H= 0.45 L= 2.58			B= 0.15 H= 0.45 L= 5.88		
Mu=-6.75 As =7.76 As(r)=1.96		Mu=-4.30 As =7.76 As(r)=1.96	Mu=-12.09 As =7.76 As(r)=1.96		Mu=-48.36 As =13.01 As(r)=3.47	Mu=-332.51 As =14.46 As(r)=999.99		Mu=-1.99 As =7.76 As(r)=1.96
	Mu=7.16 As =0.32 As(r)=1.96			Mu=14.76 As =0.32 As(r)=1.96			Mu=0.00 As =0.32 As(r)=3.52	
Vu=-33.91	Vu=-33.23	Vu=-32.55	Vu=6.43	Vu=-19.98	Vu=-37.32	Vu=96.85	Vu=53.65	Vu=10.46

PROYECTO: RAMPA AGROECOL (CHOCÓ)

VR-7/ N+1.44

B= 0.15 H= 0.45 L= 1.95			B= 0.15 H= 0.45 L= 5.32			B= 0.15 H= 0.45 L= 0.28		
Mu=-0.00 As =7.76 As(r)=1.96		Mu=-13.39 As =7.76 As(r)=1.96	Mu=-111.47 As =7.76 As(r)=9.08		Mu=-445.90 As =14.46 As(r)=999.99	Mu=-431.26 As =14.46 As(r)=999.99		Mu=-504.97 As =14.46 As(r)=999.99
Mu=10.08 As =3.96 As(r)=1.96			Mu=111.47 As =3.96 As(r)=13.72			Mu=126.24 As =3.96 As(r)=10.80		
Vu=14.00	Vu=16.05	Vu=18.09	Vu=-46.47	Vu=-84.68	Vu=-122.90	Vu=133.48	Vu=134.01	Vu=134.55

B= 0.15 H= 0.45 L= 0.55			B= 0.15 H= 0.45 L= 2.53			B= 0.15 H= 0.45 L= 0.42		
Mu=-373.17 As =14.46 As(r)=999.99		Mu=-508.54 As =14.03 As(r)=999.99	Mu=-249.84 As =11.32 As(r)=999.99		Mu=-80.47 As =7.76 As(r)=7.20	Mu=-76.37 As =7.76 As(r)=5.76		Mu=-56.19 As =7.76 As(r)=4.24
Mu=127.13 As =3.96 As(r)=10.85			Mu=62.46 As =3.96 As(r)=9.80			Mu=19.09 As =3.96 As(r)=1.96		
Vu=141.57	Vu=142.49	Vu=143.42	Vu=79.95	Vu=60.32	Vu=40.68	Vu=-30.22	Vu=-29.54	Vu=-28.86

B= 0.15 H= 0.45 L= 0.42			B= 0.15 H= 0.45 L= 2.58			B= 0.15 H= 0.45 L= 5.88		
Mu=-44.35 As =7.76 As(r)=3.16		Mu=-37.50 As =7.76 As(r)=2.69	Mu=-38.72 As =7.76 As(r)=2.89		Mu=-110.28 As =12.00 As(r)=8.96	Mu=-268.82 As =14.46 As(r)=999.99		Mu=-1.21 As =0.00 As(r)=1.96
Mu=11.09 As =3.96 As(r)=1.96			Mu=27.57 As =3.96 As(r)=1.96			Mu=0.00 As =3.96 As(r)=1.96		
Vu=-14.16	Vu=-13.48	Vu=-12.80	Vu=-8.97	Vu=-25.09	Vu=-45.01	Vu=86.77	Vu=43.58	Vu=3.62

VR-1/ N+2.1

B= 0.15 H= 0.45 L= 1.95			B= 0.15 H= 0.45 L= 0.10			B= 0.15 H= 0.45 L= 1.95		
Mu=-22.36 As =3.96 As(r)=1.96		Mu=-10.88 As =3.96 As(r)=1.96	Mu=-9.14 As =3.96 As(r)=1.96		Mu=-9.14 As =3.96 As(r)=1.96	Mu=-0.00 As =3.96 As(r)=1.96		Mu=-0.92 As =3.96 As(r)=1.96
Mu=12.04 As =3.96 As(r)=1.96			Mu=35.12 As =2.97 As(r)=2.49			Mu=15.53 As =3.96 As(r)=1.96		
Vu=-33.40	Vu=-31.36	Vu=-29.32	Vu=-14.69	Vu=-14.50	Vu=-14.30	Vu=11.82	Vu=13.86	Vu=15.90

VR-2/ N+2.1

B= 0.40 H= 0.45 L= 1.88			B= 0.40 H= 0.45 L= 1.88		
Mu=-5.01 As =18.16 As(r)=5.23		Mu=-446.33 As =24.22 As(r)=35.62	Mu=-232.05 As =24.22 As(r)=17.88		Mu=-0.00 As =24.22 As(r)=5.23
Mu=0.00 As =15.52 As(r)=5.23			Mu=0.00 As =15.52 As(r)=5.23		
Vu=180.59	Vu=186.29	Vu=313.28	Vu=-217.08	Vu=-111.91	Vu=-106.20

PROYECTO: RAMPA AGROECOL (CHOCÓ)

VR-8/ N+ 2.1

B= 0.15 H= 0.45 L= 1.98			B= 0.15 H= 0.45 L= 7.57			B= 0.15 H= 0.45 L= 1.82		
Mu=-0.00 As =7.76 As(r)=1.96		Mu=-0.00 As =7.76 As(r)=1.96	Mu=-101.73 As =7.76 As(r)=8.09		Mu=-406.91 As =12.68 As(r)=999.99	Mu=-117.49 As =12.68 As(r)=10.25		Mu=-15.07 As =5.82 As(r)=1.96
Mu=31.02 As =5.70 As(r)=2.17			Mu=101.73 As =5.70 As(r)=9.45			Mu=0.00 As =5.70 As(r)=1.96		
Vu=-14.00	Vu=3.87	Vu=16.74	Vu=6.75	Vu=58.17	Vu=112.79	Vu=-64.14	Vu=-48.77	Vu=-33.40

VR-9/ N+ 2.1

B= 0.15 H= 0.45 L= 1.98			B= 0.15 H= 0.45 L= 7.72			B= 0.15 H= 0.45 L= 1.97		
Mu=-0.71 As =7.76 As(r)=1.96		Mu=-1.35 As =7.76 As(r)=1.96	Mu=-93.88 As =7.76 As(r)=7.34		Mu=-375.54 As =14.46 As(r)=999.99	Mu=-6.75 As =14.46 As(r)=1.96		Mu=-0.00 As =7.76 As(r)=1.96
Mu=17.93 As =5.70 As(r)=1.96			Mu=93.88 As =5.70 As(r)=8.11			Mu=14.70 As =5.70 As(r)=1.96		
Vu=-24.16	Vu=-10.03	Vu=8.47	Vu=-8.80	Vu=50.42	Vu=105.04	Vu=-18.65	Vu=-4.85	Vu=14.63

VR-10/ N+ 2.57

B= 0.15 H= 0.45 L= 1.95			B= 0.15 H= 0.45 L= 5.39			B= 0.15 H= 0.45 L= 1.97		
Mu=-0.00 As =7.76 As(r)=1.96		Mu=-1.89 As =7.76 As(r)=1.96	Mu=-57.98 As =7.76 As(r)=4.23		Mu=-231.93 As =14.46 As(r)=999.99	Mu=-2.42 As =14.46 As(r)=1.96		Mu=-0.00 As =7.76 As(r)=1.96
Mu=31.91 As =5.70 As(r)=2.23			Mu=57.98 As =5.70 As(r)=4.23			Mu=21.47 As =5.70 As(r)=1.96		
Vu=-16.34	Vu=4.45	Vu=16.21	Vu=-13.75	Vu=-50.92	Vu=-89.41	Vu=-9.86	Vu=10.82	Vu=26.02

VR-12/ N+ 2.57

B= 0.15 H= 0.45 L= 1.95			B= 0.15 H= 0.45 L= 5.24			B= 0.15 H= 0.45 L= 1.82		
Mu=-11.48 As =2.97 As(r)=1.96		Mu=-11.48 As =3.96 As(r)=1.96	Mu=-21.73 As =3.96 As(r)=1.96		Mu=-86.93 As =9.12 As(r)=6.69	Mu=-61.36 As =9.12 As(r)=4.50		Mu=-0.00 As =9.12 As(r)=1.96
Mu=26.71 As =3.96 As(r)=2.20			Mu=43.46 As =3.96 As(r)=3.09			Mu=0.00 As =3.96 As(r)=1.96		
Vu=-39.15	Vu=-24.38	Vu=-12.32	Vu=17.51	Vu=-22.67	Vu=-60.78	Vu=-46.54	Vu=-31.17	Vu=-15.90

VR-15/ N+ 2.97

B= 0.40 H= 0.45 L= 2.00		
Mu=-341.94 As =29.04 As(r)=29.12		Mu=-0.00 As =20.28 As(r)=5.23
Mu=0.00 As =7.92 As(r)=5.23		
Vu=-360.12	Vu=-161.79	Vu=-156.35

PROYECTO: RAMPA AGROECOL (CHOCÓ)

VR-18/ N+3.18

B= 0.15 H= 0.45 L= 1.95		
Mu=-4.39 As =1.90 As(r)=1.96		Mu=-4.93 As =2.54 As(r)=1.96
	Mu=1.23 As =2.54 As(r)=1.96	
Vu=-7.67	Vu=2.84	Vu=8.23

VR-22/ N+3.18

B= 0.15 H= 0.45 L= 1.95		
Mu=-3.21 As =1.90 As(r)=1.96		Mu=-4.22 As =2.54 As(r)=1.96
	Mu=2.12 As =2.54 As(r)=1.96	
Vu=-7.37	Vu=2.73	Vu=8.11

VR-20/ N+3.39

B= 0.40 H= 0.45 L= 2.15		
Mu=-198.99 As =15.52 As(r)=14.95		Mu=-3.84 As =15.52 As(r)=5.23
	Mu=0.00 As =7.92 As(r)=5.23	
Vu=-193.81	Vu=-89.21	Vu=-82.68

VR-25/ N+3.95

B= 0.40 H= 0.45 L= 2.15		
Mu=-100.50 As =7.92 As(r)=7.09		Mu=-3.29 As =7.92 As(r)=5.23
	Mu=0.00 As =5.08 As(r)=5.23	
Vu=-75.40	Vu=-43.20	Vu=-36.67

VR-3/ N+3.95

B= 0.15 H= 0.45 L= 1.98			B= 0.15 H= 0.45 L= 4.57			B= 0.15 H= 0.45 L= 2.68		
Mu=-8.09 As =7.76 As(r)=1.96		Mu=-20.00 As =7.76 As(r)=1.96	Mu=-55.04 As =7.76 As(r)=3.99		Mu=-220.15 As =12.68 As(r)=999.99	Mu=-179.65 As =12.68 As(r)=14.12		Mu=-44.91 As =7.76 As(r)=3.20
	Mu=2.15 As =5.70 As(r)=1.96			Mu=55.04 As =5.70 As(r)=3.99			Mu=44.91 As =5.70 As(r)=3.20	
Vu=-4.63	Vu=6.04	Vu=8.08	Vu=14.33	Vu=42.57	Vu=75.18	Vu=-79.74	Vu=-60.11	Vu=-40.48

PROYECTO: RAMPA AGROECOL (CHOCÓ)

B= 0.15 H= 0.45 L= 0.42			B= 0.15 H= 0.45 L= 0.45			B= 0.15 H= 0.45 L= 2.75		
Mu=-18.01 As =7.76 As(r)=1.96		Mu=-4.50 As =7.76 As(r)=1.96	Mu=-5.61 As =7.76 As(r)=1.96		Mu=-5.61 As =7.76 As(r)=1.96	Mu=-7.77 As =7.76 As(r)=1.96		Mu=-31.08 As =7.76 As(r)=2.17
	Mu=11.94 As =5.70 As(r)=1.96			Mu=19.90 As =5.70 As(r)=1.96			Mu=25.16 As =5.70 As(r)=1.96	
Vu=-33.88	Vu=-33.20	Vu=-32.52	Vu=-19.97	Vu=-19.29	Vu=-18.61	Vu=-13.11	Vu=17.05	Vu=32.70

B= 0.15 H= 0.45 L= 5.89		
Mu=-65.52 As =7.76 As(r)=4.84		Mu=-26.99 As =7.76 As(r)=1.96
	Mu=34.07 As =5.70 As(r)=2.53	
Vu=-50.25	Vu=-12.78	Vu=35.44

VR-5/ N+ 3.95

B= 0.15 H= 0.50 L= 1.98			B= 0.15 H= 0.50 L= 4.57			B= 0.15 H= 0.50 L= 2.68		
Mu=-0.00 As =7.76 As(r)=2.21		Mu=-19.33 As =7.76 As(r)=2.21	Mu=-107.70 As =7.76 As(r)=7.33		Mu=-430.81 As =12.77 As(r)=999.99	Mu=-175.12 As =12.77 As(r)=13.09		Mu=-43.78 As =7.76 As(r)=2.73
	Mu=8.34 As =5.70 As(r)=2.21			Mu=107.70 As =5.70 As(r)=13.62			Mu=43.78 As =5.70 As(r)=2.73	
Vu=16.34	Vu=18.38	Vu=20.43	Vu=62.12	Vu=94.73	Vu=127.33	Vu=-82.18	Vu=-62.54	Vu=-46.01

B= 0.15 H= 0.50 L= 0.42			B= 0.15 H= 0.50 L= 0.45			B= 0.15 H= 0.50 L= 2.75		
Mu=-6.40 As =7.76 As(r)=2.21		Mu=-6.19 As =7.76 As(r)=2.21	Mu=-7.04 As =7.76 As(r)=2.21		Mu=-7.04 As =7.76 As(r)=2.21	Mu=-12.63 As =7.76 As(r)=2.21		Mu=-36.78 As =7.76 As(r)=2.27
	Mu=20.84 As =5.70 As(r)=2.21			Mu=26.23 As =5.70 As(r)=2.21			Mu=47.50 As =5.70 As(r)=3.10	
Vu=-28.28	Vu=-27.59	Vu=-26.91	Vu=-15.12	Vu=-14.44	Vu=-13.76	Vu=-24.21	Vu=18.19	Vu=33.84

B= 0.15 H= 0.50 L= 5.89		
Mu=-116.19 As =7.76 As(r)=8.02		Mu=-29.07 As =7.76 As(r)=2.21
	Mu=29.05 As =5.70 As(r)=2.21	
Vu=-62.55	Vu=-27.16	Vu=29.52

PROYECTO: SEDE EDUCATIVA AGROECOL-RAMPA

Columna A1-1'

Nivel	H Libre	Losa	B	H	M1	M2	P	V1	V2	Cuantia	m/mr	Col/Vig Eje ppal	Col/vig Eje sec
N+2.1					211.97	-823.58				16/#7 (2.5%)	2.56	1.27	
	1.70	.45	.50	.50			-447.71	221.70	303.69				
		1.00			622.15	-1057.38				16/#7 (2.5%)	3.32		

Columna E'-3

Nivel	H Libre	Losa	B	H	M1	M2	P	V1	V2	Cuantia	m/mr	Col/Vig Eje ppal	Col/vig Eje sec
N+3.95					39.10	127.93				24/#6 (2.7%)	0.61		5.01
	3.55	.45	.50	.50			-79.78	85.59	99.04				
		1.00			-40.83	440.53				24/#6 (2.7%)	0.96		

Columna C'-3

Nivel	H Libre	Losa	B	H	M1	M2	P	V1	V2	Cuantia	m/mr	Col/Vig Eje ppal	Col/vig Eje sec
N+3.39					221.09	183.09				20/#6 #5 (2.0%)	0.89		2.14
	2.78	.45	.50	.50			-172.41	234.55	98.38				
					187.41	417.59				20/#6 #5 (2.0%)	1.35		
					-9.38	-339.44				20/#6 #5 (2.0%)	1.04		2.74
	.10	.45	.50	.50			-404.79	552.65	127.81				
		1.00			255.74	-400.01				20/#6 #5 (2.0%)	1.44		

Columna A'-3

Nivel	H Libre	Losa	B	H	M1	M2	P	V1	V2	Cuantia	m/mr	Col/Vig Eje ppal	Col/vig Eje sec
N+2.97					303.25	341.94				20/#6 #5 (2.0%)	1.42		1.31
	1.70	.45	.50	.50			-374.52	313.09	104.80				
					236.50	412.70				20/#6 #5 (2.0%)	1.44		
N+0.76					609.54	-379.45				20/#6 #5 (2.0%)	2.20		2.67
	.91	.45	.50	.50			-697.16	475.01	123.88				
		1.00			281.54	-488.76				20/#6 #5 (2.0%)	1.94		

PROYECTO: SEDE EDUCATIVA AGROECOL-RAMPA

Columna A1-3

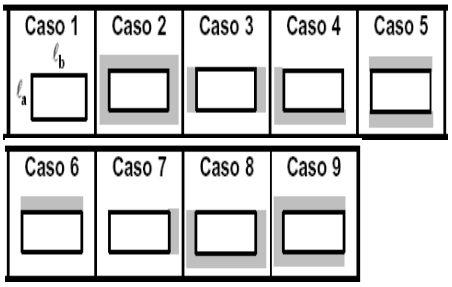
Nivel	H Libre	Losa	B	H	M1	M2	P	V1	V2	Cuantia	m/mr	Col/Vig Eje ppal	Col/vig Eje sec
N+2.57					0.00	0.00				24/#4 (1.2%)	0.80		
	2.52	.10	.50	.50			365.15	115.2	92.8				
		1.00			0.00	0.00				24/#4 (1.2%)	1.04		

6. DISEÑO DE ELEMENTOS COMPLEMENTARIOS

DISEÑO DE ELEMENTOS COMPLEMENTARIOS

PROYECTO: SEDE EDUCATIVA AGROECOL - 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 =	**1.80**	m	fy =	**420**	MPa
lb =	**6.10**	m	f'c =	**21**	MPa
Relación m =	**0.295**				

h = l/20 (0.4+Fy/700) = 0.09 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 = **4.89** kN.m

Cuantía:	0.0024	*As =*	2.45 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= 10.87 **kN**

ϕvc = **0.573** **MPa**
ϕvu = **0.155** **MPa** **OK**

8. 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+3.95	N+3.39	0.560	3.950
N+3.39	None	0.210	3.390
N+3.18	None	0.210	3.180
N+2.97	None	0.400	2.970
N+2.57	None	0.470	2.570
N+2.1	None	0.660	2.100
N+1.44	None	0.470	1.440
N+0.97	N+1.44	0.210	0.970
N+0.76	N+1.44	0.260	0.760
N+0.5	N+1.44	0.550	0.500
BASE	None		-0.050

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

POINT	X	Y	DZ-BELOW
70	22.250	0.000	0.000
72	12.550	0.000	0.000
74	13.250	0.000	0.000
76	11.850	0.000	0.000
78	8.100	0.000	0.000
82	7.550	0.000	0.000
89	0.000	0.000	0.000
92	0.000	9.890	0.000
94	4.400	9.890	0.000
99	4.400	4.400	0.000
103	12.550	4.400	0.000
104	13.250	4.400	0.000
105	11.850	4.400	0.000
132	22.250	2.100	0.000
134	0.000	2.100	0.000
136	7.550	2.100	0.000
137	8.100	2.100	0.000
139	11.850	2.100	0.000
140	12.550	2.100	0.000
141	13.250	2.100	0.000
143	2.100	0.000	0.000
146	2.100	9.890	0.000
149	2.300	4.400	0.000
150	2.300	9.890	0.000
153	4.400	2.300	0.000
154	11.850	2.300	0.000
155	12.550	2.300	0.000
156	13.250	2.300	0.000
160	2.100	2.100	0.000
161	2.300	2.300	0.000
162	2.200	9.890	0.000
169	22.200	2.200	0.000
170	16.090	2.200	0.000
171	9.050	2.200	0.000
174	2.200	2.200	0.000
177	16.090	0.000	0.000
178	9.050	0.000	0.000
179	9.050	4.400	0.000
180	16.090	4.400	0.000
181	22.200	4.400	0.000
182	9.050	2.100	0.000
186	16.090	2.100	0.000
189	9.050	2.300	0.000
192	16.090	2.300	0.000
196	22.200	2.300	0.000
197	0.000	11.990	0.000
198	4.400	11.990	0.000
202	2.100	11.990	0.000
203	2.300	11.990	0.000

ETABS v9.7.4 File:RAMPA Units:KN-m enero 6, 2017 14:10 PAGE 3

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

C27	169	169	Below
C29	170	170	Below
C32	171	171	Below
C34	174	174	Below
C36	162	162	Below

ETABS v9.7.4 File:RAMPA Units:KN-m enero 6, 2017 14:10 PAGE 4

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
B52	82	78
B56	76	72
B57	72	74
B74	105	103
B75	103	104
B92	136	137
B94	139	140
B95	140	141
B101	154	155
B102	155	156
B103	70	132
B107	72	140
B109	76	139
B111	74	141
B113	78	137
B117	82	136
B121	89	143
B123	89	134
B136	149	99
B138	153	99
B142	155	103
B144	156	104
B146	154	105
B151	134	160
B153	143	160
B156	161	149
B158	161	153
B164	178	171
B168	137	182
B170	78	178
B174	177	186
B175	186	170
B176	162	94
B177	92	162
B180	171	189
B181	189	179
B184	170	192
B185	192	180
B188	169	196
B189	196	181
B190	92	197
B191	94	198
B196	197	202
B199	203	198
B200	146	202
B202	150	203
B204	202	203

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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
D76	177	74	Below
D77	70	177	Below
D78	76	178	Below
D79	139	182	Below
D80	186	141	Below
D81	132	186	Below
D82	82	143	Below
D83	136	160	Below
D84	134	92	Below
D85	160	146	Below
D86	150	149	Below
D87	94	99	Below
D88	99	179	Below
D89	153	189	Below
D90	179	105	Below

D91	189	154	Below
D92	156	192	Below
D93	192	196	Below
D94	180	181	Below
D95	104	180	Below

ETABS v9.7.4 File:RAMPA Units:KN-m enero 6, 2017 14:10 PAGE 6

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	None	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

ETABS v9.7.4 File:RAMPA Units:KN-m enero 6, 2017 14:10 PAGE 7

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
COL50X50	CONC21	Rectangular	Yes	
VIG15X50	CONC21	Rectangular		Yes
VIG40X50	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
COL50X50	0.5000	0.5000	0.0000	0.0000	0.0000	0.0000
VIG15X50	0.5000	0.1500	0.0000	0.0000	0.0000	0.0000
VIG40X50	0.5000	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
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
COL50X50	0.2500	0.0088	0.0052	0.0052	0.2083	0.2083
VIG15X50	0.0750	0.0005	0.0016	0.0001	0.0625	0.0625
VIG40X50	0.2000	0.0055	0.0042	0.0027	0.1667	0.1667

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
COL50X50	0.0208	0.0208	0.0313	0.0313	0.1443	0.1443
VIG15X50	0.0063	0.0019	0.0094	0.0028	0.1443	0.0433
VIG40X50	0.0167	0.0133	0.0250	0.0200	0.1443	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

FRAME SECTION NAME	TOTAL WEIGHT	TOTAL MASS
VIG15X45	199.1682	19.9168
VIG40X45	93.7440	9.3744
COL50X50	91.3800	9.1380
VIG15X50	35.9251	3.5925
VIG40X50	10.0800	1.0080

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

FRAME SECTION NAME	REINF CONFIGURATION LONGIT	REINF CONFIGURATION LATERAL	REINF SIZE/TYPE	NUM BARS 3DIR/2DIR	NUM BARS CIRCULAR	BAR COVER
COL50X50	Rectangular	Ties	#8/Design	5/5	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
VIG15X50	0.0500	0.0500	0.000	0.000	0.000	0.000
VIG40X50	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
PLACAMACIZA	CONC21	Membrane	Yes	0.1420	0.1420	92.3227	9.2323
RAMPA	RAMPA	Membrane	No	0.1420	0.1420	0.0000	33.7091

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: 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\dyein_000\desktop\cristian\agroecol\agroecol\rampa agroecol\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\dyein_000\desktop\cristian\agroecol\agroecol\rampa agroecol\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\dyein_000\desktop\cristian\agroecol\agroecol\rampa agroecol\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

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+3.95	C27	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+3.39	C27	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+3.39	C29	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+3.18	C27	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+3.18	C29	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+2.97	C27	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+2.97	C29	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+2.97	C32	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+2.57	C27	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+2.57	C29	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+2.57	C32	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+2.57	C34	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+2.1	C27	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+2.1	C29	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+2.1	C32	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+2.1	C34	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+2.1	C36	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+1.44	C27	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+1.44	C29	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+1.44	C32	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+1.44	C34	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+1.44	C36	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+0.97	C27	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+0.97	C29	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+0.97	C32	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+0.97	C34	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+0.97	C36	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+0.76	C27	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+0.76	C29	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+0.76	C32	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+0.76	C34	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+0.76	C36	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+0.5	C27	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+0.5	C29	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+0.5	C32	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+0.5	C34	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+0.5	C36	Column	Rectangular	None	COL50X50	Conc Frame	COL50X50
N+3.95	B188	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+3.95	B189	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+3.39	B184	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+3.39	B185	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+3.18	B74	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45

N+3.18	B75	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+3.18	B101	Beam	Rectangular	None	VIG15X50	Conc Frame	VIG15X50
N+3.18	B102	Beam	Rectangular	None	VIG15X50	Conc Frame	VIG15X50
N+3.18	B142	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+3.18	B144	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+3.18	B146	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+2.97	B180	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+2.97	B181	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+2.57	B136	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+2.57	B138	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+2.57	B156	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+2.57	B158	Beam	Rectangular	None	VIG15X50	Conc Frame	VIG15X50
N+2.1	B176	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+2.1	B177	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+2.1	B190	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+2.1	B191	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+2.1	B196	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+2.1	B199	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+2.1	B200	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+2.1	B202	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+2.1	B204	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+1.44	B121	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+1.44	B123	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+1.44	B151	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+1.44	B153	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+0.97	B52	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+0.97	B92	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+0.97	B113	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+0.97	B117	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+0.97	B164	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+0.97	B168	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+0.97	B170	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+0.76	B56	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+0.76	B57	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+0.76	B94	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+0.76	B95	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+0.76	B107	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+0.76	B109	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+0.76	B111	Beam	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+0.5	B174	Beam	Rectangular	None	VIG40X50	Conc Frame	VIG40X50
N+0.5	B175	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
BASE	B103	Beam	Rectangular	None	VIG40X45	Conc Frame	VIG40X45
N+3.95	D93	Brace	Rectangular	None	VIG15X50	Conc Frame	VIG15X50
N+3.95	D94	Brace	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+3.39	D92	Brace	Rectangular	None	VIG15X50	Conc Frame	VIG15X50
N+3.39	D95	Brace	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+3.18	D90	Brace	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+3.18	D91	Brace	Rectangular	None	VIG15X50	Conc Frame	VIG15X50
N+2.97	D88	Brace	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+2.97	D89	Brace	Rectangular	None	VIG15X50	Conc Frame	VIG15X50
N+2.57	D86	Brace	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+2.57	D87	Brace	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+2.1	D84	Brace	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+2.1	D85	Brace	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+1.44	D82	Brace	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+1.44	D83	Brace	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+0.97	D78	Brace	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+0.97	D79	Brace	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+0.76	D76	Brace	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+0.76	D80	Brace	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+0.5	D77	Brace	Rectangular	None	VIG15X45	Conc Frame	VIG15X45
N+0.5	D81	Brace	Rectangular	None	VIG15X45	Conc Frame	VIG15X45

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+3.95	D93	Force	Gravity	0.000	6.136	3.400	3.400
DEAD	N+3.95	D94	Force	Gravity	0.000	6.136	3.400	3.400
DEAD	N+3.39	D92	Force	Gravity	0.000	2.848	3.400	3.400
DEAD	N+3.39	D95	Force	Gravity	0.000	2.848	3.400	3.400
DEAD	N+3.18	D90	Force	Gravity	0.000	2.808	3.400	3.400
DEAD	N+3.18	D91	Force	Gravity	0.000	2.808	3.400	3.400
DEAD	N+2.97	D88	Force	Gravity	0.000	4.667	3.400	3.400
DEAD	N+2.97	D89	Force	Gravity	0.000	4.667	3.400	3.400
DEAD	N+2.57	D86	Force	Gravity	0.000	5.510	3.400	3.400
DEAD	N+2.57	D87	Force	Gravity	0.000	5.510	3.400	3.400
DEAD	N+2.1	D84	Force	Gravity	0.000	7.818	3.400	3.400

DEAD	N+2.1	D85	Force	Gravity	0.000	7.818	3.400	3.400
DEAD	N+1.44	D82	Force	Gravity	0.000	5.470	3.400	3.400
DEAD	N+1.44	D83	Force	Gravity	0.000	5.470	3.400	3.400
DEAD	N+0.97	D78	Force	Gravity	0.000	2.808	3.400	3.400
DEAD	N+0.97	D79	Force	Gravity	0.000	2.808	3.400	3.400
DEAD	N+0.76	D76	Force	Gravity	0.000	2.852	3.400	3.400
DEAD	N+0.76	D80	Force	Gravity	0.000	2.852	3.400	3.400
DEAD	N+0.5	D77	Force	Gravity	0.000	6.185	3.400	3.400
DEAD	N+0.5	D81	Force	Gravity	0.000	6.185	3.400	3.400
LIVE	N+3.95	D93	Force	Gravity	0.000	6.136	5.000	5.000
LIVE	N+3.95	D94	Force	Gravity	0.000	6.136	5.000	5.000
LIVE	N+3.39	D92	Force	Gravity	0.000	2.848	5.000	5.000
LIVE	N+3.39	D95	Force	Gravity	0.000	2.848	5.000	5.000
LIVE	N+3.18	D90	Force	Gravity	0.000	2.808	5.000	5.000
LIVE	N+3.18	D91	Force	Gravity	0.000	2.808	5.000	5.000
LIVE	N+2.97	D88	Force	Gravity	0.000	4.667	5.000	5.000
LIVE	N+2.97	D89	Force	Gravity	0.000	4.667	5.000	5.000
LIVE	N+2.57	D86	Force	Gravity	0.000	5.510	5.000	5.000
LIVE	N+2.57	D87	Force	Gravity	0.000	5.510	5.000	5.000
LIVE	N+2.1	D84	Force	Gravity	0.000	7.818	5.000	5.000
LIVE	N+2.1	D85	Force	Gravity	0.000	7.818	5.000	5.000
LIVE	N+1.44	D82	Force	Gravity	0.000	5.470	5.000	5.000
LIVE	N+1.44	D83	Force	Gravity	0.000	5.470	5.000	5.000
LIVE	N+0.97	D78	Force	Gravity	0.000	2.808	5.000	5.000
LIVE	N+0.97	D79	Force	Gravity	0.000	2.808	5.000	5.000
LIVE	N+0.76	D76	Force	Gravity	0.000	2.852	5.000	5.000
LIVE	N+0.76	D80	Force	Gravity	0.000	2.852	5.000	5.000
LIVE	N+0.5	D77	Force	Gravity	0.000	6.185	5.000	5.000
LIVE	N+0.5	D81	Force	Gravity	0.000	6.185	5.000	5.000

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+3.18	F19	Floor	Gravity	5.0000
LIVE	N+3.18	F20	Floor	Gravity	5.0000
LIVE	N+2.57	F21	Floor	Gravity	5.0000
LIVE	N+2.1	F25	Floor	Gravity	5.0000
LIVE	N+2.1	F26	Floor	Gravity	5.0000
LIVE	N+2.1	F28	Floor	Gravity	5.0000
LIVE	N+1.44	F14	Floor	Gravity	5.0000
LIVE	N+0.97	F15	Floor	Gravity	5.0000
LIVE	N+0.97	F29	Floor	Gravity	5.0000
LIVE	N+0.76	F17	Floor	Gravity	5.0000
LIVE	N+0.76	F18	Floor	Gravity	5.0000

Diseños & Estructuras

PROYECTO: SEDE EDUCATIVA AGROECOL - RAMPA

FUERZAS EN VIGAS

BEAM FORCES
UNID: kN-m

Story	Beam	Load	Loc	P	V2	V3	T	M2	M3
N+0.97	B52	ENVOLVENTE MAX	0	57.66	133.13	1.61	-4.049	-0.379	-132.168
N+0.97	B52	ENVOLVENTE MAX	0.275	57.66	133.67	1.61	-4.049	0.082	-144.187
N+0.97	B52	ENVOLVENTE MAX	0.55	57.66	134.2	1.61	-4.049	0.928	-156.251
N+0.97	B52	ENVOLVENTE MIN	0	-18.71	41.37	-4.28	-13.502	-2.482	-429.783
N+0.97	B52	ENVOLVENTE MIN	0.275	-18.71	41.77	-4.28	-13.502	-2.183	-466.468
N+0.97	B52	ENVOLVENTE MIN	0.55	-18.71	42.17	-4.28	-13.502	-2.296	-503.3
N+0.76	B56	ENVOLVENTE MAX	0	26.44	-6.39	3.12	-0.863	2.01	-19.096
N+0.76	B56	ENVOLVENTE MAX	0.35	26.44	-5.88	3.12	-0.863	0.962	-15.929
N+0.76	B56	ENVOLVENTE MAX	0.7	26.44	-5.37	3.12	-0.863	0.615	-12.524
N+0.76	B56	ENVOLVENTE MIN	0	-41.86	-29.85	-3.02	-3.964	-1.772	-74.062
N+0.76	B56	ENVOLVENTE MIN	0.35	-41.86	-29.17	-3.02	-3.964	-0.758	-63.733
N+0.76	B56	ENVOLVENTE MIN	0.7	-41.86	-28.49	-3.02	-3.964	-0.446	-53.641
N+0.76	B57	ENVOLVENTE MAX	0	27.89	2.12	3.46	0.849	0.567	-9.727
N+0.76	B57	ENVOLVENTE MAX	0.35	27.89	2.64	3.46	0.849	0.771	-8.631
N+0.76	B57	ENVOLVENTE MAX	0.7	27.89	3.15	3.46	0.849	1.733	-7.026
N+0.76	B57	ENVOLVENTE MIN	0	-45.88	-12.34	-2.84	-0.455	-0.461	-40.438
N+0.76	B57	ENVOLVENTE MIN	0.35	-45.88	-11.66	-2.84	-0.455	-0.882	-36.718
N+0.76	B57	ENVOLVENTE MIN	0.7	-45.88	-10.98	-2.84	-0.455	-2.061	-33.237
N+3.18	B74	ENVOLVENTE MAX	0	22.67	-5.91	4.67	0.933	2.502	6.483
N+3.18	B74	ENVOLVENTE MAX	0.35	22.67	-5.4	4.67	0.933	0.875	8.997
N+3.18	B74	ENVOLVENTE MAX	0.7	22.67	-4.89	4.67	0.933	0.666	15.708
N+3.18	B74	ENVOLVENTE MIN	0	-37.64	-29.53	-5.27	-0.55	-3.161	-12.497
N+3.18	B74	ENVOLVENTE MIN	0.35	-37.64	-28.85	-5.27	-0.55	-1.322	-2.816
N+3.18	B74	ENVOLVENTE MIN	0.7	-37.64	-28.17	-5.27	-0.55	-0.901	2.253
N+3.18	B75	ENVOLVENTE MAX	0	22.4	1.4	4.17	0.584	0.796	15.202
N+3.18	B75	ENVOLVENTE MAX	0.35	22.4	1.91	4.17	0.584	1.014	17.638
N+3.18	B75	ENVOLVENTE MAX	0.7	22.4	2.42	4.17	0.584	2.685	20.227
N+3.18	B75	ENVOLVENTE MIN	0	-39.71	-16.04	-4.81	-0.965	-0.772	1.673
N+3.18	B75	ENVOLVENTE MIN	0.35	-39.71	-15.36	-4.81	-0.965	-0.768	4.152
N+3.18	B75	ENVOLVENTE MIN	0.7	-39.71	-14.68	-4.81	-0.965	-2.216	6.103
N+0.97	B92	ENVOLVENTE MAX	0	21.79	100.67	-0.57	-4.788	1.787	-112.023
N+0.97	B92	ENVOLVENTE MAX	0.275	21.79	101.2	-0.57	-4.788	2.554	-121.61
N+0.97	B92	ENVOLVENTE MAX	0.55	21.79	101.74	-0.57	-4.788	3.525	-131.093
N+0.97	B92	ENVOLVENTE MIN	0	-61.94	28.04	-4.78	-15.767	-2.283	-362.492
N+0.97	B92	ENVOLVENTE MIN	0.275	-61.94	28.44	-4.78	-15.767	-1.578	-390.249
N+0.97	B92	ENVOLVENTE MIN	0.55	-61.94	28.84	-4.78	-15.767	-1.077	-418.153
N+0.76	B94	ENVOLVENTE MAX	0	101.64	-4.15	3.2	-0.339	1.952	2.103
N+0.76	B94	ENVOLVENTE MAX	0.35	101.64	-3.64	3.2	-0.339	0.844	3.692
N+0.76	B94	ENVOLVENTE MAX	0.7	101.64	-3.13	3.2	-0.339	0.579	11.187
N+0.76	B94	ENVOLVENTE MIN	0	-5.45	-38.99	-2.92	-2.547	-1.578	-16.228
N+0.76	B94	ENVOLVENTE MIN	0.35	-5.45	-38.31	-2.92	-2.547	-0.568	-2.924
N+0.76	B94	ENVOLVENTE MIN	0.7	-5.45	-37.63	-2.92	-2.547	-0.402	4.057
N+0.76	B95	ENVOLVENTE MAX	0	104.16	2.13	3.19	0.462	0.53	4.431
N+0.76	B95	ENVOLVENTE MAX	0.35	104.16	2.64	3.19	0.462	0.568	6.37
N+0.76	B95	ENVOLVENTE MAX	0.7	104.16	3.15	3.19	0.462	1.498	14.899
N+0.76	B95	ENVOLVENTE MIN	0	-5.37	-28.09	-2.69	-0.668	-0.44	-4.776
N+0.76	B95	ENVOLVENTE MIN	0.35	-5.37	-27.41	-2.69	-0.668	-0.653	2.162
N+0.76	B95	ENVOLVENTE MIN	0.7	-5.37	-26.73	-2.69	-0.668	-1.758	2.093
N+3.18	B101	ENVOLVENTE MAX	0	103.08	-3.8	6.21	0.526	3.493	10.478
N+3.18	B101	ENVOLVENTE MAX	0.35	103.08	-3.24	6.21	0.526	1.33	14.438
N+3.18	B101	ENVOLVENTE MAX	0.7	103.08	-2.67	6.21	0.526	0.862	20.584
N+3.18	B101	ENVOLVENTE MIN	0	0.38	-31.45	-6.17	-1.207	-3.563	-9.392
N+3.18	B101	ENVOLVENTE MIN	0.35	0.38	-30.69	-6.17	-1.207	-1.412	-1.245
N+3.18	B101	ENVOLVENTE MIN	0.7	0.38	-29.94	-6.17	-1.207	-0.957	4.253
N+3.18	B102	ENVOLVENTE MAX	0	106.28	3.65	5.43	0.934	0.893	21.28
N+3.18	B102	ENVOLVENTE MAX	0.35	106.28	4.21	5.43	0.934	1.11	23.755
N+3.18	B102	ENVOLVENTE MAX	0.7	106.28	4.78	5.43	0.934	3.184	27.574
N+3.18	B102	ENVOLVENTE MIN	0	0.16	-17.75	-5.99	-0.766	-1.116	4.643
N+3.18	B102	ENVOLVENTE MIN	0.35	0.16	-16.99	-5.99	-0.766	-1.138	6.874
N+3.18	B102	ENVOLVENTE MIN	0.7	0.16	-16.24	-5.99	-0.766	-3.018	7.563
BASE	B103	ENVOLVENTE MAX	0	0.33	2.09	45.13	0.711	47.175	7.094
BASE	B103	ENVOLVENTE MAX	1.05	0.33	7.53	45.13	0.711	0.599	2.766
BASE	B103	ENVOLVENTE MAX	2.1	0.33	12.98	45.13	0.711	47.174	2.236
BASE	B103	ENVOLVENTE MIN	0	-0.23	-6.53	-44.62	-1.528	-46.535	-2.904
BASE	B103	ENVOLVENTE MIN	1.05	-0.23	-2.45	-44.62	-1.528	-0.488	1.712
BASE	B103	ENVOLVENTE MIN	2.1	-0.23	1.64	-44.62	-1.528	-47.591	-8.733
N+0.76	B107	ENVOLVENTE MAX	0	0.85	-7.27	4.67	15.89	5.616	-1.301

N+0.76	B107	ENVOLVENTE MAX	1.05	0.85	-0.93	4.67	15.89	0.735	6.548
N+0.76	B107	ENVOLVENTE MAX	2.1	0.85	11.13	4.67	15.89	5.824	2.382
N+0.76	B107	ENVOLVENTE MIN	0	-7.32	-17.53	-6.16	-0.302	-7.124	-4.331
N+0.76	B107	ENVOLVENTE MIN	1.05	-7.32	-3.2	-6.16	-0.302	-0.671	2.918
N+0.76	B107	ENVOLVENTE MIN	2.1	-7.32	5.07	-6.16	-0.302	-4.186	0.656
N+0.76	B109	ENVOLVENTE MAX	0	-0.13	-3.88	1.28	4.179	1.359	-2.693
N+0.76	B109	ENVOLVENTE MAX	1.05	-0.13	-1.22	1.28	4.179	0.042	0.081
N+0.76	B109	ENVOLVENTE MAX	2.1	-0.13	1.43	1.28	4.179	1.131	3.833
N+0.76	B109	ENVOLVENTE MIN	0	-4	-13.6	-1.11	0.9	-1.194	-11.558
N+0.76	B109	ENVOLVENTE MIN	1.05	-4	-7.12	-1.11	0.9	-0.062	-0.682
N+0.76	B109	ENVOLVENTE MIN	2.1	-4	-1.42	-1.11	0.9	-1.337	-0.129
N+0.76	B111	ENVOLVENTE MAX	0	1.23	-3.13	1.33	0.281	1.449	-1.115
N+0.76	B111	ENVOLVENTE MAX	1.05	1.23	-0.47	1.33	0.281	0.084	1.543
N+0.76	B111	ENVOLVENTE MAX	2.1	1.23	2.56	1.33	0.281	1.05	4.276
N+0.76	B111	ENVOLVENTE MIN	0	-5.56	-11.72	-1.04	-1.238	-1.129	-7.406
N+0.76	B111	ENVOLVENTE MIN	1.05	-5.56	-5.56	-1.04	-1.238	-0.072	0.597
N+0.76	B111	ENVOLVENTE MIN	2.1	-5.56	-0.55	-1.04	-1.238	-1.346	-0.133
N+0.97	B113	ENVOLVENTE MAX	0	16.63	-3.49	5.49	131.579	8.334	-1.256
N+0.97	B113	ENVOLVENTE MAX	1.05	16.63	7.95	5.49	131.579	14.629	-0.898
N+0.97	B113	ENVOLVENTE MAX	2.1	16.63	22.91	5.49	131.579	21.828	-7.231
N+0.97	B113	ENVOLVENTE MIN	0	-47.21	-7.02	-6.95	40.374	-0.261	-4.564
N+0.97	B113	ENVOLVENTE MIN	1.05	-47.21	2.56	-6.95	40.374	-5.021	-5.05
N+0.97	B113	ENVOLVENTE MIN	2.1	-47.21	9.06	-6.95	40.374	-10.685	-21.249
N+0.97	B117	ENVOLVENTE MAX	0	10.63	-4.62	0.34	14.609	0.085	-2.575
N+0.97	B117	ENVOLVENTE MAX	1.05	10.63	-2.2	0.34	14.609	0.162	2.147
N+0.97	B117	ENVOLVENTE MAX	2.1	10.63	0.22	0.34	14.609	1.236	8.624
N+0.97	B117	ENVOLVENTE MIN	0	-3.15	-14.47	-1.15	4.399	-1.235	-10.139
N+0.97	B117	ENVOLVENTE MIN	1.05	-3.15	-8.93	-1.15	4.399	-0.462	0.931
N+0.97	B117	ENVOLVENTE MIN	2.1	-3.15	-3.4	-1.15	4.399	-0.685	2.044
N+1.44	B121	ENVOLVENTE MAX	0	26.34	13.8	0.1	-7.415	0.108	24.226
N+1.44	B121	ENVOLVENTE MAX	1.05	26.34	15.85	0.1	-7.415	0.09	9.07
N+1.44	B121	ENVOLVENTE MAX	2.1	26.34	17.89	0.1	-7.415	0.119	0.302
N+1.44	B121	ENVOLVENTE MIN	0	-10.71	2.34	-0.05	-24.265	-0.01	7.431
N+1.44	B121	ENVOLVENTE MIN	1.05	-10.71	3.87	-0.05	-24.265	-0.046	1.112
N+1.44	B121	ENVOLVENTE MIN	2.1	-10.71	5.4	-0.05	-24.265	-0.13	-11.2
N+1.44	B123	ENVOLVENTE MAX	0	24.63	-2.34	0.03	24.226	0.068	24.265
N+1.44	B123	ENVOLVENTE MAX	1.05	24.63	3.12	0.03	24.226	0.106	30.69
N+1.44	B123	ENVOLVENTE MAX	2.1	24.63	16.94	0.03	24.226	0.202	20.977
N+1.44	B123	ENVOLVENTE MIN	0	-10.58	-13.8	-0.11	7.431	-0.06	7.415
N+1.44	B123	ENVOLVENTE MIN	1.05	-10.58	-0.87	-0.11	7.431	-0.011	8.09
N+1.44	B123	ENVOLVENTE MIN	2.1	-10.58	4.05	-0.11	7.431	-0.019	2.912
N+2.57	B136	ENVOLVENTE MAX	0	21.08	2.94	0.2	-6.254	0.377	-1.698
N+2.57	B136	ENVOLVENTE MAX	1.05	21.08	4.98	0.2	-6.254	0.221	0.403
N+2.57	B136	ENVOLVENTE MAX	2.1	21.08	7.02	0.2	-6.254	0.407	1.289
N+2.57	B136	ENVOLVENTE MIN	0	-11.54	-3.16	-0.22	-21.84	-0.142	-7.804
N+2.57	B136	ENVOLVENTE MIN	1.05	-11.54	-1.63	-0.22	-21.84	0.053	-10.991
N+2.57	B136	ENVOLVENTE MIN	2.1	-11.54	-0.1	-0.22	-21.84	-0.14	-17.274
N+2.57	B138	ENVOLVENTE MAX	0	18.82	-10.47	0.43	22.328	0.659	-1.976
N+2.57	B138	ENVOLVENTE MAX	1.05	18.82	-5.56	0.43	22.328	0.262	29.387
N+2.57	B138	ENVOLVENTE MAX	2.1	18.82	-0.65	0.43	22.328	0.237	51.48
N+2.57	B138	ENVOLVENTE MIN	0	-13.76	-44.1	-0.13	6.336	-0.047	-8.845
N+2.57	B138	ENVOLVENTE MIN	1.05	-13.76	-28.73	-0.13	6.336	0.036	4.868
N+2.57	B138	ENVOLVENTE MIN	2.1	-13.76	-14.65	-0.13	6.336	-0.253	8.155
N+3.18	B142	ENVOLVENTE MAX	0	3	-6.22	6.13	6.983	6.038	-0.143
N+3.18	B142	ENVOLVENTE MAX	1.05	3	0.15	6.13	6.983	-0.032	6.852
N+3.18	B142	ENVOLVENTE MAX	2.1	3	14.35	6.13	6.983	4.31	-0.04
N+3.18	B142	ENVOLVENTE MIN	0	-12.31	-14.31	-4.46	-5.897	-5.065	-0.706
N+3.18	B142	ENVOLVENTE MIN	1.05	-12.31	-0.19	-4.46	-5.897	-0.748	3.042
N+3.18	B142	ENVOLVENTE MIN	2.1	-12.31	6.14	-4.46	-5.897	-6.842	-0.724
N+3.18	B144	ENVOLVENTE MAX	0	1.75	-1.13	1.51	0.877	1.654	1.003
N+3.18	B144	ENVOLVENTE MAX	1.05	1.75	1.55	1.51	0.877	0.092	1.782
N+3.18	B144	ENVOLVENTE MAX	2.1	1.75	6.93	1.51	0.877	1.878	1.22
N+3.18	B144	ENVOLVENTE MIN	0	-5.71	-7.06	-1.81	-0.753	-1.92	-3.05
N+3.18	B144	ENVOLVENTE MIN	1.05	-5.71	-1.69	-1.81	-0.753	-0.043	0.673
N+3.18	B144	ENVOLVENTE MIN	2.1	-5.71	0.96	-1.81	-0.753	-1.512	-2.964
N+3.18	B146	ENVOLVENTE MAX	0	2.88	-1.17	1.82	0.772	1.996	0.753
N+3.18	B146	ENVOLVENTE MAX	1.05	2.88	1.49	1.82	0.772	0.124	0.921
N+3.18	B146	ENVOLVENTE MAX	2.1	2.88	6.69	1.82	0.772	2.122	1.084
N+3.18	B146	ENVOLVENTE MIN	0	-3.75	-7.52	-2.03	-0.843	-2.135	-4.361
N+3.18	B146	ENVOLVENTE MIN	1.05	-3.75	-2.14	-2.03	-0.843	-0.041	0.374
N+3.18	B146	ENVOLVENTE MIN	2.1	-3.75	0.7	-2.03	-0.843	-1.816	-3.327
N+1.44	B151	ENVOLVENTE MAX	0	11.99	10	0.11	-7.999	0.095	4.352
N+1.44	B151	ENVOLVENTE MAX	1.05	11.99	12.04	0.11	-7.999	0.014	-0.072
N+1.44	B151	ENVOLVENTE MAX	2.1	11.99	14.08	0.11	-7.999	0.215	-3.352
N+1.44	B151	ENVOLVENTE MIN	0	-28.68	0.8	-0.22	-26.136	-0.25	0.963
N+1.44	B151	ENVOLVENTE MIN	1.05	-28.68	2.33	-0.22	-26.136	-0.057	-7.747
N+1.44	B151	ENVOLVENTE MIN	2.1	-28.68	3.86	-0.22	-26.136	-0.146	-20.935
N+1.44	B153	ENVOLVENTE MAX	0	12.38	-5.37	0.04	26.55	0.053	1.197

N+1.44	B153	ENVOLVENTE MAX	1.05	12.38	-0.46	0.04	26.55	0.037	17.9
N+1.44	B153	ENVOLVENTE MAX	2.1	12.38	7.48	0.04	26.55	0.304	19.484
N+1.44	B153	ENVOLVENTE MIN	0	-25.3	-24.06	-0.29	8.07	-0.304	-0.383
N+1.44	B153	ENVOLVENTE MIN	1.05	-25.3	-8.89	-0.29	8.07	-0.028	3.046
N+1.44	B153	ENVOLVENTE MIN	2.1	-25.3	0.15	-0.29	8.07	-0.035	0.969
N+2.57	B156	ENVOLVENTE MAX	0	14	-2.92	0.07	21.003	-0.004	23.785
N+2.57	B156	ENVOLVENTE MAX	1.05	14	1.99	0.07	21.003	-0.015	36.116
N+2.57	B156	ENVOLVENTE MAX	2.1	14	12.01	0.07	21.003	0.042	32.307
N+2.57	B156	ENVOLVENTE MIN	0	-21.53	-19.43	-0.1	5.993	-0.32	6.74
N+2.57	B156	ENVOLVENTE MIN	1.05	-21.53	-6.01	-0.1	5.993	-0.274	8.002
N+2.57	B156	ENVOLVENTE MIN	2.1	-21.53	0.94	-0.1	5.993	-0.297	3.573
N+2.57	B158	ENVOLVENTE MAX	0	14.98	19.43	0.15	-6.74	-0.02	21.003
N+2.57	B158	ENVOLVENTE MAX	1.05	14.98	21.7	0.15	-6.74	-0.007	2.849
N+2.57	B158	ENVOLVENTE MAX	2.1	14.98	23.96	0.15	-6.74	0.045	-2.979
N+2.57	B158	ENVOLVENTE MIN	0	-24.93	2.92	-0.07	-23.785	-0.27	5.993
N+2.57	B158	ENVOLVENTE MIN	1.05	-24.93	4.62	-0.07	-23.785	-0.367	-3.005
N+2.57	B158	ENVOLVENTE MIN	2.1	-24.93	6.32	-0.07	-23.785	-0.502	-25.472
N+0.97	B164	ENVOLVENTE MAX	0	32.5	225.9	31.13	258.379	8.672	6.374
N+0.97	B164	ENVOLVENTE MAX	1.1	32.5	237.92	31.13	258.379	9.882	-82.197
N+0.97	B164	ENVOLVENTE MAX	2.1	32.5	248.84	31.13	258.379	23.558	-165.019
N+0.97	B164	ENVOLVENTE MAX	2.1	28.92	450.57	-16.45	803.225	37.807	-174.907
N+0.97	B164	ENVOLVENTE MAX	2.2	28.92	451.09	-16.45	803.225	50.057	-190.479
N+0.97	B164	ENVOLVENTE MIN	0	-9.46	74.2	-13.96	80.661	-8.74	0.901
N+0.97	B164	ENVOLVENTE MIN	1.1	-9.46	80.08	-13.96	80.661	-28.84	-249.006
N+0.97	B164	ENVOLVENTE MIN	2.1	-9.46	85.42	-13.96	80.661	-59.69	-492.386
N+0.97	B164	ENVOLVENTE MIN	2.1	-40.63	152.18	-252.93	241.168	-108.987	-523.971
N+0.97	B164	ENVOLVENTE MIN	2.2	-40.63	152.56	-252.93	241.168	-94.299	-569.054
N+0.97	B168	ENVOLVENTE MAX	0	21.18	124.65	6.37	-12.089	0.21	-172.375
N+0.97	B168	ENVOLVENTE MAX	0.475	21.18	125.57	6.37	-12.089	1.241	-193.271
N+0.97	B168	ENVOLVENTE MAX	0.95	21.18	126.49	6.37	-12.089	2.296	-213.997
N+0.97	B168	ENVOLVENTE MIN	0	-61.57	38.05	-2.23	-37.016	-0.348	-549.732
N+0.97	B168	ENVOLVENTE MIN	0.475	-61.57	38.74	-2.23	-37.016	-3.347	-609.158
N+0.97	B168	ENVOLVENTE MIN	0.95	-61.57	39.43	-2.23	-37.016	-6.37	-669.022
N+0.97	B170	ENVOLVENTE MAX	0	56.26	141.22	0.57	-2.521	1.106	-115.025
N+0.97	B170	ENVOLVENTE MAX	0.475	56.26	142.14	0.57	-2.521	1.565	-137.926
N+0.97	B170	ENVOLVENTE MAX	0.95	56.26	143.07	0.57	-2.521	2.048	-160.925
N+0.97	B170	ENVOLVENTE MIN	0	-17.23	45.81	-1.23	-8.938	-0.294	-371.72
N+0.97	B170	ENVOLVENTE MIN	0.475	-17.23	46.5	-1.23	-8.938	-0.441	-439.019
N+0.97	B170	ENVOLVENTE MIN	0.95	-17.23	47.2	-1.23	-8.938	-0.612	-506.757
N+0.5	B174	ENVOLVENTE MAX	0	24.91	129.91	58.1	-54.02	48.52	6.832
N+0.5	B174	ENVOLVENTE MAX	1.05	24.91	135.96	58.1	-54.02	26.644	-45.5
N+0.5	B174	ENVOLVENTE MAX	2.1	24.91	142.01	58.1	-54.02	50.808	-100.342
N+0.5	B174	ENVOLVENTE MIN	0	-22.04	44.41	-31.57	-169.638	-43.166	-2.937
N+0.5	B174	ENVOLVENTE MIN	1.05	-22.04	48.95	-31.57	-169.638	-49.148	-136.223
N+0.5	B174	ENVOLVENTE MIN	2.1	-22.04	53.48	-31.57	-169.638	-101.169	-282.156
N+0.5	B175	ENVOLVENTE MAX	0	47.77	257.16	283.36	-147.239	58.954	-97.476
N+0.5	B175	ENVOLVENTE MAX	0.05	47.77	257.42	283.36	-147.239	54.554	-102.319
N+0.5	B175	ENVOLVENTE MAX	0.1	47.77	257.68	283.36	-147.239	51.335	-107.153
N+0.5	B175	ENVOLVENTE MIN	0	-42.75	86.1	-19.76	-462.527	-107.229	-284.625
N+0.5	B175	ENVOLVENTE MIN	0.05	-42.75	86.3	-19.76	-462.527	-116.008	-297.489
N+0.5	B175	ENVOLVENTE MIN	0.1	-42.75	86.49	-19.76	-462.527	-125.969	-310.366
N+2.1	B176	ENVOLVENTE MAX	0	44.58	-68.95	11.04	242.713	15.164	-63.975
N+2.1	B176	ENVOLVENTE MAX	0.1	44.58	-68.56	11.04	242.713	15.811	-57.076
N+2.1	B176	ENVOLVENTE MAX	0.1	26.05	-35.33	3.83	22.657	8.896	-60.213
N+2.1	B176	ENVOLVENTE MAX	1.1	26.05	-31.44	3.83	22.657	5.206	-26.805
N+2.1	B176	ENVOLVENTE MAX	2.2	26.05	-27.17	3.83	22.657	1.766	14.468
N+2.1	B176	ENVOLVENTE MIN	0	-63.38	-211.98	-6.69	56.291	-25.291	-234.21
N+2.1	B176	ENVOLVENTE MIN	0.1	-63.38	-211.46	-6.69	56.291	-26.374	-213.038
N+2.1	B176	ENVOLVENTE MIN	0.1	-36.37	-116.29	-4.33	-4.059	-12.712	-218.301
N+2.1	B176	ENVOLVENTE MIN	1.1	-36.37	-111.1	-4.33	-4.059	-8.521	-104.607
N+2.1	B176	ENVOLVENTE MIN	2.2	-36.37	-105.4	-4.33	-4.059	-4.531	3.513
N+2.1	B177	ENVOLVENTE MAX	0	38.72	180.38	1.65	-84.534	2.849	-0.559
N+2.1	B177	ENVOLVENTE MAX	1.1	38.72	186.09	1.65	-84.534	8.855	-65.63
N+2.1	B177	ENVOLVENTE MAX	2.1	38.72	191.27	1.65	-84.534	15.323	-128.194
N+2.1	B177	ENVOLVENTE MAX	2.1	55.16	314.33	11.03	-179.57	28.518	-134.261
N+2.1	B177	ENVOLVENTE MAX	2.2	55.16	314.85	11.03	-179.57	27.448	-145.346
N+2.1	B177	ENVOLVENTE MIN	0	-47.74	56.31	-6.63	-291.196	-4.723	-4.279
N+2.1	B177	ENVOLVENTE MIN	1.1	-47.74	60.59	-6.63	-291.196	-5.248	-205.786
N+2.1	B177	ENVOLVENTE MIN	2.1	-47.74	64.48	-6.63	-291.196	-6.734	-394.464
N+2.1	B177	ENVOLVENTE MIN	2.1	-71.55	106.27	-6.67	-671.283	-17.954	-413.758
N+2.1	B177	ENVOLVENTE MIN	2.2	-71.55	106.66	-6.67	-671.283	-17.319	-445.217
N+2.97	B180	ENVOLVENTE MAX	0	52.9	-119.17	270.96	-43.678	15.04	-105.569
N+2.97	B180	ENVOLVENTE MAX	0.05	52.9	-118.97	270.96	-43.678	7.551	-99.304
N+2.97	B180	ENVOLVENTE MAX	0.1	52.9	-118.78	270.96	-43.678	0.38	-93.032
N+2.97	B180	ENVOLVENTE MIN	0	-71.53	-371.25	-4.06	-315.241	-38.305	-333.797
N+2.97	B180	ENVOLVENTE MIN	0.05	-71.53	-370.99	-4.06	-315.241	-44.162	-315.241
N+2.97	B180	ENVOLVENTE MIN	0.1	-71.53	-370.73	-4.06	-315.241	-50.335	-296.698
N+2.97	B181	ENVOLVENTE MAX	0	25.34	-52.82	29.77	6.472	27.365	-96.256

N+2.97	B181	ENVOLVENTE MAX	1.05	25.34	-48.73	29.77	6.472	1.03	-42.802
N+2.97	B181	ENVOLVENTE MAX	2.1	25.34	-44.65	29.77	6.472	29.068	18.974
N+2.97	B181	ENVOLVENTE MIN	0	-35.1	-159.95	-38.58	-36.382	-57.515	-305.483
N+2.97	B181	ENVOLVENTE MIN	1.05	-35.1	-154.5	-38.58	-36.382	-21.937	-140.396
N+2.97	B181	ENVOLVENTE MIN	2.1	-35.1	-149.06	-38.58	-36.382	-40.732	4.565
N+3.39	B184	ENVOLVENTE MAX	0	63.03	-66.69	-6.99	212.526	12.493	-53.384
N+3.39	B184	ENVOLVENTE MAX	0.05	63.03	-66.5	-6.99	212.526	13.292	-50.034
N+3.39	B184	ENVOLVENTE MAX	0.1	63.03	-66.31	-6.99	212.526	14.217	-46.694
N+3.39	B184	ENVOLVENTE MIN	0	-61.58	-193.43	-206.76	-12.207	-47.372	-200.372
N+3.39	B184	ENVOLVENTE MIN	0.05	-61.58	-193.17	-206.76	-12.207	-37.484	-190.707
N+3.39	B184	ENVOLVENTE MIN	0.1	-61.58	-192.91	-206.76	-12.207	-27.722	-181.055
N+3.39	B185	ENVOLVENTE MAX	0	30.62	-30.46	24.64	45.127	26.541	-50.851
N+3.39	B185	ENVOLVENTE MAX	1.05	30.62	-26.38	24.64	45.127	6.593	-20.921
N+3.39	B185	ENVOLVENTE MAX	2.1	30.62	-22.3	24.64	45.127	34.025	6.968
N+3.39	B185	ENVOLVENTE MIN	0	-29.72	-93.5	-37.93	-4.789	-46.22	-180.691
N+3.39	B185	ENVOLVENTE MIN	1.05	-29.72	-88.05	-37.93	-4.789	-12.317	-85.376
N+3.39	B185	ENVOLVENTE MIN	2.1	-29.72	-82.61	-37.93	-4.789	-25.794	-2.196
N+3.95	B188	ENVOLVENTE MAX	0	53.03	-17.04	12.91	52.099	16.789	-22.443
N+3.95	B188	ENVOLVENTE MAX	0.05	53.03	-16.84	12.91	52.099	16.545	-21.285
N+3.95	B188	ENVOLVENTE MAX	0.1	53.03	-16.65	12.91	52.099	16.347	-20.131
N+3.95	B188	ENVOLVENTE MIN	0	-50.22	-71.88	-65.44	-28.567	-40.671	-98.735
N+3.95	B188	ENVOLVENTE MIN	0.05	-50.22	-71.62	-65.44	-28.567	-37.8	-95.147
N+3.95	B188	ENVOLVENTE MIN	0.1	-50.22	-71.36	-65.44	-28.567	-34.975	-91.573
N+3.95	B189	ENVOLVENTE MAX	0	26.21	-15.06	11	9.585	19.498	-21.968
N+3.95	B189	ENVOLVENTE MAX	1.05	26.21	-10.97	11	9.585	8.032	-8.293
N+3.95	B189	ENVOLVENTE MAX	2.1	26.21	-6.89	11	9.585	9.574	1.18
N+3.95	B189	ENVOLVENTE MIN	0	-24.65	-48.33	-24.11	-21.772	-42.05	-91.124
N+3.95	B189	ENVOLVENTE MIN	1.05	-24.65	-42.88	-24.11	-21.772	-16.822	-43.238
N+3.95	B189	ENVOLVENTE MIN	2.1	-24.65	-37.44	-24.11	-21.772	-4.601	-2.433
N+2.1	B190	ENVOLVENTE MAX	0	24.26	-19.01	0.08	22.606	0.364	-34.469
N+2.1	B190	ENVOLVENTE MAX	1.05	24.26	-14.1	0.08	22.606	0.399	-17.08
N+2.1	B190	ENVOLVENTE MAX	2.1	24.26	-9.19	0.08	22.606	0.456	-4.77
N+2.1	B190	ENVOLVENTE MIN	0	-13.49	-63.81	-0.11	6.899	-0.267	-117.124
N+2.1	B190	ENVOLVENTE MIN	1.05	-13.49	-48.44	-0.11	6.899	-0.263	-58.193
N+2.1	B190	ENVOLVENTE MIN	2.1	-13.49	-33.07	-0.11	6.899	-0.281	-15.401
N+2.1	B191	ENVOLVENTE MAX	0	19.1	-13.24	0.07	0.882	0.343	-15.988
N+2.1	B191	ENVOLVENTE MAX	1.05	19.1	-8.32	0.07	0.882	0.401	-4.663
N+2.1	B191	ENVOLVENTE MAX	2.1	19.1	-3.41	0.07	0.882	0.474	4.438
N+2.1	B191	ENVOLVENTE MIN	0	-16.28	-45.65	-0.1	-0.517	-0.215	-59.152
N+2.1	B191	ENVOLVENTE MIN	1.05	-16.28	-30.28	-0.1	-0.517	-0.236	-19.288
N+2.1	B191	ENVOLVENTE MIN	2.1	-16.28	-14.91	-0.1	-0.517	-0.272	1.097
N+2.1	B196	ENVOLVENTE MAX	0	21.17	-9.19	0.11	-4.77	0.236	-6.899
N+2.1	B196	ENVOLVENTE MAX	1.05	21.17	-7.66	0.11	-4.77	0.259	11.045
N+2.1	B196	ENVOLVENTE MAX	2.1	21.17	-6.13	0.11	-4.77	0.3	42.554
N+2.1	B196	ENVOLVENTE MIN	0	-14.24	-33.07	-0.08	-15.401	-0.364	-22.606
N+2.1	B196	ENVOLVENTE MIN	1.05	-14.24	-31.03	-0.08	-15.401	-0.414	1.888
N+2.1	B196	ENVOLVENTE MIN	2.1	-14.24	-28.99	-0.08	-15.401	-0.483	9.135
N+2.1	B199	ENVOLVENTE MAX	0	19.55	10.83	0.11	-1.097	0.515	27.426
N+2.1	B199	ENVOLVENTE MAX	1.05	19.55	12.87	0.11	-1.097	0.425	14.984
N+2.1	B199	ENVOLVENTE MAX	2.1	19.55	14.91	0.11	-1.097	0.348	0.882
N+2.1	B199	ENVOLVENTE MIN	0	-14.81	0.35	-0.06	-4.438	-0.29	4.524
N+2.1	B199	ENVOLVENTE MIN	1.05	-14.81	1.88	-0.06	-4.438	-0.246	3.342
N+2.1	B199	ENVOLVENTE MIN	2.1	-14.81	3.41	-0.06	-4.438	-0.213	-0.517
N+2.1	B200	ENVOLVENTE MAX	0	18.82	-5.18	0.11	10.207	0.339	4.623
N+2.1	B200	ENVOLVENTE MAX	1.05	18.82	0.06	0.11	10.207	0.269	13.543
N+2.1	B200	ENVOLVENTE MAX	2.1	18.82	13.26	0.11	10.207	0.228	8.359
N+2.1	B200	ENVOLVENTE MIN	0	-36.32	-20.02	-0.15	2.986	-0.585	-5.724
N+2.1	B200	ENVOLVENTE MIN	1.05	-36.32	-5.11	-0.15	2.986	-0.466	1.19
N+2.1	B200	ENVOLVENTE MIN	2.1	-36.32	1.27	-0.15	2.986	-0.375	2.594
N+2.1	B202	ENVOLVENTE MAX	0	28.3	-0.34	0.1	8.028	0.355	22.62
N+2.1	B202	ENVOLVENTE MAX	1.05	28.3	9.7	0.1	8.028	0.276	21.348
N+2.1	B202	ENVOLVENTE MAX	2.1	28.3	26.17	0.1	8.028	0.213	2.604
N+2.1	B202	ENVOLVENTE MIN	0	-24.21	-8.5	-0.16	2.301	-0.607	0.217
N+2.1	B202	ENVOLVENTE MIN	1.05	-24.21	-0.29	-0.16	2.301	-0.464	3.273
N+2.1	B202	ENVOLVENTE MIN	2.1	-24.21	4.94	-0.16	2.301	-0.338	0.785
N+2.1	B204	ENVOLVENTE MAX	0	42.92	-4.79	5.68	-2.018	0.782	32.347
N+2.1	B204	ENVOLVENTE MAX	0.1	42.92	-4.64	5.68	-2.018	0.487	33.91
N+2.1	B204	ENVOLVENTE MAX	0.2	42.92	-4.5	5.68	-2.018	0.591	35.454
N+2.1	B204	ENVOLVENTE MIN	0	-30.34	-15.73	-3.98	-7.042	-0.526	6.048
N+2.1	B204	ENVOLVENTE MIN	0.1	-30.34	-15.54	-3.98	-7.042	-0.4	6.527
N+2.1	B204	ENVOLVENTE MIN	0.2	-30.34	-15.34	-3.98	-7.042	-0.674	6.992

FUERZAS EN COLUMNAS

COLUMN FORCES
UNID: kN-m

Story	Column	Load	Loc	P	V2	V3	T	M2	M3
N+3.95	C27	ENVOLVENTE MAX	0	-16.62	29.58	91.09	54.619	116.69	21.127
N+3.95	C27	ENVOLVENTE MAX	0.055	-16.32	29.58	91.09	54.619	112.305	24.267
N+3.95	C27	ENVOLVENTE MAX	0.11	-16.02	29.58	91.09	54.619	108.104	27.42
N+3.95	C27	ENVOLVENTE MIN	0	-79.35	-79.53	-88.36	-30.443	0.162	-37.291
N+3.95	C27	ENVOLVENTE MIN	0.055	-78.96	-79.53	-88.36	-30.443	4.396	-37.684
N+3.95	C27	ENVOLVENTE MIN	0.11	-78.56	-79.53	-88.36	-30.443	8.447	-38.091
N+3.39	C27	ENVOLVENTE MAX	0	-17.75	30.94	95.08	54.619	135.21	9.072
N+3.39	C27	ENVOLVENTE MAX	0.105	-17.18	30.94	95.08	54.619	125.794	15.052
N+3.39	C27	ENVOLVENTE MAX	0.21	-16.62	30.94	95.08	54.619	116.69	21.127
N+3.39	C27	ENVOLVENTE MIN	0	-80.86	-80.89	-92.34	-30.443	-17.784	-35.725
N+3.39	C27	ENVOLVENTE MIN	0.105	-80.11	-80.89	-92.34	-30.443	-8.656	-36.461
N+3.39	C27	ENVOLVENTE MIN	0.21	-79.35	-80.89	-92.34	-30.443	0.162	-37.291
N+3.18	C27	ENVOLVENTE MAX	0	-18.88	31.63	97.05	54.619	154.91	1.069
N+3.18	C27	ENVOLVENTE MAX	0.105	-18.32	31.63	97.05	54.619	145.004	3.909
N+3.18	C27	ENVOLVENTE MAX	0.21	-17.75	31.63	97.05	54.619	135.21	9.072
N+3.18	C27	ENVOLVENTE MIN	0	-82.38	-81.58	-94.32	-30.443	-36.91	-38.211
N+3.18	C27	ENVOLVENTE MIN	0.105	-81.62	-81.58	-94.32	-30.443	-27.29	-35.806
N+3.18	C27	ENVOLVENTE MIN	0.21	-80.86	-81.58	-94.32	-30.443	-17.784	-35.725
N+2.97	C27	ENVOLVENTE MAX	0	-21.04	32.54	99.62	54.619	194.149	0.178
N+2.97	C27	ENVOLVENTE MAX	0.2	-19.96	32.54	99.62	54.619	174.462	-1.314
N+2.97	C27	ENVOLVENTE MAX	0.4	-18.88	32.54	99.62	54.619	154.91	1.069
N+2.97	C27	ENVOLVENTE MIN	0	-85.26	-82.48	-96.89	-30.443	-75.054	-57.299
N+2.97	C27	ENVOLVENTE MIN	0.2	-83.82	-82.48	-96.89	-30.443	-55.914	-45.817
N+2.97	C27	ENVOLVENTE MIN	0.4	-82.38	-82.48	-96.89	-30.443	-36.91	-38.211
N+2.57	C27	ENVOLVENTE MAX	0	-23.58	33.58	102.53	54.619	242.006	15.078
N+2.57	C27	ENVOLVENTE MAX	0.235	-22.31	33.58	102.53	54.619	218.048	7.504
N+2.57	C27	ENVOLVENTE MAX	0.47	-21.04	33.58	102.53	54.619	194.149	0.178
N+2.57	C27	ENVOLVENTE MIN	0	-88.64	-83.53	-99.79	-30.443	-121.627	-95.674
N+2.57	C27	ENVOLVENTE MIN	0.235	-86.95	-83.53	-99.79	-30.443	-98.311	-76.363
N+2.57	C27	ENVOLVENTE MIN	0.47	-85.26	-83.53	-99.79	-30.443	-75.054	-57.299
N+2.1	C27	ENVOLVENTE MAX	0	-27.15	34.58	105.22	54.619	311.218	37.464
N+2.1	C27	ENVOLVENTE MAX	0.33	-25.36	34.58	105.22	54.619	276.591	26.217
N+2.1	C27	ENVOLVENTE MAX	0.66	-23.58	34.58	105.22	54.619	242.006	15.078
N+2.1	C27	ENVOLVENTE MIN	0	-93.39	-84.52	-102.48	-30.443	-189.032	-151.025
N+2.1	C27	ENVOLVENTE MIN	0.33	-91.02	-84.52	-102.48	-30.443	-155.308	-123.296
N+2.1	C27	ENVOLVENTE MIN	0.66	-88.64	-84.52	-102.48	-30.443	-121.627	-95.674
N+1.44	C27	ENVOLVENTE MAX	0	-29.68	35.11	106.62	54.619	361.231	53.817
N+1.44	C27	ENVOLVENTE MAX	0.235	-28.41	35.11	106.62	54.619	336.219	45.631
N+1.44	C27	ENVOLVENTE MAX	0.47	-27.15	35.11	106.62	54.619	311.218	37.464
N+1.44	C27	ENVOLVENTE MIN	0	-96.78	-85.05	-103.88	-30.443	-237.76	-190.854
N+1.44	C27	ENVOLVENTE MIN	0.235	-95.08	-85.05	-103.88	-30.443	-213.391	-170.93
N+1.44	C27	ENVOLVENTE MIN	0.47	-93.39	-85.05	-103.88	-30.443	-189.032	-151.025
N+0.97	C27	ENVOLVENTE MAX	0	-30.82	35.27	107.03	54.619	383.675	61.178
N+0.97	C27	ENVOLVENTE MAX	0.105	-30.25	35.27	107.03	54.619	372.452	57.496
N+0.97	C27	ENVOLVENTE MAX	0.21	-29.68	35.27	107.03	54.619	361.231	53.817
N+0.97	C27	ENVOLVENTE MIN	0	-98.29	-85.22	-104.3	-30.443	-259.63	-208.703
N+0.97	C27	ENVOLVENTE MIN	0.105	-97.53	-85.22	-104.3	-30.443	-248.694	-199.777
N+0.97	C27	ENVOLVENTE MIN	0.21	-96.78	-85.22	-104.3	-30.443	-237.76	-190.854
N+0.76	C27	ENVOLVENTE MAX	0	-32.22	35.34	107.22	54.619	411.518	70.32
N+0.76	C27	ENVOLVENTE MAX	0.13	-31.52	35.34	107.22	54.619	397.596	65.748
N+0.76	C27	ENVOLVENTE MAX	0.26	-30.82	35.34	107.22	54.619	383.675	61.178
N+0.76	C27	ENVOLVENTE MIN	0	-100.16	-85.29	-104.49	-30.443	-286.762	-230.832
N+0.76	C27	ENVOLVENTE MIN	0.13	-99.22	-85.29	-104.49	-30.443	-273.195	-219.766
N+0.76	C27	ENVOLVENTE MIN	0.26	-98.29	-85.29	-104.49	-30.443	-259.63	-208.703
N+0.5	C27	ENVOLVENTE MAX	0	-35.19	35.4	107.38	54.619	470.518	89.719
N+0.5	C27	ENVOLVENTE MAX	0.275	-33.71	35.4	107.38	54.619	441.016	80.016
N+0.5	C27	ENVOLVENTE MAX	0.55	-32.22	35.4	107.38	54.619	411.518	70.32
N+0.5	C27	ENVOLVENTE MIN	0	-104.12	-85.35	-104.64	-30.443	-344.258	-277.702
N+0.5	C27	ENVOLVENTE MIN	0.275	-102.14	-85.35	-104.64	-30.443	-315.507	-254.263
N+0.5	C27	ENVOLVENTE MIN	0.55	-100.16	-85.35	-104.64	-30.443	-286.762	-230.832
N+3.39	C29	ENVOLVENTE MAX	0	-64.4	25.01	91.61	60.725	199.372	172.755
N+3.39	C29	ENVOLVENTE MAX	0.001	-64.39	25.01	91.61	60.725	199.37	172.984
N+3.39	C29	ENVOLVENTE MAX	0.002	-64.39	25.01	91.61	60.725	199.369	173.212
N+3.39	C29	ENVOLVENTE MIN	0	-195.32	-228.44	-89.72	-25.652	51.357	-42.674
N+3.39	C29	ENVOLVENTE MIN	0.001	-195.31	-228.44	-89.72	-25.652	51.346	-42.698
N+3.39	C29	ENVOLVENTE MIN	0.002	-195.31	-228.44	-89.72	-25.652	51.335	-42.723
N+3.18	C29	ENVOLVENTE MAX	0	-65.53	25.86	92.64	60.725	199.757	124.713
N+3.18	C29	ENVOLVENTE MAX	0.105	-64.96	25.86	92.64	60.725	199.565	148.727
N+3.18	C29	ENVOLVENTE MAX	0.21	-64.4	25.86	92.64	60.725	199.372	172.755
N+3.18	C29	ENVOLVENTE MIN	0	-196.83	-229.28	-90.74	-25.652	46.543	-37.35
N+3.18	C29	ENVOLVENTE MIN	0.105	-196.08	-229.28	-90.74	-25.652	50.568	-40.005
N+3.18	C29	ENVOLVENTE MIN	0.21	-195.32	-229.28	-90.74	-25.652	51.357	-42.674
N+2.97	C29	ENVOLVENTE MAX	0	-67.69	27	93.99	60.725	219.429	33.17
N+2.97	C29	ENVOLVENTE MAX	0.2	-66.61	27	93.99	60.725	202.547	78.817
N+2.97	C29	ENVOLVENTE MAX	0.4	-65.53	27	93.99	60.725	199.757	124.713
N+2.97	C29	ENVOLVENTE MIN	0	-199.71	-230.42	-92.09	-25.652	16.675	-27.176

N+2.97	C29	ENVOLVENTE MIN	0.2	-198.27	-230.42	-92.09	-25.652	33.177	-32.139
N+2.97	C29	ENVOLVENTE MIN	0.4	-196.83	-230.42	-92.09	-25.652	46.543	-37.35
N+2.57	C29	ENVOLVENTE MAX	0	-70.23	28.36	95.53	60.725	262.605	-11.808
N+2.57	C29	ENVOLVENTE MAX	0.235	-68.96	28.36	95.53	60.725	240.775	-5.29
N+2.57	C29	ENVOLVENTE MAX	0.47	-67.69	28.36	95.53	60.725	219.429	33.17
N+2.57	C29	ENVOLVENTE MIN	0	-203.1	-231.78	-93.64	-25.652	-25.609	-77.807
N+2.57	C29	ENVOLVENTE MIN	0.235	-201.4	-231.78	-93.64	-25.652	-4.225	-36.522
N+2.57	C29	ENVOLVENTE MIN	0.47	-199.71	-231.78	-93.64	-25.652	16.675	-27.176
N+2.1	C29	ENVOLVENTE MAX	0	-73.79	29.69	97	60.725	325.777	7.079
N+2.1	C29	ENVOLVENTE MAX	0.33	-72.01	29.69	97	60.725	294.09	-2.558
N+2.1	C29	ENVOLVENTE MAX	0.66	-70.23	29.69	97	60.725	262.605	-11.808
N+2.1	C29	ENVOLVENTE MIN	0	-207.85	-233.11	-95.1	-25.652	-87.53	-230.954
N+2.1	C29	ENVOLVENTE MIN	0.33	-205.47	-233.11	-95.1	-25.652	-56.469	-154.187
N+2.1	C29	ENVOLVENTE MIN	0.66	-203.1	-233.11	-95.1	-25.652	-25.609	-77.807
N+1.44	C29	ENVOLVENTE MAX	0	-76.33	30.43	97.77	60.725	371.437	21.281
N+1.44	C29	ENVOLVENTE MAX	0.235	-75.06	30.43	97.77	60.725	348.589	14.17
N+1.44	C29	ENVOLVENTE MAX	0.47	-73.79	30.43	97.77	60.725	325.777	7.079
N+1.44	C29	ENVOLVENTE MIN	0	-211.23	-233.86	-95.87	-25.652	-132.299	-340.765
N+1.44	C29	ENVOLVENTE MIN	0.235	-209.54	-233.86	-95.87	-25.652	-109.897	-285.849
N+1.44	C29	ENVOLVENTE MIN	0.47	-207.85	-233.86	-95.87	-25.652	-87.53	-230.954
N+0.97	C29	ENVOLVENTE MAX	0	-77.46	30.67	98	60.725	391.925	27.696
N+0.97	C29	ENVOLVENTE MAX	0.105	-76.9	30.67	98	60.725	381.679	24.488
N+0.97	C29	ENVOLVENTE MAX	0.21	-76.33	30.67	98	60.725	371.437	21.281
N+0.97	C29	ENVOLVENTE MIN	0	-212.74	-234.1	-96.11	-25.652	-152.389	-389.899
N+0.97	C29	ENVOLVENTE MIN	0.105	-211.99	-234.1	-96.11	-25.652	-142.342	-365.331
N+0.97	C29	ENVOLVENTE MIN	0.21	-211.23	-234.1	-96.11	-25.652	-132.299	-340.765
N+0.76	C29	ENVOLVENTE MAX	0	-78.87	30.78	98.11	60.725	417.339	35.675
N+0.76	C29	ENVOLVENTE MAX	0.13	-78.17	30.78	98.11	60.725	404.63	31.685
N+0.76	C29	ENVOLVENTE MAX	0.26	-77.46	30.78	98.11	60.725	391.925	27.696
N+0.76	C29	ENVOLVENTE MIN	0	-214.62	-234.21	-96.21	-25.652	-177.309	-450.768
N+0.76	C29	ENVOLVENTE MIN	0.13	-213.68	-234.21	-96.21	-25.652	-164.846	-420.333
N+0.76	C29	ENVOLVENTE MIN	0.26	-212.74	-234.21	-96.21	-25.652	-152.389	-389.899
N+0.5	C29	ENVOLVENTE MAX	0	-167.01	73.94	124.57	111.15	270.363	200.307
N+0.5	C29	ENVOLVENTE MAX	0.05	-166.74	73.94	124.57	111.15	264.854	197.334
N+0.5	C29	ENVOLVENTE MAX	0.1	-166.47	73.94	124.57	111.15	259.374	194.431
N+0.5	C29	ENVOLVENTE MIN	0	-474.92	-552.12	-127.55	-152.183	-399.466	-346.487
N+0.5	C29	ENVOLVENTE MIN	0.05	-474.56	-552.12	-127.55	-152.183	-393.809	-319.605
N+0.5	C29	ENVOLVENTE MIN	0.1	-474.2	-552.12	-127.55	-152.183	-388.179	-292.792
N+2.97	C32	ENVOLVENTE MAX	0	-111.66	308.3	80.37	50.288	334.965	-30.657
N+2.97	C32	ENVOLVENTE MAX	0.001	-111.66	308.3	80.37	50.288	334.982	-30.657
N+2.97	C32	ENVOLVENTE MAX	0.002	-111.65	308.3	80.37	50.288	335	-30.656
N+2.97	C32	ENVOLVENTE MIN	0	-363	-54.5	-99.79	-28.073	92.831	-213.084
N+2.97	C32	ENVOLVENTE MIN	0.001	-363	-54.5	-99.79	-28.073	92.904	-213.309
N+2.97	C32	ENVOLVENTE MIN	0.002	-362.99	-54.5	-99.79	-28.073	92.977	-213.534
N+2.57	C32	ENVOLVENTE MAX	0	-114.2	309.84	82.18	50.288	326.909	2.422
N+2.57	C32	ENVOLVENTE MAX	0.235	-112.93	309.84	82.18	50.288	330.866	-26.662
N+2.57	C32	ENVOLVENTE MAX	0.47	-111.66	309.84	82.18	50.288	334.965	-30.657
N+2.57	C32	ENVOLVENTE MIN	0	-366.39	-56.04	-101.61	-28.073	52.473	-120.661
N+2.57	C32	ENVOLVENTE MIN	0.235	-364.69	-56.04	-101.61	-28.073	73.5	-160.108
N+2.57	C32	ENVOLVENTE MIN	0.47	-363	-56.04	-101.61	-28.073	92.831	-213.084
N+2.1	C32	ENVOLVENTE MAX	0	-117.77	311.31	83.94	50.288	376.007	153.139
N+2.1	C32	ENVOLVENTE MAX	0.33	-115.98	311.31	83.94	50.288	351.297	67.359
N+2.1	C32	ENVOLVENTE MAX	0.66	-114.2	311.31	83.94	50.288	326.909	2.422
N+2.1	C32	ENVOLVENTE MIN	0	-371.14	-57.51	-103.37	-28.073	-9.448	-103.868
N+2.1	C32	ENVOLVENTE MIN	0.33	-368.76	-57.51	-103.37	-28.073	21.674	-101.843
N+2.1	C32	ENVOLVENTE MIN	0.66	-366.39	-57.51	-103.37	-28.073	52.473	-120.661
N+1.44	C32	ENVOLVENTE MAX	0	-120.3	312.07	84.9	50.288	411.836	299.15
N+1.44	C32	ENVOLVENTE MAX	0.235	-119.04	312.07	84.9	50.288	393.9	226.071
N+1.44	C32	ENVOLVENTE MAX	0.47	-117.77	312.07	84.9	50.288	376.007	153.139
N+1.44	C32	ENVOLVENTE MIN	0	-374.52	-58.27	-104.33	-28.073	-54.409	-130.592
N+1.44	C32	ENVOLVENTE MIN	0.235	-372.83	-58.27	-104.33	-28.073	-31.907	-117.156
N+1.44	C32	ENVOLVENTE MIN	0.47	-371.14	-58.27	-104.33	-28.073	-9.448	-103.868
N+0.97	C32	ENVOLVENTE MAX	0	-271.06	474.5	115.13	105.656	87.884	-34.432
N+0.97	C32	ENVOLVENTE MAX	0.001	-271.05	474.5	115.13	105.656	87.78	-34.661
N+0.97	C32	ENVOLVENTE MAX	0.002	-271.05	474.5	115.13	105.656	87.675	-34.891
N+0.97	C32	ENVOLVENTE MIN	0	-827.77	59.92	-123.16	-125.475	-392.572	-595.235
N+0.97	C32	ENVOLVENTE MIN	0.001	-827.77	59.92	-123.16	-125.475	-392.459	-595.54
N+0.97	C32	ENVOLVENTE MIN	0.002	-827.76	59.92	-123.16	-125.475	-392.347	-595.845
N+0.76	C32	ENVOLVENTE MAX	0	-272.46	474.62	115.27	105.656	115.59	26.344
N+0.76	C32	ENVOLVENTE MAX	0.13	-271.76	474.62	115.27	105.656	101.627	-4.296
N+0.76	C32	ENVOLVENTE MAX	0.26	-271.06	474.62	115.27	105.656	87.884	-34.432
N+0.76	C32	ENVOLVENTE MIN	0	-829.64	59.8	-123.3	-125.475	-422.366	-517.061
N+0.76	C32	ENVOLVENTE MIN	0.13	-828.71	59.8	-123.3	-125.475	-407.359	-555.896
N+0.76	C32	ENVOLVENTE MIN	0.26	-827.77	59.8	-123.3	-125.475	-392.572	-595.235
N+0.5	C32	ENVOLVENTE MAX	0	-275.43	474.72	115.39	105.656	176.184	159.905
N+0.5	C32	ENVOLVENTE MAX	0.275	-273.95	474.72	115.39	105.656	145.662	92.481
N+0.5	C32	ENVOLVENTE MAX	0.55	-272.46	474.72	115.39	105.656	115.59	26.344
N+0.5	C32	ENVOLVENTE MIN	0	-833.6	59.7	-123.42	-125.475	-487.378	-356.691

N+0.5	C32	ENVOLVENTE MIN	0.275	-831.62	59.7	-123.42	-125.475	-454.647	-436.233
N+0.5	C32	ENVOLVENTE MIN	0.55	-829.64	59.7	-123.42	-125.475	-422.366	-517.061
N+2.57	C34	ENVOLVENTE MAX	0	-2.54	0	0	0	0	0
N+2.57	C34	ENVOLVENTE MAX	0.235	-1.27	0	0	0	0	0
N+2.57	C34	ENVOLVENTE MAX	0.47	0	0	0	0	0	0
N+2.57	C34	ENVOLVENTE MIN	0	-3.95	0	0	0	0	0
N+2.57	C34	ENVOLVENTE MIN	0.235	-1.97	0	0	0	0	0
N+2.57	C34	ENVOLVENTE MIN	0.47	0	0	0	0	0	0
N+2.1	C34	ENVOLVENTE MAX	0	-6.1	0	0	0	0.001	0
N+2.1	C34	ENVOLVENTE MAX	0.33	-4.32	0	0	0	0	0
N+2.1	C34	ENVOLVENTE MAX	0.66	-2.54	0	0	0	0	0
N+2.1	C34	ENVOLVENTE MIN	0	-9.49	0	0	0	-0.001	0
N+2.1	C34	ENVOLVENTE MIN	0.33	-6.72	0	0	0	0	0
N+2.1	C34	ENVOLVENTE MIN	0.66	-3.95	0	0	0	0	0
N+1.44	C34	ENVOLVENTE MAX	0	-8.64	0	0	0	0.001	0.001
N+1.44	C34	ENVOLVENTE MAX	0.235	-7.37	0	0	0	0.001	0.001
N+1.44	C34	ENVOLVENTE MAX	0.47	-6.1	0	0	0	0.001	0
N+1.44	C34	ENVOLVENTE MIN	0	-13.44	0	0	0	-0.001	-0.001
N+1.44	C34	ENVOLVENTE MIN	0.235	-11.47	0	0	0	-0.001	-0.001
N+1.44	C34	ENVOLVENTE MIN	0.47	-9.49	0	0	0	-0.001	0
N+0.97	C34	ENVOLVENTE MAX	0	-9.77	0	0	0	0.001	0.001
N+0.97	C34	ENVOLVENTE MAX	0.105	-9.21	0	0	0	0.001	0.001
N+0.97	C34	ENVOLVENTE MAX	0.21	-8.64	0	0	0	0.001	0.001
N+0.97	C34	ENVOLVENTE MIN	0	-15.2	0	0	0	-0.001	-0.001
N+0.97	C34	ENVOLVENTE MIN	0.105	-14.32	0	0	0	-0.001	-0.001
N+0.97	C34	ENVOLVENTE MIN	0.21	-13.44	0	0	0	-0.001	-0.001
N+0.76	C34	ENVOLVENTE MAX	0	-11.18	0	0	0	0.001	0.002
N+0.76	C34	ENVOLVENTE MAX	0.13	-10.48	0	0	0	0.001	0.001
N+0.76	C34	ENVOLVENTE MAX	0.26	-9.77	0	0	0	0.001	0.001
N+0.76	C34	ENVOLVENTE MIN	0	-17.39	0	0	0	-0.001	-0.002
N+0.76	C34	ENVOLVENTE MIN	0.13	-16.3	0	0	0	-0.001	-0.001
N+0.76	C34	ENVOLVENTE MIN	0.26	-15.2	0	0	0	-0.001	-0.001
N+0.5	C34	ENVOLVENTE MAX	0	-14.15	0	0	0	0.002	0.002
N+0.5	C34	ENVOLVENTE MAX	0.275	-12.66	0	0	0	0.002	0.002
N+0.5	C34	ENVOLVENTE MAX	0.55	-11.18	0	0	0	0.001	0.002
N+0.5	C34	ENVOLVENTE MIN	0	-22.01	0	0	0	-0.002	-0.002
N+0.5	C34	ENVOLVENTE MIN	0.275	-19.7	0	0	0	-0.002	-0.002
N+0.5	C34	ENVOLVENTE MIN	0.55	-17.39	0	0	0	-0.001	-0.002
N+2.1	C36	ENVOLVENTE MAX	0	-178.2	210.62	281.77	106.353	-211.63	49.143
N+2.1	C36	ENVOLVENTE MAX	0.105	-177.64	210.62	281.77	106.353	-239.231	27.486
N+2.1	C36	ENVOLVENTE MAX	0.21	-177.07	210.62	281.77	106.353	-265.918	5.99
N+2.1	C36	ENVOLVENTE MIN	0	-535.12	-216.91	-273.5	-76.367	-941.082	-294.491
N+2.1	C36	ENVOLVENTE MIN	0.105	-534.36	-216.91	-273.5	-76.367	-941.87	-272.173
N+2.1	C36	ENVOLVENTE MIN	0.21	-533.61	-216.91	-273.5	-76.367	-942.658	-250.017
N+1.44	C36	ENVOLVENTE MAX	0	-180.74	213.49	283.41	106.353	-83.08	148.378
N+1.44	C36	ENVOLVENTE MAX	0.235	-179.47	213.49	283.41	106.353	-147.862	98.627
N+1.44	C36	ENVOLVENTE MAX	0.47	-178.2	213.49	283.41	106.353	-211.63	49.143
N+1.44	C36	ENVOLVENTE MIN	0	-538.5	-219.78	-275.14	-76.367	-970.732	-396.681
N+1.44	C36	ENVOLVENTE MIN	0.235	-536.81	-219.78	-275.14	-76.367	-939.318	-345.453
N+1.44	C36	ENVOLVENTE MIN	0.47	-535.12	-219.78	-275.14	-76.367	-941.082	-294.491
N+0.97	C36	ENVOLVENTE MAX	0	-181.88	214.4	283.94	106.353	-24.715	193.146
N+0.97	C36	ENVOLVENTE MAX	0.105	-181.31	214.4	283.94	106.353	-53.926	170.752
N+0.97	C36	ENVOLVENTE MAX	0.21	-180.74	214.4	283.94	106.353	-83.08	148.378
N+0.97	C36	ENVOLVENTE MIN	0	-540.01	-220.69	-275.66	-76.367	-1027.359	-442.77
N+0.97	C36	ENVOLVENTE MIN	0.105	-539.26	-220.69	-275.66	-76.367	-999.017	-419.715
N+0.97	C36	ENVOLVENTE MIN	0.21	-538.5	-220.69	-275.66	-76.367	-970.732	-396.681
N+0.76	C36	ENVOLVENTE MAX	0	-183.28	214.81	284.18	106.353	47.841	248.774
N+0.76	C36	ENVOLVENTE MAX	0.13	-182.58	214.81	284.18	106.353	11.54	220.95
N+0.76	C36	ENVOLVENTE MAX	0.26	-181.88	214.81	284.18	106.353	-24.715	193.146
N+0.76	C36	ENVOLVENTE MIN	0	-541.89	-221.1	-275.91	-76.367	-1097.764	-500.033
N+0.76	C36	ENVOLVENTE MIN	0.13	-540.95	-221.1	-275.91	-76.367	-1062.538	-471.392
N+0.76	C36	ENVOLVENTE MIN	0.26	-540.01	-221.1	-275.91	-76.367	-1027.359	-442.77
N+0.5	C36	ENVOLVENTE MAX	0	-186.25	215.17	284.39	106.353	201.833	366.823
N+0.5	C36	ENVOLVENTE MAX	0.275	-184.76	215.17	284.39	106.353	124.793	307.777
N+0.5	C36	ENVOLVENTE MAX	0.55	-183.28	215.17	284.39	106.353	47.841	248.774
N+0.5	C36	ENVOLVENTE MIN	0	-545.85	-221.46	-276.12	-76.367	-1247.206	-621.542
N+0.5	C36	ENVOLVENTE MIN	0.275	-543.87	-221.46	-276.12	-76.367	-1172.441	-560.765
N+0.5	C36	ENVOLVENTE MIN	0.55	-541.89	-221.46	-276.12	-76.367	-1097.764	-500.033