

I. GENERALIDADES:

Ubicación: Provincia: Alajuela
Cantón: Alajuela
Distrito: Guacima

Descripción: El puente es una estructura de 130 m de tres claros (2 claros de 40m entre apoyos en los extremos y un claro central de 50m entre apoyos). La superestructura está conformada por dos vigas principales de acero armadas a partir de placas con un peralte de 2.74m, y 3 vigas secundarias de sección W roladas en caliente apoyadas sobre los diafragmas. Los diafragmas del puente son cerchas de acero ubicadas a cada 8.0m en los extremos y 7.2m en el tramo central. La subestructura es de concreto colado en sitio y está compuesta por pilas de dos columnas rectangulares y huecas. Los bastiones y pilas están cimentados mediante placas aisladas

Documentos de referencia: Especificaciones para el Diseño de Puentes LRFD, ed.8, AASHTO 2017.
Requisitos del Reglamento para Concreto Estructural y Comentarios ACI 318-14.
Lineamientos para el Diseño Sismorresistente de puentes, marzo 2013.
Código Sísmico de Costa Rica, CSCR-2010
Planos constructivos, puente sobre quebrada Salitral, IMSA 1994

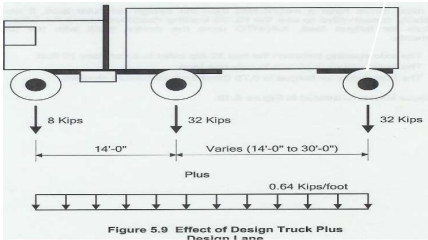
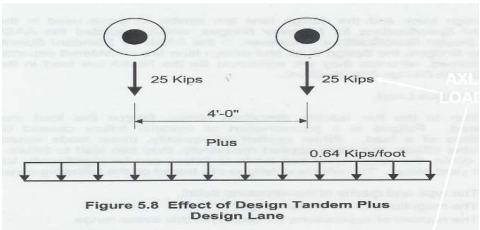
1. CARGAS DE DISEÑO

Cargas Permanentes:

Las correspondientes al peso de los elementos y demás dispositivos.				AASHTO 3.5.1
Concreto colado en sitio	=	2.40	ton/m ³	
Concreto prefabricado	=	2.50	ton/m ³	
Asfalto	=	2.20	ton/m ³	
Baranda concreto	=	0.32	ton/m	
Baranda peatonal	=	0.04	ton/m	

Carga Peatonal: Las correspondiente al empuje de suelos = 0.40 ton/m² **AASHTO 3.5.2**
Carga Vehicular: **AASHTO 3.6.1.6**

La carga vehicular HL-93 **AASHTO 3.6.1.2**



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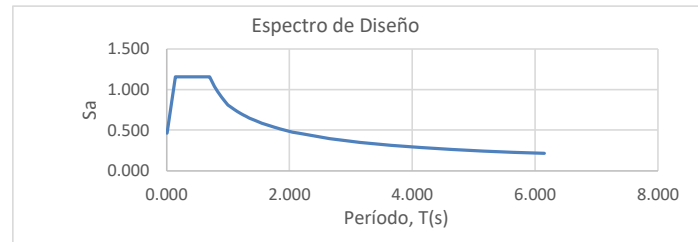


Carga de Sismo

Tipo de Sitio de Cimentación	=	S2		
Zona Sísmica	=	III		
Coefficiente Sísmico Espectral C_a	=	0.386		
Coefficiente Sísmico Espectral C_v	=	0.541		
Periodo de Control T_{sf}	=	0.700		
Periodo de Control T_{af}	=	0.140		
Factor de Importancia Operacional (Crítico)	=	1.25		
Factor de modificación de la respuesta				
	R_{pilas}	=	1.50	$R_{conexiones}$ = 0.80
	$R_{bastiones}$	=	1.50	

Lineamientos 2.3
Lineamientos 2.1
Lineamientos 2.4
Lineamientos 2.4
Lineamientos 2.4
Lineamientos 2.4
Lineamientos 3.2
Lineamientos 3.4

Espectro de diseño



Carga de Viento

Para la combinación de carga Strenght III

Velocidad básica ($T_R=50$ años)	=	115 km/h
Coefficiente de recurrencia ($T_R = 700$ años)	=	1.60
C_d	=	1.3
G	=	1
Z	=	50 m
K_z (Categoría de exposición C)	=	1.4

Borrador lineamientos viento CR
Borrador lineamientos viento CR

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Presión de diseño	=	193 kg/m ²	AASHTO 3.8.1.2.1
Para la combinación de carga Strenght V			
Velocidad de diseño	=	128 km/h	
Cd	=	1.3	
G	=	1	
Z	=	50 m	
Kz (Catergoría de exposición C)	=	1.4	AASHTO 3.8.1.2.1
Presión de diseño	=	150 kg/m ²	AASHTO 3.8.1.2.1
Para la combinación de carga Service I			
Velocidad de diseño	=	112 km/h	
Cd	=	1.3	
G	=	1	
Z	=	50 m	
Kz (Catergoría de exposición C)	=	1.4	
Presión de diseño	=	115 kg/m ²	AASHTO 3.8.1.2.1

*Por demanda lateral rige la carga de sismo, por lo que se desprecian las combinaciones de carga de viento

Modificadores de Carga

AASHTO 1.3.2

Factor debido a ductilidad (η_D)	=	0.95	*Subestructura está detallada por ductilidad
Factor debido a redundancia (η_R)	=	1.00	*Redundancia convencional
Factor debido a clasificación operacional (η_R)	=	1.05	*Nivel operativo crítico
Factor modificador de carga (η_i)	=	1.00	

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2. PROPIEDADES DE LOS MATERIALES

2.1 Concreto

Viga Cabezal (VC-1)

Resistencia a los 28 días	f'_c	=	280	kg/cm ²	
Módulo de elasticidad	E_c	=	278419.866	kg/cm ²	AASHTO 5.4.2.4

Pilas

Resistencia a los 28 días	f'_c	=	280	kg/cm ²	
Módulo de elasticidad	E_c	=	2.784E+05	kg/cm ²	AASHTO 5.4.2.4

Fundaciones

Resistencia a los 28 días	f'_c	=	250	kg/cm ²	
Módulo de elasticidad	E_c	=	2.682E+05	kg/cm ²	AASHTO 5.4.2.4

Losa

Resistencia a los 28 días	f'_c	=	350	kg/cm ²	
Módulo de elasticidad	E_c	=	299695.708	kg/cm ²	AASHTO 5.4.2.4

Bastion

Resistencia a los 28 días	f'_c	=	280	kg/cm ²	
Módulo de elasticidad	E_c	=	2.784E+05	kg/cm ²	AASHTO 5.4.2.4

2.2 Acero de Refuerzo

ASTM A-615	Grado 40	f_y	=	2800	kg/cm ²
ASTM A-615	Grado 60	f_y	=	4200	kg/cm ²

2.2 Acero de Presfuerzo

Grado 270	f_{pu}	=	18900	kg/cm ²	
	E_{sp}	=	1898287.87	kg/cm ²	

2.3 Acero Estructural

ASTM A-709	Grado 50	f_y	=	3500	kg/cm ²
		f_b	=	1890	kg/cm ²
		f_u	=	4920	kg/cm ²
		E_s	=	2.030E+06	kg/cm ²
		G_s	=	7.816E+05	kg/cm ²

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2.4 Studs

f_u	=	4218	kg/cm ²
F_y	=	3515	kg/cm ²

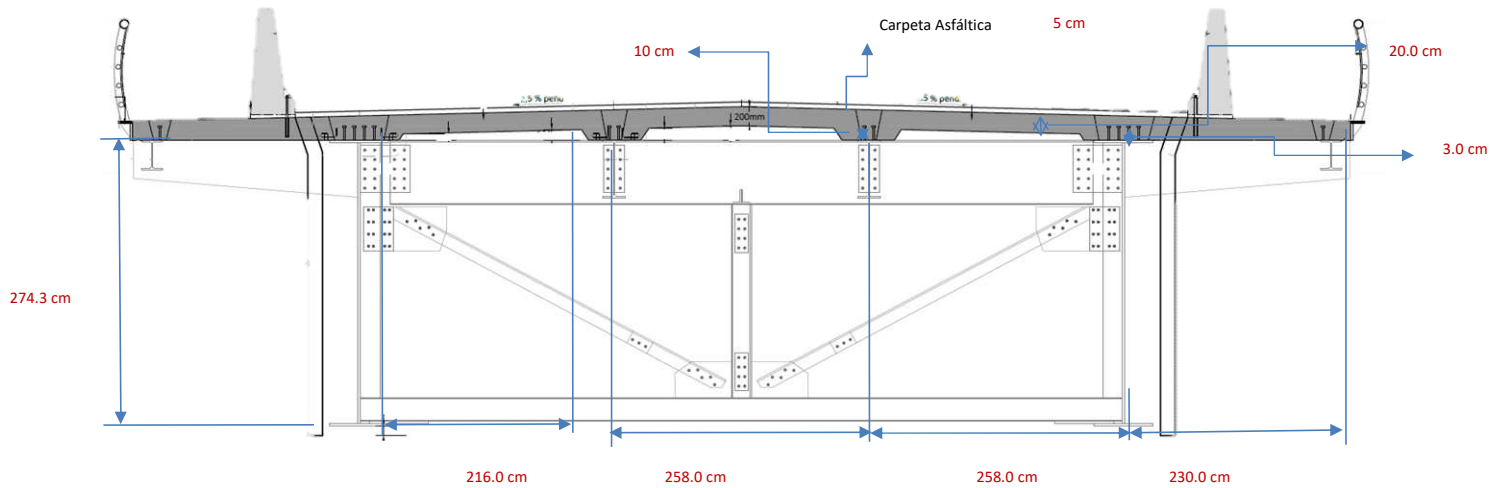
2.5 Pernos

ASTM A-325	Tipo 3	f_y	=	3500	kg/cm ²
		f_{ub}	=	8437	kg/cm ²
		f_b	=	1890	kg/cm ²
		E_s	=	2.030E+06	kg/cm ²

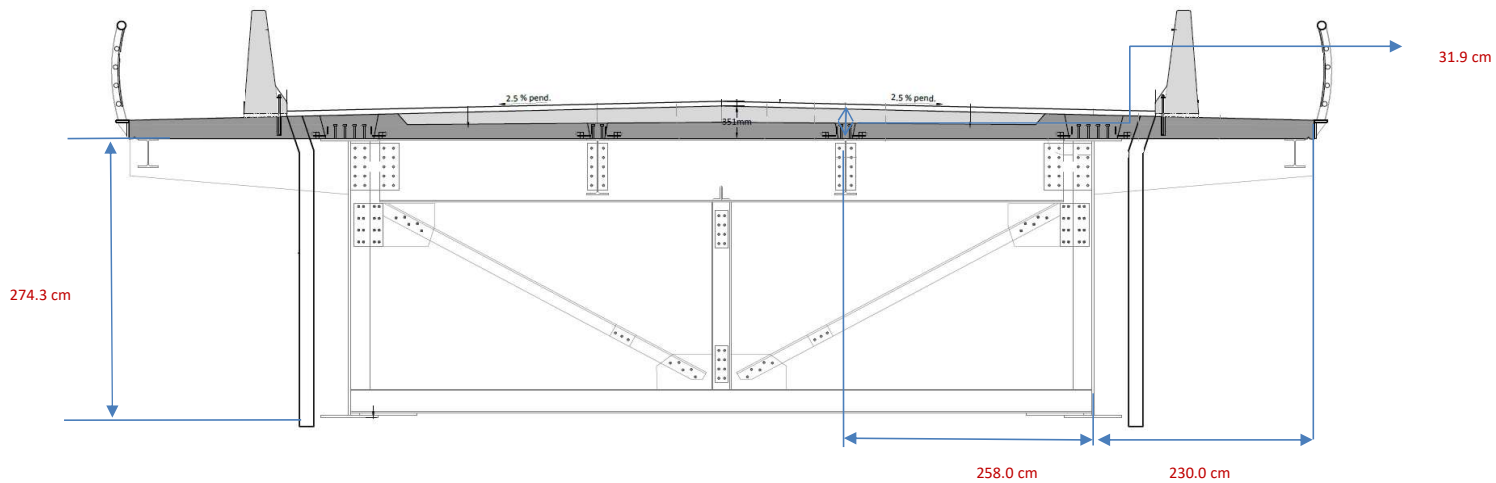
II. DISEÑO DE LA SUPERESTRUCTURA

1. GEOMETRÍA

En la siguientes figuras se muestra la geometría de los elementos de la superestructura del puente sobre el río Ciruelas.



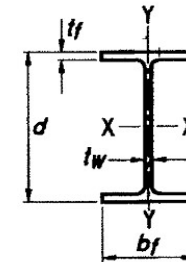
En la siguientes figuras se muestra la geometría de los elementos de la superestructura del puente sobre el río Ciruelas.



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A continuación se muestran las dimensiones generales y propiedades geométricas de la vigas exteriores

		unid.	TRAMO1	TRAMO 2	TRAMO 3	TRAMO 4	
Seccion Simple	d	cm	274.32	274.32	274.32	274.32	
	tw	cm	1.27	1.27	1.43	1.27	
	bf _{inf}	cm	60.96	60.96	60.96	60.96	
	tf _{inf}	cm	2.54	2.86	3.49	3.18	
	bf _{sup}	cm	50.80	50.80	60.96	50.80	
	tf _{sup}	cm	2.54	2.86	3.49	3.18	
	A	cm ²	625.8	660.8	807.8	695.7	
	y	cm	131.6	131.2	137.2	105.1	
	I _x	cm ⁴	7288054.0	7916050.0	10079849.0	8540896.0	
	I _y	cm ⁴	75744.6	85281.3	131832.9	94818.0	
	S _{ytop}	cm ³	2982.1	3357.5	4325.2	3733.0	
	S _{ybot}	cm ³	2485.1	2797.9	4325.2	3110.8	
	S _{xtop}	cm ³	51065.4	55310.6	73511.2	50472.1	
	S _{xbot}	cm ³	55380.3	60335.7	73468.3	81264.5	
Seccion Compuesta, M+ (cargas de largo plazo)	A	cm ²	1112.5	1014.1	1161.1	1049.0	
	y	cm	200.1	185.6	182.9	166.5	
	I	cm ⁴	14023980.0	13539324.0	15631318.7	16333267.0	
	S _{conc}	cm ³	137754.0	121183.2	136591.8	124829.0	
	S _{topflan}	cm ³	188863.7	152596.8	170949.5	151451.2	
	S _{botflan}	cm ³	70096.9	72951.3	85472.2	98112.5	
Seccion Compuesta, M- (cargas de corto plazo)	A	cm ²	2086.0	1720.8	1867.8	1755.7	
	y	cm	241.1	227.4	222.4	215.1	
	I	cm ⁴	18108711.4	17872573.5	20446549.4	22522982.9	
	S _{conc}	cm ³	298211.5	255501.4	272894.5	273985.1	
	S _{topflan}	cm ³	545864.1	380664.5	393772.7	380422.7	
	S _{botflan}	cm ³	75094.5	78606.0	91937.9	104702.1	
Seccion Compuesta, M- (concreto no efectivo en tensión)	A	cm ²	652.7	687.7	843.0	722.6	
	y	cm	138.0	137.3	143.7	111.9	
	I	cm ⁴	7914586.6	8547178.9	10891002.2	9402121.8	
	S _{topflan}	cm ³	58068.3	62384.0	83359.6	57883.4	
	S _{botflan}	cm ³	57342.9	62246.9	75806.2	84031.6	



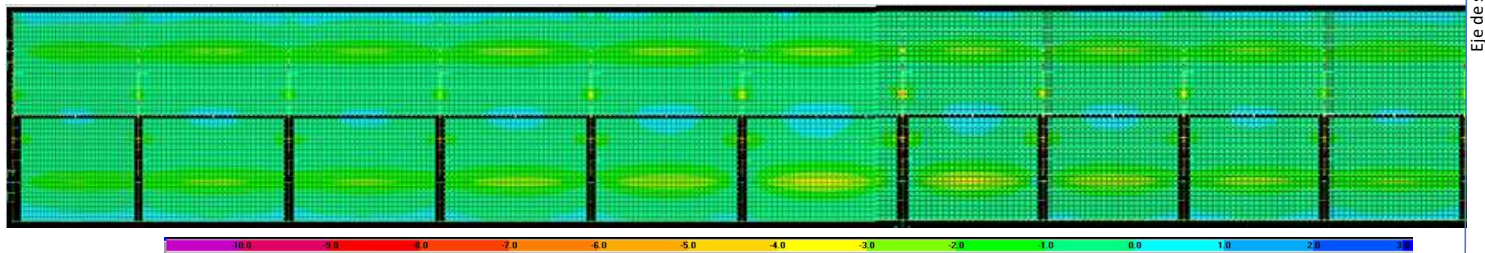
2. Diseño de Losa

2.1 Cálculo de Demanda

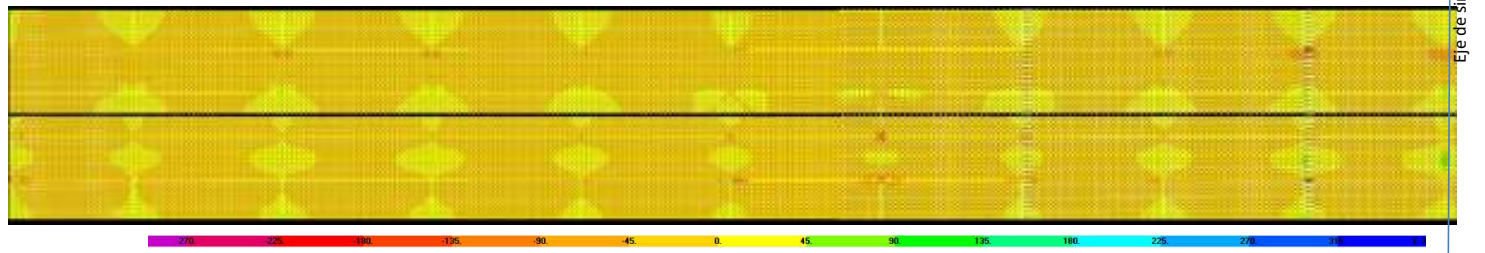
$t_{\text{losa pref}}$	20	cm	$t_{\text{losa pref}}$	31.9	cm
$t_{\text{losa c.s.}}$	0	cm	$t_{\text{losa c.s.}}$	0	cm
$t_{\text{carpeta asf.}}$	5	cm	$t_{\text{carpeta asf.}}$	5	cm
w_{DC}	0.50	ton/m ²	w_{DC}	0.80	ton/m ²
w_{DW}	0.11	ton/m ²	w_{DW}	0.11	ton/m ²
S_{losa}	774	cm	S_{losa}	774	cm

Momento debido a peso de la losa

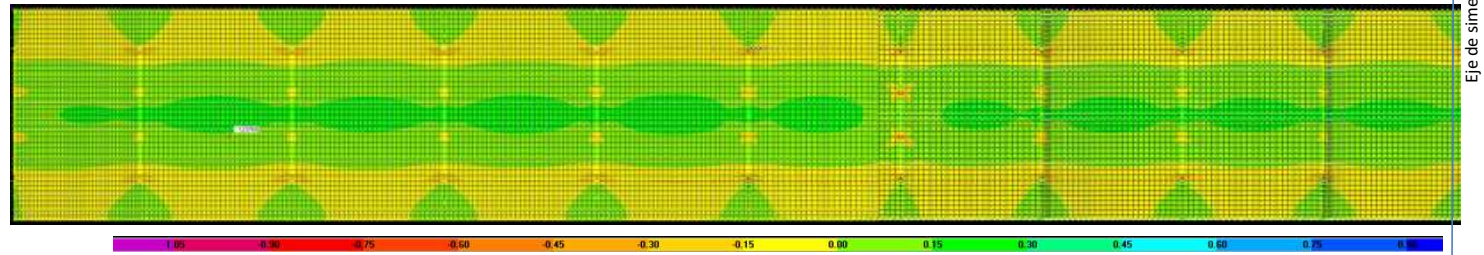
ETAPA 1 (Montaje de losas prefabricadas)



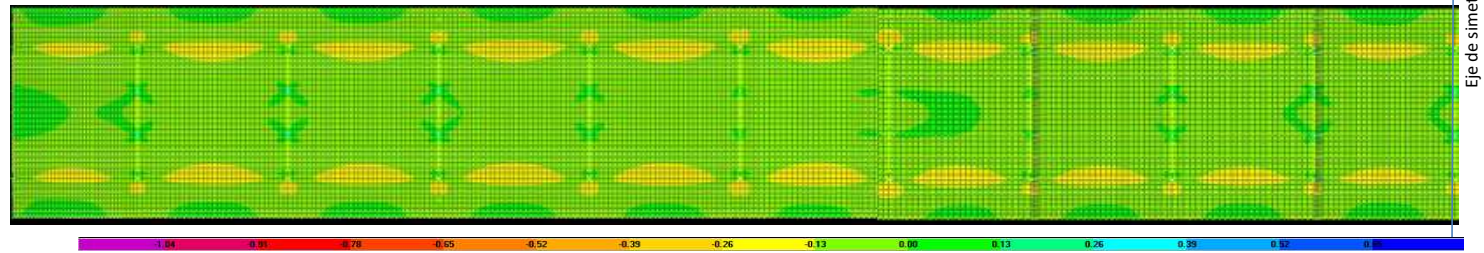
ETAPA 2 (Colado de completamientos de losa)



Momento debido a la carpeta asfáltica (ton.m/m)

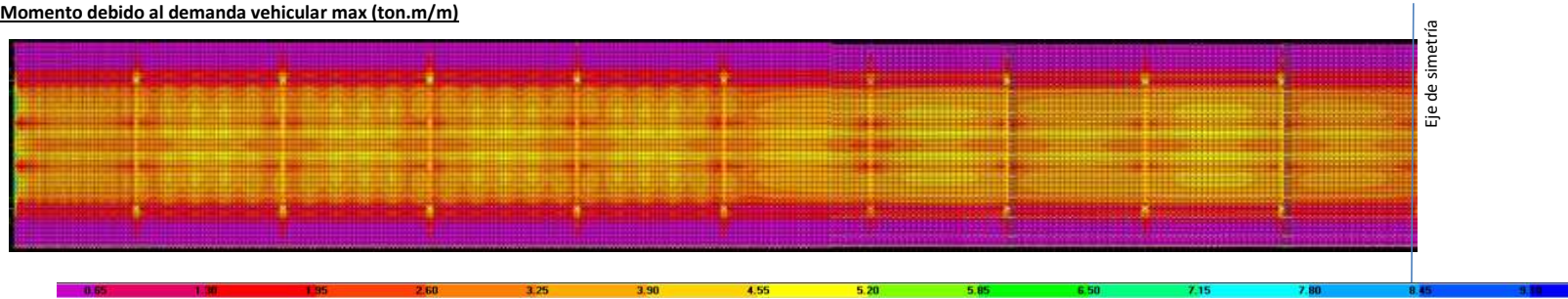


Momento debido al peso propio de las barandas (ton.m/m)

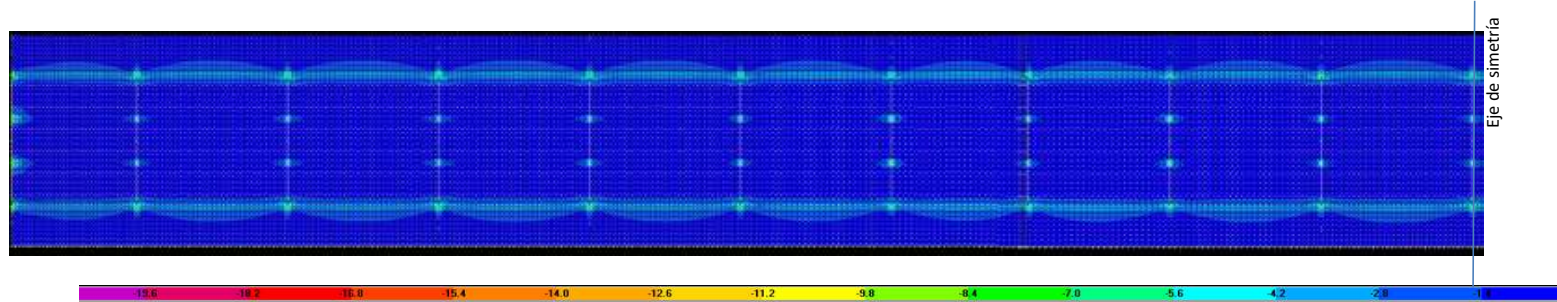


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Momento debido al demanda vehicular max (ton.m/m)

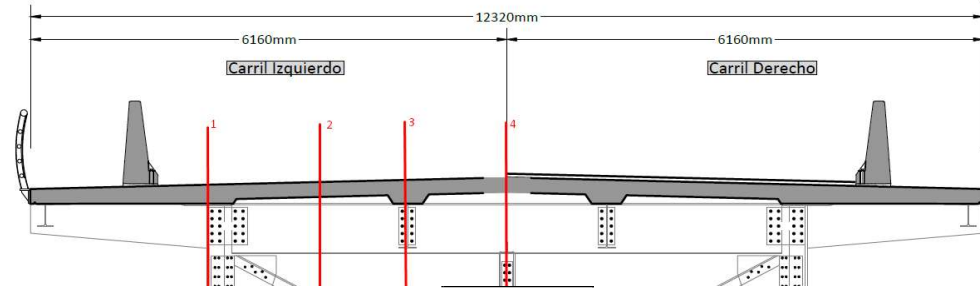


Momento debido al demanda vehicular min (ton.m/m)



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Resumen de demandas



Resumen de demandas losas prefabricadas

Ubicación	1	2	3	4	
Mlosa E1 (zona cercana a pilas1)	-4.22	-1.64	-0.15	0	ton.m/m
Mlosa E1 (zona cercana a pilas2)	-4.22	-1.64	-0.15	0	ton.m/m
Mlosa E1 (centro de claros 1)	-2.35	-0.56	-0.3	0	ton.m/m
Mlosa E1 (centro de claros 2)	-2.28	-0.55	-0.32	0	ton.m/m
Mlosa E1 (centro de claros 3)	-2.34	-0.57	-0.32	0	ton.m/m
Mlosa E2 (zona cercana a pilas1)	0	0	0	0	ton.m/m
Mlosa E2 (zona cercana a pilas2)	0	0	0	0	ton.m/m
Mlosa E2 (centro de claros 1)	0	0	0	0	ton.m/m
Mlosa E2 (centro de claros 2)	0	0	0	0	ton.m/m
Mlosa E2 (centro de claros 3)	0	0	0	0	ton.m/m
Mbaranda (zona cercana a pilas1)	-0.23	-0.098	-0.02	-0.004	ton.m/m
Mbaranda (zona cercana a pilas2)	-0.23	-0.07	0	0	ton.m/m
Mbaranda (centro de claros 1)	-0.21	-0.12	-0.02	-0.015	ton.m/m
Mbaranda (centro de claros 2)	-0.2	-0.08	-0.03	0	ton.m/m
Mbaranda (centro de claros 3)	-0.2133	-0.098	-0.021	-0.015	ton.m/m
Mcarpeta (zona cercana a pilas1)	-0.166	0.028	0.127	0.2	ton.m/m
Mcarpeta (zona cercana a pilas2)	-0.166	0.028	0.127	0.2	ton.m/m
Mcarpeta (centro de claros 1)	-0.158	0.07	0.132	0.208	ton.m/m
Mcarpeta (centro de claros 2)	-0.13	0.095	0.11	0.188	ton.m/m
Mcarpeta (centro de claros 3)	-0.14	0.11	0.123	0.2	ton.m/m

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Ubicación	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	
<u>MII+imp max (zona cercana a pilas1)</u>	0.44	4	4.23	3.56	ton.m/m
<u>MII+imp max (zona cercana a pilas2)</u>	0.44	4	4	3.53	ton.m/m
<u>MII+imp max (centro de claros 1)</u>	1.79	4.18	5.1	3.82	ton.m/m
<u>MII+imp max (centro de claros 2)</u>	0.47	3.3	3.48	3.6	ton.m/m
<u>MII+imp max (centro de claros 3)</u>	0.59	4.24	5.17	3.82	ton.m/m
<u>MII+imp min (zona cercana a pilas1)</u>	-3.83	-0.83	-0.48	-0.11	ton.m/m
<u>MII+imp min (zona cercana a pilas2)</u>	-3.93	-0.81	-0.55	-0.15	ton.m/m
<u>MII+imp min (centro de claros 1)</u>	-3.49	-0.83	-0.51	-0.14	ton.m/m
<u>MII+imp min (centro de claros 2)</u>	-3.48	-0.8	-0.55	-0.12	ton.m/m
<u>MII+imp min (centro de claros 3)</u>	-3.48	-0.64	-0.52	-0.15	ton.m/m

Resumen de demandas últimas

	Factores de carga		
	DC	DW	LL
Strenght I	1.25	1.5	1.75
Service I	1.00	1.0	1.00

	<u>1</u>		<u>2</u>		<u>3</u>		<u>4</u>		
	max	min	max	min	max	min	max	min	
<u>Stenght I (zona cercana a pilas1)</u>	-5.0	-12.5	4.9	-3.6	7.4	-0.9	6.5	0.1	ton.m/m
<u>Stenght I (zona cercana a pilas2)</u>	-5.0	-12.7	4.9	-3.5	7.0	-1.0	6.5	0.0	ton.m/m
<u>Stenght I (centro de claros 1)</u>	-0.3	-9.5	6.6	-2.2	8.7	-1.1	7.0	0.0	ton.m/m
<u>Stenght I (centro de claros 2)</u>	-2.5	-9.4	5.1	-2.0	5.8	-1.2	6.6	0.1	ton.m/m
<u>Stenght I (centro de claros 3)</u>	-2.4	-9.5	6.8	-1.8	8.8	-1.2	7.0	0.0	ton.m/m
<u>Service I (zona cercana a pilas1)</u>	-4.2	-8.4	2.3	-2.4	4.2	-0.5	3.8	0.1	ton.m/m
<u>Service I (zona cercana a pilas2)</u>	-4.2	-8.5	2.3	-2.4	4.0	-0.6	3.7	0.1	ton.m/m
<u>Service I (centro de claros 1)</u>	-0.9	-6.2	3.6	-1.4	4.9	-0.7	4.0	0.1	ton.m/m
<u>Service I (centro de claros 2)</u>	-2.1	-6.1	2.8	-1.3	3.2	-0.8	3.8	0.1	ton.m/m
<u>Service I (centro de claros 3)</u>	-2.1	-6.2	3.7	-1.2	5.0	-0.7	4.0	0.0	ton.m/m

2.2 Calculo de Espesor mínimo

$t_{losamin}$ = 17.78 cm **Ok**

AASHTO 9.7.1.1

2.2 Calculo de Refuerzo por Momentos Negativos, losas prefabricadas espesor 20cm

M_u = 9.54 ton-m/m
 M_r = 3.01 ton-m/m

AASHTO 5.6.3.3

Acero Colocado

corridas # 5 @ 20 cm **Ok**
bastones # 4 @ 20 cm
Recubrimiento = 2.50 cm **AASHTO 5.10.1**
Espesor de desgaste = 0.00 cm **AASHTO 2.5.2.4**
 d = 16.71 cm
 b = 100 cm
 ϕ = 0.90
 β_1 = 0.85
 $(\phi M_n)^+$ = 9.55 ton-m/m
 $\phi M_n / M_u$ = 1.00 **Ok**

A_{scoloc} = 16.2 cm²/m **Ok**
 A_{smin1} = 5.71 cm²/m **AASHTO 9.7.2.5**
 A_{smin2} = 1.54 cm²/m **AASHTO 5.10.6**
Espaciamiento máx = 30.0 cm **AASHTO 5.10.3.2**

2.3 Calculo de Refuerzo por Momentos Positivos, losas prefabricadas espesor 20cm

M_u = 8.81 ton-m/m
 M_r = 3.01 ton-m/m

AASHTO 5.6.3.3

Acero Colocado

corridas # 5 @ 20 cm **Ok**
bastones # 4 @ 20 cm
Recubrimiento = 2.50 cm **AASHTO 5.10.1**
 d = 16.71 cm
 b = 100 cm
 ϕ = 0.90
 β_1 = 0.85
 $(\phi M_n)^+$ = 9.5466 ton-m/m
 $\phi M_n / M_u$ = 1.08 **Ok**

A_{scoloc} = 16.2 cm²/m **Ok**
 A_{smin1} = 5.71 cm²/m **AASHTO 9.7.2.5**
 A_{smin2} = 1.54 cm²/m **AASHTO 5.10.6**
Espaciamiento máx = 30.0 cm **AASHTO 5.10.3.2**

2.4 Calculo de Refuerzo por Momentos Negativos, losas prefabricadas espesor 30cm

$$M_u = 12.69 \text{ ton-m/m}$$

$$M_r = 3.01 \text{ ton-m/m}$$

AASHTO 5.6.3.3

Acero Colocado

corridas	# 5	@ 20 cm	Ok
bastones	# 4	@ 20 cm	
Recubrimiento	=	2.50 cm	AASHTO 5.10.1
Espesor de desgaste	=	0.00 cm	AASHTO 2.5.2.4
d	=	28.61 cm	
b	=	100 cm	
ϕ	=	0.90	
β_1	=	0.85	
$(\phi M_n)^+$	=	16.85 ton-m/m	
$\phi M_n/M_u$	=	1.33	Ok

$$A_{s_{coloc}} = 16.2 \text{ cm}^2/\text{m}$$

$$A_{s_{min1}} = 5.71 \text{ cm}^2/\text{m}$$

$$A_{s_{min2}} = 1.54 \text{ cm}^2/\text{m}$$

$$\text{Espaciamiento máx} = 30.0 \text{ cm}$$

Ok

AASHTO 9.7.2.5

AASHTO 5.10.6

AASHTO 5.10.3.2

2.5 Calculo de Refuerzo por Momentos Positivos, losas prefabricadas espesor 30cm

$$M_u = 7.38 \text{ ton-m/m}$$

$$M_r = 3.01 \text{ ton-m/m}$$

AASHTO 5.6.3.3

Acero Colocado

corridas	# 5	@ 20 cm	Ok
bastones	# 0	@ 20 cm	
Recubrimiento	=	2.50 cm	AASHTO 5.10.1
d	=	28.61 cm	
b	=	100 cm	
ϕ	=	0.90	
β_1	=	0.85	
$(\phi M_n)^+$	=	10.273 ton-m/m	
$\phi M_n/M_u$	=	1.4	Ok

$$A_{s_{coloc}} = 9.9 \text{ cm}^2/\text{m}$$

$$A_{s_{min1}} = 5.71 \text{ cm}^2/\text{m}$$

$$A_{s_{min2}} = 1.54 \text{ cm}^2/\text{m}$$

$$\text{Espaciamiento máx} = 30.0 \text{ cm}$$

Ok

AASHTO 9.7.2.5

AASHTO 5.10.6

AASHTO 5.10.3.2

2.4 Calculo de Refuerzo longitudinal inferior

LOSA 20cm				LOSA 30cm				AASHTO 9.7.3.2
% de acero transversal	67%			% de acero transversal	67%			
Área de acero longitudinal min	10.87	cm ²		Área de acero longitudinal min	6.63	cm ²		AASHTO 5.10.6
As _{min}	1.09	cm ²		As _{min}	1.41	cm ²		AASHTO 5.10.6
s _{max}	45.00	cm		s _{max}	45.00	cm		
Usado	# 5	@ 20.0 cm		Usado	# 5	@ 20.0 cm		
	# 4	@ 20.0 cm			# 0	@ 20.0 cm		
As _{coloc}	16.2	cm ² /m	OK	As _{coloc}	9.9	cm ² /m	OK	

2.5 Control de agrietamiento mediante postension longitudinal

Acero de postensión requerido

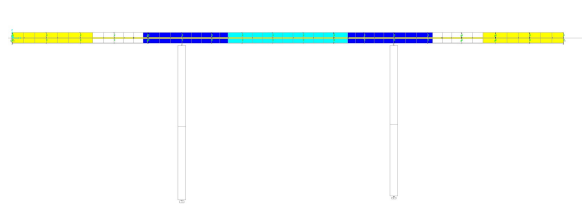
bf	=	100	cm
tc	=	20	cm
Ag	=	2000	cm ²
Ȳ _{presf.}	=	10.00	cm
Torones	=	0.60	in
Aps	=	1.40	cm ²

f _{15%ruptura}	=	5.63	kg/cm ²
Δf _{pT}	=	0.15	
P _{pe}	=	11.3	ton
P _{pi}	=	13	ton
torones requeridos por metro	=	1.00	

3. DISEÑO DE VIGAS PRINCIPALES

3.1 Modelaje Estructural

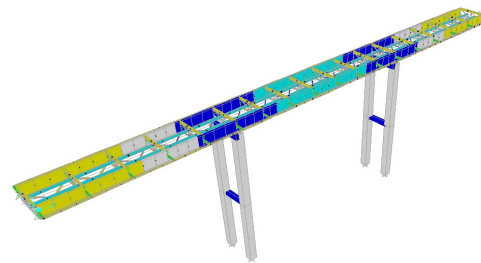
Se construyó un modelo de la estructura del puente en el programa SAP 2000, a partir del cual se estimaron las demandas en los elementos. Se modelaron los bastiones con pilotes, suponiendo las rigidices del suelo con base la descripción geotécnica de los planos.



Vista Lateral



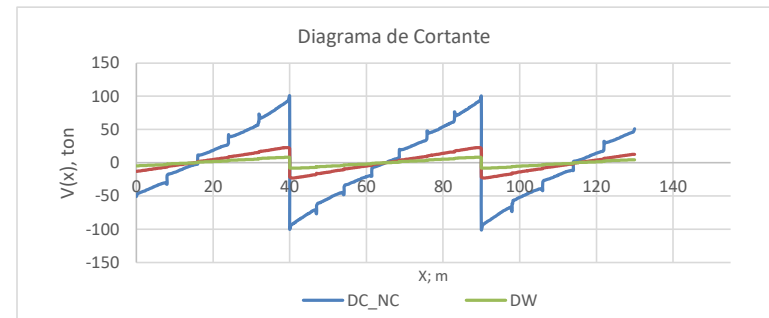
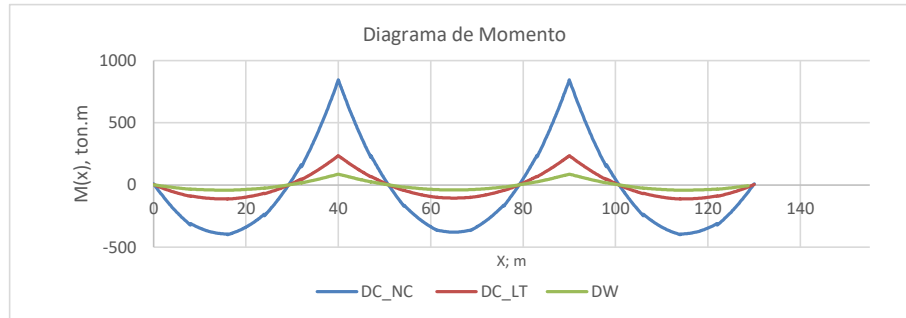
Vista Transversal



Vista 3D

3.3 Estimación de demandas (Vigas Exteriores)

3.3.1 Cargas Permanentes

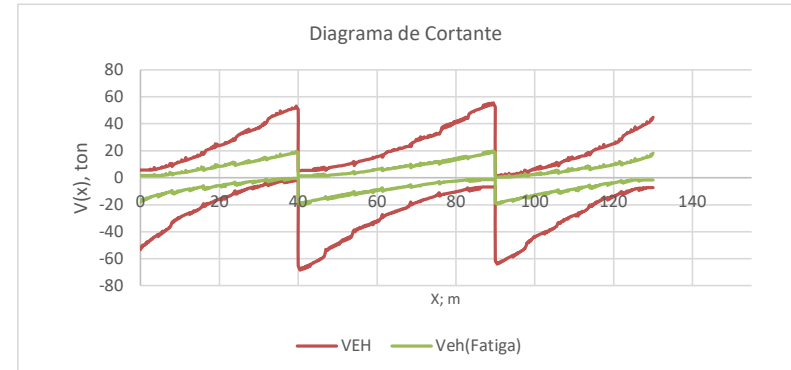
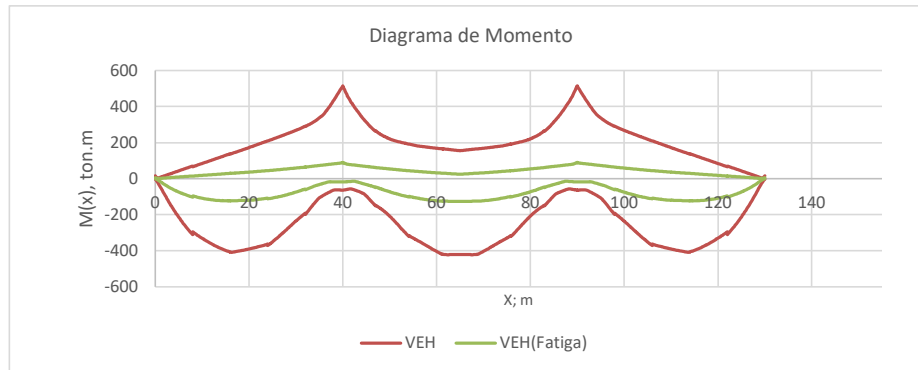


3.3.3 Carga Vehicular (LL+IM)

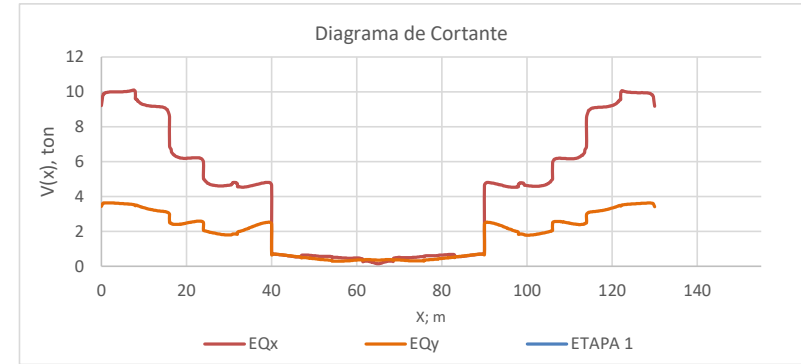
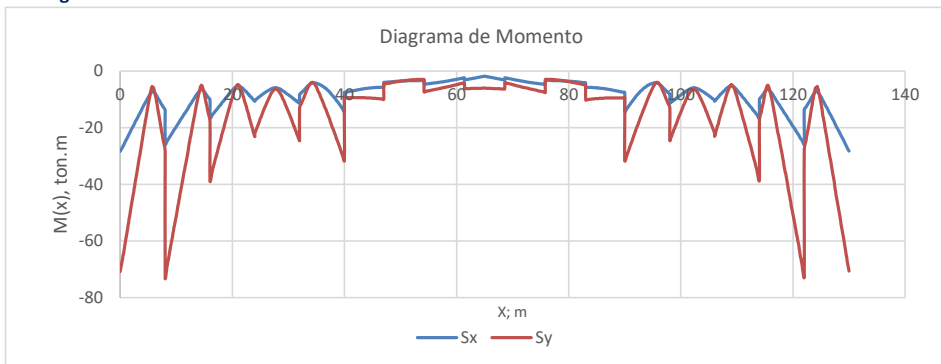
$$F_{IM} = 1.33$$

$$F_{IM(FATIGA)} = 1.15$$

AASHTO 3.6.2.1



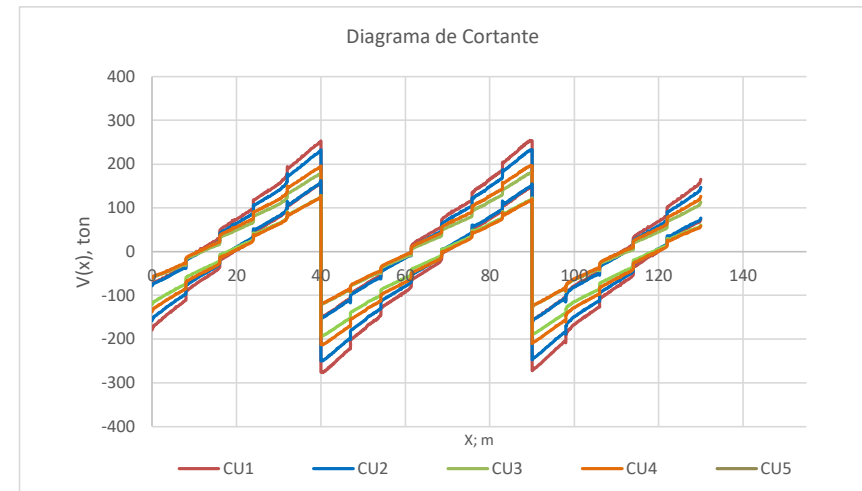
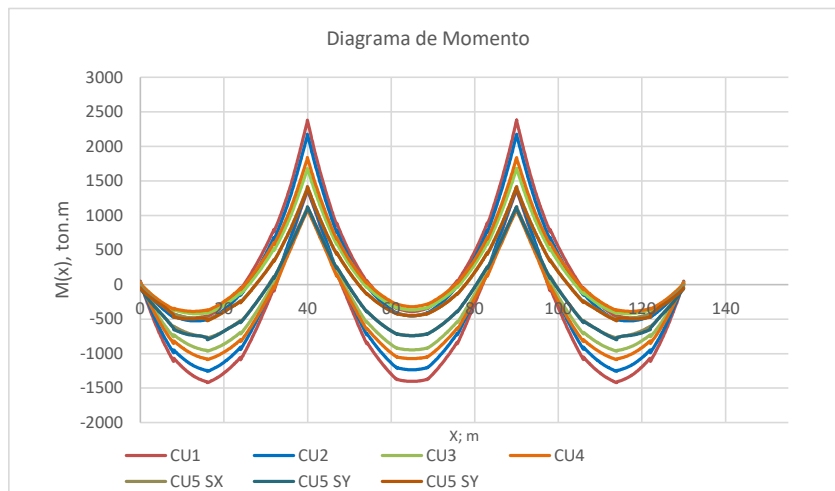
3.3.4 Carga de Sismo



3.3.5 Demandas Últimas

AASHTO 3.4.1

	Factores de carga			
	DC	DW	LL+IM	EQ
CU1 (Strenght I)	1.25	1.5	1.75	0.00
CU2 (Strenght II)	1.25	1.5	1.35	0.00
CU3 (Service I)	1.00	1.0	1.00	0.00
CU4 (Service II)	1.00	1.0	1.30	0.00
CU5 (Extreme Event I)	1.00	1.0	0.50	1.00
CU6 (Fatigue I)	0.00	0.0	1.75	0.00
CU7 (Fatigue II)	0.00	0.0	0.80	0.00



3.4 Diseño por Flexión

3.4.1 Límites de proporcionalidad de las secciones

	TRAMO 1		TRAMO 2		TRAMO 3		TRAMO 4			
D/tw:Alma Sin rigidizadores Long.	212	X	211.496	X	187	X	211	X		
D/tw:Alma con rigidizadores long.		OK		OK		OK		OK		
$b_{f_{bot}}$	60.96	OK	60.96	OK	60.96	OK	60.96	OK		
$t_{f_{bot}}$	2.54	OK	2.86	OK	3.49	OK	3.18	OK		
$b_f/2t_{f_{bot}}$	12.0	OK	10.7	OK	8.7	OK	9.6	OK		
$b_{f_{top}}$	50.80	OK	50.80	OK	60.96	OK	50.80	OK		
$t_{f_{top}}$	2.54	OK	2.86	OK	3.49	OK	3.18	OK		
$b_f/2t_{f_{top}}$	10.0	OK	8.9	OK	8.7	OK	8.0	OK		
$I_{y_{bot}}/I_{y_{top}}$	1.728	OK	1.728	OK	1	OK	1.728	OK		
$I_{y_{top}}/I_{y_{bot}}$	0.578704	OK	0.5787	OK	1	OK	0.579	OK		

AASHTO 6.10.2

3.4.2 Estado Límite de Servicio

Deformación Elástica

Longitud entre apoyos

Deflexion por carga vehicular

Extremos		Central		
40		50		m
4.22	X	5.63	X	cm

AASHTO 6.10.4

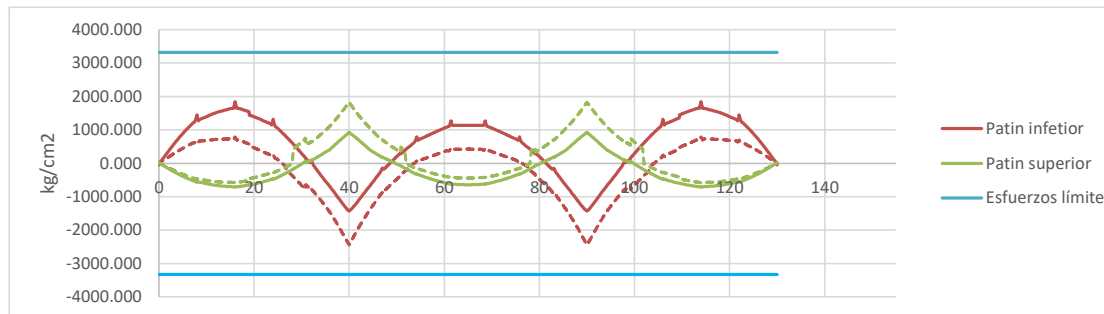
AASHTO 6.10.4.1

Deformaciones Permanentes

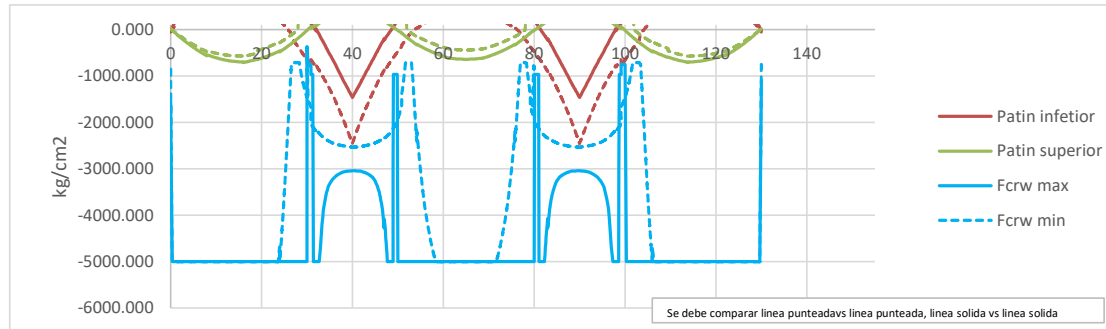
AASHTO 2.5.2.6.2

AASHTO 6.10.4.2

Sección compuesta?	=	Si
Viga continua?	=	Si
Construcción apuntalada	=	No
Concreto es efectivo a tensión	=	Si
Se detallan rigidizadores longitudinales	=	Si
Se cumple AASHTO 6.10.1.7	=	Si



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3.4.3 Momento Positivo

Revisión de sección compacta

AASHTO 6.10.6.2.2

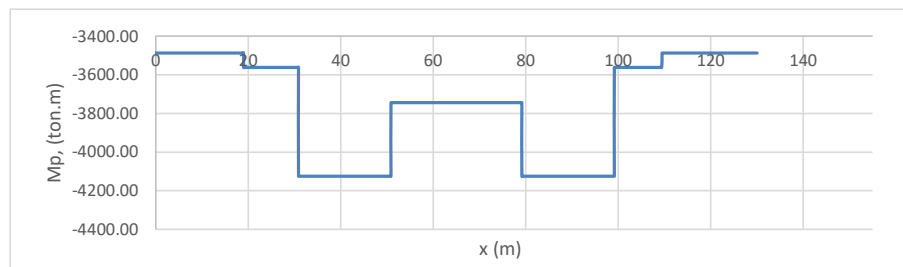
	TRAMO 1		TRAMO 2		TRAMO 3		TRAMO 4		
Esfuerzo de fluencia de los patines	3500	OK	3500	OK	3500	OK	3500	OK	kg/cm ²
Límite de esbeltez del alma ($2D_{cp}/t_w$)	0	OK	0.0	OK	0.0	OK	0.0	OK	
Requisito de ductilidad (D_p)	30.65	OK	31.68	OK	32.48	OK	31.97	OK	

AASHTO 6.10.7.3

Cálculo de Momento Plástico

AASHTO D.6.1

	TRAMO 1	TRAMO 2	TRAMO 3	TRAMO 4	
Dt	301.9	297.3	297.3	297.3	cm
Y	273.7	272.6	271.8	272.3	cm
D _p	30.7	31.7	32.5	32.0	cm
D _{cp}	0.0	0.0	0.0	0.0	cm
M _p	3486.2	3561.7	4125.1	3744.2	ton.m



Cálculo de Momento de Fluencia

AASHTO D.6.2

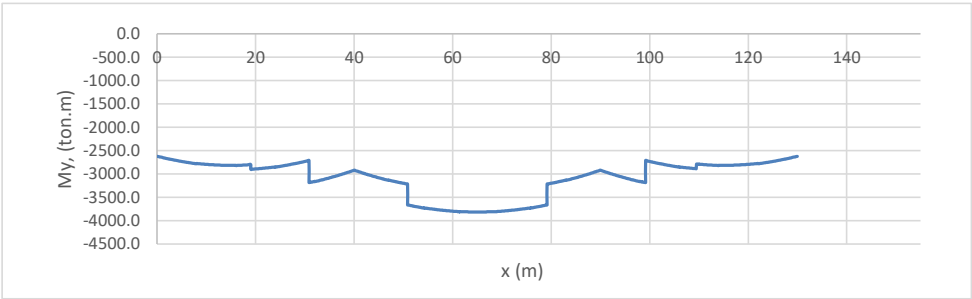
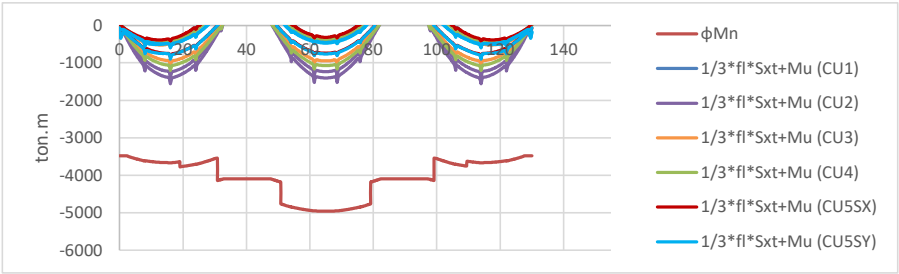
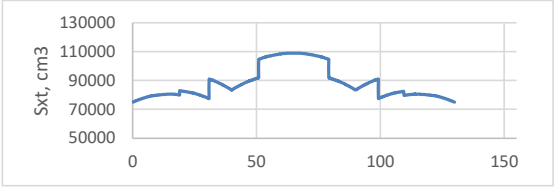


Grafico Demanda/Capacidad para momento positivo

AASHTO 6.10.7.1.2

Factor hibrido Rh = 1.0
Factor de resistencia por Flexion ϕf = 1.0
Modulo de seccion elastico =

AASHTO 6.10.1.10.1
AASHTO 6.5.4.2



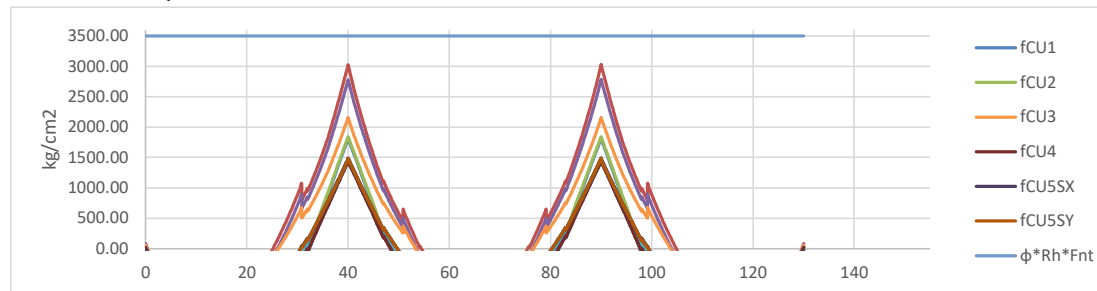
3.4.4 Momento Negativo

Patines en tensión

Factor de resistencia por Flexion	$\phi f =$	1.0
Patines arriostrados continuamente	$=$	Si
Factor híbrido	$R_h =$	1.0

AASHTO 6.10.8.1.3
AASHTO 6.10.1.10.1

Grafico demanda capacidad



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Patines en compresión

AASHTO 6.10.8.1.1

		TRAMO 1	TRAMO 2	TRAMO 3	TRAMO 4	
Pandeo Local del patín a compresión	Rb	0.91	0.92	0.94	0.97	
	Rh	1.0	1.0	1.0	1.0	
	Fyc	3500	3500	3500	3500	kgf/cm ²
	Fyw	3500	3500	3500	3500	kgf/cm ²
	Fyr	2450	2450	2450	2450	kgf/cm ²
	λ_f	12.00	10.66	8.73	9.58	
	λ_{rf}	16.12	16.12	16.12	16.12	
	λ_{pf}	9.15	9.15	9.15	9.15	
	Fnc	2792.6	3006.05	3280.39	3332.73	kgf/cm ²
	rt	15.03	15.28	15.35	15.82	cm
Pandeo Lateral Torsional	Lb	800.00	800.00	800.00	800.00	cm
	Lp	362.03	367.98	369.71	380.99	cm
	Lr	1359.39	1381.72	1388.22	1430.59	cm
	Fcr	6433.34	6712.22	9956.93	7601.98	kg/cm ²
	Cb	1.00	1.00	1.44	1.00	
	Fnc	2763.64	2803.48	3280.39	2989.36	kg/cm ²

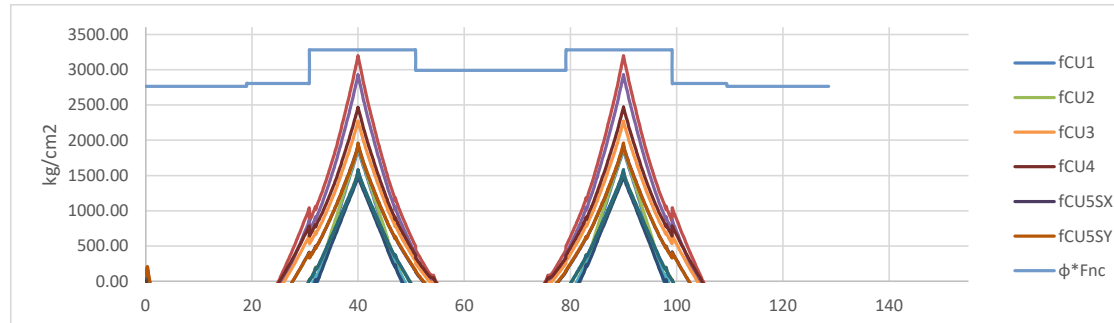
AASHTO 6.10.1.10.2

AASHTO 6.10.1.10.1

AASHTO 6.10.8.2.2

*Únicamente se estima Cb para el tramo cercano a las pilas pues en los demás con un Cb=1.0 conservadoramente se cumple con la demanda requerida.

Grafico demanda capacidad



Revisión de Refuerzo mínimo en flexión Negativa

AASHTO 6.10.1.7

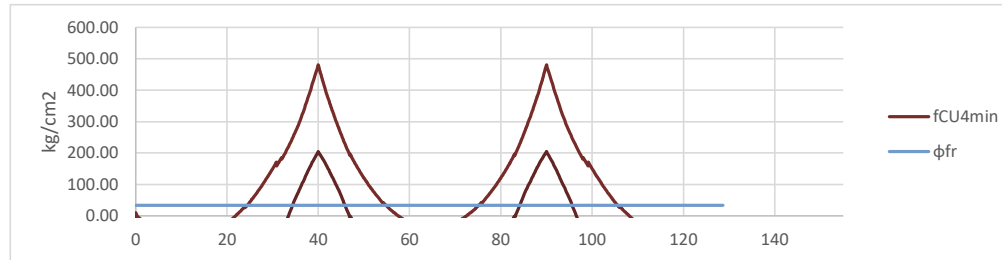
Módulo de ruptura

$f_r = 37.6 \text{ kg/cm}^2$

Esfuerzo límite en tensión del concreto

$\phi = 0.9$

$\phi * f_r = 33.8 \text{ kg/cm}^2$



Acero de refuerzo longitudinal mínimo en las zonas donde f_{CU4} es mayor a $\phi * f_r$ (LOSA 20cm)

= 20 cm^2/m

*2/3 deben colocarse en el lecho superior

Acero de refuerzo longitudinal mínimo en las zonas donde f_{CU4} es mayor a $\phi * f_r$ (LOSA 30cm)

= 30 cm^2/m

Acero de refuerzo longitudinal colocado

LOSA 20cm			
Malla superior	=	# 5 @ 20 cm	OK
		# 4 @ 20 cm	
Malla inferior	=	# 5 @ 20 cm	OK
		# 4 @ 20 cm	
Area de acero Total	=	32.5 cm^2/m	OK

LOSA 30cm			
Malla superior	=	# 8 @ 20 cm	OK
		# 0 @ 20 cm	
Malla inferior	=	# 5 @ 20 cm	OK
		# 0 @ 20 cm	
Area de acero Total	=	35.2 cm^2/m	OK

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3.5 Diseño Conectores de Cortante

AASHTO 6.10.10

	Distribucion de studs colocados							
Estacion inicial	0	17	40	65.000	90	113		
Estacion final	17	40	65	90	113	130		
Diametro studs	2.2	2.2	2.2	2.2	2.2	2.2		cm
Cant.max.studs x linea	7	7	7	7	7	7		
Cant.studs x linea	4	4	4	4	4	4		
pitch _{max}	60	121.92	121.92	121.92	121.92	60		cm
pitch _{min}	13.2	13.2	13.2	13.2	13.2	13.2		
pitch	30	30	40	40	30	30		cm
losa con metaldeck?	No	No	No	No	No	No		
altura min studs	15	15	15	15	15	15		cm
altura de studs	15.24	15.24	15.24	15.24	15.24	15.24		cm
h/d	6.93	6.93	6.93	6.93	6.93	6.93		

OK

OK

OK

OK

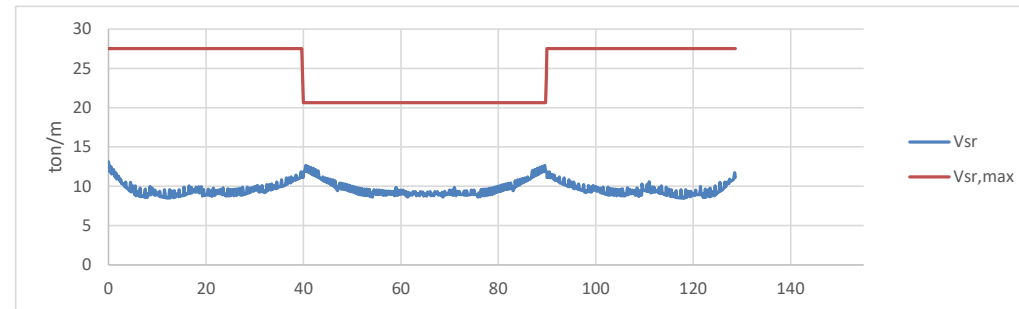
Fatiga

	TRAMO1	TRAMO 2	TRAMO 3	TRAMO 4	
Q (momento positivo)	68553.64	63548.49	68820.72	76537.99	cm3
Q (momento negativo)	68553.64	63548.49	68820.72	76537.99	cm3

AASHTO 6.10.10.2

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PUENTE SOBRE EL RÍO CIRUELAS RN.27

	Distribucion de studs							
Estacion inicial	0	17	40	65	90	113		
Estacion final	17	40	65	90	113	130		
Zr	2.06	2.06	2.06	2.06	2.06	2.06		ton
Vsrmax	27.507	27.507	20.631	20.631	27.507	27.507		ton/m



Resistencia

Factor de resistencia

$$\phi_{sc} = 0.85$$

AASHTO 6.10.10.4

	TRAMO1	TRAMO 2	TRAMO 3	TRAMO 4	
P1p	2942	2136	2136	2136	ton
P2p	2190	2313	2827	2435	ton
Pp	2190	2136	2136	2136	ton
Fp	0	0	0	0	ton
P1n	2190	2313	2827	2435	ton
P2n	1558	1131	1131	1131	ton
Pn	1558	1131	1131	1131	ton
Pt	3748	3267	3267	3267	ton
Ft	0	0	0	0	ton
P al extremo del elemento	2190	2136	2136	2136	ton
P al apoyo intermedio (M-)	3748	3267	3267	3267	ton

MEMORIA DE CÁLCULO
PUENTE SOBRE EL RÍO CIRUELAS RN.27

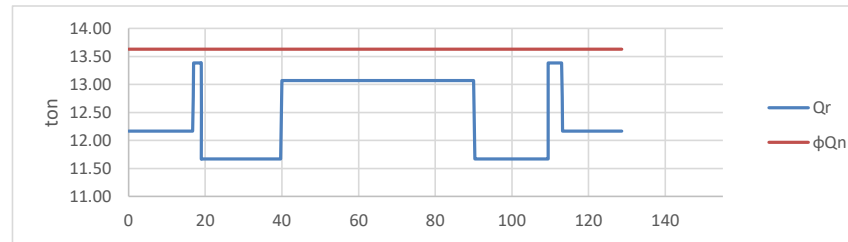
	Primer Luz		Segunda luz		Tercera luz	
	max	min	max	min	max	min
inicio de tramo	0		40		90	
ubicacion momento veh max positivo	17		65		113	
final del tramo	40		90		130	

Cantidad de studs tramo azul 180

Cantidad de studs tramo rojo 280

Cantidad de studs tramo naranja 250

*considera del momento positivo maximo al apoyo



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3.6 Diseño por Cortante

Factor de resistencia

$$\phi_v = 1.0$$

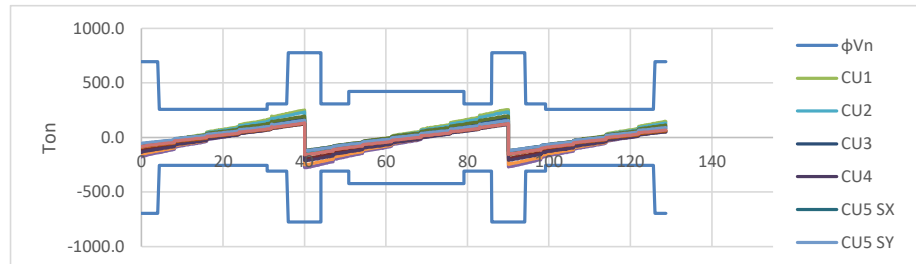
AASHTO 6.10.6.3/AASHTO 6.10.9/6.11.1.3

Paneles intermedios				
	TRAMO 1	TRAMO 2	TRAMO 3	TRAMO 4
D/tw	212.00	211.50	186.95	210.99
do paneles internos	165	165	187	193
Rigidizadores Longitudinales?	Si	Si	Si	Si
Alma rigidizada?	Si	Si	Si	Si
considera el alma rigidizada para la capacidad?	No	No	No	Si
Vp	694.13	692.48	776.06	690.83
k	18.31	18.25	15.22	14.64
C	0.37	0.37	0.40	0.30
Vn	257.55	257.27	307.72	422.49

*Cumple con ser menor a 1.5D al tener rigidizadores long.

*Casos que no consideran rigidizada es debido a que no cumplen con la inercia mínima requerida según AASHTO 6.10.11.1.3

Paneles en zona de apoyo				
	TRAMO 1		TRAMO 3	
D/tw	212.00		186.95	
do paneles internos	70		70	
Alma rigidizada?	Si		Si	
Vp	694.13		776.06	
k	78.97		77.93	
C	1.00		1.00	
Vn	694.13		776.06	



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Rigidizadores Transversales Intermedios

AASHTO 6.10.11.1

	TRAMO1	TRAMO 2	TRAMO 3	TRAMO 4	
Rigidizadores a ambos lados de la viga?	No	No	No	No	
bt	15.24 X	15.24 X	15.24 X	15.24 X	cm
tp	0.95	0.95	0.95	0.95	cm
Fcr	2445.316106	2445.316106	2445.316106	2445.316106	kg/cm ²
esarrollar postbuckling tension field action?	Si	Si	Si	Si	
Se considera Tension Field Action?	No	No	No	No	
b	165.0	165.0	187.0	193.0	cm
J	4.66	4.62	3.11	2.82	
ρ_t	1.43	1.00	1.00	1.00	
I_{t1}	1573.8	1563.2	1700.4	1114.5	cm ⁴
I_{t2}	14990.3	9315.8	9142.3	9227.4	cm ⁴
I_3	444.2	443.1	470.7	425.6	
I_{min}	1573.8	1563.2	1700.4	1114.5	
I_t	X 1120.9	X 1120.9	X 1120.9	✓ 1120.9	cm ⁴

AASHTO 6.10.11.1.2

AASHTO 6.10.11.1.3

Rigidizadores en zona de apoyo

AASHTO 6.10.11.1

Rigidizadores a ambos lados de la viga?

Pu en pilas = Si
Pu en bastiones = 529 ton
179 ton

En pilas									
TRAMO 3									
VA-01 TRAMO3									
b_f			20.32	X					cm
t_p			1.5875						cm
Cantidad			3						
separación			10						cm
Ancho del alma			45.74						cm
h			267.34						cm
A_g			258.96						cm ²
I			26638.81						
r_s			10.14						cm
P_e			4225.81						ton
resistencia axial ϕP_n			671.11						
Bearing ϕR_{sbn}			975.48						ton

*X, implica rigidizadores esbletos

AASHTO 6.10.11.2.2

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Seccion utilizada en los apoyos de las pilas = TRAMO 3
 ϕP_n = 671.11
 ϕR_{sbn} = 975.48

OK
OK

En bastiones									
	TRAMO1								
bf	20.32	X							cm
tp	1.5875								cm
Cantidad	3								
separación	10								cm
Ancho del alma	42.86								cm
h	269.24								cm
Ag	247.98								cm ²
I	26638.81								
rs	10.36								cm
Pe	4166.38								ton
resistencia axial ϕP_n	644.32								
Bearing ϕR_{sbn}	975.48								ton

AASHTO 6.10.11.2.2

Seccion utilizada en los apoyos de los bastiones = TRAMO1
 ϕP_n = 644.32 ton
 ϕR_{sbn} = 975.48 ton

OK
OK

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PUENTE SOBRE EL RÍO CIRUELAS RN.27

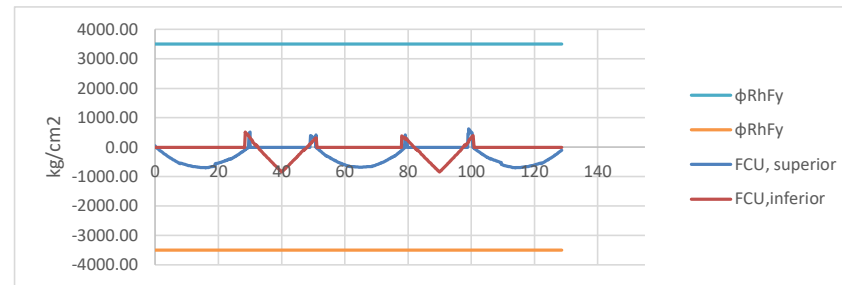
Rigidizadores longitudinales

AASHTO 6.10.11.3

	TRAMO 1		TRAMO 2		TRAMO 3		TRAMO 4		
bl	14.0	X	13.97	X	13.97	X	13.97	X	cm
ts	0.95		0.95		1.11		1.11		cm
bef	22.86		22.86		25.74		22.86		cm
y	3.03		3.03		3.00		3.29		cm
I	✓ 748.59		✓ 748.59		✓ 905.34		✓ 843.00		cm4
Imin	425.41		426.77		816.36		612.03		cm4
Imax	1889.01		1893.51		2156.09		2220.12		
Ag	42.30		42.30		52.31		44.54		cm2
r	✓ 4.21		✓ 4.21		✓ 4.16		✓ 4.35		cm3
rmin	1.73		1.73		1.96		2.03		
β	1.00		1.00		1.00		1.00		

OK

	Distribucion de rigidizador									
Estacion inicial	0	28.35	30	49.13	51.07	77.93	79.87	99	100.65	m
Estacion final	28.35	30	49.13	51.07	77.93	79.87	99	100.65	129	m
ubicacion superior	55	55	0	55	55	55	0	55	55	cm
ubicación inferior	0	55	55	55	0	55	55	55	0	cm



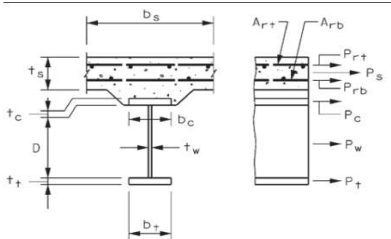
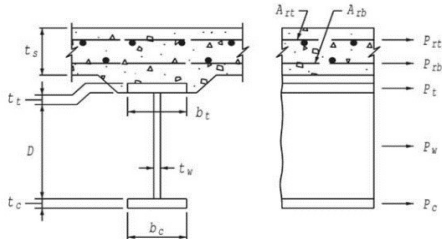
4. Apoyos de Vigas en Bastiones

Las demandas verticales y transeversales se deben transmitir mediante apoyos tipo Vasoflón VU (con desplazamiento longitudinal) y retenedores oleodinámicos OT, o similares, los cuales deben ser diseñados por el proveedor con la capacidad para los siguientes demandas:

	DC	DW	LL+IMP	SX	SY
Axial (ton)	75.269	6.256	51.639	1.125	1.7875
Transversal (ton)	2.2495	1.29	-8.219	12	424.3
Longitudinal (ton)	0	0	0	435.738	2783
Movimiento long (mm)	0.0309	0.0054	0.0545	0	0
Rotación (rad)	0.00407	0.00033	0.00307	0.00015	0.0036

* Debe diseñarse los apoyos para que tengan una capacidad de movimiento longitudinal de 100mm para que sea compatible con la junta de expansión

VIGA PRINCIPAL(CIRUELAS)

		Momento Plastico Flexión Positiva				Momento Plástico Flexión Negativa					
		TRAMO 1	TRAMO 2	TRAMO 3	TRAMO 4		TRAMO 1	TRAMO 2	TRAMO 3	TRAMO 4	
		VA-01 TRAMO1	VA-01 TRAMO2	VA-01 TRAMO3	VA-01 TRAMO4		VA-01 TRAMO1	VA-01 TRAMO2	VA-01 TRAMO3	VA-01 TRAMO4	
Patín Inferior en tensión	Dt	301.9	297.3	297.3	297.3		301.9	297.3	297.3	297.3	
	Y	273.67	272.64	271.84	272.35		139.72	138.44	151.94	137.16	
	dbt (cm)	2.54	2.86	3.49	3.18		2.5	2.9	3.5	3.2	
	Ybt (cm)	1.27	1.43	1.75	1.59		1.3	1.4	1.7	1.6	
	Pbt (ton)	541.9	610.2	744.6	678.5		-541.9	-610.2	-744.6	-678.5	
Patín Inferior en compresión	dbc (cm)	0.00	0.00	0.00	0.00		0.0	0.0	0.0	0.0	
	Ybc (cm)	2.54	2.86	3.49	3.18		2.5	2.9	3.5	3.2	
	Pbc (ton)	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	
Alma en tensión	dwt (cm)	269.2	268.6	267.3	268.0		137.2	135.6	148.5	134.0	
	Ywt (cm)	137.2	137.2	137.2	137.2		71.1	70.6	77.7	70.2	
	Pwt (ton)	1196.8	1193.9	1338.0	1191.1		-609.8	-602.6	-743.0	-595.5	
Alma en compresión	dwc (cm)	0.0	0.0	0.0	0.0		132.1	133.0	118.9	134.0	
	Ywc (cm)	271.8	271.5	270.8	271.1		205.7	204.9	211.4	204.1	
	Pwc (ton)	0.0	0.0	0.0	0.0		587.0	591.3	595.0	595.5	
Patín Superior en tensión	dtb (cm)	1.89	1.18	1.01	1.21		0.0	0.0	0.0	0.0	
	Ytb (cm)	272.7	272.0	271.3	271.7		271.8	271.5	270.8	271.1	
	Ptb (ton)	335.4	209.0	215.4	214.7		0.0	0.0	0.0	0.0	
Patín Superior en compresión	dts (cm)	0.65	1.68	2.48	1.97		2.5	2.9	3.5	3.2	
	Yts (cm)	273.99	273.5	273.1	273.33385		273.1	272.9	272.6	272.7	
	Pts (ton)	-116.2	-299.5	-529.2	-350.7		451.6	508.5	744.6	565.4	
Concreto en compresión	β1	0.65	0.65	0.65	0.65						
	a (cm)	18.3	16.0	16.6	16.2						
	ds (cm)	18.3	16.0	16.6	16.2						
	Ys (cm)	292.7	289.3	289.0	289.2						
	Ps (ton)	-1957.9	-1713.6	-1768.9	-1733.6						
Acero long. cama inferior	Arb (cm2)						13.5	13.5	9.9	13.5	
	Yrb (cm)						279.2	282.2	282.2	282.2	
	Prb (ton)						56.5	56.5	41.6	56.5	
Acero long. cama superior	Art						13.5	13.5	25.3	13.5	
	Yrt (cm)						297.0	292.4	292.4	292.4	
	Prt (ton)						56.5	56.5	106.4	56.5	
Suma de fuerzas		0.001	-0.002	-0.008	0.003		-0.0039	-0.0039	-0.0034	-0.0039	
Dcp		0.0	0.0	0.0	0.0		137.2	135.6	148.5	134.0	
Mp (ton.m)		3486.2	3561.7	4125.1	3744.2		-2326.0	-2489.9	-3125.5	-2654.0	
Dt (cm)		304.32	304.32	304.32	304.32						
Dp (cm)		30.65	31.68	32.48	31.97		162.15	158.88	145.38	160.16	
											

VIGA PRINCIPAL (CIRUELAS)

Ubicación	Sección	Sección No Compuesta							Sección Compuesta Momento Positivo														
		SNC _{top} (cm3)	SNC _{bot} (cm3)	Fy _{top} (kg/cm2)	Fy _{bot} (kg/cm2)	My _{top} (ton.m)	My _{bot} (ton.m)	My (ton.m)	SNC _{top} (cm3)	SST _{top} (cm3)	SLT _{top} (cm3)	MD1 _{top} (ton.m)	MD2 _{top} (ton.m)	MAD _{top} (ton.m)	My _{top} (ton.m)	SNC _{bot} (cm3)	SST _{bot} (cm3)	SLT _{bot} (cm3)	MD1 _{bot} (ton.m)	MD2 _{bot} (ton.m)	MAD _{bot} (ton.m)	My _{bot} (ton.m)	My (ton.m)
0	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	12.7	5.6	18953.5	18971.7	55380.35	75094.51	70096.94	12.69306	5.558195	2605.1	2623.4	-2623.4
0.33333	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-8.7	-3.2	19207.8	19195.9	55380.35	75094.51	70096.94	-8.73024	-3.19138	2643.6	2631.6	-2631.6
0.33333	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-8.7	-3.2	19207.8	19195.9	55380.35	75094.51	70096.94	-8.73024	-3.19138	2643.6	2631.6	-2631.6
0.5	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-19.9	-8.1	19341.4	19313.4	55380.35	75094.51	70096.94	-19.8966	-8.12914	2664.0	2636.0	-2636.0
0.5	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-19.9	-8.1	19341.4	19313.4	55380.35	75094.51	70096.94	-19.8966	-8.12914	2664.0	2636.0	-2636.0
0.66667	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-29.4	-11.9	19454.3	19413.0	55380.35	75094.51	70096.94	-29.4465	-11.8664	2680.9	2639.6	-2639.6
0.66667	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-29.4	-11.9	19454.3	19413.0	55380.35	75094.51	70096.94	-29.4465	-11.8664	2680.9	2639.6	-2639.6
1	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-51.4	-21.5	19716.6	19643.7	55380.35	75094.51	70096.94	-51.3786	-21.4991	2721.0	2648.1	-2648.1
1	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-51.4	-21.5	19716.6	19643.7	55380.35	75094.51	70096.94	-51.3786	-21.4991	2721.0	2648.1	-2648.1
1.33333	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-71.4	-29.8	19955.2	19853.9	55380.35	75094.51	70096.94	-71.4448	-29.825	2757.1	2655.9	-2655.9
1.33333	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-71.4	-29.8	19955.2	19853.9	55380.35	75094.51	70096.94	-71.4448	-29.825	2757.1	2655.9	-2655.9
1.5	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-82.1	-34.5	20082.3	19965.7	55380.35	75094.51	70096.94	-82.0787	-34.4709	2776.5	2660.0	-2660.0
1.5	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-82.1	-34.5	20082.3	19965.7	55380.35	75094.51	70096.94	-82.0787	-34.4709	2776.5	2660.0	-2660.0
1.66667	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-92.6	-39.1	20208.2	20076.5	55380.35	75094.51	70096.94	-92.6162	-39.0692	2795.7	2664.1	-2664.1
1.66667	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-92.6	-39.1	20208.2	20076.5	55380.35	75094.51	70096.94	-92.6162	-39.0692	2795.7	2664.1	-2664.1
2	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-112.0	-47.0	20437.9	20278.9	55380.35	75094.51	70096.94	-111.951	-47.0391	2830.5	2671.5	-2671.5
2	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-112.0	-47.0	20437.9	20278.9	55380.35	75094.51	70096.94	-111.951	-47.0391	2830.5	2671.5	-2671.5
2.33333	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-130.9	-54.9	20637.5	20477.7	55380.35	75094.51	70096.94	-130.945	-54.853	2864.6	2678.8	-2678.8
2.33333	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-130.9	-54.9	20637.5	20477.7	55380.35	75094.51	70096.94	-130.945	-54.853	2864.6	2678.8	-2678.8
2.5	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-141.0	-59.2	20783.1	20582.9	55380.35	75094.51	70096.94	-140.956	-59.1988	2882.9	2682.7	-2682.7
2.5	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-141.0	-59.2	20783.1	20582.9	55380.35	75094.51	70096.94	-140.956	-59.1988	2882.9	2682.7	-2682.7
2.66667	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-150.9	-63.5	20901.4	20687.0	55380.35	75094.51	70096.94	-150.862	-63.4959	2900.9	2686.5	-2686.5
2.66667	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-150.9	-63.5	20901.4	20687.0	55380.35	75094.51	70096.94	-150.862	-63.4959	2900.9	2686.5	-2686.5
3	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-169.1	-70.9	21117.5	20877.5	55380.35	75094.51	70096.94	-169.063	-70.9453	2933.6	2693.5	-2693.5
3	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-169.1	-70.9	21117.5	20877.5	55380.35	75094.51	70096.94	-169.063	-70.9453	2933.6	2693.5	-2693.5
3.33334	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-188.1	-79.2	21344.9	21077.6	55380.35	75094.51	70096.94	-188.107	-79.1839	2968.2	2700.9	-2700.9
3.33334	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-188.1	-79.2	21344.9	21077.6	55380.35	75094.51	70096.94	-188.107	-79.1839	2968.2	2700.9	-2700.9
3.5	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-196.3	-82.3	21440.9	21162.4	55380.35	75094.51	70096.94	-196.255	-82.2746	2982.6	2704.0	-2704.0
3.5	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-196.3	-82.3	21440.9	21162.4	55380.35	75094.51	70096.94	-196.255	-82.2746	2982.6	2704.0	-2704.0
3.66667	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-205.5	-86.3	21551.2	21259.5	55380.35	75094.51	70096.94	-205.497	-86.2642	2999.4	2707.6	-2707.6
3.66667	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-205.5	-86.3	21551.2	21259.5	55380.35	75094.51	70096.94	-205.497	-86.2642	2999.4	2707.6	-2707.6
4	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-222.5	-93.2	21753.2	21437.5	55380.35	75094.51	70096.94	-222.523	-93.1838	3029.9	2714.2	-2714.2
4	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-222.5	-93.2	21753.2	21437.5	55380.35	75094.51	70096.94	-222.523	-93.1838	3029.9	2714.2	-2714.2
4.33334	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-240.2	-100.8	21964.6	21623.5	55380.35	75094.51	70096.94	-240.233	-100.804	3062.0	2721.0	-2721.0
4.33334	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-240.2	-100.8	21964.6	21623.5	55380.35	75094.51	70096.94	-240.233	-100.804	3062.0	2721.0	-2721.0
4.5	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-248.9	-104.5	22068.3	21714.8	55380.35	75094.51	70096.94	-248.928	-104.539	3077.8	2724.4	-2724.4
4.5	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-248.9	-104.5	22068.3	21714.8	55380.35	75094.51	70096.94	-248.928	-104.539	3077.8	2724.4	-2724.4
4.66667	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-256.5	-107.4	22156.9	21793.1	55380.35	75094.51	70096.94	-256.451	-107.352	3091.1	2727.3	-2727.3
4.66667	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-256.5	-107.4	22156.9	21793.1	55380.35	75094.51	70096.94	-256.451	-107.352	3091.1	2727.3	-2727.3
5	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-273.3	-114.6	22357.8	21969.9	55380.35	75094.51	70096.94	-273.295	-114.566	3121.6	2733.8	-2733.8
5	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-273.3	-114.6	22357.8	21969.9	55380.							

7.50001	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-383.2	-158.6	23659.4	23117.7	55380.35	75094.51	70096.94	-383.162	-158.599	3317.8	2776.0	-2776.0
7.50001	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-383.2	-158.6	23659.4	23117.7	55380.35	75094.51	70096.94	-383.162	-158.599	3317.8	2776.0	-2776.0
7.66667	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-390.2	-161.4	23742.8	23191.2	55380.35	75094.51	70096.94	-390.21	-161.378	3330.3	2778.7	-2778.7
7.66667	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-390.2	-161.4	23742.8	23191.2	55380.35	75094.51	70096.94	-390.21	-161.378	3330.3	2778.7	-2778.7
8.00001	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-403.7	-166.1	23901.1	23331.3	55380.35	75094.51	70096.94	-403.744	-166.089	3353.7	2783.9	-2783.9
8.00001	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-388.2	-159.9	23717.4	23169.3	55380.35	75094.51	70096.94	-388.236	-159.885	3326.0	2777.9	-2777.9
8.33334	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-396.4	-163.6	23815.5	23255.5	55380.35	75094.51	70096.94	-396.41	-163.582	3341.1	2781.1	-2781.1
8.33334	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-396.4	-163.6	23815.5	23255.5	55380.35	75094.51	70096.94	-396.41	-163.582	3341.1	2781.1	-2781.1
8.50001	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-400.6	-165.6	23866.0	23299.8	55380.35	75094.51	70096.94	-400.595	-165.603	3348.9	2782.7	-2782.7
8.50001	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-400.6	-165.6	23866.0	23299.8	55380.35	75094.51	70096.94	-400.595	-165.603	3348.9	2782.7	-2782.7
8.66668	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-404.1	-167.1	23908.1	23336.8	55380.35	75094.51	70096.94	-404.12	-167.103	3355.3	2784.1	-2784.1
8.66668	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-404.1	-167.1	23908.1	23336.8	55380.35	75094.51	70096.94	-404.12	-167.103	3355.3	2784.1	-2784.1
9.00001	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-412.2	-170.9	24005.6	23422.5	55380.35	75094.51	70096.94	-412.229	-170.87	3370.3	2787.2	-2787.2
9.00001	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-412.2	-170.9	24005.6	23422.5	55380.35	75094.51	70096.94	-412.229	-170.87	3370.3	2787.2	-2787.2
9.33334	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-419.5	-174.0	24092.2	23498.7	55380.35	75094.51	70096.94	-419.475	-174.016	3383.5	2790.0	-2790.0
9.33334	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-419.5	-174.0	24092.2	23498.7	55380.35	75094.51	70096.94	-419.475	-174.016	3383.5	2790.0	-2790.0
9.50001	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-423.3	-175.7	24137.7	23538.7	55380.35	75094.51	70096.94	-423.269	-175.727	3390.5	2791.5	-2791.5
9.50001	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-423.3	-175.7	24137.7	23538.7	55380.35	75094.51	70096.94	-423.269	-175.727	3390.5	2791.5	-2791.5
9.66668	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-427.0	-177.4	24182.2	23577.8	55380.35	75094.51	70096.94	-426.98	-177.392	3397.3	2793.0	-2793.0
9.66668	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-427.0	-177.4	24182.2	23577.8	55380.35	75094.51	70096.94	-426.98	-177.392	3397.3	2793.0	-2793.0
10.00001	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-433.6	-180.2	24261.1	23647.3	55380.35	75094.51	70096.94	-433.604	-180.191	3409.3	2795.5	-2795.5
10.00001	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-433.6	-180.2	24261.1	23647.3	55380.35	75094.51	70096.94	-433.604	-180.191	3409.3	2795.5	-2795.5
10.33334	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-439.9	-182.8	24336.2	23713.5	55380.35	75094.51	70096.94	-439.921	-182.843	3420.7	2797.9	-2797.9
10.33334	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-439.9	-182.8	24336.2	23713.5	55380.35	75094.51	70096.94	-439.921	-182.843	3420.7	2797.9	-2797.9
10.50001	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-443.2	-184.3	24375.0	23747.6	55380.35	75094.51	70096.94	-443.163	-184.267	3426.6	2799.2	-2799.2
10.50001	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-443.2	-184.3	24375.0	23747.6	55380.35	75094.51	70096.94	-443.163	-184.267	3426.6	2799.2	-2799.2
10.66668	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-446.3	-185.6	24412.6	23780.7	55380.35	75094.51	70096.94	-446.31	-185.645	3432.4	2800.4	-2800.4
10.66668	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-446.3	-185.6	24412.6	23780.7	55380.35	75094.51	70096.94	-446.31	-185.645	3432.4	2800.4	-2800.4
11.00001	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-451.9	-188.0	24479.1	23839.2	55380.35	75094.51	70096.94	-451.899	-187.952	3442.4	2802.6	-2802.6
11.00001	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-451.9	-188.0	24479.1	23839.2	55380.35	75094.51	70096.94	-451.899	-187.952	3442.4	2802.6	-2802.6
11.33335	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-457.5	-190.4	24545.7	23897.8	55380.35	75094.51	70096.94	-457.478	-190.371	3452.6	2804.7	-2804.7
11.33335	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-457.5	-190.4	24545.7	23897.8	55380.35	75094.51	70096.94	-457.478	-190.371	3452.6	2804.7	-2804.7
11.50001	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-459.8	-191.2	24572.8	23921.8	55380.35	75094.51	70096.94	-459.78	-191.241	3456.6	2805.6	-2805.6
11.50001	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-459.8	-191.2	24572.8	23921.8	55380.35	75094.51	70096.94	-459.78	-191.241	3456.6	2805.6	-2805.6
11.66668	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-462.3	-192.3	24602.9	23948.3	55380.35	75094.51	70096.94	-462.305	-192.328	3461.2	2806.6	-2806.6
11.66668	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-462.3	-192.3	24602.9	23948.3	55380.35	75094.51	70096.94	-462.305	-192.328	3461.2	2806.6	-2806.6
12.00001	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-466.8	-194.1	24656.1	23995.1	55380.35	75094.51	70096.94	-466.787	-194.133	3469.2	2808.3	-2808.3
12.00001	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-466.8	-194.1	24656.1	23995.1	55380.35	75094.51	70096.94	-466.787	-194.133	3469.2	2808.3	-2808.3
12.33335	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-471.1	-196.0	24707.5	24040.4	55380.35	75094.51	70096.94	-471.1	-195.965	3477.0	2810.0	-2810.0
12.33335	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-471.1	-196.0	24707.5	24040.4	55380.35	75094.51	70096.94	-471.1	-195.965	3477.0	2810.0	-2810.0
12.50001	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-473.1	-196.8	24731.3	24061.4	55380.35	75094.51	70096.94	-473.103	-196.811	3480.7	2810.8	-2810.8
12.50001	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-473.1	-196.8	24731.3	24061.4	55380.35	75094.51	70096.94	-473.103	-196.811	3480.7	2810.8	-2810.8
12.66668	VA-01 TRAMO1	10165.4	55380.35	3500	3500	1787.3	1787.3	1787.3	10165.4	545864.1	188863.7	-474.8	-197.4	24751.3									

15.50002	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-492.8	-203.2	24960.1	24264.1	55380.35	75094.51	70096.94	-492.769	-203.226	3514.2	2818.2	-2818.2
15.50002	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-492.8	-203.2	24960.1	24264.1	55380.35	75094.51	70096.94	-492.769	-203.226	3514.2	2818.2	-2818.2
15.66668	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-493.2	-203.1	24964.6	24268.3	55380.35	75094.51	70096.94	-493.219	-203.138	3514.7	2818.4	-2818.4
15.66668	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-493.2	-203.1	24964.6	24268.3	55380.35	75094.51	70096.94	-493.219	-203.138	3514.7	2818.4	-2818.4
16.00002	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-494.0	-202.8	24972.0	24275.2	55380.35	75094.51	70096.94	-493.996	-202.824	3515.4	2818.6	-2818.6
16.00002	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-500.0	-205.9	25044.7	24338.8	55380.35	75094.51	70096.94	-499.96	-205.895	3526.8	2821.0	-2821.0
16.37502	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-494.5	-204.4	24982.0	24283.1	55380.35	75094.51	70096.94	-494.502	-204.41	3517.8	2818.9	-2818.9
16.37502	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-494.5	-204.4	24982.0	24283.1	55380.35	75094.51	70096.94	-494.502	-204.41	3517.8	2818.9	-2818.9
16.50002	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-492.5	-203.7	24959.0	24262.8	55380.35	75094.51	70096.94	-492.538	-203.72	3514.4	2818.2	-2818.2
16.50002	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-492.5	-203.7	24959.0	24262.8	55380.35	75094.51	70096.94	-492.538	-203.72	3514.4	2818.2	-2818.2
16.75002	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-488.7	-202.4	24914.5	24223.4	55380.35	75094.51	70096.94	-488.721	-202.442	3507.9	2816.7	-2816.7
16.75002	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-488.7	-202.4	24914.5	24223.4	55380.35	75094.51	70096.94	-488.721	-202.442	3507.9	2816.7	-2816.7
17.00002	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-484.8	-201.1	24868.7	24182.8	55380.35	75094.51	70096.94	-484.804	-201.059	3501.1	2815.2	-2815.2
17.00002	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-484.8	-201.1	24868.7	24182.8	55380.35	75094.51	70096.94	-484.804	-201.059	3501.1	2815.2	-2815.2
17.12502	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-482.9	-200.5	24846.5	24163.2	55380.35	75094.51	70096.94	-482.896	-200.457	3497.9	2814.5	-2814.5
17.12502	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-482.9	-200.5	24846.5	24163.2	55380.35	75094.51	70096.94	-482.896	-200.457	3497.9	2814.5	-2814.5
17.50002	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-476.6	-198.0	24771.7	24097.1	55380.35	75094.51	70096.94	-476.56	-197.991	3486.6	2812.1	-2812.1
17.50002	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-476.6	-198.0	24771.7	24097.1	55380.35	75094.51	70096.94	-476.56	-197.991	3486.6	2812.1	-2812.1
17.87502	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-470.1	-195.6	24695.6	24029.9	55380.35	75094.51	70096.94	-470.091	-195.593	3475.3	2809.6	-2809.6
17.87502	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-470.1	-195.6	24695.6	24029.9	55380.35	75094.51	70096.94	-470.091	-195.593	3475.3	2809.6	-2809.6
18.00002	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-467.7	-194.5	24666.6	24004.4	55380.35	75094.51	70096.94	-467.662	-194.534	3470.9	2808.7	-2808.7
18.00002	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-467.7	-194.5	24666.6	24004.4	55380.35	75094.51	70096.94	-467.662	-194.534	3470.9	2808.7	-2808.7
18.25002	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-462.9	-192.7	24610.7	23955.1	55380.35	75094.51	70096.94	-462.939	-192.662	3462.4	2806.8	-2806.8
18.25002	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-462.9	-192.7	24610.7	23955.1	55380.35	75094.51	70096.94	-462.939	-192.662	3462.4	2806.8	-2806.8
18.50002	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-458.0	-190.7	24552.4	23903.7	55380.35	75094.51	70096.94	-458.023	-190.695	3453.7	2804.9	-2804.9
18.50002	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-458.0	-190.7	24552.4	23903.7	55380.35	75094.51	70096.94	-458.023	-190.695	3453.7	2804.9	-2804.9
18.62502	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-455.3	-189.5	24520.2	23875.3	55380.35	75094.51	70096.94	-455.326	-189.501	3448.7	2803.9	-2803.9
18.62502	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-455.3	-189.5	24520.2	23875.3	55380.35	75094.51	70096.94	-455.326	-189.501	3448.7	2803.9	-2803.9
19.00002	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-447.6	-186.5	24428.8	23794.7	55380.35	75094.51	70096.94	-447.592	-186.478	3435.0	2800.9	-2800.9
19.00002	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-447.6	-186.5	16868.9	16234.8	60335.75	78606.02	72951.35	-447.592	-186.478	3535.3	2901.2	-2901.2
19.31252	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-440.3	-183.3	16811.2	16187.5	60335.75	78606.02	72951.35	-440.335	-183.345	3522.4	2898.8	-2898.8
19.31252	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-440.3	-183.3	16811.2	16187.5	60335.75	78606.02	72951.35	-440.335	-183.345	3522.4	2898.8	-2898.8
19.50002	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-436.3	-181.9	16779.7	16161.6	60335.75	78606.02	72951.35	-436.307	-181.863	3515.6	2897.4	-2897.4
19.50002	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-436.3	-181.9	16779.7	16161.6	60335.75	78606.02	72951.35	-436.307	-181.863	3515.6	2897.4	-2897.4
19.62502	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-433.1	-180.4	16754.1	16140.6	60335.75	78606.02	72951.35	-433.108	-180.428	3509.9	2896.3	-2896.3
19.62502	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-433.1	-180.4	16754.1	16140.6	60335.75	78606.02	72951.35	-433.108	-180.428	3509.9	2896.3	-2896.3
19.93752	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-425.6	-177.4	16694.5	16091.6	60335.75	78606.02	72951.35	-425.56	-177.367	3496.7	2893.8	-2893.8
19.93752	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-425.6	-177.4	16694.5	16091.6	60335.75	78606.02	72951.35	-425.56	-177.367	3496.7	2893.8	-2893.8
20.00002	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-424.1	-176.8	16683.3	16082.4	60335.75	78606.02	72951.35	-424.121	-176.832	3494.3	2893.3	-2893.3
20.00002	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-424.1	-176.8	16683.3	16082.4	60335.75	78606.02	72951.35	-424.121	-176.832	3494.3	2893.3	-2893.3
20.25002	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-417.1	-173.7	16627.5	16036.6	60335.75	78606.02	72951.35	-417.146	-173.693	3481.8	2891.0	-2891.0
20.25002	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-417.1	-173.7	16627.5	16036.6	60335.75	78606.02	72951.35	-417.146	-173.693	3481.8	2891.0	-2891.0
20.50002	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935																

22.75002	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-340.5	-141.2	16018.9	15537.1	60335.75	78606.02	72951.35	-340.477	-141.241	3347.0	2865.3	-2865.3
22.75002	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-340.5	-141.2	16018.9	15537.1	60335.75	78606.02	72951.35	-340.477	-141.241	3347.0	2865.3	-2865.3
23.00002	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-331.7	-137.4	15949.2	15480.0	60335.75	78606.02	72951.35	-331.728	-137.45	3331.5	2862.3	-2862.3
23.00002	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-331.7	-137.4	15949.2	15480.0	60335.75	78606.02	72951.35	-331.728	-137.45	3331.5	2862.3	-2862.3
23.06252	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-329.7	-136.7	15933.5	15467.1	60335.75	78606.02	72951.35	-329.734	-136.657	3328.0	2861.7	-2861.7
23.06252	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-329.7	-136.7	15933.5	15467.1	60335.75	78606.02	72951.35	-329.734	-136.657	3328.0	2861.7	-2861.7
23.37502	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-317.9	-131.2	15838.3	15389.2	60335.75	78606.02	72951.35	-317.876	-131.23	3306.7	2857.6	-2857.6
23.37502	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-317.9	-131.2	15838.3	15389.2	60335.75	78606.02	72951.35	-317.876	-131.23	3306.7	2857.6	-2857.6
23.50002	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-313.8	-129.6	15806.0	15362.6	60335.75	78606.02	72951.35	-313.776	-129.562	3299.6	2856.3	-2856.3
23.50002	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-313.8	-129.6	15806.0	15362.6	60335.75	78606.02	72951.35	-313.776	-129.562	3299.6	2856.3	-2856.3
23.68752	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-306.7	-126.3	15749.2	15316.2	60335.75	78606.02	72951.35	-306.71	-126.311	3286.9	2853.9	-2853.9
23.68752	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-306.7	-126.3	15749.2	15316.2	60335.75	78606.02	72951.35	-306.71	-126.311	3286.9	2853.9	-2853.9
24.00002	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-295.1	-121.3	15656.4	15240.1	60335.75	78606.02	72951.35	-295.057	-121.253	3266.3	2850.0	-2850.0
24.00002	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-295.1	-121.3	15656.4	15240.1	60335.75	78606.02	72951.35	-295.057	-121.253	3266.3	2850.0	-2850.0
24.00002	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-311.2	-128.0	15784.3	15345.1	60335.75	78606.02	72951.35	-311.198	-127.977	3294.5	2855.4	-2855.4
24.28544	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-296.0	-122.4	15665.6	15247.2	60335.75	78606.02	72951.35	-295.957	-122.437	3268.7	2850.3	-2850.3
24.28544	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-296.0	-122.4	15665.6	15247.2	60335.75	78606.02	72951.35	-295.957	-122.437	3268.7	2850.3	-2850.3
24.50002	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-284.5	-117.9	15575.7	15173.2	60335.75	78606.02	72951.35	-284.535	-117.918	3249.0	2846.5	-2846.5
24.50002	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-284.5	-117.9	15575.7	15173.2	60335.75	78606.02	72951.35	-284.535	-117.918	3249.0	2846.5	-2846.5
24.57085	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-281.1	-116.7	15548.8	15151.0	60335.75	78606.02	72951.35	-281.07	-116.695	3243.1	2845.4	-2845.4
24.57085	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-281.1	-116.7	15548.8	15151.0	60335.75	78606.02	72951.35	-281.07	-116.695	3243.1	2845.4	-2845.4
24.85627	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-266.1	-110.8	15430.8	15054.0	60335.75	78606.02	72951.35	-266.065	-110.819	3217.3	2840.4	-2840.4
24.85627	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-266.1	-110.8	15430.8	15054.0	60335.75	78606.02	72951.35	-266.065	-110.819	3217.3	2840.4	-2840.4
25.00002	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-258.0	-107.4	15366.4	15001.1	60335.75	78606.02	72951.35	-257.953	-107.355	3203.0	2837.6	-2837.6
25.00002	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-258.0	-107.4	15366.4	15001.1	60335.75	78606.02	72951.35	-257.953	-107.355	3203.0	2837.6	-2837.6
25.14169	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-250.9	-104.8	15311.5	14955.7	60335.75	78606.02	72951.35	-250.893	-104.818	3191.0	2835.3	-2835.3
25.14169	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-250.9	-104.8	15311.5	14955.7	60335.75	78606.02	72951.35	-250.893	-104.818	3191.0	2835.3	-2835.3
25.4271	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-234.5	-97.7	15180.9	14848.7	60335.75	78606.02	72951.35	-234.489	-97.7422	3162.0	2829.8	-2829.8
25.4271	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-234.5	-97.7	15180.9	14848.7	60335.75	78606.02	72951.35	-234.489	-97.7422	3162.0	2829.8	-2829.8
25.50002	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-230.8	-96.4	15152.0	14824.8	60335.75	78606.02	72951.35	-230.776	-96.3903	3155.7	2828.6	-2828.6
25.50002	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-230.8	-96.4	15152.0	14824.8	60335.75	78606.02	72951.35	-230.776	-96.3903	3155.7	2828.6	-2828.6
25.71252	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-218.9	-91.5	15057.7	14747.3	60335.75	78606.02	72951.35	-218.855	-91.466	3134.9	2824.6	-2824.6
25.71252	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-218.9	-91.5	15057.7	14747.3	60335.75	78606.02	72951.35	-218.855	-91.466	3134.9	2824.6	-2824.6
25.99794	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-203.0	-85.1	14932.5	14644.4	60335.75	78606.02	72951.35	-202.984	-85.0678	3107.3	2819.3	-2819.3
25.99794	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-203.0	-85.1	14932.5	14644.4	60335.75	78606.02	72951.35	-202.984	-85.0678	3107.3	2819.3	-2819.3
26.00002	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-202.9	-85.0	14931.6	14643.7	60335.75	78606.02	72951.35	-202.876	-85.0279	3107.1	2819.2	-2819.2
26.00002	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-202.9	-85.0	14931.6	14643.7	60335.75	78606.02	72951.35	-202.876	-85.0279	3107.1	2819.2	-2819.2
26.28335	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-186.9	-78.5	14805.2	14539.8	60335.75	78606.02	72951.35	-186.863	-78.5469	3079.3	2813.9	-2813.9
26.28335	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-186.9	-78.5	14805.2	14539.8	60335.75	78606.02	72951.35	-186.863	-78.5469	3079.3	2813.9	-2813.9
26.50002	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-174.2	-73.3	14704.7	14457.3	60335.75	78606.02	72951.35	-174.169	-73.264	3057.1	2809.6	-2809.6
26.50002	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-174.2	-73.3	14704.7	14457.3	60335.75	78606.02	72951.35	-174.169	-73.264	3057.1	2809.6	-2809.6
26.56877	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-170.5	-71.9	14675.9	14433.5	60335.75	78606.02	72951.35	-170.481	-71.9018	3050.8	2808.4	-2808.4
26.56877	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-170.5	-71.9	14675.9	14433.5	60335.75	78606.02	72951.35	-170.481	-71.9018	3050.8	2808.4	-2808.4
26.85418	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5													

28.8521	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-26.1	-11.6	13531.8	13494.1	60335.75	78606.02	72951.35	-26.0859	-11.623	2797.7	2760.0	-2760.0
28.8521	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-26.1	-11.6	13531.8	13494.1	60335.75	78606.02	72951.35	-26.0859	-11.623	2797.7	2760.0	-2760.0
29.00001	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-15.5	-7.0	13447.4	13424.9	60335.75	78606.02	72951.35	-15.5131	-6.98088	2778.9	2756.4	-2756.4
29.00001	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-15.5	-7.0	13447.4	13424.9	60335.75	78606.02	72951.35	-15.5131	-6.98088	2778.9	2756.4	-2756.4
29.13751	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-7.0	-3.8	13380.7	13370.0	60335.75	78606.02	72951.35	-6.98671	-3.75173	2764.4	2753.6	-2753.6
29.13751	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-7.0	-3.8	13380.7	13370.0	60335.75	78606.02	72951.35	-6.98671	-3.75173	2764.4	2753.6	-2753.6
29.42293	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	13.9	5.5	13213.6	13233.0	60335.75	78606.02	72951.35	13.94688	5.48545	2727.1	2746.6	-2746.6
29.42293	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	13.9	5.5	13213.6	13233.0	60335.75	78606.02	72951.35	13.94688	5.48545	2727.1	2746.6	-2746.6
29.50001	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	18.8	7.3	13175.3	13201.4	60335.75	78606.02	72951.35	18.8421	7.347388	2718.7	2744.9	-2744.9
29.50001	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	18.8	7.3	13175.3	13201.4	60335.75	78606.02	72951.35	18.8421	7.347388	2718.7	2744.9	-2744.9
29.70835	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	33.7	13.6	13057.3	13104.7	60335.75	78606.02	72951.35	33.6935	13.64942	2692.6	2739.9	-2739.9
29.70835	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	33.7	13.6	13057.3	13104.7	60335.75	78606.02	72951.35	33.6935	13.64942	2692.6	2739.9	-2739.9
29.99376	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	53.7	21.9	12898.8	12974.4	60335.75	78606.02	72951.35	53.72684	21.94156	2657.6	2733.2	-2733.2
29.99376	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	53.7	21.9	12898.8	12974.4	60335.75	78606.02	72951.35	53.72684	21.94156	2657.6	2733.2	-2733.2
30.00001	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	54.1	22.1	12895.6	12971.8	60335.75	78606.02	72951.35	54.13349	22.09668	2656.9	2733.1	-2733.1
30.00001	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	54.1	22.1	12895.6	12971.8	60335.75	78606.02	72951.35	54.13349	22.09668	2656.9	2733.1	-2733.1
30.27918	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	74.0	30.4	12737.9	12842.3	60335.75	78606.02	72951.35	74.04169	30.36048	2622.0	2726.4	-2726.4
30.27918	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	74.0	30.4	12737.9	12842.3	60335.75	78606.02	72951.35	74.04169	30.36048	2622.0	2726.4	-2726.4
30.50001	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	90.3	37.3	12608.6	12736.2	60335.75	78606.02	72951.35	90.33176	37.2586	2593.4	2721.0	-2721.0
30.50001	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	90.3	37.3	12608.6	12736.2	60335.75	78606.02	72951.35	90.33176	37.2586	2593.4	2721.0	-2721.0
30.5646	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	94.6	38.9	12574.9	12708.5	60335.75	78606.02	72951.35	94.62998	38.90279	2586.0	2719.5	-2719.5
30.5646	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	94.6	38.9	12574.9	12708.5	60335.75	78606.02	72951.35	94.62998	38.90279	2586.0	2719.5	-2719.5
30.85001	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	117.1	48.9	12395.1	12561.1	60335.75	78606.02	72951.35	117.1483	48.85838	2545.9	2711.9	-2711.9
30.85001	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	117.1	48.9	13042.0	13208.0	73468.29	91937.89	85472.25	117.1483	48.85838	3018.7	3184.7	-3184.7
30.99376	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	127.0	52.7	12980.2	13159.9	73468.29	91937.89	85472.25	127.0319	52.70249	3002.2	3181.9	-3181.9
30.99376	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	127.0	52.7	12980.2	13159.9	73468.29	91937.89	85472.25	127.0319	52.70249	3002.2	3181.9	-3181.9
31.00001	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	127.5	52.9	12977.5	13157.8	73468.29	91937.89	85472.25	127.4621	52.86963	3001.5	3181.8	-3181.8
31.00001	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	127.5	52.9	12977.5	13157.8	73468.29	91937.89	85472.25	127.4621	52.86963	3001.5	3181.8	-3181.8
31.13751	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	138.6	57.8	12906.7	13103.0	73468.29	91937.89	85472.25	138.5654	57.80358	2982.2	3178.6	-3178.6
31.13751	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	138.6	57.8	12906.7	13103.0	73468.29	91937.89	85472.25	138.5654	57.80358	2982.2	3178.6	-3178.6
31.28126	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	148.6	61.7	12844.1	13054.4	73468.29	91937.89	85472.25	148.5627	61.69428	2965.6	3175.8	-3175.8
31.28126	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	148.6	61.7	12844.1	13054.4	73468.29	91937.89	85472.25	148.5627	61.69428	2965.6	3175.8	-3175.8
31.42501	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	160.3	66.9	12769.6	12996.7	73468.29	91937.89	85472.25	160.2503	66.8649	2945.4	3172.5	-3172.5
31.42501	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	160.3	66.9	12769.6	12996.7	73468.29	91937.89	85472.25	160.2503	66.8649	2945.4	3172.5	-3172.5
31.50001	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	165.5	68.9	12736.7	12971.1	73468.29	91937.89	85472.25	165.5202	68.91748	2936.6	3171.0	-3171.0
31.50001	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	165.5	68.9	12736.7	12971.1	73468.29	91937.89	85472.25	165.5202	68.91748	2936.6	3171.0	-3171.0
31.56876	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	172.0	72.1	12694.7	12938.8	73468.29	91937.89	85472.25	171.9937	72.06685	2925.1	3169.1	-3169.1
31.56876	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	172.0	72.1	12694.7	12938.8	73468.29	91937.89	85472.25	171.9937	72.06685	2925.1	3169.1	-3169.1
31.71251	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	182.2	76.0	12631.1	12889.3	73468.29	91937.89	85472.25	182.1601	76.04951	2908.1	3166.3	-3166.3
31.71251	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	182.2	76.0	12631.1	12889.3	73468.29	91937.89	85472.25	182.1601	76.04951	2908.1	3166.3	-3166.3
31.85626	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	193.7	81.3	12557.2	12832.2	73468.29	91937.89	85472.25	193.6827	81.32901	2888.0	3163.0	-3163.0
31.85626	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	193.7	81.3	12557.2	12832.2	73468.29	91937.89	85472.25	193.6827	81.32901	2888.0	3163.0	-3163.0
32.00001	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	204.7	85.3	12489.0	12779.0	73468.29	91937.89	85472.25	204.6979	85.31332	2869.9	3159.9	-3159.9
32.00001	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2														

34.66668	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	435.1	179.8	11037.4	11652.3	73468.29	91937.89	85472.25	435.0785	179.7647	2480.0	3094.9	-3094.9
34.66668	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	435.1	179.8	11037.4	11652.3	73468.29	91937.89	85472.25	435.0785	179.7647	2480.0	3094.9	-3094.9
35.00001	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	468.3	192.9	10829.1	11490.4	73468.29	91937.89	85472.25	468.3019	192.918	2424.3	3085.5	-3085.5
35.00001	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	468.3	192.9	10829.1	11490.4	73468.29	91937.89	85472.25	468.3019	192.918	2424.3	3085.5	-3085.5
35.33335	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	504.3	207.9	10602.0	11314.1	73468.29	91937.89	85472.25	504.2804	207.8792	2363.2	3075.3	-3075.3
35.33335	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	504.3	207.9	10602.0	11314.1	73468.29	91937.89	85472.25	504.2804	207.8792	2363.2	3075.3	-3075.3
35.50001	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	520.3	213.8	10502.5	11236.6	73468.29	91937.89	85472.25	520.2942	213.8144	2336.7	3070.9	-3070.9
35.50001	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	520.3	213.8	10502.5	11236.6	73468.29	91937.89	85472.25	520.2942	213.8144	2336.7	3070.9	-3070.9
35.66668	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	538.7	221.4	10386.4	11146.5	73468.29	91937.89	85472.25	538.6961	221.4359	2305.5	3065.6	-3065.6
35.66668	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	538.7	221.4	10386.4	11146.5	73468.29	91937.89	85472.25	538.6961	221.4359	2305.5	3065.6	-3065.6
36.00001	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	573.7	235.2	10167.5	10976.3	73468.29	91937.89	85472.25	573.6522	235.1692	2247.0	3055.8	-3055.8
36.00001	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	573.7	235.2	10167.5	10976.3	73468.29	91937.89	85472.25	573.6522	235.1692	2247.0	3055.8	-3055.8
36.33335	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	611.6	250.8	9928.1	10790.6	73468.29	91937.89	85472.25	611.6131	250.8013	2182.7	3045.1	-3045.1
36.33335	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	611.6	250.8	9928.1	10790.6	73468.29	91937.89	85472.25	611.6131	250.8013	2182.7	3045.1	-3045.1
36.50001	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	630.8	258.7	9807.0	10696.5	73468.29	91937.89	85472.25	630.8336	258.6967	2150.1	3039.7	-3039.7
36.50001	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	630.8	258.7	9807.0	10696.5	73468.29	91937.89	85472.25	630.8336	258.6967	2150.1	3039.7	-3039.7
36.66668	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	647.8	264.9	9701.7	10614.5	73468.29	91937.89	85472.25	647.8	264.9405	2122.2	3034.9	-3034.9
36.66668	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	647.8	264.9	9701.7	10614.5	73468.29	91937.89	85472.25	647.8	264.9405	2122.2	3034.9	-3034.9
37.00001	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	687.1	281.0	9454.3	10422.4	73468.29	91937.89	85472.25	687.0893	281.012	2055.7	3023.8	-3023.8
37.00001	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	687.1	281.0	9454.3	10422.4	73468.29	91937.89	85472.25	687.0893	281.012	2055.7	3023.8	-3023.8
37.33335	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	724.5	295.6	9220.3	10240.4	73468.29	91937.89	85472.25	724.5128	295.552	1993.3	3013.3	-3013.3
37.33335	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	724.5	295.6	9220.3	10240.4	73468.29	91937.89	85472.25	724.5128	295.552	1993.3	3013.3	-3013.3
37.50002	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	744.7	303.8	9093.0	10141.5	73468.29	91937.89	85472.25	744.7408	303.7772	1959.1	3007.6	-3007.6
37.50002	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	744.7	303.8	9093.0	10141.5	73468.29	91937.89	85472.25	744.7408	303.7772	1959.1	3007.6	-3007.6
37.66668	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	765.1	312.1	8964.7	10041.9	73468.29	91937.89	85472.25	765.1281	312.0531	1924.7	3001.9	-3001.9
37.66668	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	765.1	312.1	8964.7	10041.9	73468.29	91937.89	85472.25	765.1281	312.0531	1924.7	3001.9	-3001.9
38.00002	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	803.8	327.0	8723.3	9854.1	73468.29	91937.89	85472.25	803.7782	326.9784	1860.3	2991.0	-2991.0
38.00002	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	803.8	327.0	8723.3	9854.1	73468.29	91937.89	85472.25	803.7782	326.9784	1860.3	2991.0	-2991.0
38.33335	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	843.0	342.1	8478.7	9663.7	73468.29	91937.89	85472.25	842.967	342.0604	1795.0	2980.0	-2980.0
38.33335	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	843.0	342.1	8478.7	9663.7	73468.29	91937.89	85472.25	842.967	342.0604	1795.0	2980.0	-2980.0
38.50002	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	864.2	350.6	8345.4	9560.1	73468.29	91937.89	85472.25	864.1858	350.5852	1759.3	2974.1	-2974.1
38.50002	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	864.2	350.6	8345.4	9560.1	73468.29	91937.89	85472.25	864.1858	350.5852	1759.3	2974.1	-2974.1
38.66668	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	885.6	359.1	8211.1	9455.8	73468.29	91937.89	85472.25	885.5605	359.1493	1723.3	2968.0	-2968.0
38.66668	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	885.6	359.1	8211.1	9455.8	73468.29	91937.89	85472.25	885.5605	359.1493	1723.3	2968.0	-2968.0
39.00002	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	926.0	374.5	7959.3	9259.8	73468.29	91937.89	85472.25	925.9524	374.532	1656.2	2956.7	-2956.7
39.00002	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	926.0	374.5	7959.3	9259.8	73468.29	91937.89	85472.25	925.9524	374.532	1656.2	2956.7	-2956.7
39.33335	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	969.8	391.9	7684.3	9046.0	73468.29	91937.89	85472.25	969.8486	391.8592	1582.7	2944.4	-2944.4
39.33335	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	969.8	391.9	7684.3	9046.0	73468.29	91937.89	85472.25	969.8486	391.8592	1582.7	2944.4	-2944.4
39.50002	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	989.1	398.7	7565.5	8953.2	73468.29	91937.89	85472.25	989.1036	398.6628	1551.2	2939.0	-2939.0
39.50002	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	989.1	398.7	7565.5	8953.2	73468.29	91937.89	85472.25	989.1036	398.6628	1551.2	2939.0	-2939.0
39.66668	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	1011.4	407.3	7426.1	8844.8	73468.29	91937.89	85472.25	1011.417	407.2692	1514.1	2932.8	-2932.8
39.66668	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	1011.4	407.3	7426.1	8844.8	73468.29	91937.89	85472.25	1011.417	407.2692	1514.1	2932.8	<

42.04169	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	802.5	327.0	8729.9	9859.4	73468.29	91937.89	85472.25	802.5443	327.0066	1861.8	2991.3	-2991.3
42.04169	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	802.5	327.0	8729.9	9859.4	73468.29	91937.89	85472.25	802.5443	327.0066	1861.8	2991.3	-2991.3
42.33335	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	768.5	313.8	8942.5	10024.8	73468.29	91937.89	85472.25	768.5331	313.8005	1918.5	3000.9	-3000.9
42.33335	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	768.5	313.8	8942.5	10024.8	73468.29	91937.89	85472.25	768.5331	313.8005	1918.5	3000.9	-3000.9
42.50002	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	748.2	305.6	9070.0	10123.9	73468.29	91937.89	85472.25	748.2473	305.5919	1952.8	3006.6	-3006.6
42.50002	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	748.2	305.6	9070.0	10123.9	73468.29	91937.89	85472.25	748.2473	305.5919	1952.8	3006.6	-3006.6
42.62502	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	735.0	300.7	9152.3	10188.0	73468.29	91937.89	85472.25	734.9743	300.7336	1974.6	3010.3	-3010.3
42.62502	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	735.0	300.7	9152.3	10188.0	73468.29	91937.89	85472.25	734.9743	300.7336	1974.6	3010.3	-3010.3
42.91668	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	701.9	287.8	9359.4	10349.1	73468.29	91937.89	85472.25	701.8693	287.8095	2029.9	3019.6	-3019.6
42.91668	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	701.9	287.8	9359.4	10349.1	73468.29	91937.89	85472.25	701.8693	287.8095	2029.9	3019.6	-3019.6
43.00002	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	690.8	283.0	9429.8	10403.6	73468.29	91937.89	85472.25	690.8199	282.9662	2049.0	3022.8	-3022.8
43.00002	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	690.8	283.0	9429.8	10403.6	73468.29	91937.89	85472.25	690.8199	282.9662	2049.0	3022.8	-3022.8
43.20835	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	669.2	275.0	9563.8	10508.0	73468.29	91937.89	85472.25	669.2181	275.0299	2084.5	3028.8	-3028.8
43.20835	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	669.2	275.0	9563.8	10508.0	73468.29	91937.89	85472.25	669.2181	275.0299	2084.5	3028.8	-3028.8
43.50002	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	637.0	262.4	9765.3	10664.8	73468.29	91937.89	85472.25	637.0202	262.3963	2138.4	3037.8	-3037.8
43.50002	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	637.0	262.4	9765.3	10664.8	73468.29	91937.89	85472.25	637.0202	262.3963	2138.4	3037.8	-3037.8
43.79168	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	603.1	248.3	9979.3	10830.7	73468.29	91937.89	85472.25	603.1284	248.3369	2196.0	3047.4	-3047.4
43.79168	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	603.1	248.3	9979.3	10830.7	73468.29	91937.89	85472.25	603.1284	248.3369	2196.0	3047.4	-3047.4
44.00002	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	582.3	240.6	10108.6	10931.5	73468.29	91937.89	85472.25	582.2971	240.6452	2230.3	3053.2	-3053.2
44.00002	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	582.3	240.6	10108.6	10931.5	73468.29	91937.89	85472.25	582.2971	240.6452	2230.3	3053.2	-3053.2
44.08335	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	571.9	236.0	10174.8	10982.8	73468.29	91937.89	85472.25	571.912	236.0286	2248.3	3056.2	-3056.2
44.08335	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	571.9	236.0	10174.8	10982.8	73468.29	91937.89	85472.25	571.912	236.0286	2248.3	3056.2	-3056.2
44.37502	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	541.1	223.9	10367.7	11132.7	73468.29	91937.89	85472.25	541.1369	223.8664	2299.8	3064.9	-3064.9
44.37502	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	541.1	223.9	10367.7	11132.7	73468.29	91937.89	85472.25	541.1369	223.8664	2299.8	3064.9	-3064.9
44.50002	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	528.9	219.3	10443.4	11191.7	73468.29	91937.89	85472.25	528.9411	219.349	2320.0	3068.3	-3068.3
44.50002	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	528.9	219.3	10443.4	11191.7	73468.29	91937.89	85472.25	528.9411	219.349	2320.0	3068.3	-3068.3
44.66668	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	510.8	211.8	10557.9	11280.6	73468.29	91937.89	85472.25	510.7964	211.8496	2350.7	3073.4	-3073.4
44.66668	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	510.8	211.8	10557.9	11280.6	73468.29	91937.89	85472.25	510.7964	211.8496	2350.7	3073.4	-3073.4
44.95835	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	480.9	200.0	10745.5	11426.4	73468.29	91937.89	85472.25	480.8826	199.977	2400.9	3081.8	-3081.8
44.95835	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	480.9	200.0	10745.5	11426.4	73468.29	91937.89	85472.25	480.8826	199.977	2400.9	3081.8	-3081.8
45.00001	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	476.9	198.5	10770.1	11445.6	73468.29	91937.89	85472.25	476.9154	198.5033	2407.5	3082.9	-3082.9
45.00001	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	476.9	198.5	10770.1	11445.6	73468.29	91937.89	85472.25	476.9154	198.5033	2407.5	3082.9	-3082.9
45.25001	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	451.4	188.2	10930.5	11570.2	73468.29	91937.89	85472.25	451.3857	188.2466	2450.5	3090.1	-3090.1
45.25001	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	451.4	188.2	10930.5	11570.2	73468.29	91937.89	85472.25	451.3857	188.2466	2450.5	3090.1	-3090.1
45.50001	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	426.2	178.1	11089.0	11693.2	73468.29	91937.89	85472.25	426.1681	178.0985	2493.0	3097.2	-3097.2
45.50001	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	426.2	178.1	11089.0	11693.2	73468.29	91937.89	85472.25	426.1681	178.0985	2493.0	3097.2	-3097.2
45.54168	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	420.4	175.2	11126.5	11722.1	73468.29	91937.89	85472.25	420.4185	175.1927	2503.3	3098.9	-3098.9
45.54168	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	420.4	175.2	11126.5	11722.1	73468.29	91937.89	85472.25	420.4185	175.1927	2503.3	3098.9	-3098.9
45.83335	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	391.8	163.8	11306.1	11861.7	73468.29	91937.89	85472.25	391.79	163.7687	2551.4	3106.9	-3106.9
45.83335	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	391.8	163.8	11306.1	11861.7	73468.29	91937.89	85472.25	391.79	163.7687	2551.4	3106.9	-3106.9
46.00001	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	376.6	158.1	11400.3	11935.1	73468.29	91937.89	85472.25	376.6333	158.1196	2576.4	3111.2	-3111.2
46.00001	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	376.6	158.1	11400.3	11935.1	73468.29	91937.89	85472.25	376.6333	158.1			

48.20314	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	199.8	85.6	12514.6	12800.0	73468.29	191937.89	85472.25	199.7885	85.62073	2875.7	3161.1	-3161.1
48.20314	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	199.8	85.6	12514.6	12800.0	73468.29	191937.89	85472.25	199.7885	85.62073	2875.7	3161.1	-3161.1
48.44376	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	180.6	77.6	12635.9	12894.1	73468.29	191937.89	85472.25	180.577	77.64379	2908.3	3166.6	-3166.6
48.44376	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	180.6	77.6	12635.9	12894.1	73468.29	191937.89	85472.25	180.577	77.64379	2908.3	3166.6	-3166.6
48.50001	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	174.9	74.9	12672.4	12922.3	73468.29	191937.89	85472.25	174.9476	74.8721	2918.4	3168.2	-3168.2
48.50001	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	174.9	74.9	12672.4	12922.3	73468.29	191937.89	85472.25	174.9476	74.8721	2918.4	3168.2	-3168.2
48.68439	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	161.6	69.8	12755.8	12987.1	73468.29	191937.89	85472.25	161.588	69.76339	2940.6	3171.9	-3171.9
48.68439	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	161.6	69.8	12755.8	12987.1	73468.29	191937.89	85472.25	161.588	69.76339	2940.6	3171.9	-3171.9
48.92501	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	142.8	62.0	12874.2	13079.0	73468.29	191937.89	85472.25	142.8238	61.9809	2972.4	3177.2	-3177.2
48.92501	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	142.8	62.0	12874.2	13079.0	73468.29	191937.89	85472.25	142.8238	61.9809	2972.4	3177.2	-3177.2
49.00001	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	136.0	58.8	12918.1	13112.9	73468.29	191937.89	85472.25	136.0054	58.7674	2984.4	3179.2	-3179.2
49.00001	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	136.0	58.8	12918.1	13112.9	73468.29	191937.89	85472.25	136.0054	58.7674	2984.4	3179.2	-3179.2
49.16564	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	124.3	54.3	12991.2	13169.8	73468.29	191937.89	85472.25	124.287	54.29734	3003.9	3182.5	-3182.5
49.16564	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	124.3	54.3	12991.2	13169.8	73468.29	191937.89	85472.25	124.287	54.29734	3003.9	3182.5	-3182.5
49.40626	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	106.0	46.7	13106.7	13259.4	73468.29	191937.89	85472.25	105.9796	46.71344	3035.0	3187.6	-3187.6
49.40626	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	106.0	46.7	13106.7	13259.4	73468.29	191937.89	85472.25	105.9796	46.71344	3035.0	3187.6	-3187.6
49.50001	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	98.0	43.1	13157.6	13298.8	73468.29	191937.89	85472.25	98.04006	43.08655	3048.8	3189.9	-3189.9
49.50001	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	98.0	43.1	13157.6	13298.8	73468.29	191937.89	85472.25	98.04006	43.08655	3048.8	3189.9	-3189.9
49.64689	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	87.9	39.2	13220.8	13347.9	73468.29	191937.89	85472.25	87.90348	39.22964	3065.6	3192.8	-3192.8
49.64689	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	87.9	39.2	13220.8	13347.9	73468.29	191937.89	85472.25	87.90348	39.22964	3065.6	3192.8	-3192.8
49.88751	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	70.1	31.8	13333.4	13435.3	73468.29	191937.89	85472.25	70.05981	31.84615	3095.9	3197.8	-3197.8
49.88751	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	70.1	31.8	13333.4	13435.3	73468.29	191937.89	85472.25	70.05981	31.84615	3095.9	3197.8	-3197.8
50.00001	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	61.1	27.8	13390.8	13479.7	73468.29	191937.89	85472.25	61.06714	27.83377	3111.5	3200.4	-3200.4
50.00001	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	61.1	27.8	13390.8	13479.7	73468.29	191937.89	85472.25	61.06714	27.83377	3111.5	3200.4	-3200.4
50.12814	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	52.4	24.6	13444.5	13521.5	73468.29	191937.89	85472.25	52.44896	24.56276	3125.8	3202.8	-3202.8
50.12814	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	52.4	24.6	13444.5	13521.5	73468.29	191937.89	85472.25	52.44896	24.56276	3125.8	3202.8	-3202.8
50.36876	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	35.1	17.4	13554.2	13606.6	73468.29	191937.89	85472.25	35.06978	17.37838	3155.2	3207.7	-3207.7
50.36876	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	35.1	17.4	13554.2	13606.6	73468.29	191937.89	85472.25	35.06978	17.37838	3155.2	3207.7	-3207.7
50.50001	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	25.1	13.0	13617.7	13655.8	73468.29	191937.89	85472.25	25.08751	13.00555	3172.4	3210.5	-3210.5
50.50001	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	25.1	13.0	13617.7	13655.8	73468.29	191937.89	85472.25	25.08751	13.00555	3172.4	3210.5	-3210.5
50.60939	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	17.9	10.3	13662.4	13690.6	73468.29	191937.89	85472.25	17.91758	10.28926	3184.3	3212.5	-3212.5
50.60939	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	17.9	10.3	13662.4	13690.6	73468.29	191937.89	85472.25	17.91758	10.28926	3184.3	3212.5	-3212.5
50.85001	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	1.0	3.3	13769.0	13773.3	73468.29	191937.89	85472.25	1.006538	3.30776	3213.0	3217.3	-3217.3
50.85001	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	1.0	3.3	13769.0	13773.3	73468.29	191937.89	85472.25	1.006538	3.30776	3213.0	3217.3	-3217.3
51.00001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-9.9	-1.4	13393.3	13381.9	81264.47	104702.1	98112.48	-9.9357	-1.4265	3678.9	3667.5	-3667.5
51.00001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-9.9	-1.4	13393.3	13381.9	81264.47	104702.1	98112.48	-9.9357	-1.4265	3678.9	3667.5	-3667.5
51.26876	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-28.2	-8.9	13549.6	13512.5	81264.47	104702.1	98112.48	-28.1977	-8.86801	3710.4	3673.3	-3673.3
51.26876	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-28.2	-8.9	13549.6	13512.5	81264.47	104702.1	98112.48	-28.1977	-8.86801	3710.4	3673.3	-3673.3
51.50001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-43.9	-15.3	13684.2	13624.9	81264.47	104702.1	98112.48	-43.894	-15.3409	3737.5	3678.3	-3678.3
51.50001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-43.9	-15.3	13684.2	13624.9	81264.47	104702.1	98112.48	-43.894	-15.3409	3737.5	3678.3	-3678.3
51.68751	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-55.4	-19.6	13781.9	13706.9	81264.47	104702.1	98112.48	-55.4344	-19.6254	3756.9	3681.9	-3681.9
51.68751	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-55.4	-19.6	13781.9	13706.9	81264.47	104702.1	98112.48	-55.4344	-19.6254	3756.9	3681.9	-3681.9
52.00001	VA-01 TRAMO4	50472.14	8126																				

54.50001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-216.6	-84.6	15160.2	14859.0	81264.47	104702.1	98112.48	-216.635	-84.6353	4034.0	3732.7	-3732.7
54.50001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-216.6	-84.6	15160.2	14859.0	81264.47	104702.1	98112.48	-216.635	-84.6353	4034.0	3732.7	-3732.7
54.80001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-230.1	-90.3	15275.8	14955.4	81264.47	104702.1	98112.48	-230.063	-90.3477	4057.4	3737.0	-3737.0
54.80001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-230.1	-90.3	15275.8	14955.4	81264.47	104702.1	98112.48	-230.063	-90.3477	4057.4	3737.0	-3737.0
55.00001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-239.2	-94.3	15354.9	15021.4	81264.47	104702.1	98112.48	-239.237	-94.336	4073.5	3739.9	-3739.9
55.00001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-239.2	-94.3	15354.9	15021.4	81264.47	104702.1	98112.48	-239.237	-94.336	4073.5	3739.9	-3739.9
55.10001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-243.3	-95.9	15389.6	15050.3	81264.47	104702.1	98112.48	-243.302	-95.9202	4080.4	3741.2	-3741.2
55.10001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-243.3	-95.9	15389.6	15050.3	81264.47	104702.1	98112.48	-243.302	-95.9202	4080.4	3741.2	-3741.2
55.40001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-256.3	-101.4	15501.2	15143.6	81264.47	104702.1	98112.48	-256.307	-101.357	4103.0	3745.3	-3745.3
55.40001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-256.3	-101.4	15501.2	15143.6	81264.47	104702.1	98112.48	-256.307	-101.357	4103.0	3745.3	-3745.3
55.50001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-261.2	-103.6	15543.8	15179.0	81264.47	104702.1	98112.48	-261.193	-103.627	4111.7	3746.9	-3746.9
55.50001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-261.2	-103.6	15543.8	15179.0	81264.47	104702.1	98112.48	-261.193	-103.627	4111.7	3746.9	-3746.9
55.70001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-270.0	-107.4	15619.2	15241.9	81264.47	104702.1	98112.48	-269.953	-107.38	4127.0	3749.6	-3749.6
55.70001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-270.0	-107.4	15619.2	15241.9	81264.47	104702.1	98112.48	-269.953	-107.38	4127.0	3749.6	-3749.6
56.00001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-282.4	-112.5	15725.9	15331.0	81264.47	104702.1	98112.48	-282.388	-112.517	4148.5	3753.6	-3753.6
56.00001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-282.4	-112.5	15725.9	15331.0	81264.47	104702.1	98112.48	-282.388	-112.517	4148.5	3753.6	-3753.6
56.30001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-294.5	-117.5	15830.0	15418.0	81264.47	104702.1	98112.48	-294.543	-117.52	4169.5	3757.4	-3757.4
56.30001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-294.5	-117.5	15830.0	15418.0	81264.47	104702.1	98112.48	-294.543	-117.52	4169.5	3757.4	-3757.4
56.50001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-302.8	-121.0	15900.7	15477.0	81264.47	104702.1	98112.48	-302.76	-121.006	4183.8	3760.0	-3760.0
56.50001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-302.8	-121.0	15900.7	15477.0	81264.47	104702.1	98112.48	-302.76	-121.006	4183.8	3760.0	-3760.0
56.60001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-306.4	-122.4	15931.7	15502.9	81264.47	104702.1	98112.48	-306.409	-122.389	4190.0	3761.2	-3761.2
56.60001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-306.4	-122.4	15931.7	15502.9	81264.47	104702.1	98112.48	-306.409	-122.389	4190.0	3761.2	-3761.2
56.90001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-318.0	-127.1	16030.8	15585.7	81264.47	104702.1	98112.48	-317.98	-127.123	4209.9	3764.8	-3764.8
56.90001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-318.0	-127.1	16030.8	15585.7	81264.47	104702.1	98112.48	-317.98	-127.123	4209.9	3764.8	-3764.8
57.00001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-322.3	-129.1	16068.1	15616.7	81264.47	104702.1	98112.48	-322.265	-129.092	4217.5	3766.2	-3766.2
57.00001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-322.3	-129.1	16068.1	15616.7	81264.47	104702.1	98112.48	-322.265	-129.092	4217.5	3766.2	-3766.2
57.20001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-330.0	-132.3	16134.3	15672.0	81264.47	104702.1	98112.48	-329.973	-132.343	4230.9	3768.6	-3768.6
57.20001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-330.0	-132.3	16134.3	15672.0	81264.47	104702.1	98112.48	-329.973	-132.343	4230.9	3768.6	-3768.6
57.50001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-340.9	-136.8	16227.6	15750.0	81264.47	104702.1	98112.48	-340.878	-136.772	4249.7	3772.1	-3772.1
57.50001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-340.9	-136.8	16227.6	15750.0	81264.47	104702.1	98112.48	-340.878	-136.772	4249.7	3772.1	-3772.1
57.80001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-351.5	-141.1	16318.3	15825.8	81264.47	104702.1	98112.48	-351.477	-141.065	4268.0	3775.4	-3775.4
57.80001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-351.5	-141.1	16318.3	15825.8	81264.47	104702.1	98112.48	-351.477	-141.065	4268.0	3775.4	-3775.4
58.00001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-358.6	-144.0	16379.4	15876.8	81264.47	104702.1	98112.48	-358.588	-144.043	4280.3	3777.7	-3777.7
58.00001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-358.6	-144.0	16379.4	15876.8	81264.47	104702.1	98112.48	-358.588	-144.043	4280.3	3777.7	-3777.7
58.10001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-361.8	-145.2	16406.3	15899.3	81264.47	104702.1	98112.48	-361.77	-145.221	4285.7	3778.7	-3778.7
58.10001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-361.8	-145.2	16406.3	15899.3	81264.47	104702.1	98112.48	-361.77	-145.221	4285.7	3778.7	-3778.7
58.40001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-371.8	-149.2	16491.7	15970.7	81264.47	104702.1	98112.48	-371.759	-149.242	4302.8	3781.8	-3781.8
58.40001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-371.8	-149.2	16491.7	15970.7	81264.47	104702.1	98112.48	-371.759	-149.242	4302.8	3781.8	-3781.8
58.50001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-375.4	-150.9	16523.3	15997.0	81264.47	104702.1	98112.48	-375.398	-150.908	4309.3	3783.0	-3783.0
58.50001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-375.4	-150.9	16523.3	15997.0	81264.47	104702.1	98112.48	-375.398	-150.908	4309.3	3783.0	-3783.0
58.70001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-382.0	-153.7	16579.9	16044.3	81264.47	104702.1	98112.48	-381.993	-153.65	4320.7	3785.1	-3785.1
58.70001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-382.0	-153.7	16579.9	16044.3	81264.47	104702.1	98112.48	-381.993	-153.65	4320.7	3785.1	-3785.1
59.00001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-391.3	-157.4	16659.6	16110.9	81264.47	104702.1	98112.48	-391.33	-157.368	4336.7	3788.0	-3788.0
59.00001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-391.3	-157.4	16659.6	16110.9	81264							

61.40001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-457.5	-182.5	17221.5	16581.5	81264.47	104702.1	98112.48	-457.501	-182.488	4448.8	3808.8	-3808.8
61.40001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-453.8	-181.2	17190.7	16555.6	81264.47	104702.1	98112.48	-453.84	-181.201	4442.7	3807.6	-3807.6
61.50001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-454.8	-181.7	17199.4	16562.9	81264.47	104702.1	98112.48	-454.846	-181.671	4444.5	3808.0	-3808.0
61.50001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-454.8	-181.7	17199.4	16562.9	81264.47	104702.1	98112.48	-454.846	-181.67	4444.5	3808.0	-3808.0
61.70001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-456.9	-182.8	17217.5	16577.8	81264.47	104702.1	98112.48	-456.863	-182.817	4448.3	3808.6	-3808.6
61.70001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-456.9	-182.8	17217.5	16577.8	81264.47	104702.1	98112.48	-456.863	-182.817	4448.3	3808.6	-3808.6
62.00001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-459.6	-184.3	17242.0	16598.1	81264.47	104702.1	98112.48	-459.617	-184.293	4453.4	3809.5	-3809.5
62.00001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-459.6	-184.3	17242.0	16598.1	81264.47	104702.1	98112.48	-459.617	-184.293	4453.4	3809.5	-3809.5
62.30001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-462.2	-185.6	17265.0	16617.1	81264.47	104702.1	98112.48	-462.225	-185.623	4458.2	3810.4	-3810.4
62.30001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-462.2	-185.6	17265.0	16617.1	81264.47	104702.1	98112.48	-462.225	-185.623	4458.2	3810.4	-3810.4
62.50001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-463.9	-186.5	17280.1	16629.6	81264.47	104702.1	98112.48	-463.94	-186.483	4461.3	3810.9	-3810.9
62.50001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-463.9	-186.5	17280.1	16629.6	81264.47	104702.1	98112.48	-463.94	-186.483	4461.3	3810.9	-3810.9
62.60001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-464.6	-186.8	17286.2	16634.7	81264.47	104702.1	98112.48	-464.64	-186.816	4462.6	3811.1	-3811.1
62.60001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-464.6	-186.8	17286.2	16634.7	81264.47	104702.1	98112.48	-464.64	-186.816	4462.6	3811.1	-3811.1
62.90001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-467.1	-188.0	17307.3	16652.3	81264.47	104702.1	98112.48	-467.051	-188.003	4467.0	3811.9	-3811.9
62.90001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-467.1	-188.0	17307.3	16652.3	81264.47	104702.1	98112.48	-467.051	-188.003	4467.0	3811.9	-3811.9
63.00001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-467.6	-188.3	17312.4	16656.5	81264.47	104702.1	98112.48	-467.636	-188.268	4468.0	3812.1	-3812.1
63.00001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-467.6	-188.3	17312.4	16656.5	81264.47	104702.1	98112.48	-467.636	-188.268	4468.0	3812.1	-3812.1
63.20001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-469.0	-188.9	17323.9	16666.1	81264.47	104702.1	98112.48	-468.955	-188.896	4470.4	3812.5	-3812.5
63.20001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-469.0	-188.9	17323.9	16666.1	81264.47	104702.1	98112.48	-468.955	-188.896	4470.4	3812.5	-3812.5
63.50001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-470.6	-189.7	17338.2	16678.0	81264.47	104702.1	98112.48	-470.597	-189.658	4473.3	3813.0	-3813.0
63.50001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-470.6	-189.7	17338.2	16678.0	81264.47	104702.1	98112.48	-470.597	-189.658	4473.3	3813.0	-3813.0
63.80001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-472.0	-190.3	17350.1	16687.9	81264.47	104702.1	98112.48	-471.965	-190.288	4475.7	3813.5	-3813.5
63.80001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-472.0	-190.3	17350.1	16687.9	81264.47	104702.1	98112.48	-471.965	-190.288	4475.7	3813.5	-3813.5
64.00001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-472.8	-190.7	17357.0	16693.6	81264.47	104702.1	98112.48	-472.753	-190.653	4477.1	3813.7	-3813.7
64.00001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-472.8	-190.7	17357.0	16693.6	81264.47	104702.1	98112.48	-472.753	-190.653	4477.1	3813.7	-3813.7
64.10001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-473.1	-190.8	17359.5	16695.7	81264.47	104702.1	98112.48	-473.051	-190.787	4477.7	3813.8	-3813.8
64.10001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-473.1	-190.8	17359.5	16695.7	81264.47	104702.1	98112.48	-473.051	-190.787	4477.7	3813.8	-3813.8
64.40001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-473.9	-191.2	17367.0	16701.9	81264.47	104702.1	98112.48	-473.905	-191.185	4479.2	3814.1	-3814.1
64.40001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-473.9	-191.2	17367.0	16701.9	81264.47	104702.1	98112.48	-473.905	-191.185	4479.2	3814.1	-3814.1
64.50001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-474.1	-191.3	17368.3	16703.0	81264.47	104702.1	98112.48	-474.061	-191.252	4479.5	3814.1	-3814.1
64.50001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-474.1	-191.3	17368.3	16703.0	81264.47	104702.1	98112.48	-474.061	-191.252	4479.5	3814.1	-3814.1
64.70001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-474.3	-191.4	17370.8	16705.1	81264.47	104702.1	98112.48	-474.349	-191.385	4480.0	3814.2	-3814.2
64.70001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-474.3	-191.4	17370.8	16705.1	81264.47	104702.1	98112.48	-474.349	-191.385	4480.0	3814.2	-3814.2
65.00001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-474.5	-191.5	17372.1	16706.1	81264.47	104702.1	98112.48	-474.495	-191.451	4480.2	3814.3	-3814.3
65.00001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-474.5	-191.5	17372.1	16706.1	81264.47	104702.1	98112.48	-474.495	-191.451	4480.2	3814.3	-3814.3
65.30001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-474.3	-191.4	17370.8	16705.0	81264.47	104702.1	98112.48	-474.341	-191.383	4480.0	3814.2	-3814.2
65.30001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-474.3	-191.4	17370.8	16705.0	81264.47	104702.1	98112.48	-474.341	-191.383	4480.0	3814.2	-3814.2
65.50001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-474.0	-191.2	17368.2	16702.9	81264.47	104702.1	98112.48	-474.047	-191.249	4479.4	3814.1	-3814.1
65.50001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-474.0	-191.2	17368.2	16702.9	81264.47	104702.1	98112.48	-474.047	-191.249	4479.4	3814.1	-3814.1
65.60001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-473.9	-191.2	17366.9	16701.8	81264.47	104702.1	98112.48	-473.889	-191.182	4479.2	3814.1	-3814.1
65.60001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-473.9	-191.2	17366.9	16701.8	81264.47	104702.1	98112.48	-473.889	-191.182	4479.2	3814.1	-3814.1
65.90001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-473.0	-190.8	17359.3	16695.5	81264.47	104702.1	98112.48	-473.027	-190.782	4477.6	3813.8	-3813.8
65.90001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-473.0	-190.8	17359.3									

68.30001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-456.8	-182.8	17216.8	16577.2	81264.47	104702.1	98112.48	-456.774	-182.799	4448.2	3808.6	-3808.6
68.30001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-456.8	-182.8	17216.8	16577.2	81264.47	104702.1	98112.48	-456.774	-182.799	4448.2	3808.6	-3808.6
68.50001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-454.8	-181.7	17198.7	16562.3	81264.47	104702.1	98112.48	-454.752	-181.651	4444.3	3807.9	-3807.9
68.50001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-454.8	-181.7	17198.7	16562.3	81264.47	104702.1	98112.48	-454.752	-181.651	4444.3	3807.9	-3807.9
68.60001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-453.7	-181.2	17189.9	16555.0	81264.47	104702.1	98112.48	-453.743	-181.182	4442.5	3807.6	-3807.6
68.60001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-453.7	-181.2	17220.8	16580.9	81264.47	104702.1	98112.48	-457.409	-182.469	4448.6	3808.8	-3808.8
68.90001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-449.7	-179.9	17156.6	16526.9	81264.47	104702.1	98112.48	-449.733	-179.944	4436.0	3806.4	-3806.4
68.90001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-449.7	-179.9	17156.6	16526.9	81264.47	104702.1	98112.48	-449.733	-179.944	4436.0	3806.4	-3806.4
69.00001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-447.3	-179.2	17136.3	16509.9	81264.47	104702.1	98112.48	-447.307	-179.176	4432.1	3805.6	-3805.6
69.00001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-447.3	-179.2	17136.3	16509.9	81264.47	104702.1	98112.48	-447.307	-179.176	4432.1	3805.6	-3805.6
69.20001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-442.1	-177.2	17091.8	16472.5	81264.47	104702.1	98112.48	-442.051	-177.21	4423.2	3804.0	-3804.0
69.20001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-442.1	-177.2	17091.8	16472.5	81264.47	104702.1	98112.48	-442.051	-177.21	4423.2	3804.0	-3804.0
69.50001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-434.2	-174.3	17025.6	16417.0	81264.47	104702.1	98112.48	-434.227	-174.328	4410.1	3801.5	-3801.5
69.50001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-434.2	-174.3	17025.6	16417.0	81264.47	104702.1	98112.48	-434.227	-174.328	4410.1	3801.5	-3801.5
69.80001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-426.2	-171.3	16957.6	16360.1	81264.47	104702.1	98112.48	-426.215	-171.308	4396.5	3799.0	-3799.0
69.80001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-426.2	-171.3	16957.6	16360.1	81264.47	104702.1	98112.48	-426.215	-171.308	4396.5	3799.0	-3799.0
70.00001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-420.6	-169.1	16909.6	16320.0	81264.47	104702.1	98112.48	-420.6	-169.063	4386.9	3797.2	-3797.2
70.00001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-420.6	-169.1	16909.6	16320.0	81264.47	104702.1	98112.48	-420.6	-169.063	4386.9	3797.2	-3797.2
70.10001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-417.5	-167.7	16883.1	16297.9	81264.47	104702.1	98112.48	-417.539	-167.695	4381.5	3796.3	-3796.3
70.10001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-417.5	-167.7	16883.1	16297.9	81264.47	104702.1	98112.48	-417.539	-167.695	4381.5	3796.3	-3796.3
70.40001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-409.0	-164.4	16810.6	16237.2	81264.47	104702.1	98112.48	-409.018	-164.375	4367.0	3793.6	-3793.6
70.40001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-409.0	-164.4	16810.6	16237.2	81264.47	104702.1	98112.48	-409.018	-164.375	4367.0	3793.6	-3793.6
70.50001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-406.3	-163.4	16787.5	16217.8	81264.47	104702.1	98112.48	-406.278	-163.399	4362.4	3792.7	-3792.7
70.50001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-406.3	-163.4	16787.5	16217.8	81264.47	104702.1	98112.48	-406.278	-163.399	4362.4	3792.7	-3792.7
70.70001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-400.2	-160.9	16735.7	16174.5	81264.47	104702.1	98112.48	-400.233	-160.922	4352.0	3790.8	-3790.8
70.70001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-400.2	-160.9	16735.7	16174.5	81264.47	104702.1	98112.48	-400.233	-160.922	4352.0	3790.8	-3790.8
71.00001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-391.2	-157.3	16658.4	16109.9	81264.47	104702.1	98112.48	-391.174	-157.336	4336.5	3788.0	-3788.0
71.00001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-391.2	-157.3	16658.4	16109.9	81264.47	104702.1	98112.48	-391.174	-157.336	4336.5	3788.0	-3788.0
71.30001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-381.8	-153.6	16578.6	16043.2	81264.47	104702.1	98112.48	-381.829	-153.617	4320.5	3785.0	-3785.0
71.30001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-381.8	-153.6	16578.6	16043.2	81264.47	104702.1	98112.48	-381.829	-153.617	4320.5	3785.0	-3785.0
71.50001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-375.2	-150.9	16522.0	15995.9	81264.47	104702.1	98112.48	-375.229	-150.874	4309.0	3782.9	-3782.9
71.50001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-375.2	-150.9	16522.0	15995.9	81264.47	104702.1	98112.48	-375.229	-150.874	4309.0	3782.9	-3782.9
71.60001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-371.6	-149.2	16490.3	15969.5	81264.47	104702.1	98112.48	-371.586	-149.207	4302.6	3781.8	-3781.8
71.60001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-371.6	-149.2	16490.3	15969.5	81264.47	104702.1	98112.48	-371.586	-149.207	4302.6	3781.8	-3781.8
71.90001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-361.6	-145.2	16404.9	15898.1	81264.47	104702.1	98112.48	-361.589	-145.185	4285.4	3778.6	-3778.6
71.90001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-361.6	-145.2	16404.9	15898.1	81264.47	104702.1	98112.48	-361.589	-145.185	4285.4	3778.6	-3778.6
72.00001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-358.4	-144.0	16377.9	15875.5	81264.47	104702.1	98112.48	-358.405	-144.006	4280.0	3777.6	-3777.6
72.00001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-358.4	-144.0	16377.9	15875.5	81264.47	104702.1	98112.48	-358.405	-144.006	4280.0	3777.6	-3777.6
72.20001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-351.3	-141.0	16316.8	15824.5	81264.47	104702.1	98112.48	-351.289	-141.026	4267.7	3775.4	-3775.4
72.20001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-351.3	-141.0	16316.8	15824.5	81264.47	104702.1	98112.48	-351.289	-141.026	4267.7	3775.4	-3775.4
72.50001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-340.7	-136.7	16226.1	15748.6	81264.47	104702.1	98112.48	-340.682	-136.732	4249.4	3772.0	-3772.0
72.50001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-340.7	-136.7	16226.1	15748.6	81264.47	104702.1	98112.48	-340.682	-136.732	4249.4	3772.0	-3772.0
72.80001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-329.8	-132.3	16132.7	15670.6	81264.47	104702.1	98112.48	-329.769	-132.301	4230.6	3768.6	-3768.6
72.80001	VA-01 TRAMQ4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	1												

75.00001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-239.0	-94.3	15352.8	15019.6	81264.47	104702.1	98112.48	-238.972	-94.2827	4073.1	3739.8	-3739.8
75.00001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-239.0	-94.3	15352.8	15019.6	81264.47	104702.1	98112.48	-238.972	-94.2827	4073.1	3739.8	-3739.8
75.20001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-229.8	-90.3	15273.6	14953.5	81264.47	104702.1	98112.48	-229.793	-90.2933	4057.0	3736.9	-3736.9
75.20001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-229.8	-90.3	15273.6	14953.5	81264.47	104702.1	98112.48	-229.793	-90.2933	4057.0	3736.9	-3736.9
75.50001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-216.4	-84.6	15158.0	14857.0	81264.47	104702.1	98112.48	-216.356	-84.5793	4033.6	3732.7	-3732.7
75.50001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-216.4	-84.6	15158.0	14857.0	81264.47	104702.1	98112.48	-216.356	-84.5793	4033.6	3732.7	-3732.7
75.80001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-202.5	-78.8	15038.7	14757.5	81264.47	104702.1	98112.48	-202.459	-78.8031	4009.5	3728.3	-3728.3
75.80001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-212.5	-82.4	15123.7	14828.8	81264.47	104702.1	98112.48	-212.524	-82.4464	4026.4	3731.4	-3731.4
76.00001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-200.6	-78.7	15024.3	14745.0	81264.47	104702.1	98112.48	-200.579	-78.7168	4007.0	3727.7	-3727.7
76.00001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-200.6	-78.7	15024.3	14745.0	81264.47	104702.1	98112.48	-200.579	-78.7168	4007.0	3727.7	-3727.7
76.21876	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-187.7	-73.4	14914.1	14652.9	81264.47	104702.1	98112.48	-187.704	-73.4468	3984.8	3723.6	-3723.6
76.21876	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-187.7	-73.4	14914.1	14652.9	81264.47	104702.1	98112.48	-187.704	-73.4468	3984.8	3723.6	-3723.6
76.50001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-170.9	-66.8	14770.5	14532.8	81264.47	104702.1	98112.48	-170.863	-66.847	3956.1	3718.3	-3718.3
76.50001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-170.9	-66.8	14770.5	14532.8	81264.47	104702.1	98112.48	-170.863	-66.847	3956.1	3718.3	-3718.3
76.63751	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-162.0	-63.1	14694.2	14469.1	81264.47	104702.1	98112.48	-161.996	-63.0592	3940.6	3715.5	-3715.5
76.63751	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-162.0	-63.1	14694.2	14469.1	81264.47	104702.1	98112.48	-161.996	-63.0592	3940.6	3715.5	-3715.5
77.00001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-140.2	-54.6	14508.7	14313.9	81264.47	104702.1	98112.48	-140.215	-54.5677	3903.5	3708.7	-3708.7
77.00001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-140.2	-54.6	14508.7	14313.9	81264.47	104702.1	98112.48	-140.215	-54.5677	3903.5	3708.7	-3708.7
77.05626	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-135.8	-52.4	14470.2	14282.0	81264.47	104702.1	98112.48	-135.839	-52.37	3895.5	3707.3	-3707.3
77.05626	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-135.8	-52.4	14470.2	14282.0	81264.47	104702.1	98112.48	-135.839	-52.37	3895.5	3707.3	-3707.3
77.47501	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-110.3	-42.4	14252.8	14100.0	81264.47	104702.1	98112.48	-110.307	-42.4193	3852.0	3699.2	-3699.2
77.47501	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-110.3	-42.4	14252.8	14100.0	81264.47	104702.1	98112.48	-110.307	-42.4193	3852.0	3699.2	-3699.2
77.50001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-108.8	-41.9	14240.4	14089.6	81264.47	104702.1	98112.48	-108.842	-41.8825	3849.5	3698.8	-3698.8
77.50001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-108.8	-41.9	14240.4	14089.6	81264.47	104702.1	98112.48	-108.842	-41.8825	3849.5	3698.8	-3698.8
77.89376	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-83.0	-31.1	14018.9	13904.7	81264.47	104702.1	98112.48	-83.0326	-31.1431	3804.8	3690.6	-3690.6
77.89376	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-83.0	-31.1	14018.9	13904.7	81264.47	104702.1	98112.48	-83.0326	-31.1431	3804.8	3690.6	-3690.6
78.00001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-76.7	-28.8	13964.9	13859.4	81264.47	104702.1	98112.48	-76.6522	-28.7887	3794.1	3688.6	-3688.6
78.00001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-76.7	-28.8	13964.9	13859.4	81264.47	104702.1	98112.48	-76.6522	-28.7887	3794.1	3688.6	-3688.6
78.31251	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-55.1	-19.6	13779.5	13704.8	81264.47	104702.1	98112.48	-55.1316	-19.5662	3756.5	3681.8	-3681.8
78.31251	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-55.1	-19.6	13779.5	13704.8	81264.47	104702.1	98112.48	-55.1316	-19.5662	3756.5	3681.8	-3681.8
78.50001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-43.6	-15.3	13681.7	13622.8	81264.47	104702.1	98112.48	-43.5867	-15.2809	3737.0	3678.2	-3678.2
78.50001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-43.6	-15.3	13681.7	13622.8	81264.47	104702.1	98112.48	-43.5867	-15.2809	3737.0	3678.2	-3678.2
78.73126	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-27.9	-8.8	13547.1	13510.4	81264.47	104702.1	98112.48	-27.8842	-8.80685	3709.9	3673.2	-3673.2
78.73126	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-27.9	-8.8	13547.1	13510.4	81264.47	104702.1	98112.48	-27.8842	-8.80685	3709.9	3673.2	-3673.2
79.00001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-9.6	-1.4	13390.7	13379.7	81264.47	104702.1	98112.48	-9.61509	-1.36395	3678.4	3667.4	-3667.4
79.00001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	-9.6	-1.4	13390.7	13379.7	81264.47	104702.1	98112.48	-9.61509	-1.36395	3678.4	3667.4	-3667.4
79.15001	VA-01 TRAMO4	50472.14	81264.47	3500	3500	1766.5	1766.5	1766.5	50472.1	380422.7	151451.2	1.3	3.4	13296.3	13301.0	81264.47	104702.1	98112.48	1.331463	3.371175	3659.3	3664.0	-3664.0
79.15001	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	1.3	3.4	13767.1	13771.8	73468.29	91937.89	85472.25	1.331463	3.371175	3212.5	3217.2	-3217.2
79.39064	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	18.2	10.4	13660.4	13689.0	73468.29	91937.89	85472.25	18.24898	10.35396	3183.9	3212.5	-3212.5
79.39064	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	18.2	10.4	13660.4	13689.0	73468.29	91937.89	85472.25	18.24898	10.35396	3183.9	3212.5	-3212.5
79.50001	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	25.4	13.1	13615.8	13654.3	73468.29	91937.89	85472.25	25.42156	13.07075	3172.0	3210.4	-3210.4
79.50001	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	25.4	13.1	13615.8	13654.3	73468.29	91937.89	85472.25	25.42156	13.07075	3172.0	3210.4	-3210.4
79.63126	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	7351														

81.50001	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	175.3	74.9	12670.2	12920.5	73468.29	91937.89	85472.25	175.3361	74.94805	2917.8	3168.1	-3168.1
81.50001	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	175.3	74.9	12670.2	12920.5	73468.29	91937.89	85472.25	175.3361	74.94805	2917.8	3168.1	-3168.1
81.55626	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	181.0	77.7	12633.6	12892.3	73468.29	91937.89	85472.25	180.9676	77.72021	2907.8	3166.5	-3166.5
81.55626	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	181.0	77.7	12633.6	12892.3	73468.29	91937.89	85472.25	180.9676	77.72021	2907.8	3166.5	-3166.5
81.79688	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	200.2	85.7	12512.3	12798.2	73468.29	91937.89	85472.25	200.1859	85.69853	2875.1	3161.0	-3161.0
81.79688	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	200.2	85.7	12512.3	12798.2	73468.29	91937.89	85472.25	200.1859	85.69853	2875.1	3161.0	-3161.0
82.00001	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	215.2	91.5	12418.3	12725.1	73468.29	91937.89	85472.25	215.249	91.46995	2850.1	3156.8	-3156.8
82.00001	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	215.2	91.5	12418.3	12725.1	73468.29	91937.89	85472.25	215.249	91.46995	2850.1	3156.8	-3156.8
82.03751	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	219.6	93.8	12389.6	12703.0	73468.29	91937.89	85472.25	219.6253	93.77194	2842.1	3155.5	-3155.5
82.03751	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	219.6	93.8	12389.6	12703.0	73468.29	91937.89	85472.25	219.6253	93.77194	2842.1	3155.5	-3155.5
82.27814	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	239.3	101.9	12265.5	12606.7	73468.29	91937.89	85472.25	239.286	101.939	2808.7	3150.0	-3150.0
82.27814	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	239.3	101.9	12265.5	12606.7	73468.29	91937.89	85472.25	239.286	101.939	2808.7	3150.0	-3150.0
82.50001	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	256.1	108.4	12160.5	12525.0	73468.29	91937.89	85472.25	256.1143	108.3941	2780.7	3145.2	-3145.2
82.50001	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	256.1	108.4	12160.5	12525.0	73468.29	91937.89	85472.25	256.1143	108.3941	2780.7	3145.2	-3145.2
82.51876	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	257.5	108.9	12151.6	12518.0	73468.29	91937.89	85472.25	257.5382	108.9396	2778.4	3144.8	-3144.8
82.51876	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	257.5	108.9	12151.6	12518.0	73468.29	91937.89	85472.25	257.5382	108.9396	2778.4	3144.8	-3144.8
82.75939	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	277.6	117.3	12025.0	12419.9	73468.29	91937.89	85472.25	277.5814	117.2831	2744.3	3139.2	-3139.2
82.75939	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	277.6	117.3	12025.0	12419.9	73468.29	91937.89	85472.25	277.5814	117.2831	2744.3	3139.2	-3139.2
83.00001	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	298.1	125.6	11895.9	12319.6	73468.29	91937.89	85472.25	298.1057	125.5813	2709.7	3133.4	-3133.4
83.00001	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	280.1	119.7	12006.2	12405.9	73468.29	91937.89	85472.25	280.0579	119.6946	2738.6	3138.4	-3138.4
83.29168	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	308.5	130.4	11829.3	12268.2	73468.29	91937.89	85472.25	308.4726	130.386	2691.6	3130.4	-3130.4
83.29168	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	308.5	130.4	11829.3	12268.2	73468.29	91937.89	85472.25	308.4726	130.386	2691.6	3130.4	-3130.4
83.50001	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	328.7	138.6	11702.2	12169.5	73468.29	91937.89	85472.25	328.6508	138.6436	2657.4	3124.7	-3124.7
83.50001	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	328.7	138.6	11702.2	12169.5	73468.29	91937.89	85472.25	328.6508	138.6436	2657.4	3124.7	-3124.7
83.58334	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	336.1	141.4	11656.1	12133.6	73468.29	91937.89	85472.25	336.0659	141.4099	2645.2	3122.6	-3122.6
83.58334	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	336.1	141.4	11656.1	12133.6	73468.29	91937.89	85472.25	336.0659	141.4099	2645.2	3122.6	-3122.6
83.87501	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	364.0	152.6	11481.0	11997.5	73468.29	91937.89	85472.25	363.968	152.5712	2598.2	3114.8	-3114.8
83.87501	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	364.0	152.6	11481.0	11997.5	73468.29	91937.89	85472.25	363.968	152.5712	2598.2	3114.8	-3114.8
84.00001	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	377.1	158.2	11397.8	11933.1	73468.29	91937.89	85472.25	377.0677	158.2141	2575.8	3111.1	-3111.1
84.00001	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	377.1	158.2	11397.8	11933.1	73468.29	91937.89	85472.25	377.0677	158.2141	2575.8	3111.1	-3111.1
84.16668	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	392.2	163.9	11303.6	11859.7	73468.29	91937.89	85472.25	392.2279	163.8639	2550.7	3106.8	-3106.8
84.16668	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	392.2	163.9	11303.6	11859.7	73468.29	91937.89	85472.25	392.2279	163.8639	2550.7	3106.8	-3106.8
84.45834	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	420.9	175.3	11123.9	11720.0	73468.29	91937.89	85472.25	420.8632	175.2894	2502.6	3098.8	-3098.8
84.45834	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	420.9	175.3	11123.9	11720.0	73468.29	91937.89	85472.25	420.8632	175.2894	2502.6	3098.8	-3098.8
84.50001	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	426.6	178.2	11086.4	11691.2	73468.29	91937.89	85472.25	426.6145	178.1956	2492.3	3097.1	-3097.1
84.50001	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	426.6	178.2	11086.4	11691.2	73468.29	91937.89	85472.25	426.6145	178.1956	2492.3	3097.1	-3097.1
84.75001	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	451.8	188.3	10927.9	11568.1	73468.29	91937.89	85472.25	451.8381	188.345	2449.8	3090.0	-3090.0
84.75001	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	451.8	188.3	10927.9	11568.1	73468.29	91937.89	85472.25	451.8381	188.345	2449.8	3090.0	-3090.0
85.00001	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	477.4	198.6	10767.5	11443.4	73468.29	91937.89	85472.25	477.3738	198.6031	2406.8	3082.8	-3082.8
85.00001	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	477.4	198.6	10767.5	11443.4	73468.29	91937.89	85472.25	477.3738	198.6031	2406.8	3082.8	-3082.8
85.04168	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	481.3	200.1	10742.8	11424.2	73468.29	91937.89	85472.25	481.3419	200.077	2400.3	3081.7	-3081.7
85.04168	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	481.3	200.1	10742.8	11424.2	73468.29	91937.89	85472.25	481.3419				

87.50001	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	748.8	305.7	9067.0	10121.5	73468.29	91937.89	85472.25	748.7665	305.7058	1952.0	3006.5	-3006.5
87.50001	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	748.8	305.7	9067.0	10121.5	73468.29	91937.89	85472.25	748.7665	305.7058	1952.0	3006.5	-3006.5
87.66667	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	769.1	313.9	8939.4	10022.4	73468.29	91937.89	85472.25	769.0567	313.9153	1917.8	3000.7	-3000.7
87.66667	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	769.1	313.9	8939.4	10022.4	73468.29	91937.89	85472.25	769.0567	313.9153	1917.8	3000.7	-3000.7
87.95834	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	803.1	327.1	8726.8	9856.9	73468.29	91937.89	85472.25	803.0751	327.1231	1861.0	2991.2	-2991.2
87.95834	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	803.1	327.1	8726.8	9856.9	73468.29	91937.89	85472.25	803.0751	327.1231	1861.0	2991.2	-2991.2
88	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	807.6	328.8	8698.7	9835.1	73468.29	91937.89	85472.25	807.604	328.7739	1853.5	2989.9	-2989.9
88	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	807.6	328.8	8698.7	9835.1	73468.29	91937.89	85472.25	807.604	328.7739	1853.5	2989.9	-2989.9
88.25	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	837.5	340.5	8511.4	9689.4	73468.29	91937.89	85472.25	837.5442	340.4649	1803.5	2981.5	-2981.5
88.25	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	837.5	340.5	8511.4	9689.4	73468.29	91937.89	85472.25	837.5442	340.4649	1803.5	2981.5	-2981.5
88.5	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	867.8	352.3	8322.0	9542.1	73468.29	91937.89	85472.25	867.8303	352.253	1752.9	2973.0	-2973.0
88.5	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	867.8	352.3	8322.0	9542.1	73468.29	91937.89	85472.25	867.8303	352.253	1752.9	2973.0	-2973.0
88.54167	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	875.1	355.7	8275.3	9506.1	73468.29	91937.89	85472.25	875.07	355.6706	1740.2	2970.9	-2970.9
88.54167	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	875.1	355.7	8275.3	9506.1	73468.29	91937.89	85472.25	875.07	355.6706	1740.2	2970.9	-2970.9
88.83334	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	910.5	369.3	8054.1	9333.9	73468.29	91937.89	85472.25	910.5204	369.2705	1681.2	2961.0	-2961.0
88.83334	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	910.5	369.3	8054.1	9333.9	73468.29	91937.89	85472.25	910.5204	369.2705	1681.2	2961.0	-2961.0
89	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	929.4	376.1	7937.1	9242.6	73468.29	91937.89	85472.25	929.4402	376.0782	1650.2	2955.7	-2955.7
89	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	929.4	376.1	7937.1	9242.6	73468.29	91937.89	85472.25	929.4402	376.0782	1650.2	2955.7	-2955.7
89.125	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	946.4	383.0	7830.3	9159.7	73468.29	91937.89	85472.25	946.4244	382.9526	1621.6	2950.9	-2950.9
89.125	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	946.4	383.0	7830.3	9159.7	73468.29	91937.89	85472.25	946.4244	382.9526	1621.6	2950.9	-2950.9
89.41667	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	982.8	396.7	7603.8	8983.3	73468.29	91937.89	85472.25	982.7976	396.6717	1561.3	2940.7	-2940.7
89.41667	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	982.8	396.7	7603.8	8983.3	73468.29	91937.89	85472.25	982.7976	396.6717	1561.3	2940.7	-2940.7
89.5	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	992.5	400.1	7544.1	8936.7	73468.29	91937.89	85472.25	992.4737	400.0907	1545.5	2938.1	-2938.1
89.5	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	992.5	400.1	7544.1	8936.7	73468.29	91937.89	85472.25	992.4737	400.0907	1545.5	2938.1	-2938.1
89.70834	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	1019.6	410.3	7375.5	8805.3	73468.29	91937.89	85472.25	1019.57	410.3052	1500.6	2930.5	-2930.5
89.70834	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	1019.6	410.3	7375.5	8805.3	73468.29	91937.89	85472.25	1019.57	410.3052	1500.6	2930.5	-2930.5
90	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	1056.9	423.3	7145.5	8625.7	73468.29	91937.89	85472.25	1056.92	423.283	1439.9	2920.1	-2920.1
90	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	1056.9	423.3	7145.5	8625.7	73468.29	91937.89	85472.25	1056.92	423.283	1439.9	2920.1	-2920.1
90.33333	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	1054.5	422.2	7160.9	8637.6	73468.29	91937.89	85472.25	1054.497	422.2479	1444.0	2920.8	-2920.8
90.33333	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	1054.5	422.2	7160.9	8637.6	73468.29	91937.89	85472.25	1054.497	422.2479	1444.0	2920.8	-2920.8
90.5	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	1012.1	407.4	7422.4	8841.8	73468.29	91937.89	85472.25	1012.058	407.4033	1513.1	2932.6	-2932.6
90.5	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	1012.1	407.4	7422.4	8841.8	73468.29	91937.89	85472.25	1012.058	407.4033	1513.1	2932.6	-2932.6
90.5	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	989.7	398.8	7561.8	8950.3	73468.29	91937.89	85472.25	989.7417	398.7964	1550.3	2938.8	-2938.8
90.5	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	989.7	398.8	7561.8	8950.3	73468.29	91937.89	85472.25	989.7417	398.7964	1550.3	2938.8	-2938.8
90.66667	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	970.5	392.0	7680.6	9043.1	73468.29	91937.89	85472.25	970.4842	391.9924	1581.7	2944.2	-2944.2
90.66667	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	970.5	392.0	7680.6	9043.1	73468.29	91937.89	85472.25	970.4842	391.9924	1581.7	2944.2	-2944.2
91	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	926.6	374.7	7955.7	9256.9	73468.29	91937.89	85472.25	926.5813	374.6641	1655.3	2956.5	-2956.5
91	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	926.6	374.7	7955.7	9256.9	73468.29	91937.89	85472.25	926.5813	374.6641	1655.3	2956.5	-2956.5
91.33333	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	886.2	359.3	8207.5	9453.0	73468.29	91937.89	85472.25	886.1838	359.2803	1722.4	2967.9	-2967.9
91.33333	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	886.2	359.3	8207.5	9453.0	73468.29	91937.89	85472.25	886.1838	359.2803	1722.4	2967.9	-2967.9
91.5	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	864.8	350.7	8341.7	9557.3	73468.29	91937.89	85472.25	864.806	350.7155	1758.4	2973.9	-2973.9
91.5	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	864.8	350.7	8341.7	9557.3	73468.29	91937.89	85472.25	864.806	350.7155	1758.4	2973.9	-2973.9
91.66667	VA-01 TRAM03	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9															

94.66667	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	504.8	208.0	10598.6	11311.5	73468.29	191937.89	85472.25	504.8481	207.9983	2362.3	3075.2	-3075.2
94.66667	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	504.8	208.0	10598.6	11311.5	73468.29	191937.89	85472.25	504.8481	207.9983	2362.3	3075.2	-3075.2
95	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	468.9	193.0	10825.9	11487.8	73468.29	191937.89	85472.25	468.8637	193.0358	2423.5	3085.4	-3085.4
95	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	468.9	193.0	10825.9	11487.8	73468.29	191937.89	85472.25	468.8637	193.0358	2423.5	3085.4	-3085.4
95.33334	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	435.6	179.9	11034.2	11649.7	73468.29	191937.89	85472.25	435.6353	179.8814	2479.2	3094.7	-3094.7
95.33334	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	435.6	179.9	11034.2	11649.7	73468.29	191937.89	85472.25	435.6353	179.8814	2479.2	3094.7	-3094.7
95.50001	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	418.2	172.6	11144.4	11735.1	73468.29	191937.89	85472.25	418.1973	172.5918	2508.8	3099.6	-3099.6
95.50001	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	418.2	172.6	11144.4	11735.1	73468.29	191937.89	85472.25	418.1973	172.5918	2508.8	3099.6	-3099.6
95.66667	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	400.9	165.4	11253.6	11819.9	73468.29	191937.89	85472.25	400.9077	165.3539	2538.3	3104.5	-3104.5
95.66667	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	400.9	165.4	11253.6	11819.9	73468.29	191937.89	85472.25	400.9077	165.3539	2538.3	3104.5	-3104.5
96.00001	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	368.8	152.6	11454.9	11976.3	73468.29	191937.89	85472.25	368.8195	152.5944	2592.1	3113.6	-3113.6
96.00001	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	368.8	152.6	11454.9	11976.3	73468.29	191937.89	85472.25	368.8195	152.5944	2592.1	3113.6	-3113.6
96.33334	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	337.2	140.0	11653.2	12130.4	73468.29	191937.89	85472.25	337.2158	140.0022	2645.2	3122.5	-3122.5
96.33334	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	337.2	140.0	11653.2	12130.4	73468.29	191937.89	85472.25	337.2158	140.0022	2645.2	3122.5	-3122.5
96.50001	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	320.7	133.0	11757.9	12211.6	73468.29	191937.89	85472.25	320.6698	133.0317	2673.4	3127.1	-3127.1
96.50001	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	320.7	133.0	11757.9	12211.6	73468.29	191937.89	85472.25	320.6698	133.0317	2673.4	3127.1	-3127.1
96.66667	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	304.3	126.1	11861.8	12292.1	73468.29	191937.89	85472.25	304.2555	126.1095	2701.4	3131.8	-3131.8
96.66667	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	304.3	126.1	11861.8	12292.1	73468.29	191937.89	85472.25	304.2555	126.1095	2701.4	3131.8	-3131.8
97.00001	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	273.7	113.9	12053.8	12441.3	73468.29	191937.89	85472.25	273.6703	113.8879	2752.9	3140.4	-3140.4
97.00001	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	273.7	113.9	12053.8	12441.3	73468.29	191937.89	85472.25	273.6703	113.8879	2752.9	3140.4	-3140.4
97.33334	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	241.7	100.4	12255.9	12598.0	73468.29	191937.89	85472.25	241.735	100.3885	2807.3	3149.5	-3149.5
97.33334	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	241.7	100.4	12255.9	12598.0	73468.29	191937.89	85472.25	241.735	100.3885	2807.3	3149.5	-3149.5
97.50001	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	227.7	95.2	12343.1	12666.0	73468.29	191937.89	85472.25	227.7128	95.15004	2830.5	3153.4	-3153.4
97.50001	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	227.7	95.2	12343.1	12666.0	73468.29	191937.89	85472.25	227.7128	95.15004	2830.5	3153.4	-3153.4
97.66667	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	212.0	88.5	12442.5	12743.1	73468.29	191937.89	85472.25	211.9977	88.52924	2857.3	3157.8	-3157.8
97.66667	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	212.0	88.5	12442.5	12743.1	73468.29	191937.89	85472.25	211.9977	88.52924	2857.3	3157.8	-3157.8
98.00001	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	181.4	76.9	12633.3	12891.6	73468.29	191937.89	85472.25	181.3719	76.93297	2908.1	3166.4	-3166.4
98.00001	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	205.2	85.4	12486.1	12776.7	73468.29	191937.89	85472.25	205.2037	85.41704	2869.2	3159.8	-3159.8
98.14376	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	194.2	81.4	12554.3	12829.9	73468.29	191937.89	85472.25	194.1859	81.4323	2887.2	3162.8	-3162.8
98.14376	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	194.2	81.4	12554.3	12829.9	73468.29	191937.89	85472.25	194.1859	81.4323	2887.2	3162.8	-3162.8
98.28751	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	182.7	76.2	12628.2	12887.0	73468.29	191937.89	85472.25	182.6605	76.15221	2907.3	3166.1	-3166.1
98.28751	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	182.7	76.2	12628.2	12887.0	73468.29	191937.89	85472.25	182.6605	76.15221	2907.3	3166.1	-3166.1
98.43126	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	172.5	72.2	12691.8	12936.5	73468.29	191937.89	85472.25	172.4917	72.16912	2924.3	3169.0	-3169.0
98.43126	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	172.5	72.2	12691.8	12936.5	73468.29	191937.89	85472.25	172.4917	72.16912	2924.3	3169.0	-3169.0
98.50001	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	166.0	69.0	12733.8	12968.8	73468.29	191937.89	85472.25	166.0167	69.01941	2935.8	3170.9	-3170.9
98.50001	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	166.0	69.0	12733.8	12968.8	73468.29	191937.89	85472.25	166.0167	69.01941	2935.8	3170.9	-3170.9
98.57501	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	160.7	67.0	12766.7	12994.4	73468.29	191937.89	85472.25	160.7456	66.9666	2944.6	3172.3	-3172.3
98.57501	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	160.7	67.0	12766.7	12994.4	73468.29	191937.89	85472.25	160.7456	66.9666	2944.6	3172.3	-3172.3
98.71876	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	149.1	61.8	12841.3	13052.1	73468.29	191937.89	85472.25	149.0553	61.79542	2964.8	3175.7	-3175.7
98.71876	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	149.1	61.8	12841.3	13052.1	73468.29	191937.89	85472.25	149.0553	61.79542	2964.8	3175.7	-3175.7
98.86251	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	139.1	57.9	12903.8	13100.8	73468.29	191937.89	85472.25	139.0556	57.90426	2981.5	3178.5	-3178.5
98.86251	VA-01 TRAMO3	73511.15	73468.29	3500	3500	2572.9	2572.9	2572.9	73511.2	393772.7	170949.5	139.1	57.9	12903.8	13100.8	73468.29	191937.89	85472.25	139.0556	57.90426			

100.8625	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-6.5	-3.7	13377.3	13367.1	60335.75	78606.02	72951.35	-6.53063	-3.6583	2763.7	2753.5	-2753.5
100.8625	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-6.5	-3.7	13377.3	13367.1	60335.75	78606.02	72951.35	-6.53063	-3.6583	2763.7	2753.5	-2753.5
101	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-15.1	-6.9	13444.1	13422.1	60335.75	78606.02	72951.35	-15.0591	-6.88784	2778.3	2756.3	-2756.3
101	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-15.1	-6.9	13444.1	13422.1	60335.75	78606.02	72951.35	-15.0591	-6.88784	2778.3	2756.3	-2756.3
101.1479	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-25.6	-11.5	13528.4	13491.3	60335.75	78606.02	72951.35	-25.6344	-11.5305	2797.0	2759.9	-2759.9
101.1479	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-25.6	-11.5	13528.4	13491.3	60335.75	78606.02	72951.35	-25.6344	-11.5305	2797.0	2759.9	-2759.9
101.4333	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-44.4	-19.3	13677.2	13613.5	60335.75	78606.02	72951.35	-44.4425	-19.2726	2829.9	2766.2	-2766.2
101.4333	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-44.4	-19.3	13677.2	13613.5	60335.75	78606.02	72951.35	-44.4425	-19.2726	2829.9	2766.2	-2766.2
101.5	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-48.5	-20.8	13708.7	13639.5	60335.75	78606.02	72951.35	-48.4705	-20.7936	2836.8	2767.5	-2767.5
101.5	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-48.5	-20.8	13708.7	13639.5	60335.75	78606.02	72951.35	-48.4705	-20.7936	2836.8	2767.5	-2767.5
101.7188	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-63.0	-26.9	13823.6	13733.8	60335.75	78606.02	72951.35	-62.9543	-26.8845	2862.2	2772.4	-2772.4
101.7188	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-63.0	-26.9	13823.6	13733.8	60335.75	78606.02	72951.35	-62.9543	-26.8845	2862.2	2772.4	-2772.4
102	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-80.9	-34.3	13965.7	13850.5	60335.75	78606.02	72951.35	-80.925	-34.2738	2893.6	2778.4	-2778.4
102	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-80.9	-34.3	13965.7	13850.5	60335.75	78606.02	72951.35	-80.925	-34.2738	2893.6	2778.4	-2778.4
102.0042	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-82.5	-35.5	13979.7	13861.7	60335.75	78606.02	72951.35	-82.5102	-35.4946	2897.0	2778.9	-2778.9
102.0042	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-82.5	-35.5	13979.7	13861.7	60335.75	78606.02	72951.35	-82.5102	-35.4946	2897.0	2778.9	-2778.9
102.2896	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-100.4	-42.8	14120.8	13977.6	60335.75	78606.02	72951.35	-100.368	-42.8121	2928.1	2784.9	-2784.9
102.2896	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-100.4	-42.8	14120.8	13977.6	60335.75	78606.02	72951.35	-100.368	-42.8121	2928.1	2784.9	-2784.9
102.5	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-113.7	-48.4	14226.5	14064.4	60335.75	78606.02	72951.35	-113.689	-48.4152	2951.5	2789.4	-2789.4
102.5	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-113.7	-48.4	14226.5	14064.4	60335.75	78606.02	72951.35	-113.689	-48.4152	2951.5	2789.4	-2789.4
102.575	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-117.9	-50.0	14259.6	14091.7	60335.75	78606.02	72951.35	-117.934	-50.0002	2958.7	2790.8	-2790.8
102.575	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-117.9	-50.0	14259.6	14091.7	60335.75	78606.02	72951.35	-117.934	-50.0002	2958.7	2790.8	-2790.8
102.8604	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-135.2	-57.1	14396.2	14203.9	60335.75	78606.02	72951.35	-135.212	-57.0593	2988.8	2796.6	-2796.6
102.8604	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-135.2	-57.1	14396.2	14203.9	60335.75	78606.02	72951.35	-135.212	-57.0593	2988.8	2796.6	-2796.6
103	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-144.2	-61.0	14467.7	14262.5	60335.75	78606.02	72951.35	-144.176	-61.0054	3004.8	2799.6	-2799.6
103	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-144.2	-61.0	14467.7	14262.5	60335.75	78606.02	72951.35	-144.176	-61.0054	3004.8	2799.6	-2799.6
103.1458	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-152.2	-64.0	14530.4	14314.2	60335.75	78606.02	72951.35	-152.205	-63.9905	3018.5	2802.3	-2802.3
103.1458	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-152.2	-64.0	14530.4	14314.2	60335.75	78606.02	72951.35	-152.205	-63.9905	3018.5	2802.3	-2802.3
103.4313	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-170.1	-71.8	14672.9	14431.0	60335.75	78606.02	72951.35	-170.067	-71.8172	3050.2	2808.3	-2808.3
103.4313	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-170.1	-71.8	14672.9	14431.0	60335.75	78606.02	72951.35	-170.067	-71.8172	3050.2	2808.3	-2808.3
103.5	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-173.8	-73.2	14701.7	14454.7	60335.75	78606.02	72951.35	-173.756	-73.1796	3056.4	2809.5	-2809.5
103.5	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-173.8	-73.2	14701.7	14454.7	60335.75	78606.02	72951.35	-173.756	-73.1796	3056.4	2809.5	-2809.5
103.7167	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-186.5	-78.5	14802.2	14537.3	60335.75	78606.02	72951.35	-186.453	-78.4631	3078.7	2813.8	-2813.8
103.7167	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-186.5	-78.5	14802.2	14537.3	60335.75	78606.02	72951.35	-186.453	-78.4631	3078.7	2813.8	-2813.8
104	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-202.5	-84.9	14928.6	14641.2	60335.75	78606.02	72951.35	-202.471	-84.9451	3106.5	2819.1	-2819.1
104	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-202.5	-84.9	14928.6	14641.2	60335.75	78606.02	72951.35	-202.471	-84.9451	3106.5	2819.1	-2819.1
104.0021	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-202.6	-85.0	14929.5	14641.9	60335.75	78606.02	72951.35	-202.579	-84.985	3106.7	2819.1	-2819.1
104.0021	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-202.6	-85.0	14929.5	14641.9	60335.75	78606.02	72951.35	-202.579	-84.985	3106.7	2819.1	-2819.1
104.2875	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-218.5	-91.4	15054.7	14744.9	60335.75	78606.02	72951.35	-218.455	-91.3841	3134.3	2824.4	-2824.4
104.2875	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-218.5	-91.4	15054.7	14744.9	60335.75	78606.02	72951.35	-218.455	-91.3841	3134.3	2824.4	-2824.4
104.5	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-230.4	-96.3	15149.1	14822.4	60335.75	78606.02	72951.35	-230.379	-96.3091	3155.1	2828.4	-2828.4
104.5	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-230.4	-96.3	15149.1	14822.4	60335.75	78606.02	72951.35	-230.379	-96.3091	3155.1	2828.4	-2828.4
104.5729	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-234.1	-97.7	15178.0	14846.2	60335.75	78606.02	72951.35	-234.092	-97.6613	3161.4	2829.7	-2829.7
104.5729	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-234.1	-97.7	15178.0	14846.2	60335.75	78606.02	72951.35	-234.092	-			

106.9375	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-329.4	-136.6	15930.8	15464.9	60335.75	78606.02	72951.35	-329.374	-136.583	3327.5	2861.5	-2861.5
106.9375	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-329.4	-136.6	15930.8	15464.9	60335.75	78606.02	72951.35	-329.374	-136.583	3327.5	2861.5	-2861.5
107	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-331.4	-137.4	15946.5	15477.8	60335.75	78606.02	72951.35	-331.368	-137.377	3330.9	2862.2	-2862.2
107	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-331.4	-137.4	15946.5	15477.8	60335.75	78606.02	72951.35	-331.368	-137.377	3330.9	2862.2	-2862.2
107.25	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-340.1	-141.2	16016.2	15534.9	60335.75	78606.02	72951.35	-340.121	-141.169	3346.4	2865.1	-2865.1
107.25	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-340.1	-141.2	16016.2	15534.9	60335.75	78606.02	72951.35	-340.121	-141.169	3346.4	2865.1	-2865.1
107.5	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-348.7	-144.9	16084.5	15590.9	60335.75	78606.02	72951.35	-348.702	-144.862	3361.6	2868.0	-2868.0
107.5	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-348.7	-144.9	16084.5	15590.9	60335.75	78606.02	72951.35	-348.702	-144.862	3361.6	2868.0	-2868.0
107.5625	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-350.6	-145.6	16099.6	15603.4	60335.75	78606.02	72951.35	-350.621	-145.616	3364.9	2868.7	-2868.7
107.5625	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-350.6	-145.6	16099.6	15603.4	60335.75	78606.02	72951.35	-350.621	-145.616	3364.9	2868.7	-2868.7
107.875	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-360.9	-149.9	16180.8	15670.0	60335.75	78606.02	72951.35	-360.856	-149.925	3382.9	2872.1	-2872.1
107.875	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-360.9	-149.9	16180.8	15670.0	60335.75	78606.02	72951.35	-360.856	-149.925	3382.9	2872.1	-2872.1
108	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-365.3	-152.0	16216.5	15699.2	60335.75	78606.02	72951.35	-365.305	-151.952	3390.9	2873.6	-2873.6
108	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-365.3	-152.0	16216.5	15699.2	60335.75	78606.02	72951.35	-365.305	-151.952	3390.9	2873.6	-2873.6
108.1875	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-371.5	-154.7	16265.9	15739.7	60335.75	78606.02	72951.35	-371.511	-154.653	3401.9	2875.7	-2875.7
108.1875	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-371.5	-154.7	16265.9	15739.7	60335.75	78606.02	72951.35	-371.511	-154.653	3401.9	2875.7	-2875.7
108.5	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-381.1	-158.6	16341.9	15802.2	60335.75	78606.02	72951.35	-381.107	-158.647	3418.7	2878.9	-2878.9
108.5	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-381.1	-158.6	16341.9	15802.2	60335.75	78606.02	72951.35	-381.107	-158.647	3418.7	2878.9	-2878.9
108.8125	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-390.4	-162.5	16415.5	15862.6	60335.75	78606.02	72951.35	-390.399	-162.501	3434.9	2882.0	-2882.0
108.8125	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-390.4	-162.5	16415.5	15862.6	60335.75	78606.02	72951.35	-390.399	-162.501	3434.9	2882.0	-2882.0
109	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-396.1	-164.9	16460.5	15899.5	60335.75	78606.02	72951.35	-396.059	-164.943	3444.9	2883.9	-2883.9
109	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-396.1	-164.9	16460.5	15899.5	60335.75	78606.02	72951.35	-396.059	-164.943	3444.9	2883.9	-2883.9
109.125	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-400.0	-166.7	16491.8	15925.1	60335.75	78606.02	72951.35	-399.967	-166.708	3451.9	2885.2	-2885.2
109.125	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-400.0	-166.7	16491.8	15925.1	60335.75	78606.02	72951.35	-399.967	-166.708	3451.9	2885.2	-2885.2
109.4375	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-408.6	-170.2	16559.8	15981.0	60335.75	78606.02	72951.35	-408.559	-170.239	3466.9	2888.1	-2888.1
109.4375	VA-01 TRAMO2	55310.58	60335.75	3500	3500	1935.9	1935.9	1935.9	55310.6	380664.5	152596.8	-408.6	-170.2	16559.8	15981.0	60335.75	78606.02	72951.35	-408.559	-170.239	3466.9	2888.1	-2888.1
109.5	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-410.1	-170.8	23983.1	23402.1	55380.35	75094.51	70096.94	-410.131	-170.835	3367.5	2786.5	-2786.5
109.5	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-410.1	-170.8	23983.1	23402.1	55380.35	75094.51	70096.94	-410.131	-170.835	3367.5	2786.5	-2786.5
109.75	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-416.8	-173.6	24062.8	23472.3	55380.35	75094.51	70096.94	-416.831	-173.629	3379.5	2789.1	-2789.1
109.75	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-416.8	-173.6	24062.8	23472.3	55380.35	75094.51	70096.94	-416.831	-173.629	3379.5	2789.1	-2789.1
110	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-423.3	-176.3	24139.8	23540.2	55380.35	75094.51	70096.94	-423.306	-176.321	3391.2	2791.6	-2791.6
110	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-423.3	-176.3	24139.8	23540.2	55380.35	75094.51	70096.94	-423.306	-176.321	3391.2	2791.6	-2791.6
110.0625	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-425.3	-177.3	24163.4	23560.9	55380.35	75094.51	70096.94	-425.251	-177.304	3394.9	2792.3	-2792.3
110.0625	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-425.3	-177.3	24163.4	23560.9	55380.35	75094.51	70096.94	-425.251	-177.304	3394.9	2792.3	-2792.3
110.375	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-432.8	-180.4	24253.0	23639.8	55380.35	75094.51	70096.94	-432.804	-180.367	3408.4	2795.2	-2795.2
110.375	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-432.8	-180.4	24253.0	23639.8	55380.35	75094.51	70096.94	-432.804	-180.367	3408.4	2795.2	-2795.2
110.5	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-436.0	-181.8	24291.4	23673.6	55380.35	75094.51	70096.94	-436.006	-181.802	3414.3	2796.5	-2796.5
110.5	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-436.0	-181.8	24291.4	23673.6	55380.35	75094.51	70096.94	-436.006	-181.802	3414.3	2796.5	-2796.5
110.6875	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-440.0	-183.3	24338.8	23715.4	55380.35	75094.51	70096.94	-440.036	-183.285	3421.3	2798.0	-2798.0
110.6875	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-440.0	-183.3	24338.8	23715.4	55380.35	75094.51	70096.94	-440.036	-183.285	3421.3	2798.0	-2798.0
111	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-447.3	-186.4	24425.4	23791.7	55380.35	75094.51	70096.94	-447.299	-186.418	3434.5	2800.8	-2800.8
111	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-447.3	-186.4	24425.4	23791.7	55380.35	75094.51	70096.94	-447.299	-186.418	3434.5	2800.8	-2800.8
111.375	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-455.0	-189.4	24516.9	23872.4	55380.35	75094.51	70096.94	-455.039	-189.443	3448.3	2803.8	-2803.8
111.375	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-455.0	-189.4	24516.9	23872.4	55380.35	75094.51						

114	VA-01 TRAM01	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-499.7	-205.8	25041.9	24336.3	55380.35	75094.51	70096.94	-499.715	-205.845	3526.4	2820.9	-2820.9
114	VA-01 TRAM01	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-493.7	-202.8	24969.2	24272.7	55380.35	75094.51	70096.94	-493.745	-202.773	3515.0	2818.5	-2818.5
114.3333	VA-01 TRAM01	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-493.0	-203.1	24961.9	24265.8	55380.35	75094.51	70096.94	-492.974	-203.088	3514.3	2818.3	-2818.3
114.3333	VA-01 TRAM01	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-493.0	-203.1	24961.9	24265.8	55380.35	75094.51	70096.94	-492.974	-203.088	3514.3	2818.3	-2818.3
114.5	VA-01 TRAM01	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-492.5	-203.2	24957.3	24261.6	55380.35	75094.51	70096.94	-492.527	-203.177	3513.8	2818.1	-2818.1
114.5	VA-01 TRAM01	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-492.5	-203.2	24957.3	24261.6	55380.35	75094.51	70096.94	-492.527	-203.177	3513.8	2818.1	-2818.1
114.6667	VA-01 TRAM01	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-492.0	-203.2	24951.5	24256.4	55380.35	75094.51	70096.94	-491.977	-203.201	3513.1	2817.9	-2817.9
114.6667	VA-01 TRAM01	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-492.0	-203.2	24951.5	24256.4	55380.35	75094.51	70096.94	-491.977	-203.201	3513.1	2817.9	-2817.9
115	VA-01 TRAM01	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-490.9	-203.1	24939.7	24245.7	55380.35	75094.51	70096.94	-490.898	-203.102	3511.5	2817.5	-2817.5
115	VA-01 TRAM01	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-490.9	-203.1	24939.7	24245.7	55380.35	75094.51	70096.94	-490.898	-203.102	3511.5	2817.5	-2817.5
115.3333	VA-01 TRAM01	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-489.5	-202.8	24924.3	24231.9	55380.35	75094.51	70096.94	-489.528	-202.839	3509.4	2817.0	-2817.0
115.3333	VA-01 TRAM01	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-489.5	-202.8	24924.3	24231.9	55380.35	75094.51	70096.94	-489.528	-202.839	3509.4	2817.0	-2817.0
115.5	VA-01 TRAM01	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-488.8	-202.6	24915.4	24224.1	55380.35	75094.51	70096.94	-488.758	-202.617	3508.1	2816.7	-2816.7
115.5	VA-01 TRAM01	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-488.8	-202.6	24915.4	24224.1	55380.35	75094.51	70096.94	-488.758	-202.617	3508.1	2816.7	-2816.7
115.6667	VA-01 TRAM01	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-487.9</											

122	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-388.1	-159.9	23716.1	23168.1	55380.35	75094.51	70096.94	-388.118	-159.861	3325.8	2777.9	-2777.9
122	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-403.6	-166.1	23899.7	23330.0	55380.35	75094.51	70096.94	-403.616	-166.064	3353.5	2783.8	-2783.8
122.3333	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-390.1	-161.4	23741.4	23190.0	55380.35	75094.51	70096.94	-390.088	-161.353	3330.1	2778.7	-2778.7
122.3333	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-390.1	-161.4	23741.4	23190.0	55380.35	75094.51	70096.94	-390.088	-161.353	3330.1	2778.7	-2778.7
122.5	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-383.0	-158.6	23658.1	23116.5	55380.35	75094.51	70096.94	-383.043	-158.575	3317.6	2776.0	-2776.0
122.5	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-383.0	-158.6	23658.1	23116.5	55380.35	75094.51	70096.94	-383.043	-158.575	3317.6	2776.0	-2776.0
122.6667	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-376.7	-156.4	23584.4	23051.3	55380.35	75094.51	70096.94	-376.735	-156.408	3306.7	2773.6	-2773.6
122.6667	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-376.7	-156.4	23584.4	23051.3	55380.35	75094.51	70096.94	-376.735	-156.408	3306.7	2773.6	-2773.6
123	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-362.4	-150.6	23414.5	22901.5	55380.35	75094.51	70096.94	-362.415	-150.578	3281.0	2768.1	-2768.1
123	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-362.4	-150.6	23414.5	22901.5	55380.35	75094.51	70096.94	-362.415	-150.578	3281.0	2768.1	-2768.1
123.3333	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-348.6	-145.3	23251.8	22757.9	55380.35	75094.51	70096.94	-348.637	-145.259	3256.7	2762.8	-2762.8
123.3333	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-348.6	-145.3	23251.8	22757.9	55380.35	75094.51	70096.94	-348.637	-145.259	3256.7	2762.8	-2762.8
123.5	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-341.2	-142.2	23163.7	22680.3	55380.35	75094.51	70096.94	-341.229	-142.171	3243.3	2759.9	-2759.9
123.5	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-341.2	-142.2	23163.7	22680.3	55380.35	75094.51	70096.94	-341.229	-142.171	3243.3	2759.9	-2759.9
123.6667	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-333.7	-139.0	23074.6	22601.8	55380.35	75094.51	70096.94	-333.74	-139.036	3229.8	2757.0	-2757.0
123.6667	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-333.7	-139.0	23074.6	22601.8	55380.35	75094.51	70096.94	-333.74	-139.036	3229.8	2757.0	-2757.0
124	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-319.4	-133.4	22904.4	22451.7	55380.35	75094.51	70096.94	-319.352	-133.366	3204.2	2751.5	-2751.5
124	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-319.4	-133.4	22904.4	22451.7	55380.35	75094.51	70096.94	-319.352	-133.366	3204.2	2751.5	-2751.5
124.3333	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-304.7	-127.5	22730.5	22298.3	55380.35	75094.51	70096.94	-304.659	-127.544	3178.1	2745.9	-2745.9
124.3333	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-304.7	-127.5	22730.5	22298.3	55380.35	75094.51	70096.94	-304.659	-127.544	3178.1	2745.9	-2745.9
124.5	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-296.7	-124.2	22635.7	22214.8	55380.35	75094.51	70096.94	-296.702	-124.161	3163.6	2742.8	-2742.8
124.5	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-296.7	-124.2	22635.7	22214.8	55380.35	75094.51	70096.94	-296.702	-124.161	3163.6	2742.8	-2742.8
124.6667	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-288.6	-120.7	22539.7	22130.3	55380.35	75094.51	70096.94	-288.647	-120.731	3149.0	2739.7	-2739.7
124.6667	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-288.6	-120.7	22539.7	22130.3	55380.35	75094.51	70096.94	-288.647	-120.731	3149.0	2739.7	-2739.7
125	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-273.2	-114.6	22356.9	21969.1	55380.35	75094.51	70096.94	-273.218	-114.55	3121.5	2733.7	-2733.7
125	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-273.2	-114.6	22356.9	21969.1	55380.35	75094.51	70096.94	-273.218	-114.55	3121.5	2733.7	-2733.7
125.3334	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-256.4	-107.3	22156.0	21792.3	55380.35	75094.51	70096.94	-256.379	-107.338	3090.9	2727.2	-2727.2
125.3334	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-256.4	-107.3	22156.0	21792.3	55380.35	75094.51	70096.94	-256.379	-107.338	3090.9	2727.2	-2727.2
125.5	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-248.9	-104.5	22067.5	21714.1	55380.35	75094.51	70096.94	-248.858	-104.525	3077.7	2724.3	-2724.3
125.5	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-248.9	-104.5	22067.5	21714.1	55380.35	75094.51	70096.94	-248.858	-104.525	3077.7	2724.3	-2724.3
125.6667	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-240.2	-100.8	21963.8	21622.9	55380.35	75094.51	70096.94	-240.166	-100.79	3061.9	2721.0	-2721.0
125.6667	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-240.2	-100.8	21963.8	21622.9	55380.35	75094.51	70096.94	-240.166	-100.79	3061.9	2721.0	-2721.0
126	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-223.6	-94.1	21767.3	21449.6	55380.35	75094.51	70096.94	-223.596	-94.0824	3032.3	2714.6	-2714.6
126	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-223.6	-94.1	21767.3	21449.6	55380.35	75094.51	70096.94	-223.596	-94.0824	3032.3	2714.6	-2714.6
126.3334	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-205.4	-86.3	21550.6	21258.9	55380.35	75094.51	70096.94	-205.441	-86.2532	2999.3	2707.6	-2707.6
126.3334	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-205.4	-86.3	21550.6	21258.9	55380.35	75094.51	70096.94	-205.441	-86.2532	2999.3	2707.6	-2707.6
126.5	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-196.2	-82.3	21440.3	21161.8	55380.35	75094.51	70096.94	-196.202	-82.2641	2982.5	2704.0	-2704.0
126.5	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-196.2	-82.3	21440.3	21161.8	55380.35	75094.51	70096.94	-196.202	-82.2641	2982.5	2704.0	-2704.0
126.6667	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-188.1	-79.2	21344.3	21077.1	55380.35	75094.51	70096.94	-188.057	-79.1739	2968.1	2700.9	-2700.9
126.6667	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-188.1	-79.2	21344.3	21077.1	55380.35	75094.51	70096.94	-188.057	-79.1739	2968.1	2700.9	-2700.9
127	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-169.0	-70.9	21117.0	20877.0	55380.35	75094.51	70096.94	-169.019	-70.9365	2933.5	2693.5	-2693.5
127	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-169.0	-70.9	21117.0	20877.0	55380.35	75094.51	70096.94	-169.019	-70.9365	2933.5	2693.5	-2693.5
127.3334	VA-01 TRAMO1	51065.4	55380.35	3500	3500	1787.3	1787.3	1787.3	51065.4	545864.1	188863.7	-150.8	-63.5	20901.0	20686.7	55380.35							

130

VA-01 TRAMO1

51065.4

55380.35

3500

3500

1787.3

1787.3

1787.3

51065.4

545864.1

188863.7

12.7

5.6

18953.6

18971.8

55380.35

75094.51

70096.94

12.68803

5.55722

2605.1

2623.4

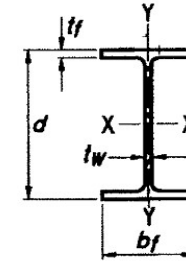
-2623.4

II. DISEÑO DE LA SUPERESTRUCTURA (Vigas Secundarias)

1. GEOMETRÍA

A continuación se muestran las dimensiones generales y propiedades geométricas de la vigas secundarias

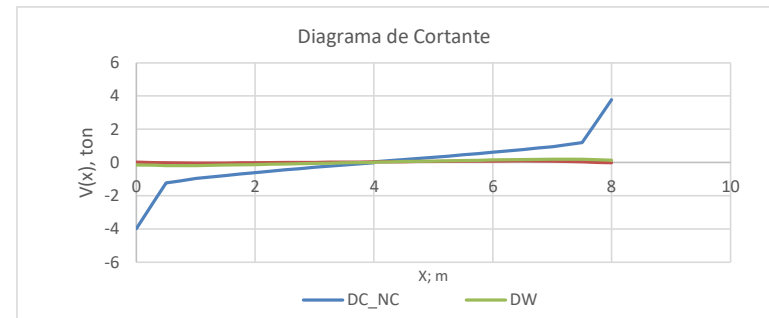
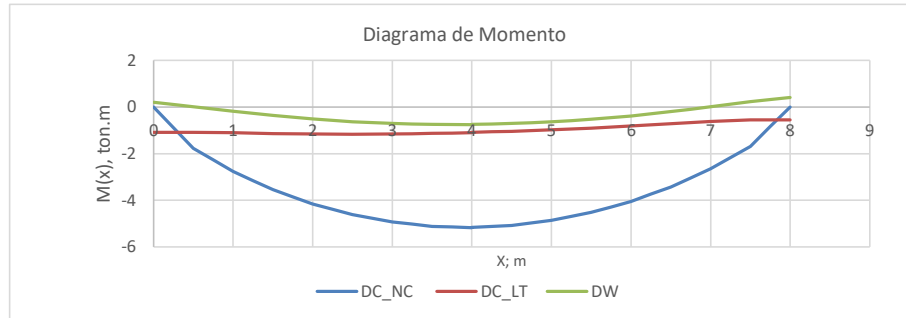
	unid.	TRAMO1				
		W24x68				
Seccion Simple	d	cm	60.30			
	tw	cm	1.10			
	bf _{inf}	cm	22.80			
	tf _{inf}	cm	1.50			
	bf _{sup}	cm	22.80			
	tf _{sup}	cm	1.50			
	A	cm ²	129.7			
	y	cm	30.15			
	I _x	cm ⁴	76170.4			
	I _y	cm ⁴	2930.3			
	S _{ytop}	cm ³	257.0			
	S _{ybot}	cm ³	257.0			
	S _{xtop}	cm ³	2526.4			
	S _{xbot}	cm ³	2526.4			
Seccion Compuesta, M+ (cargas de largo plazo)	A	cm ²	383.6			
	y	cm	63.3			
	I	cm ⁴	300549.8			
	S _{conc}	cm ³	11150.0			
	S _{topflan}	cm ³	98704.3			
	S _{botflan}	cm ³	4744.7			
Seccion Compuesta, M+ (cargas de corto plazo)	A	cm ²	891.5			
	y	cm	73.0			
	I	cm ⁴	380304.1			
	S _{conc}	cm ³	21987.8			
	S _{topflan}	cm ³	29936.2			
	S _{botflan}	cm ³	5209.4			
Seccion Compuesta, M- (concreto no efectivo en tensión)	A	cm ²	163.7			
	y	cm	41.0			
	I	cm ⁴	150587.2			
	S _{topflan}	cm ³	7810.1			
	S _{botflan}	cm ³	3671.2			



3. DISEÑO DE VIGAS Secundarias

3.3 Estimación de demandas (Vigas Secundarias)

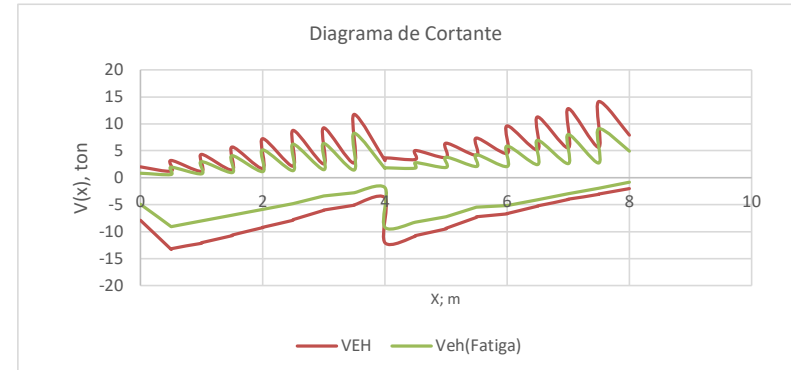
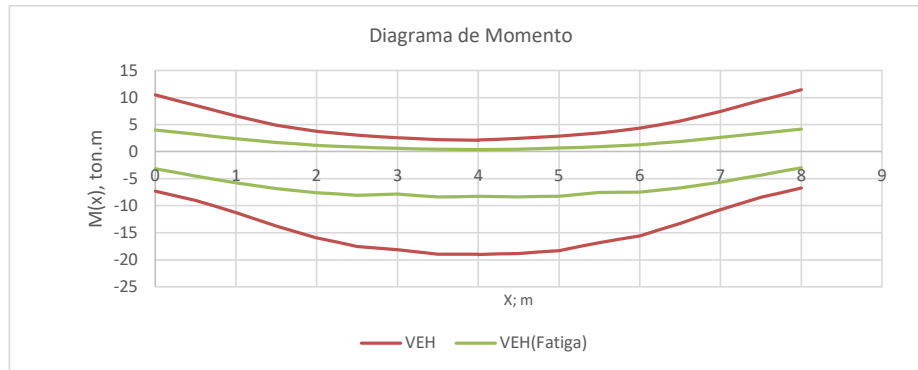
3.3.1 Cargas Permanentes



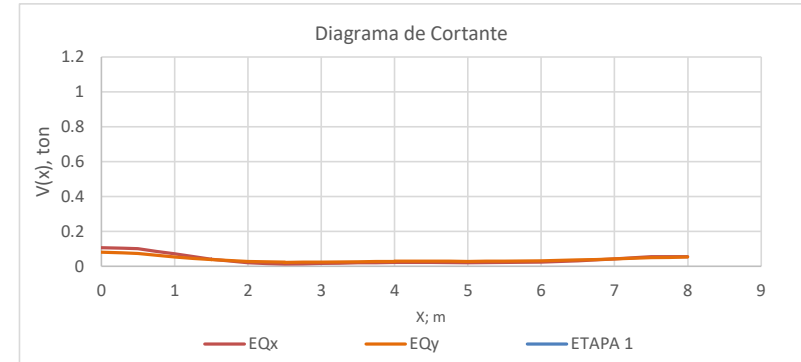
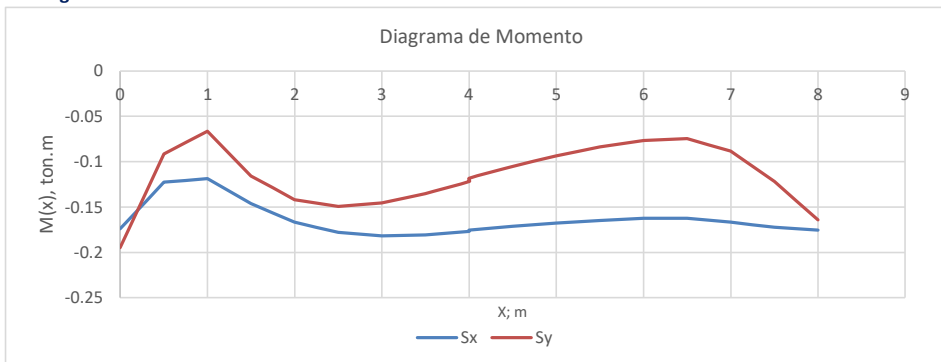
3.3.3 Carga Vehicular (LL+IM)

$$F_{IM} = 1.33 \quad F_{IM(FATIGA)} = 1.15$$

AASHTO 3.6.2.1



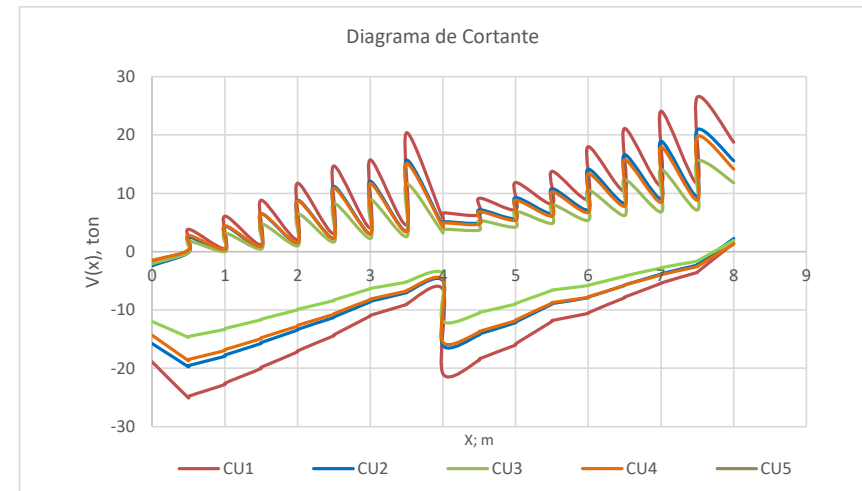
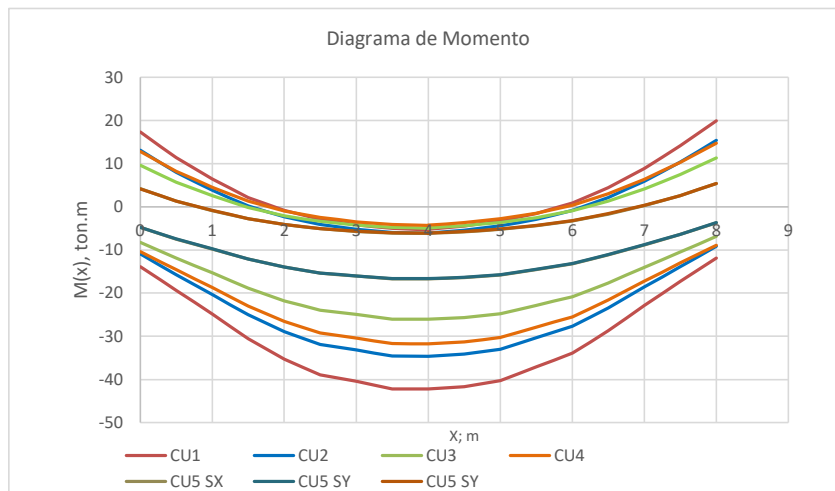
3.3.4 Carga de Sismo



3.3.5 Demandas Últimas

AASHTO 3.4.1

	Factores de carga			
	DC	DW	LL+IM	EQ
CU1 (Strenght I)	1.25	1.5	1.75	0.00
CU2 (Strenght II)	1.25	1.5	1.35	0.00
CU3 (Service I)	1.00	1.0	1.00	0.00
CU4 (Service II)	1.00	1.0	1.30	0.00
CU5 (Extreme Event I)	1.00	1.0	0.50	1.00
CU6 (Fatigue I)	0.00	0.0	1.75	0.00
CU7 (Fatigue II)	0.00	0.0	0.80	0.00



3.4 Diseño por Flexión

3.4.1 Límites de proporcionalidad de las secciones

	TRAMO1								
D/tw:Alma Sin rigidizadores Long.	52.09091	OK							
D/tw:Alma con rigidizadores long.		OK							
bf _{bot}	22.80	OK							
tf _{bot}	1.50	OK							
bf/2tf _(bot)	7.6	OK							
bf _{top}	22.80	OK							
tf _{top}	1.50	OK							
bf/2tf _(top)	7.6	OK							
I _{ybot} /I _{ytop}	1	OK							
I _{ytop} /I _{ybot}	1	OK							

AASHTO 6.10.2

3.4.2 Estado Límite de Servicio

Deformación Elástica

Longitud entre apoyos

Deflexion por carga vehicular

8			m
0.5	OK		cm

AASHTO 6.10.4

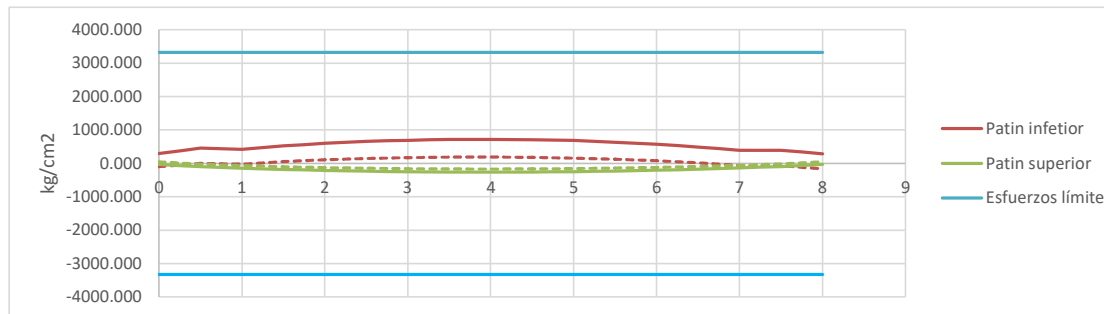
AASHTO 6.10.4.1

Deformaciones Permanentes

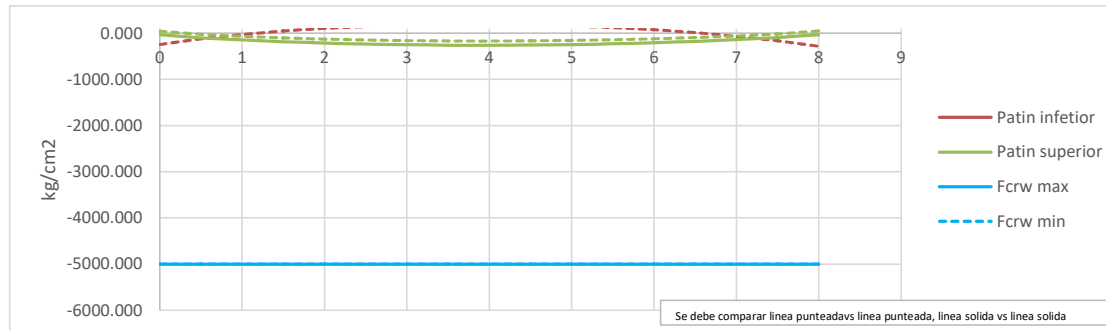
AASHTO 2.5.2.6.2

AASHTO 6.10.4.2

Sección compuesta?	=	Si
Viga continua?	=	No
Construcción apuntalada	=	No
Concreto es efectivo a tensión	=	Si
Se detallan rigidizadores longitudinales	=	No
Se cumple AASHTO 6.10.1.7	=	Si



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3.4.3 Momento Positivo

Revisión de sección compacta

AASHTO 6.10.6.2.2

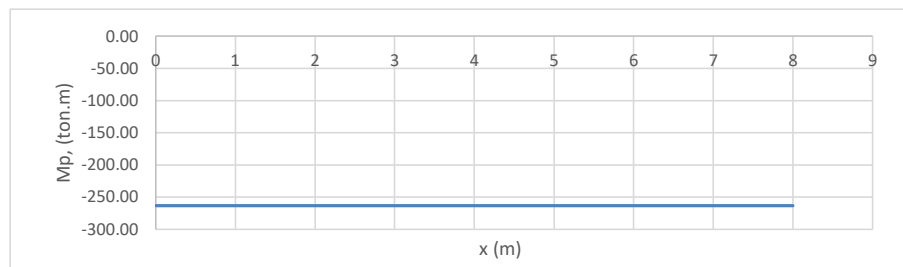
	TRAMO 1								
Esfuerzo de fluencia de los patines	3500	OK							kg/cm ²
Límite de esbeltez del alma ($2D_{cp}/t_w$)	0	OK							
Requisito de ductilidad (D_p)	9.22	OK							

AASHTO 6.10.7.3

Cálculo de Momento Plástico

AASHTO D.6.1

	TRAMO 1								
Dt	90.3								cm
Y	81.1								cm
D _p	9.2								cm
D _{cp}	0.0								cm
M _p	262.9								ton.m



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Cálculo de Momento de Fluencia

AASHTO D.6.2

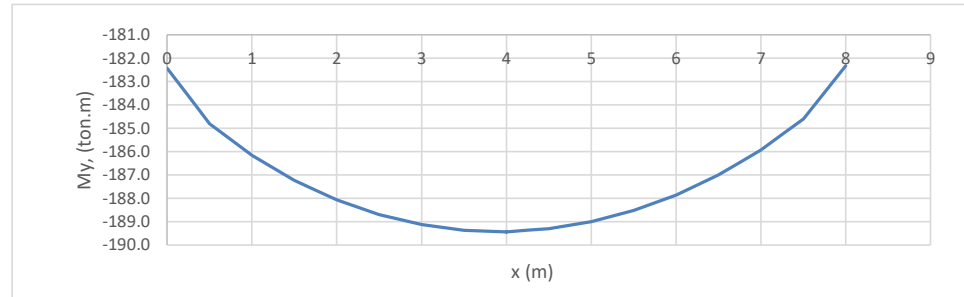


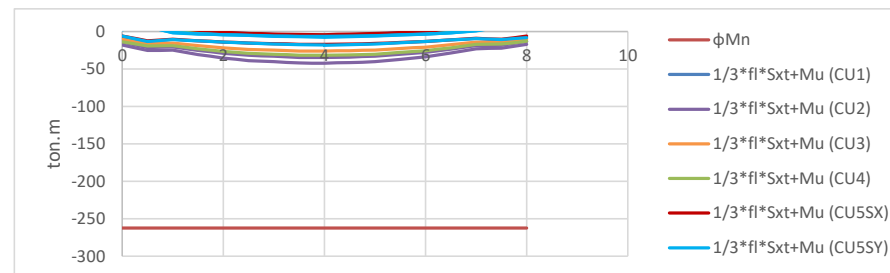
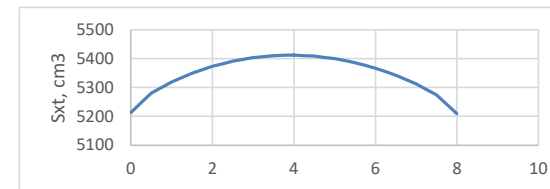
Grafico Demanda/Capacidad para momento positivo

AASHTO 6.10.7.1.2

Factor híbrido $R_h = 1.0$
 Factor de resistencia por Flexion $\phi_f = 1.0$
 Modulo de seccion elastico =

AASHTO 6.10.1.10.1

AASHTO 6.5.4.2



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3.4.4 Momento Negativo

Revisión de sección compacta

AASHTO 6.10.6.2.3

	TRAMO 1									
Esfuerzo de fluencia de los patines	3500	OK								kg/cm ²
Límite de esbeltez del alma (2Dc/tw)	71.85	OK								
Razón de Inercias (I_{yc}/I_{yt})	1.0	OK								

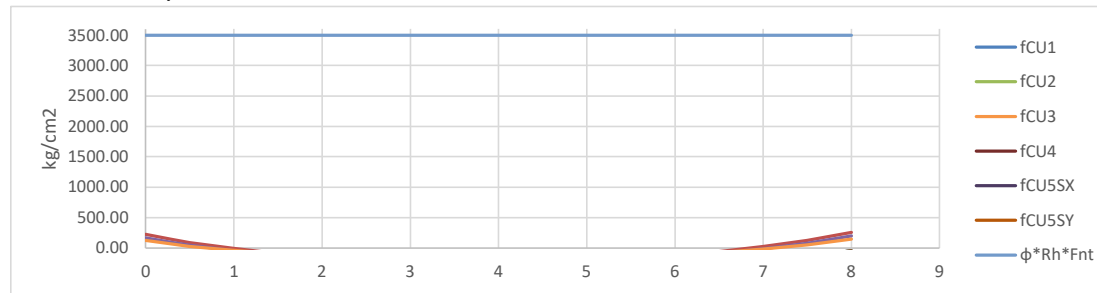
Patines en tensión

Factor de resistencia por Flexion	$\phi f =$	1.0
Patines arriostrados continuamente	$=$	Si
Factor hibrido	$R_h =$	1.0

AASHTO 6.10.8.1.3

AASHTO 6.10.1.10.1

Grafico demanda capacidad



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Patines en compresión

	TRAMO 1				
Pandeo Local del patín a compresión	Rb	1.00			
	Rh	1.0			
	Fyc	3500			kgf/cm2
	Fyw	3500			kgf/cm2
	Fyr	2450			kg/cm2
	λ_f	7.60			
	λ_{rf}	16.12			
	λ_{pf}	9.15			
Pandeo Lateral Torsional	Fnc	3500.0			kgf/cm2
	rt	5.52			cm
	Lb	800.00			cm
	Lp	132.85			cm
	Lr	498.83			cm
	Fcr	952.55			kg/cm2
	Cb	1.00			
	Fnc	952.55			kg/cm2

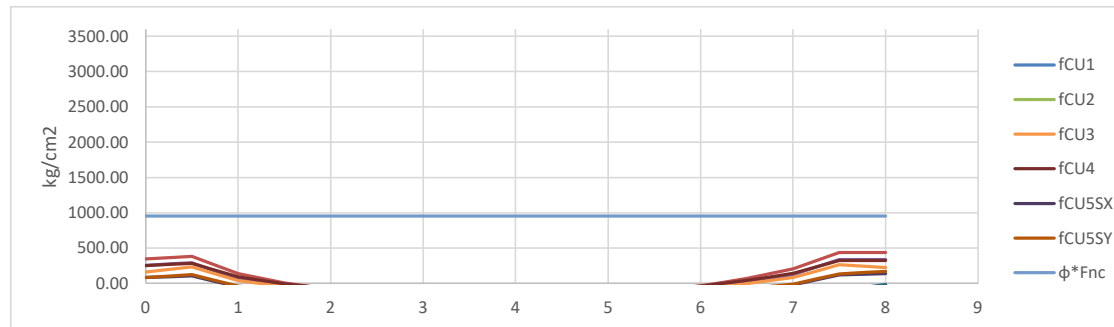
AASHTO 6.10.8.1.1

AASHTO 6.10.1.10.2

AASHTO 6.10.1.10.1

AASHTO 6.10.8.2.2

Grafico demanda capacidad



Revisión de Refuerzo mínimo en flexión Negativa

AASHTO 6.10.1.7

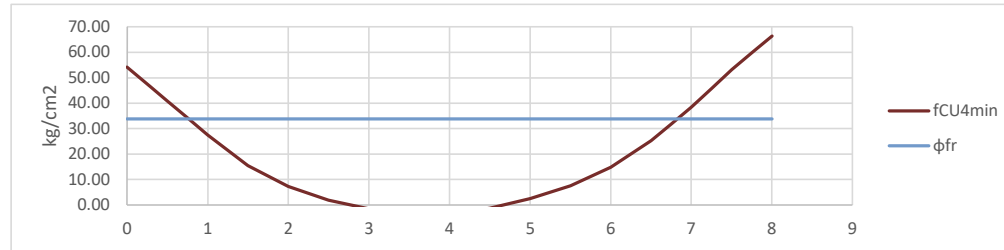
Módulo de ruptura

$f_r = 37.6 \text{ kg/cm}^2$

Esfuerzo límite en tensión del concreto

$\phi = 0.9$

$\phi * f_r = 33.8 \text{ kg/cm}^2$



Acero de refuerzo longitudinal mínimo en las zonas donde f_{CU4} es mayor a ϕf_r (LOSA 20cm)

= 20 cm²/m

*2/3 deben colocarse en el

Acero de refuerzo longitudinal mínimo en las zonas donde f_{CU4} es mayor a ϕf_r (LOSA 30cm)

= 30 cm²/m

lecho superior

Acero de refuerzo longitudinal colocado

LOSA 20cm				
Malla superior	=	# 5	@ 20 cm	OK
		# 3	@ 20 cm	
Malla inferior	=	# 5	@ 20 cm	OK
		# 3	@ 20 cm	
Area de acero Total	=	26.9	cm ² /m	OK

LOSA 30cm				
Malla superior	=	# 5	@ 20 cm	OK
		# 6	@ 20 cm	
Malla inferior	=	# 5	@ 20 cm	OK
		# 0	@ 20 cm	
Area de acero Total	=	34.0	cm ² /m	OK

3.5 Diseño Conectores de Cortante

AASHTO 6.10.10

	Distribucion de studs colocados									
Estacion inicial	0									
Estacion final	8									
Diametro studs	2.5									cm
Cant.max.studs x linea	2.0									
Cant.studs x linea	2.0									
pitch _{max}	60									cm
pitch _{min}	15.0									
pitch	16									cm
losa con metaldeck?	No									
altura min studs	15									cm
altura de studs	15.24									cm
h/d	6.10									

OK

OK

OK

OK

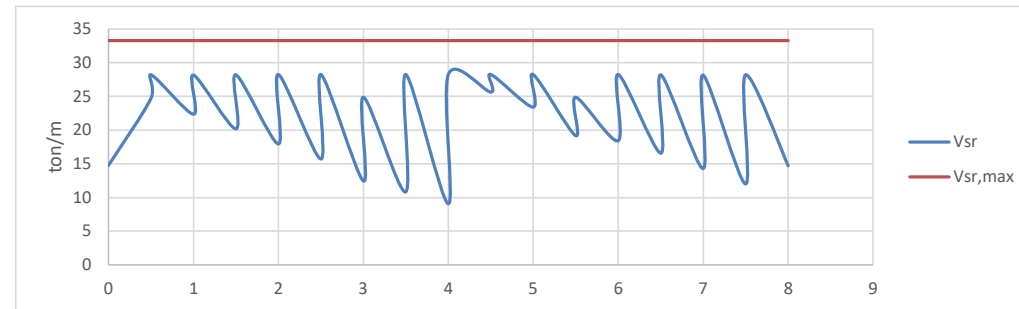
Fatiga

	TRAMO1				
Q (momento positivo)	5558.14				cm3
Q (momento negativo)	5558.14				cm3

AASHTO 6.10.10.2

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Distribucion de studs							
Estacion inicial	0						
Estacion final	8.01						
Zr	2.66						ton
Vsrmax	33.301						ton/m



Resistencia

AASHTO 6.10.10.4

Factor de resistencia

$$\phi_{sc} = 0.85$$

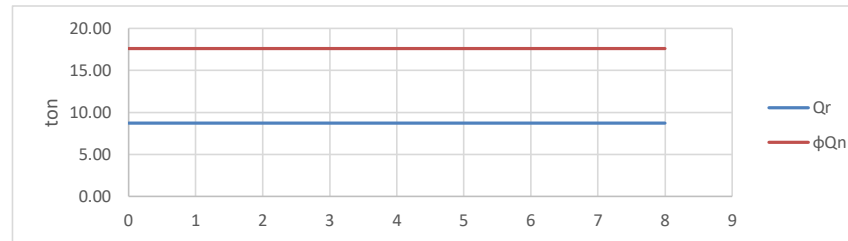
	TRAMO1				
P1p	1535				ton
P2p	454				ton
Pp	454				ton
Fp	0				ton
P1n	454				ton
P2n	813				ton
Pn	454				ton
Pt	908				ton
Ft	0				ton
P al extremo del elemento	454				ton
P al apoyo intermedio (M-)	908				ton

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	Primer Luz			
	max	min		
inicio de tramo	0			
ubicacion momento veh max positivo	4			
final del tramo	8			

Cantidad de studs tramo azul 52

Cantidad de studs tramo rojo 52



3.6 Diseño por Cortante

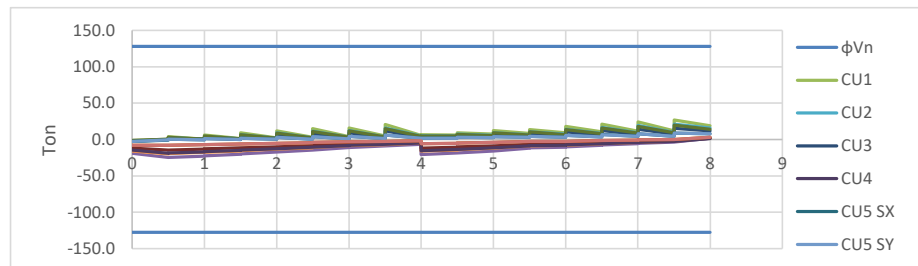
Factor de resistencia

$$\phi_v = 1.0$$

AASHTO 6.10.6.3/AASHTO 6.10.9/6.10.11

Paneles intermedios					
	TRAMO1				
D/tw	52.09				
do paneles internos	223				cm
Rigidizadores Longitudinales?	No				
Alma rigidizada?	No				
considera el alma rigidizada para la capacidad?	No				
Vp	127.95				ton
k	5.00				
C	1.00				
Vn	127.95				ton

Paneles en zona de apoyo					
	TRAMO1				
D/tw	52.09				
do paneles internos	130				cm
Alma rigidizada?	No				
Vp	127.95				ton
k	5.00				
C	1.00				
Vn	127.95				ton

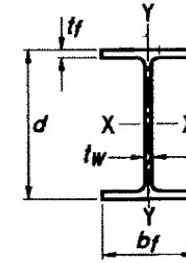


II. DISEÑO DE LA SUPERESTRUCTURA (Vigas Secundaria en zona de Pilas)

1.GEOMETRÍA

A continuación se muestran las dimensiones generales y propiedades geométricas de la vigas exteriores

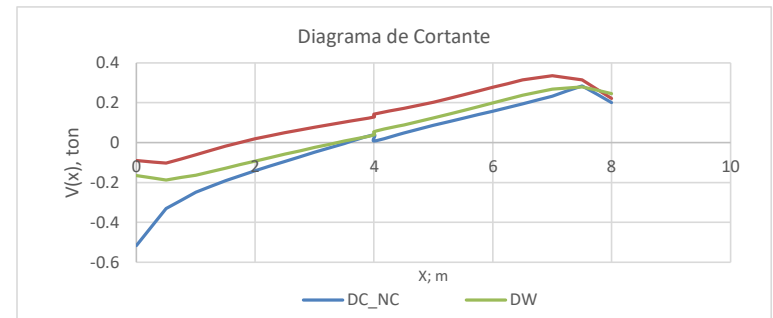
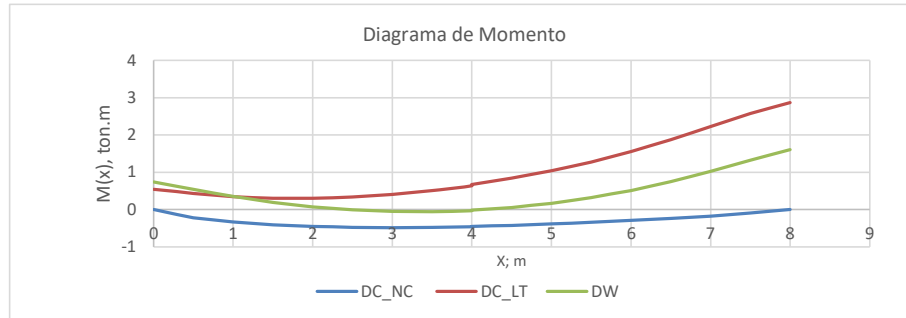
		unid.	TRAMO1				
Seccion Simple	d	cm	60.30				
	tw	cm	1.10				
	bf _{inf}	cm	22.80				
	tf _{inf}	cm	1.50				
	bf _{sup}	cm	22.80				
	tf _{sup}	cm	1.50				
	A	cm ²	129.7				
	y	cm	30.15				
	I _x	cm ⁴	76170.4				
	I _y	cm ⁴	2930.3				
	S _{y_{top}}	cm ³	257.0				
	S _{y_{bot}}	cm ³	257.0				
	S _{x_{top}}	cm ³	2526.4				
	S _{x_{bot}}	cm ³	2526.4				
Seccion Compuesta, M+ (cargas de largo plazo)	A	cm ²	480.1				
	y	cm	62.2				
	I	cm ⁴	281266.4				
	S _{conc}	cm ³	10955.9				
	S _{topflan}	cm ³	145932.4				
	S _{botflan}	cm ³	4520.0				
Seccion Compuesta, M+ (cargas de corto plazo)	A	cm ²	1181.0				
	y	cm	69.3				
	I	cm ⁴	365919.3				
	S _{conc}	cm ³	19644.8				
	S _{topflan}	cm ³	40779.2				
	S _{botflan}	cm ³	5282.3				
Seccion Compuesta, M- (concreto no efectivo en tensión)	A	cm ²	164.9				
	y	cm	40.4				
	I	cm ⁴	141825.9				
	S _{topflan}	cm ³	7116.0				
	S _{botflan}	cm ³	3513.2				



3. DISEÑO DE VIGAS Secundarias en zona de Pilas

3.3 Estimación de demandas (Vigas Secundarias en zona de pilas)

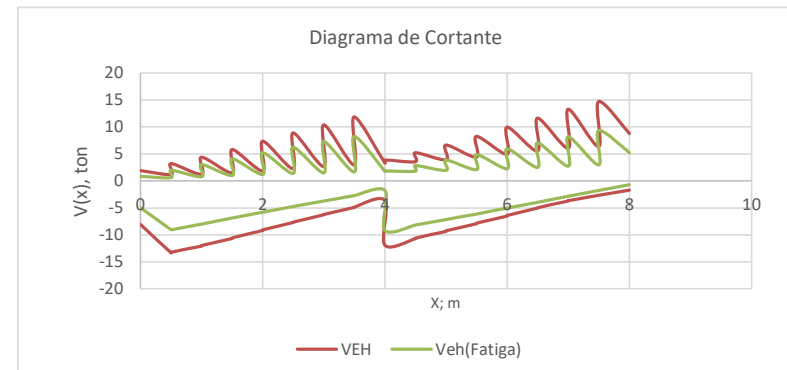
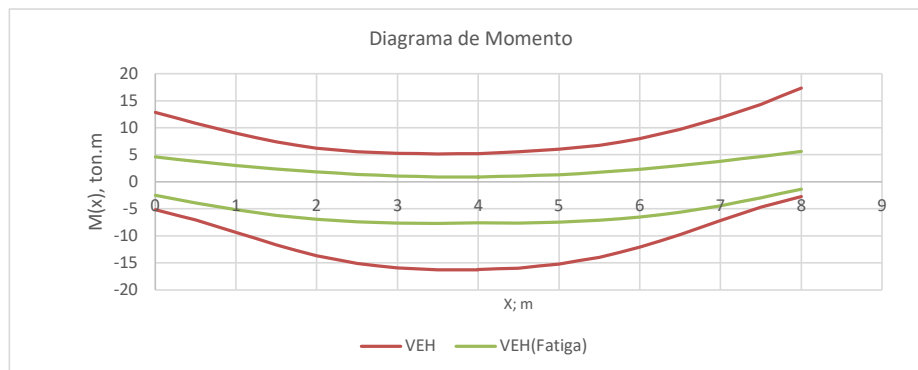
3.3.1 Cargas Permanentes



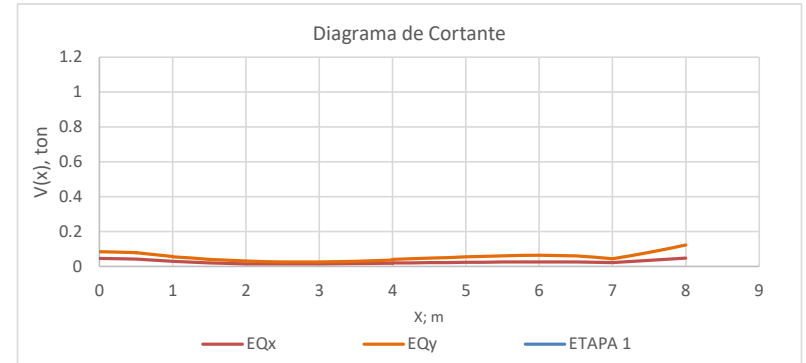
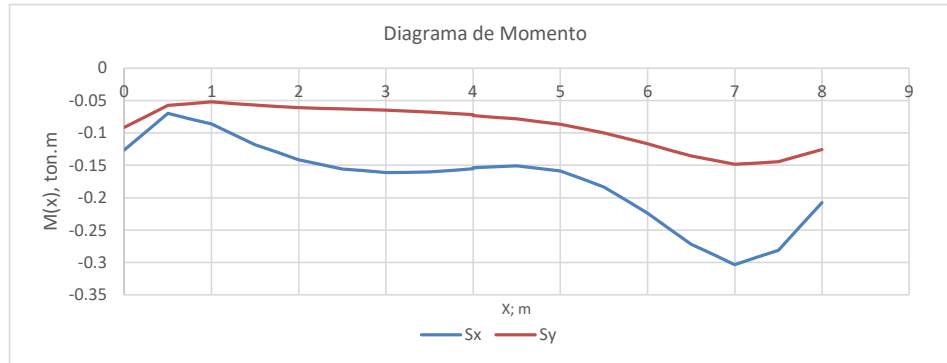
3.3.3 Carga Vehicular (LL+IM)

$$F_{IM} = 1.33 \quad F_{IM(FATIGA)} = 1.15$$

AASHTO 3.6.2.1



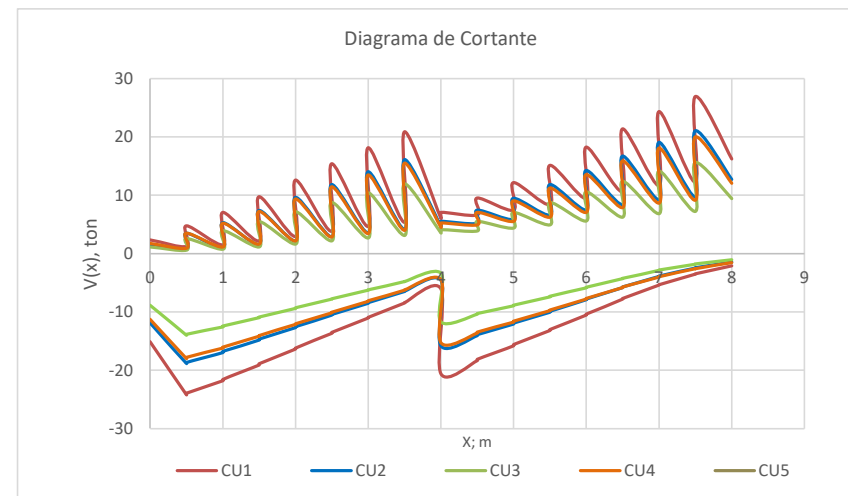
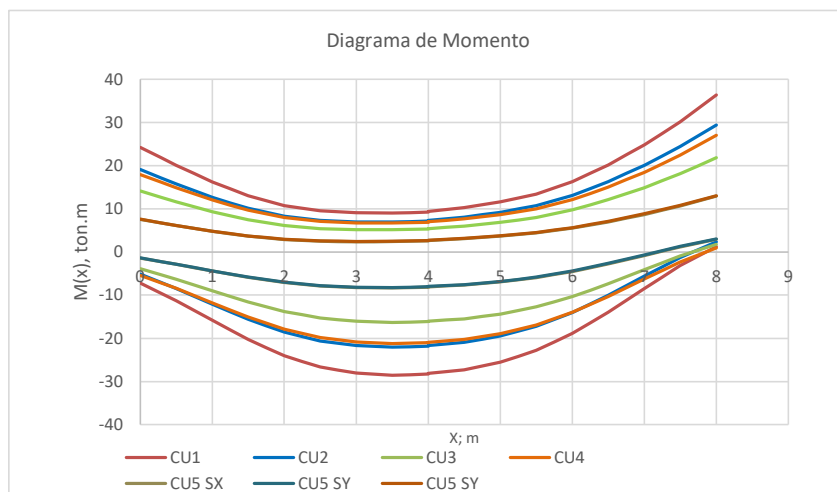
3.3.4 Carga de Sismo



3.3.5 Demandas Últimas

AASHTO 3.4.1

	Factores de carga			
	DC	DW	LL+IM	EQ
CU1 (Strenght I)	1.25	1.5	1.75	0.00
CU2 (Strenght II)	1.25	1.5	1.35	0.00
CU3 (Service I)	1.00	1.0	1.00	0.00
CU4 (Service II)	1.00	1.0	1.30	0.00
CU5 (Extreme Event I)	1.00	1.0	0.50	1.00
CU6 (Fatigue I)	0.00	0.0	1.75	0.00
CU7 (Fatigue II)	0.00	0.0	0.80	0.00



3.4 Diseño por Flexión

3.4.1 Límites de proporcionalidad de las secciones

	TRAMO1								
D/tw:Alma Sin rigidizadores Long.	52.091	OK							
D/tw:Alma con rigidizadores long.		OK							
$b_{f_{bot}}$	22.80	OK							
$t_{f_{bot}}$	1.50	OK							
$b_f/2t_{f_{bot}}$	7.6	OK							
$b_{f_{top}}$	22.80	OK							
$t_{f_{top}}$	1.50	OK							
$b_f/2t_{f_{top}}$	7.6	OK							
$I_{y_{bot}}/I_{y_{top}}$	1	OK							
$I_{y_{top}}/I_{y_{bot}}$	1	OK							

AASHTO 6.10.2

3.4.2 Estado Límite de Servicio

Deformación Elástica

Longitud entre apoyos

Deflexion por carga vehicular

8			m
0.5	OK		cm

AASHTO 6.10.4

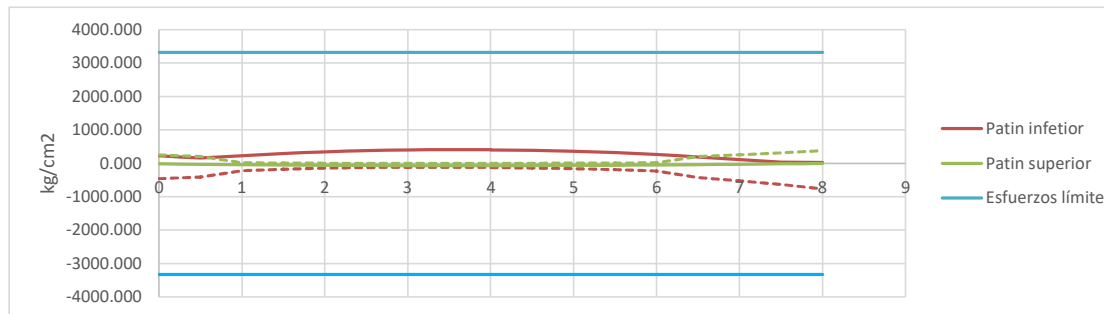
AASHTO 6.10.4.1

Deformaciones Permanentes

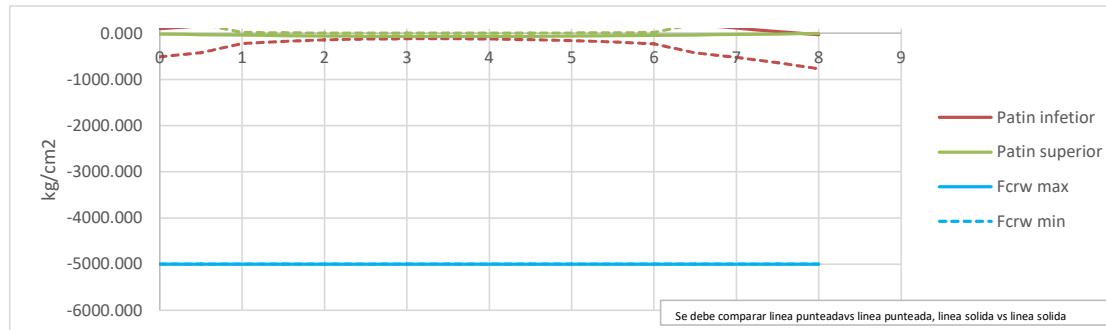
AASHTO 2.5.2.6.2

AASHTO 6.10.4.2

Sección compuesta?	=	Si
Viga continua?	=	No
Construcción apuntalada	=	No
Concreto es efectivo a tensión	=	Si
Se detallan rigidizadores longitudinales	=	No
Se cumple AASHTO 6.10.1.7	=	Si



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3.4.3 Momento Positivo

Revisión de sección compacta

AASHTO 6.10.6.2.2

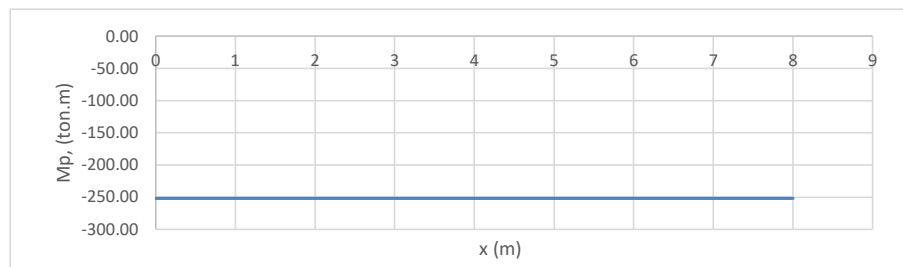
	TRAMO 1									
Esfuerzo de fluencia de los patines	3500	OK								kg/cm2
Límite de esbeltez del alma ($2D_{cp}/t_w$)	0	OK								
Requisito de ductilidad (D_p)	11.62	OK								

AASHTO 6.10.7.3

Cálculo de Momento Plástico

AASHTO D.6.1

	TRAMO 1								
Dt	87.9								cm
Y	78.7								cm
D _p	11.6								cm
D _{cp}	0.0								cm
M _p	251.9								ton.m



Cálculo de Momento de Fluencia

AASHTO D.6.2

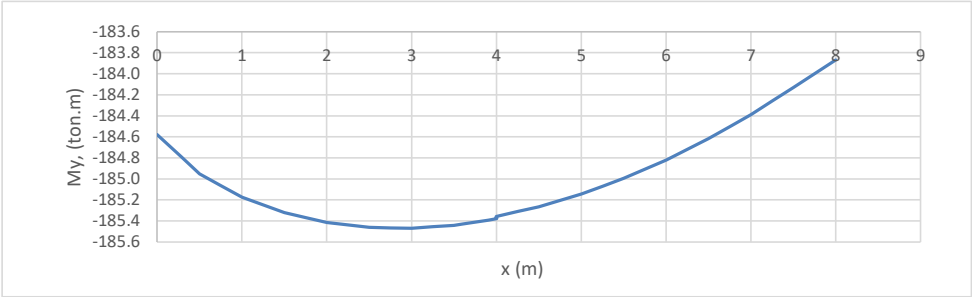
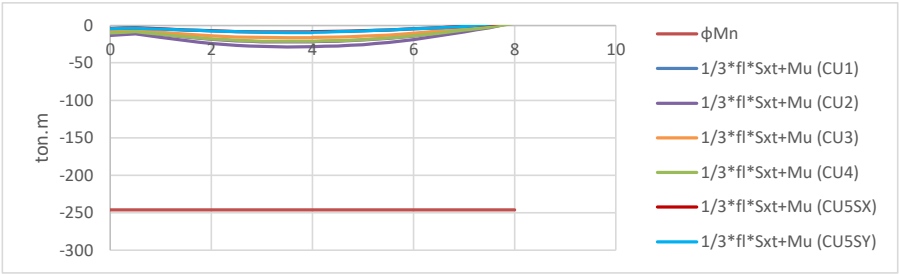
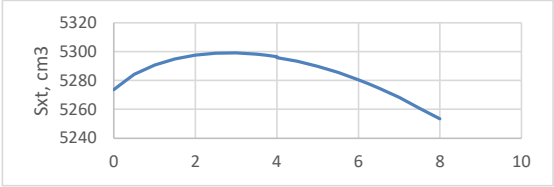


Grafico Demanda/Capacidad para momento positivo

AASHTO 6.10.7.1.2

Factor hibrido Rh = 1.0
Factor de resistencia por Flexion ϕf = 1.0
Modulo de seccion elastico =

AASHTO 6.10.1.10.1
AASHTO 6.5.4.2



3.4.4 Momento Negativo

Revisión de sección compacta

AASHTO 6.10.6.2.3

	TRAMO 1									
Esfuerzo de fluencia de los patines	3500	OK								kg/cm ²
Límite de esbeltez del alma (2Dc/tw)	70.67	OK								
Razón de Inercias (I_{yc}/I_{yt})	1.0	OK								

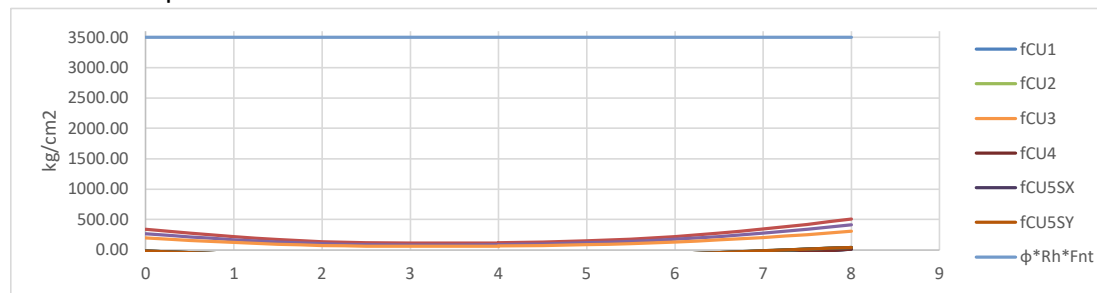
Patines en tensión

Factor de resistencia por Flexion	$\phi f =$	1.0
Patines arriostrados continuamente	$=$	Si
Factor hibrido	$R_h =$	1.0

AASHTO 6.10.8.1.3

AASHTO 6.10.1.10.1

Grafico demanda capacidad



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Patines en compresión

	TRAMO 1				
Pandeo Local del patín a compresión	Rb	1.00			
	Rh	1.0			
	Fyc	3500			kgf/cm2
	Fyw	3500			kgf/cm2
	Fyr	2450			kgf/cm2
	λ_f	7.60			
	λ_{rf}	16.12			
	λ_{pf}	9.15			
Pandeo Lateral Torsional	Fnc	3500.0			kgf/cm2
	rt	5.53			cm
	Lb	800.00			cm
	Lp	133.17			cm
	Lr	500.05			cm
	Fcr	957.23			kgf/cm2
	Cb	1.00			
	Fnc	957.23			kgf/cm2

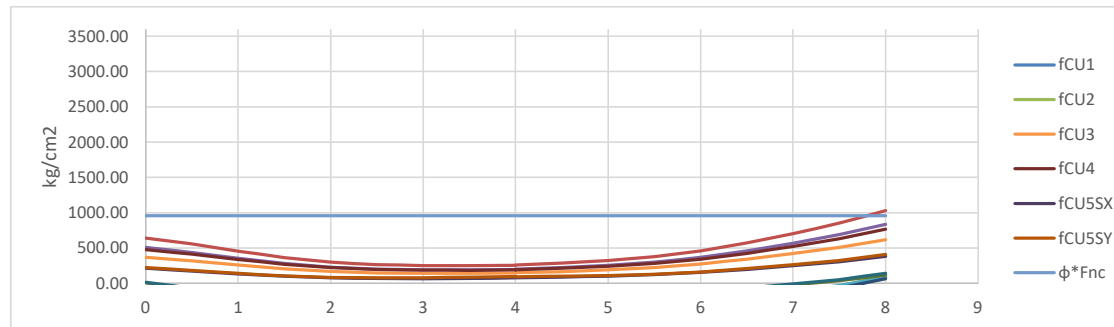
AASHTO 6.10.8.1.1

AASHTO 6.10.1.10.2

AASHTO 6.10.1.10.1

AASHTO 6.10.8.2.2

Grafico demanda capacidad



Revisión de Refuerzo mínimo en flexión Negativa

AASHTO 6.10.1.7

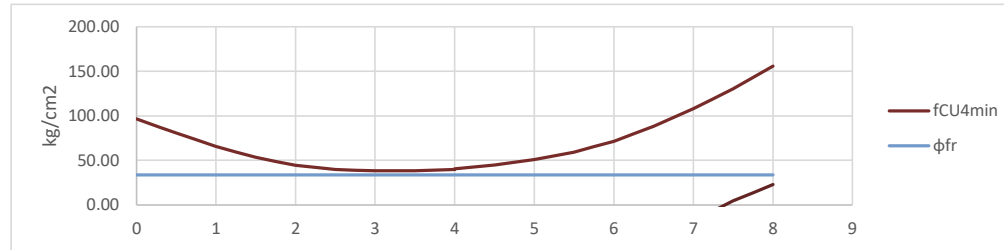
Módulo de ruptura

$f_r = 37.6 \text{ kg/cm}^2$

Esfuerzo límite en tensión del concreto

$\phi = 0.9$

$\phi * f_r = 33.8 \text{ kg/cm}^2$



Acero de refuerzo longitudinal mínimo en las zonas donde f_{CU4} es mayor a ϕf_r (LOSA 20cm)

= 20 cm^2/m

*2/3 deben colocarse en el
lecho superior

Acero de refuerzo longitudinal mínimo en las zonas donde f_{CU4} es mayor a ϕf_r (LOSA 30cm)

= 30 cm^2/m

Acero de refuerzo longitudinal colocado

LOSA 20cm				
Malla superior	=	# 5	@ 20 cm	OK
		# 3	@ 20 cm	
Malla inferior	=	# 5	@ 20 cm	OK
		# 3	@ 20 cm	
Area de acero Total	=	26.9	cm^2/m	OK

LOSA 30cm				
Malla superior	=	# 8	@ 20 cm	OK
		# 0	@ 20 cm	
Malla inferior	=	# 5	@ 20 cm	OK
		# 0	@ 20 cm	
Area de acero Total	=	35.2	cm^2/m	OK

3.5 Diseño Conectores de Cortante

AASHTO 6.10.10

	Distribucion de studs colocados									
Estacion inicial	0									
Estacion final	8									
Diametro studs	2.5									cm
Cant.max.studs x linea	2.0									
Cant.studs x linea	2.0									
pitch _{max}	60									cm
pitch _{min}	15.0									
pitch	16									cm
losa con metaldeck?	No									
altura min studs	15									cm
altura de studs	15.24									cm
h/d	6.10									

OK

OK

OK

OK

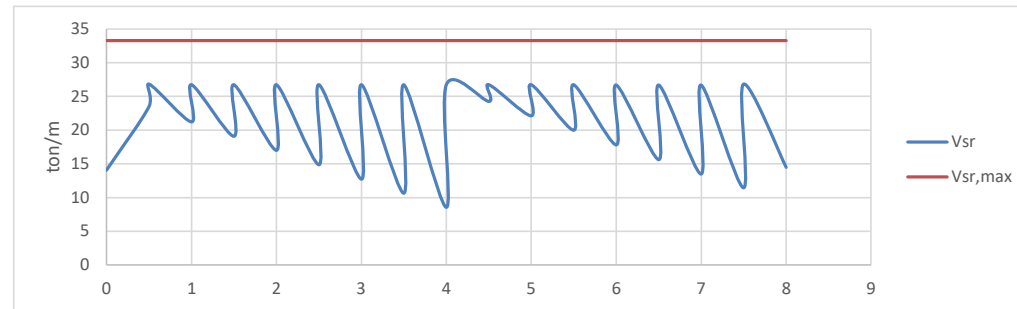
Fatiga

	TRAMO1				
Q (momento positivo)	5074.28				cm3
Q (momento negativo)	5074.28				cm3

AASHTO 6.10.10.2

MEMORIA DE CÁLCULO
PUENTE SOBRE EL RÍO CIRUELASL RN.27

	Distribucion de studs						
Estacion inicial	0						
Estacion final	8.01						
Zr	2.66						ton
Vsrmax	33.301						ton/m



Resistencia

Factor de resistencia

$$\phi_{sc} = 0.85$$

AASHTO 6.10.10.4

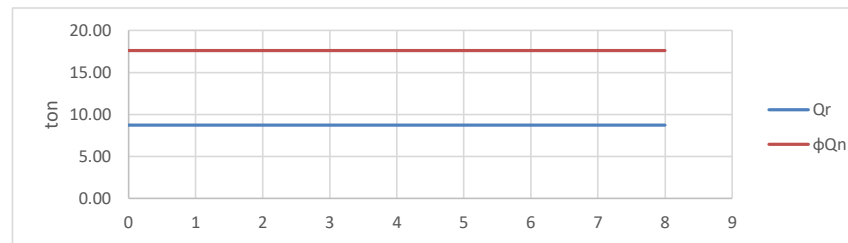
	TRAMO1				
P1p	2118				ton
P2p	454				ton
Pp	454				ton
Fp	0				ton
P1n	454				ton
P2n	1122				ton
Pn	454				ton
Pt	908				ton
Ft	0				ton
P al extremo del elemento	454				ton
P al apoyo intermedio (M-)	908				ton

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	Primer Luz			
	max	min		
inicio de tramo	0			
ubicacion momento veh max positivo	4			
final del tramo	8			

Cantidad de studs tramo azul 52

Cantidad de studs tramo rojo 52



3.6 Diseño por Cortante

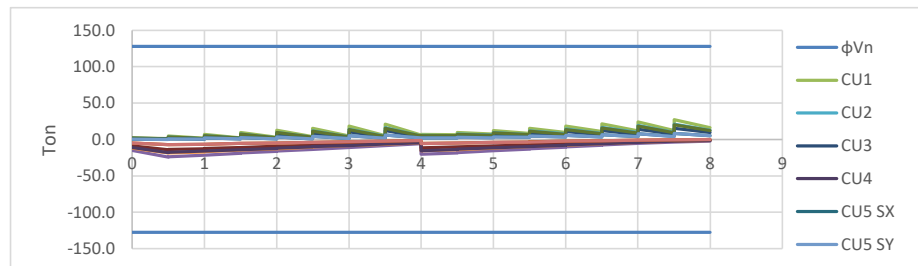
Factor de resistencia

$$\phi_v = 1.0$$

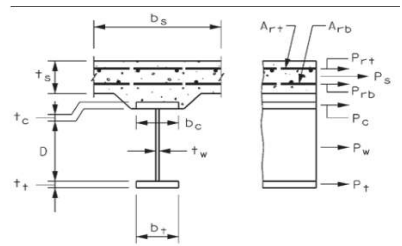
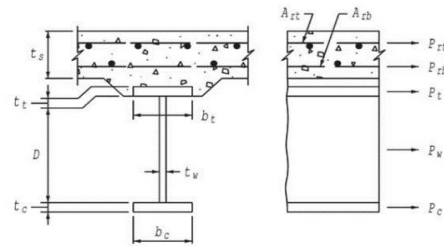
AASHTO 6.10.6.3/AASHTO 6.10.9/6.1

Paneles intermedios					
	TRAMO1				
D/tw	52.09				
do paneles internos	223				cm
Rigidizadores Longitudinales?	No				
Alma rigidizada?	No				
considera el alma rigidizada para la capacidad?	No				
Vp	127.95				ton
k	5.00				
C	1.00				
Vn	127.95				ton

Paneles en zona de apoyo					
	TRAMO1				
D/tw	52.09				
do paneles internos	130				cm
Alma rigidizada?	No				
Vp	127.95				ton
k	5.00				
C	1.00				
Vn	127.95				ton



VIGA SECUNDARIA (CIRUELAS)

		Momento Plastico Flexión Positiva					Momento Plástico Flexión Negativa				
		TRAMO 1					TRAMO 1				
		W24x68					W24x68				
Patín Inferior en tensión	Dt	87.9					87.9				
	Y	78.68					49.38				
	dbt (cm)	1.50					1.5				
	Ybt (cm)	0.75					0.8				
	Pbt (ton)	119.7					-119.7				
Patín Inferior en compresión	dbc (cm)	0.00					0.0				
	Ybc (cm)	1.50					1.5				
	Pbc (ton)	0.0					0.0				
Alma en tensión	dwt (cm)	57.3					47.9				
	Ywt (cm)	30.2					25.4				
	Pwt (ton)	220.6					-184.3				
Alma en compresión	dwc (cm)	0.0					9.4				
	Ywc (cm)	58.8					54.1				
	Pwc (ton)	0.0					36.3				
Patín Superior en tensión	dtb (cm)	1.50					0.0				
	Ytb (cm)	59.6					58.8				
	Ptb (ton)	119.7					0.0				
Patín Superior en compresión	dtd (cm)	0.00					1.5				
	Ytd (cm)	60.30					59.6				
	Ptd (ton)	0.0					119.7				
Concreto en compresión	β_1	0.65									
	a (cm)	6.0									
	ds (cm)	6.0									
	Ys (cm)	84.9									
	Ps (ton)	-460.0									
Acero long. cama inferior	Arb (cm2)						9.9				
	Yrb (cm)						65.2				
	Prb (ton)						41.6				
Acero long. cama superior	Art						25.3				
	Yrt (cm)						83.0				
	Prt (ton)						106.4				
Suma de fuerzas		-0.008					-0.0966				
Dcp		0.0					47.9				
Mp (ton.m)		251.9					-158.6				
Dt (cm)		90.30									
Dp (cm)		11.62					38.52				
											

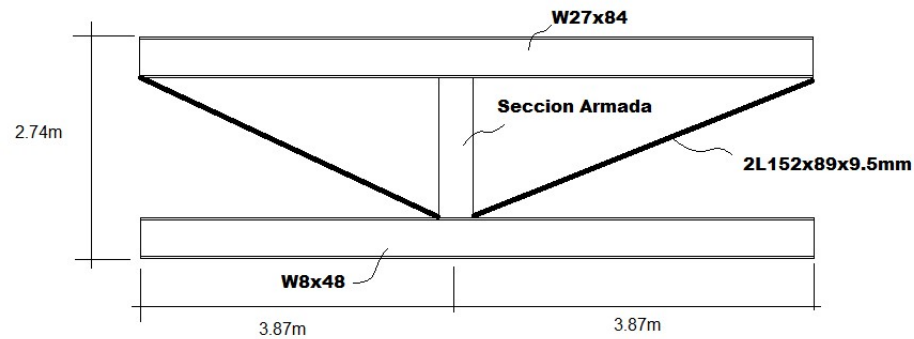
VIGA SECUNDARIA EN ZONA DE PILAS (CIRUELAS)

Ubicación	Sección	Sección No Compuesta							Sección Compuesta Momento Positivo														
		SNC _{top} (cm3)	SNC _{bot} (cm3)	FY _{top} (kg/cm2)	FY _{bot} (kg/cm2)	My _{top} (ton.m)	My _{bot} (ton.m)	My (ton.m)	SNC _{top} (cm3)	SST _{top} (cm3)	SLT _{top} (cm3)	MD1 _{top} (ton.m)	MD2 _{top} (ton.m)	MAD _{top} (ton.m)	My _{top} (ton.m)	SNC _{bot} (cm3)	SST _{bot} (cm3)	SLT _{bot} (cm3)	MD1 _{bot} (ton.m)	MD2 _{bot} (ton.m)	MAD _{bot} (ton.m)	My _{bot} (ton.m)	My (ton.m)
0	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	40779.2	145932.4	0.0	1.8	1426.8	1428.6	2526.381	5282.265	4519.978	0	1.793985	182.8	184.6	-184.6
0.5	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	40779.2	145932.4	-0.3	1.4	1431.3	1432.4	2526.381	5282.265	4519.978	-0.27564	1.360695	183.9	185.0	-185.0
0.5	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	40779.2	145932.4	-0.3	1.4	1431.3	1432.4	2526.381	5282.265	4519.978	-0.27564	1.360695	183.9	185.0	-185.0
1	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	40779.2	145932.4	-0.4	1.0	1433.8	1434.3	2526.381	5282.265	4519.978	-0.41785	0.955778	184.6	185.2	-185.2
1	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	40779.2	145932.4	-0.4	1.0	1433.8	1434.3	2526.381	5282.265	4519.978	-0.41785	0.955778	184.6	185.2	-185.2
1.5	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	40779.2	145932.4	-0.5	0.7	1435.3	1435.4	2526.381	5282.265	4519.978	-0.50706	0.66218	185.2	185.3	-185.3
1.5	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	40779.2	145932.4	-0.5	0.7	1435.3	1435.4	2526.381	5282.265	4519.978	-0.50706	0.66218	185.2	185.3	-185.3
2	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	40779.2	145932.4	-0.6	0.5	1436.2	1436.2	2526.381	5282.265	4519.978	-0.56436	0.483963	185.5	185.4	-185.4
2	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	40779.2	145932.4	-0.6	0.5	1436.2	1436.2	2526.381	5282.265	4519.978	-0.56436	0.483963	185.5	185.4	-185.4
2.5	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	40779.2	145932.4	-0.6	0.4	1436.8	1436.6	2526.381	5282.265	4519.978	-0.59685	0.410475	185.6	185.5	-185.5
2.5	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	40779.2	145932.4	-0.6	0.4	1436.8	1436.6	2526.381	5282.265	4519.978	-0.59685	0.410475	185.6	185.5	-185.5
3	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	40779.2	145932.4	-0.6	0.4	1437.0	1436.8	2526.381	5282.265	4519.978	-0.60773	0.432893	185.6	185.5	-185.5
3	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	40779.2	145932.4	-0.6	0.4	1437.0	1436.8	2526.381	5282.265	4519.978	-0.60773	0.432893	185.6	185.5	-185.5
3.5	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	40779.2	145932.4	-0.6	0.5	1436.8	1436.7	2526.381	5282.265	4519.978	-0.59916	0.546065	185.5	185.4	-185.4
3.5	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	40779.2	145932.4	-0.6	0.5	1436.8	1436.7	2526.381	5282.265	4519.978	-0.59916	0.546065	185.5	185.4	-185.4
4	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	40779.2	145932.4	-0.6	0.7	1436.3	1436.5	2526.381	5282.265	4519.978	-0.57328	0.748295	185.2	185.4	-185.4
4	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	40779.2	145932.4	-0.6	0.8	1436.2	1436.4	2526.381	5282.265	4519.978	-0.56496	0.817965	185.1	185.4	-185.4
4.5	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	40779.2	145932.4	-0.5	1.1	1435.5	1436.1	2526.381	5282.265	4519.978	-0.52999	1.136455	184.7	185.3	-185.3
4.5	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	40779.2	145932.4	-0.5	1.1	1435.5	1436.1	2526.381	5282.265	4519.978	-0.52999	1.136455	184.7	185.3	-185.3
5	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	40779.2	145932.4	-0.5	1.6	1434.6	1435.7	2526.381	5282.265	4519.978	-0.48331	1.5523	184.1	185.1	-185.1
5	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	40779.2	145932.4	-0.5	1.6	1434.6	1435.7	2526.381	5282.265	4519.978	-0.48331	1.5523	184.1	185.1	-185.1
5.5	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	40779.2	145932.4	-0.4	2.1	1433.6	1435.2	2526.381	5282.265	4519.978	-0.42749	2.073705	183.3	185.0	-185.0
5.5	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	40779.2	145932.4	-0.4	2.1	1433.6	1435.2	2526.381	5282.265	4519.978	-0.42749	2.073705	183.3	185.0	-185.0
6	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	40779.2	145932.4	-0.4	2.7	1432.4	1434.7	2526.381	5282.265	4519.978	-0.36464	2.709373	182.5	184.8	-184.8
6	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	40779.2	145932.4	-0.4	2.7	1432.4	1434.7	2526.381	5282.265	4519.978	-0.36464	2.709373	182.5	184.8	-184.8
6.5	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	40779.2	145932.4	-0.3	3.5	1431.1	1434.2	2526.381	5282.265	4519.978	-0.29536	3.46235	181.5	184.6	-184.6
6.5	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	40779.2	145932.4	-0.3	3.5	1431.1	1434.2	2526.381	5282.265	4519.978	-0.29536	3.46235	181.5	184.6	-184.6
7	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	40779.2	145932.4	-0.2	4.3	1429.6	1433.7	2526.381	5282.265	4519.978	-0.21675	4.315123	180.3	184.4	-184.4
7	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	40779.2	145932.4	-0.2	4.3	1429.6	1433.7	2526.381	5282.265	4519.978	-0.21675	4.315123	180.3	184.4	-184.4
7.5	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	40779.2	145932.4	-0.1	5.2	1427.7	1432.8	2526.381	5282.265	4519.978	-0.11774	5.203845	179.0	184.1	-184.1
7.5	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	40779.2	145932.4	-0.1	5.2	1427.7	1432.8	2526.381	5282.265	4519.978	-0.11774	5.203845	179.0	184.1	-184.1
8	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	40779.2	145932.4	0.0	6.0	1425.6	1431.6	2526.381	5282.265	4519.978	1.98E-15	5.99902	177.9	183.9	-183.9

		VIGA SECUNDARIA CIRUELAS)																					
Ubicación	Sección	Sección No Compuesta							Sección Compuesta Momento Positivo														
		SNC _{top} (cm3)	SNC _{bot} (cm3)	Fy _{top} (kg/cm2)	Fy _{bot} (kg/cm2)	My _{top} (ton.m)	My _{bot} (ton.m)	My (ton.m)	SNC _{top} (cm3)	SST _{top} (cm3)	SLT _{top} (cm3)	MD1 _{top} (ton.m)	MD2 _{top} (ton.m)	MAD _{top} (ton.m)	My _{top} (ton.m)	SNC _{bot} (cm3)	SST _{bot} (cm3)	SLT _{bot} (cm3)	MD1 _{bot} (ton.m)	MD2 _{bot} (ton.m)	MAD _{bot} (ton.m)	My _{bot} (ton.m)	My (ton.m)
0	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	29936.2	98704.3	0.0	-1.1	1048.1	1047.0	2526.381	5209.372	4744.652	0	-1.07606	183.5	182.4	-182.4
0.5	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	29936.2	98704.3	-2.2	-1.3	1074.4	1070.9	2526.381	5209.372	4744.652	-2.21399	-1.3318	188.4	184.8	-184.8
0.5	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	29936.2	98704.3	-2.2	-1.3	1074.4	1070.9	2526.381	5209.372	4744.652	-2.21399	-1.3318	188.4	184.8	-184.8
1	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	29936.2	98704.3	-3.5	-1.7	1089.3	1084.1	2526.381	5209.372	4744.652	-3.45875	-1.65824	191.3	186.2	-186.2
1	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	29936.2	98704.3	-3.5	-1.7	1089.3	1084.1	2526.381	5209.372	4744.652	-3.45875	-1.65824	191.3	186.2	-186.2
1.5	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	29936.2	98704.3	-4.4	-2.0	1100.9	1094.5	2526.381	5209.372	4744.652	-4.43549	-1.972	193.6	187.2	-187.2
1.5	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	29936.2	98704.3	-4.4	-2.0	1100.9	1094.5	2526.381	5209.372	4744.652	-4.43549	-1.972	193.6	187.2	-187.2
2	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	29936.2	98704.3	-5.2	-2.2	1110.1	1102.6	2526.381	5209.372	4744.652	-5.20068	-2.22519	195.5	188.1	-188.1
2	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	29936.2	98704.3	-5.2	-2.2	1110.1	1102.6	2526.381	5209.372	4744.652	-5.20068	-2.22519	195.5	188.1	-188.1
2.5	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	29936.2	98704.3	-5.8	-2.4	1116.9	1108.7	2526.381	5209.372	4744.652	-5.77351	-2.40358	196.9	188.7	-188.7
2.5	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	29936.2	98704.3	-5.8	-2.4	1116.9	1108.7	2526.381	5209.372	4744.652	-5.77351	-2.40358	196.9	188.7	-188.7
3	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	29936.2	98704.3	-6.2	-2.5	1121.6	1112.9	2526.381	5209.372	4744.652	-6.168	-2.5076	197.8	189.1	-189.1
3	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	29936.2	98704.3	-6.2	-2.5	1121.6	1112.9	2526.381	5209.372	4744.652	-6.168	-2.5076	197.8	189.1	-189.1
3.5	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	29936.2	98704.3	-6.4	-2.5	1124.3	1115.4	2526.381	5209.372	4744.652	-6.39619	-2.54129	198.3	189.4	-189.4
3.5	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	29936.2	98704.3	-6.4	-2.5	1124.3	1115.4	2526.381	5209.372	4744.652	-6.39619	-2.54129	198.3	189.4	-189.4
4	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	29936.2	98704.3	-6.5	-2.5	1125.2	1116.2	2526.381	5209.372	4744.652	-6.46713	-2.50815	198.4	189.4	-189.4
4	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	29936.2	98704.3	-6.5	-2.5	1125.1	1116.1	2526.381	5209.372	4744.652	-6.46118	-2.48805	198.4	189.4	-189.4
4.5	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	29936.2	98704.3	-6.3	-2.4	1123.7	1115.0	2526.381	5209.372	4744.652	-6.34694	-2.37128	198.0	189.3	-189.3
4.5	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	29936.2	98704.3	-6.3	-2.4	1123.7	1115.0	2526.381	5209.372	4744.652	-6.34694	-2.37128	198.0	189.3	-189.3
5	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	29936.2	98704.3	-6.1	-2.2	1120.5	1112.2	2526.381	5209.372	4744.652	-6.07995	-2.18701	197.3	189.0	-189.0
5	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	29936.2	98704.3	-6.1	-2.2	1120.5	1112.2	2526.381	5209.372	4744.652	-6.07995	-2.18701	197.3	189.0	-189.0
5.5	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	29936.2	98704.3	-5.7	-1.9	1115.4	1107.8	2526.381	5209.372	4744.652	-5.65496	-1.93143	196.1	188.5	-188.5
5.5	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	29936.2	98704.3	-5.7	-1.9	1115.4	1107.8	2526.381	5209.372	4744.652	-5.65496	-1.93143	196.1	188.5	-188.5
6	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	29936.2	98704.3	-5.1	-1.6	1108.2	1101.6	2526.381	5209.372	4744.652	-5.06303	-1.60128	194.5	187.9	-187.9
6	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	29936.2	98704.3	-5.1	-1.6	1108.2	1101.6	2526.381	5209.372	4744.652	-5.06303	-1.60128	194.5	187.9	-187.9
6.5	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	29936.2	98704.3	-4.3	-1.2	1099.0	1093.5	2526.381	5209.372	4744.652	-4.29219	-1.20081	192.5	187.0	-187.0
6.5	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	29936.2	98704.3	-4.3	-1.2	1099.0	1093.5	2526.381	5209.372	4744.652	-4.29219	-1.20081	192.5	187.0	-187.0
7	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	29936.2	98704.3	-3.3	-0.8	1087.4	1083.3	2526.381	5209.372	4744.652	-3.32466	-0.75927	190.0	185.9	-185.9
7	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	29936.2	98704.3	-3.3	-0.8	1087.4	1083.3	2526.381	5209.372	4744.652	-3.32466	-0.75927	190.0	185.9	-185.9
7.5	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	29936.2	98704.3	-2.1	-0.4	1072.9	1070.4	2526.381	5209.372	4744.652	-2.10924	-0.35386	187.1	184.6	-184.6
7.5	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	29936.2	98704.3	-2.1	-0.4	1072.9	1070.4	2526.381	5209.372	4744.652	-2.10924	-0.35386	187.1	184.6	-184.6
8	W24x68	2526.381	2526.381	3500	3500	88.4	88.4	88.4	2526.4	29936.2	98704.3	0.0	-0.1	1047.8	1047.7	2526.381	5209.372	4744.652	-1.2E-13	-0.07726	182.4	182.3	-182.3

Revisión Diafragma Central (Cuerda Superior)

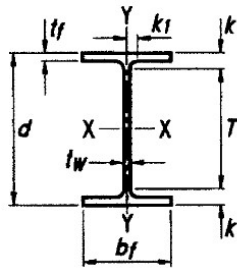
- Geometría



Sec = "W27X84"

$L := 7.74 \cdot m$

$W_s = 84 \frac{lb}{ft}$



$D = 67.818 \text{ cm}$

$t_w = 1.168 \text{ cm}$

$t_f = 1.626 \text{ cm}$

$b_f = 25.4 \text{ cm}$

$F_y := 50 \cdot ksi$

$E := 29000000 \cdot \frac{lb}{in^2}$

Propiedades de la Sección

$I_x = (1.186 \cdot 10^5) \text{ cm}^4$

$I_y = (4.412 \cdot 10^3) \text{ cm}^4$

$h_o = 66.294 \text{ cm}$

$S_x = (3.49 \cdot 10^3) \text{ cm}^3$

$S_y = 347.406 \text{ cm}^3$

$C_w = (4.807 \cdot 10^6) \text{ cm}^6$

$r_x = 27.178 \text{ cm}$

$r_y = 5.258 \text{ cm}$

$J = 116.961 \text{ cm}^4$

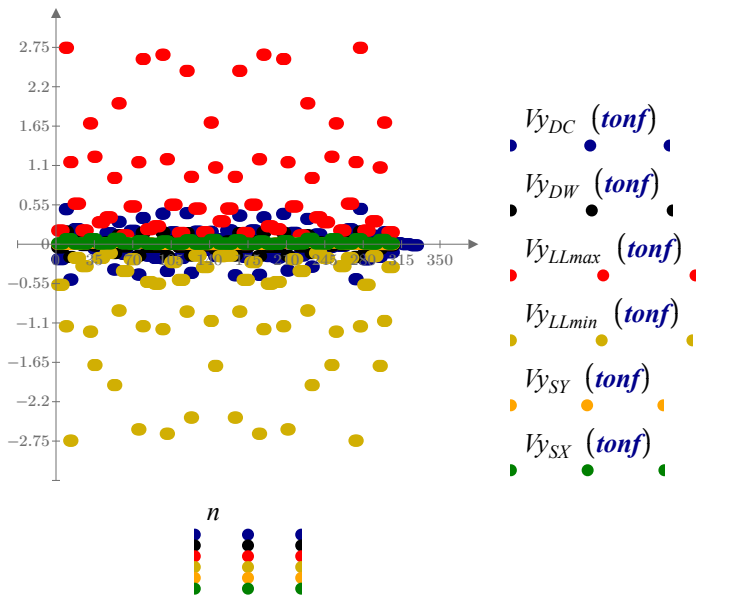
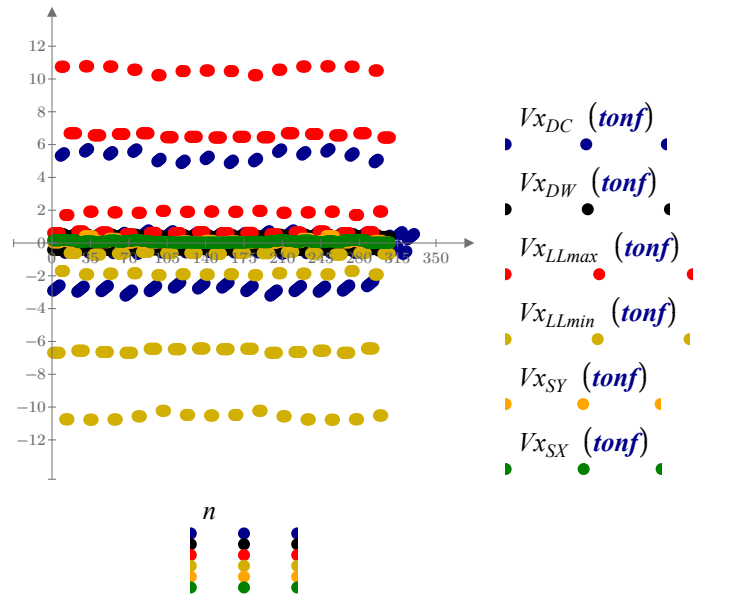
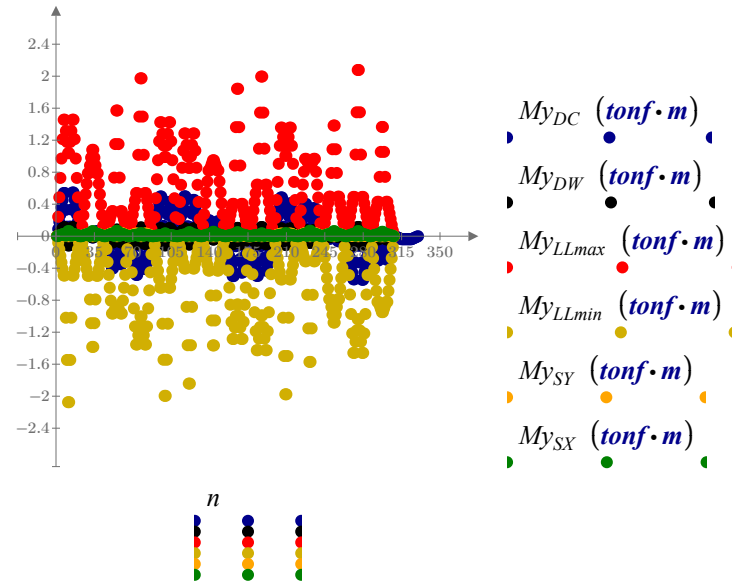
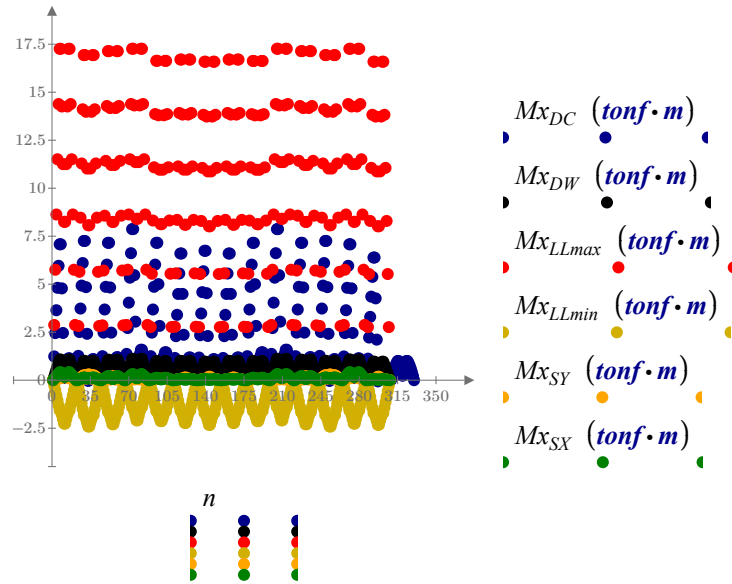
$Z_x = (3.998 \cdot 10^3) \text{ cm}^3$

$Z_y = 544.051 \text{ cm}^3$

MEMORIA DE CALCULO

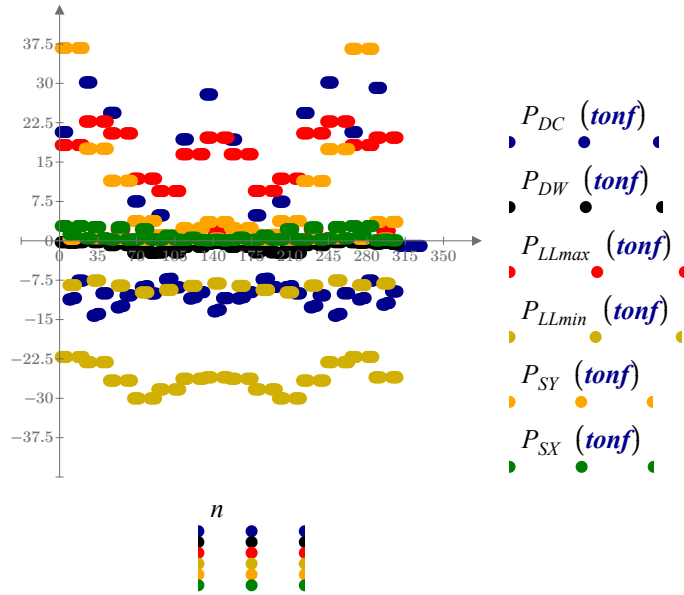
Puente Sobre Río Ciruelas RN27

Demandas



MEMORIA DE CALCULO

Puente Sobre Río Ciruelas RN27



Demanda última

$$PU_{StrenghtIa_i} := \begin{bmatrix} 1.25 & 1.5 & 1.75 & 0 & 0 & 0 \end{bmatrix} \cdot \left[\begin{matrix} \|P_{DC_i}\| & \|P_{DW_i}\| & \|P_{LLmax_i}\| & \|P_{LLmin_i}\| & \|P_{SY_i}\| & \|P_{SX_i}\| \end{matrix} \right]^T$$

$$PU_{StrenghtIb_i} := \begin{bmatrix} 1.25 & 1.5 & 0 & 1.75 & 0 & 0 \end{bmatrix} \cdot \left[\begin{matrix} \|P_{DC_i}\| & \|P_{DW_i}\| & \|P_{LLmax_i}\| & \|P_{LLmin_i}\| & \|P_{SY_i}\| & \|P_{SX_i}\| \end{matrix} \right]^T$$

$$PU_{ServiceIa_i} := \begin{bmatrix} 1 & 1 & 1.3 & 0 & 0 & 0 \end{bmatrix} \cdot \left[\begin{matrix} \|P_{DC_i}\| & \|P_{DW_i}\| & \|P_{LLmax_i}\| & \|P_{LLmin_i}\| & \|P_{SY_i}\| & \|P_{SX_i}\| \end{matrix} \right]^T$$

$$PU_{ServiceIb_i} := \begin{bmatrix} 1 & 1 & 0 & 1.3 & 0 & 0 \end{bmatrix} \cdot \left[\begin{matrix} \|P_{DC_i}\| & \|P_{DW_i}\| & \|P_{LLmax_i}\| & \|P_{LLmin_i}\| & \|P_{SY_i}\| & \|P_{SX_i}\| \end{matrix} \right]^T$$

$$PU_{ExtremEventIa_i} := \begin{bmatrix} 1 & 1 & 0.5 & 0 & \frac{1}{R} & \frac{0.3}{R} \end{bmatrix} \cdot \left[\begin{matrix} \|P_{DC_i}\| & \|P_{DW_i}\| & \|P_{LLmax_i}\| & \|P_{LLmin_i}\| & \|P_{SY_i}\| & \|P_{SX_i}\| \end{matrix} \right]^T$$

$$PU_{ExtremEventIb_i} := \begin{bmatrix} 1 & 1 & 0.5 & 0 & \frac{0.3}{R} & \frac{1}{R} \end{bmatrix} \cdot \left[\begin{matrix} \|P_{DC_i}\| & \|P_{DW_i}\| & \|P_{LLmax_i}\| & \|P_{LLmin_i}\| & \|P_{SY_i}\| & \|P_{SX_i}\| \end{matrix} \right]^T$$

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$$PU_{ExtremEventIc_i} := \begin{bmatrix} 1 & 1 & 0 & 0.5 & \frac{1}{R} & \frac{0.3}{R} \end{bmatrix} \cdot \left[\begin{bmatrix} \|P_{DC_i}\| & \|P_{DW_i}\| & \|P_{LLmax_i}\| & \|P_{LLmin_i}\| & \|P_{SY_i}\| & \|P_{SX_i}\| \end{bmatrix} \right]^T$$

$$PU_{ExtremEventId_i} := \begin{bmatrix} 1 & 1 & 0 & 0.5 & \frac{0.3}{R} & \frac{1}{R} \end{bmatrix} \cdot \left[\begin{bmatrix} \|P_{DC_i}\| & \|P_{DW_i}\| & \|P_{LLmax_i}\| & \|P_{LLmin_i}\| & \|P_{SY_i}\| & \|P_{SX_i}\| \end{bmatrix} \right]^T$$

$$MUx_{StrenghtIa_i} := \begin{bmatrix} 1.25 & 1.5 & 1.75 & 0 & 0 & 0 \end{bmatrix} \cdot \left[\begin{bmatrix} \|Mx_{DC_i}\| & \|Mx_{DW_i}\| & \|Mx_{LLmax_i}\| & \|Mx_{LLmin_i}\| & \|Mx_{SY_i}\| & \|Mx_{SX_i}\| \end{bmatrix} \right]^T$$

$$MUx_{StrenghtIb_i} := \begin{bmatrix} 1.25 & 1.5 & 0 & 1.75 & 0 & 0 \end{bmatrix} \cdot \left[\begin{bmatrix} \|Mx_{DC_i}\| & \|Mx_{DW_i}\| & \|Mx_{LLmax_i}\| & \|Mx_{LLmin_i}\| & \|Mx_{SY_i}\| & \|Mx_{SX_i}\| \end{bmatrix} \right]^T$$

$$MUx_{ServiceIIa_i} := \begin{bmatrix} 1 & 1 & 1.3 & 0 & 0 & 0 \end{bmatrix} \cdot \left[\begin{bmatrix} \|Mx_{DC_i}\| & \|Mx_{DW_i}\| & \|Mx_{LLmax_i}\| & \|Mx_{LLmin_i}\| & \|Mx_{SY_i}\| & \|Mx_{SX_i}\| \end{bmatrix} \right]^T$$

$$MUx_{ServiceIIb_i} := \begin{bmatrix} 1 & 1 & 0 & 1.3 & 0 & 0 \end{bmatrix} \cdot \left[\begin{bmatrix} \|Mx_{DC_i}\| & \|Mx_{DW_i}\| & \|Mx_{LLmax_i}\| & \|Mx_{LLmin_i}\| & \|Mx_{SY_i}\| & \|Mx_{SX_i}\| \end{bmatrix} \right]^T$$

$$MUx_{ExtremEventIa_i} := \begin{bmatrix} 1 & 1 & 0.5 & 0 & \frac{1}{R} & \frac{0.3}{R} \end{bmatrix} \cdot \left[\begin{bmatrix} \|Mx_{DC_i}\| & \|Mx_{DW_i}\| & \|Mx_{LLmax_i}\| & \|Mx_{LLmin_i}\| & \|Mx_{SY_i}\| & \|Mx_{SX_i}\| \end{bmatrix} \right]^T$$

$$MUx_{ExtremEventIb_i} := \begin{bmatrix} 1 & 1 & 0.5 & 0 & \frac{0.3}{R} & \frac{1}{R} \end{bmatrix} \cdot \left[\begin{bmatrix} \|Mx_{DC_i}\| & \|Mx_{DW_i}\| & \|Mx_{LLmax_i}\| & \|Mx_{LLmin_i}\| & \|Mx_{SY_i}\| & \|Mx_{SX_i}\| \end{bmatrix} \right]^T$$

$$MUx_{ExtremEventIc_i} := \begin{bmatrix} 1 & 1 & 0 & 0.5 & \frac{1}{R} & \frac{0.3}{R} \end{bmatrix} \cdot \left[\begin{bmatrix} \|Mx_{DC_i}\| & \|Mx_{DW_i}\| & \|Mx_{LLmax_i}\| & \|Mx_{LLmin_i}\| & \|Mx_{SY_i}\| & \|Mx_{SX_i}\| \end{bmatrix} \right]^T$$

$$MUx_{ExtremEventId_i} := \begin{bmatrix} 1 & 1 & 0 & 0.5 & \frac{0.3}{R} & \frac{1}{R} \end{bmatrix} \cdot \left[\begin{bmatrix} \|Mx_{DC_i}\| & \|Mx_{DW_i}\| & \|Mx_{LLmax_i}\| & \|Mx_{LLmin_i}\| & \|Mx_{SY_i}\| & \|Mx_{SX_i}\| \end{bmatrix} \right]^T$$

$$MUy_{StrenghtIa_i} := \begin{bmatrix} 1.25 & 1.5 & 1.75 & 0 & 0 & 0 \end{bmatrix} \cdot \left[\begin{bmatrix} \|My_{DC_i}\| & \|My_{DW_i}\| & \|My_{LLmax_i}\| & \|My_{LLmin_i}\| & \|My_{SY_i}\| & \|My_{SX_i}\| \end{bmatrix} \right]^T$$

$$MUy_{StrenghtIb_i} := \begin{bmatrix} 1.25 & 1.5 & 0 & 1.75 & 0 & 0 \end{bmatrix} \cdot \left[\begin{bmatrix} \|My_{DC_i}\| & \|My_{DW_i}\| & \|My_{LLmax_i}\| & \|My_{LLmin_i}\| & \|My_{SY_i}\| & \|My_{SX_i}\| \end{bmatrix} \right]^T$$

$$MUy_{ServiceIIa_i} := \begin{bmatrix} 1 & 1 & 1.3 & 0 & 0 & 0 \end{bmatrix} \cdot \left[\begin{bmatrix} \|My_{DC_i}\| & \|My_{DW_i}\| & \|My_{LLmax_i}\| & \|My_{LLmin_i}\| & \|My_{SY_i}\| & \|My_{SX_i}\| \end{bmatrix} \right]^T$$

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$$MUy_{ServiceI1b_i} := [1 \ 1 \ 0 \ 1.3 \ 0 \ 0] \cdot \left[\left\| My_{DC_i} \right\| \ \left\| My_{DW_i} \right\| \ \left\| My_{LLmax_i} \right\| \ \left\| My_{LLmin_i} \right\| \ \left\| My_{SY_i} \right\| \ \left\| My_{SX_i} \right\| \right]^T$$

$$MUy_{ExtremEventIa_i} := \left[1 \ 1 \ 0.5 \ 0 \ \frac{1}{R} \ \frac{0.3}{R} \right] \cdot \left[\left\| My_{DC_i} \right\| \ \left\| My_{DW_i} \right\| \ \left\| My_{LLmax_i} \right\| \ \left\| My_{LLmin_i} \right\| \ \left\| My_{SY_i} \right\| \ \left\| My_{SX_i} \right\| \right]^T$$

$$MUy_{ExtremEventIb_i} := \left[1 \ 1 \ 0.5 \ 0 \ \frac{0.3}{R} \ \frac{1}{R} \right] \cdot \left[\left\| My_{DC_i} \right\| \ \left\| My_{DW_i} \right\| \ \left\| My_{LLmax_i} \right\| \ \left\| My_{LLmin_i} \right\| \ \left\| My_{SY_i} \right\| \ \left\| My_{SX_i} \right\| \right]^T$$

$$MUy_{ExtremEventIc_i} := \left[1 \ 1 \ 0 \ 0.5 \ \frac{1}{R} \ \frac{0.3}{R} \right] \cdot \left[\left\| My_{DC_i} \right\| \ \left\| My_{DW_i} \right\| \ \left\| My_{LLmax_i} \right\| \ \left\| My_{LLmin_i} \right\| \ \left\| My_{SY_i} \right\| \ \left\| My_{SX_i} \right\| \right]^T$$

$$MUy_{ExtremEventId_i} := \left[1 \ 1 \ 0 \ 0.5 \ \frac{0.3}{R} \ \frac{1}{R} \right] \cdot \left[\left\| My_{DC_i} \right\| \ \left\| My_{DW_i} \right\| \ \left\| My_{LLmax_i} \right\| \ \left\| My_{LLmin_i} \right\| \ \left\| My_{SY_i} \right\| \ \left\| My_{SX_i} \right\| \right]^T$$

$$VUx_{StrenghtIa_i} := [1.25 \ 1.5 \ 1.75 \ 0 \ 0 \ 0] \cdot \left[\left\| Vx_{DC_i} \right\| \ \left\| Vx_{DW_i} \right\| \ \left\| Vx_{LLmax_i} \right\| \ \left\| Vx_{LLmin_i} \right\| \ \left\| Vx_{SY_i} \right\| \ \left\| Vx_{SX_i} \right\| \right]^T$$

$$VUx_{StrenghtIb_i} := [1.25 \ 1.5 \ 0 \ 1.75 \ 0 \ 0] \cdot \left[\left\| Vx_{DC_i} \right\| \ \left\| Vx_{DW_i} \right\| \ \left\| Vx_{LLmax_i} \right\| \ \left\| Vx_{LLmin_i} \right\| \ \left\| Vx_{SY_i} \right\| \ \left\| Vx_{SX_i} \right\| \right]^T$$

$$VUx_{ServiceIa_i} := [1 \ 1 \ 1.3 \ 0 \ 0 \ 0] \cdot \left[\left\| Vx_{DC_i} \right\| \ \left\| Vx_{DW_i} \right\| \ \left\| Vx_{LLmax_i} \right\| \ \left\| Vx_{LLmin_i} \right\| \ \left\| Vx_{SY_i} \right\| \ \left\| Vx_{SX_i} \right\| \right]^T$$

$$VUx_{ServiceIb_i} := [1 \ 1 \ 0 \ 1.3 \ 0 \ 0] \cdot \left[\left\| Vx_{DC_i} \right\| \ \left\| Vx_{DW_i} \right\| \ \left\| Vx_{LLmax_i} \right\| \ \left\| Vx_{LLmin_i} \right\| \ \left\| Vx_{SY_i} \right\| \ \left\| Vx_{SX_i} \right\| \right]^T$$

$$VUx_{ExtremEventIa_i} := \left[1 \ 1 \ 0.5 \ 0 \ \frac{1}{R} \ \frac{0.3}{R} \right] \cdot \left[\left\| Vx_{DC_i} \right\| \ \left\| Vx_{DW_i} \right\| \ \left\| Vx_{LLmax_i} \right\| \ \left\| Vx_{LLmin_i} \right\| \ \left\| Vx_{SY_i} \right\| \ \left\| Vx_{SX_i} \right\| \right]^T$$

$$VUx_{ExtremEventIb_i} := \left[1 \ 1 \ 0.5 \ 0 \ \frac{0.3}{R} \ \frac{1}{R} \right] \cdot \left[\left\| Vx_{DC_i} \right\| \ \left\| Vx_{DW_i} \right\| \ \left\| Vx_{LLmax_i} \right\| \ \left\| Vx_{LLmin_i} \right\| \ \left\| Vx_{SY_i} \right\| \ \left\| Vx_{SX_i} \right\| \right]^T$$

$$VUx_{ExtremEventIc_i} := \left[1 \ 1 \ 0 \ 0.5 \ \frac{1}{R} \ \frac{0.3}{R} \right] \cdot \left[\left\| Vx_{DC_i} \right\| \ \left\| Vx_{DW_i} \right\| \ \left\| Vx_{LLmax_i} \right\| \ \left\| Vx_{LLmin_i} \right\| \ \left\| Vx_{SY_i} \right\| \ \left\| Vx_{SX_i} \right\| \right]^T$$

$$VUx_{ExtremEventId_i} := \left[1 \ 1 \ 0 \ 0.5 \ \frac{0.3}{R} \ \frac{1}{R} \right] \cdot \left[\left\| Vx_{DC_i} \right\| \ \left\| Vx_{DW_i} \right\| \ \left\| Vx_{LLmax_i} \right\| \ \left\| Vx_{LLmin_i} \right\| \ \left\| Vx_{SY_i} \right\| \ \left\| Vx_{SX_i} \right\| \right]^T$$

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$$VUy_{Strenght1a_i} := [1.25 \ 1.5 \ 1.75 \ 0 \ 0 \ 0] \cdot \left[\left\| \dot{Y}_{DC_i} \right\| \ \left\| \dot{Y}_{DW_i} \right\| \ \left\| \dot{Y}_{LLmax_i} \right\| \ \left\| \dot{Y}_{LLmin_i} \right\| \ \left\| \dot{Y}_{SY_i} \right\| \ \left\| \dot{Y}_{SX_i} \right\| \right]^T$$

$$VUy_{Strenght1b_i} := [1.25 \ 1.5 \ 0 \ 1.75 \ 0 \ 0] \cdot \left[\left\| \dot{Y}_{DC_i} \right\| \ \left\| \dot{Y}_{DW_i} \right\| \ \left\| \dot{Y}_{LLmax_i} \right\| \ \left\| \dot{Y}_{LLmin_i} \right\| \ \left\| \dot{Y}_{SY_i} \right\| \ \left\| \dot{Y}_{SX_i} \right\| \right]^T$$

$$VUy_{Service1a_i} := [1 \ 1 \ 1.3 \ 0 \ 0 \ 0] \cdot \left[\left\| \dot{Y}_{DC_i} \right\| \ \left\| \dot{Y}_{DW_i} \right\| \ \left\| \dot{Y}_{LLmax_i} \right\| \ \left\| \dot{Y}_{LLmin_i} \right\| \ \left\| \dot{Y}_{SY_i} \right\| \ \left\| \dot{Y}_{SX_i} \right\| \right]^T$$

$$VUy_{Service1b_i} := [1 \ 1 \ 0 \ 1.3 \ 0 \ 0] \cdot \left[\left\| \dot{Y}_{DC_i} \right\| \ \left\| \dot{Y}_{DW_i} \right\| \ \left\| \dot{Y}_{LLmax_i} \right\| \ \left\| \dot{Y}_{LLmin_i} \right\| \ \left\| \dot{Y}_{SY_i} \right\| \ \left\| \dot{Y}_{SX_i} \right\| \right]^T$$

$$VUy_{ExtremEvent1a_i} := \left[1 \ 1 \ 0.5 \ 0 \ \frac{1}{R} \ \frac{0.3}{R} \right] \cdot \left[\left\| \dot{Y}_{DC_i} \right\| \ \left\| \dot{Y}_{DW_i} \right\| \ \left\| \dot{Y}_{LLmax_i} \right\| \ \left\| \dot{Y}_{LLmin_i} \right\| \ \left\| \dot{Y}_{SY_i} \right\| \ \left\| \dot{Y}_{SX_i} \right\| \right]^T$$

$$VUy_{ExtremEvent1b_i} := \left[1 \ 1 \ 0.5 \ 0 \ \frac{0.3}{R} \ \frac{1}{R} \right] \cdot \left[\left\| \dot{Y}_{DC_i} \right\| \ \left\| \dot{Y}_{DW_i} \right\| \ \left\| \dot{Y}_{LLmax_i} \right\| \ \left\| \dot{Y}_{LLmin_i} \right\| \ \left\| \dot{Y}_{SY_i} \right\| \ \left\| \dot{Y}_{SX_i} \right\| \right]^T$$

$$VUy_{ExtremEvent1c_i} := \left[1 \ 1 \ 0 \ 0.5 \ \frac{1}{R} \ \frac{0.3}{R} \right] \cdot \left[\left\| \dot{Y}_{DC_i} \right\| \ \left\| \dot{Y}_{DW_i} \right\| \ \left\| \dot{Y}_{LLmax_i} \right\| \ \left\| \dot{Y}_{LLmin_i} \right\| \ \left\| \dot{Y}_{SY_i} \right\| \ \left\| \dot{Y}_{SX_i} \right\| \right]^T$$

$G := 11200 \text{ } \mathbf{ksi}$

$$VUy_{ExtremEvent1d_i} := \left[1 \ 1 \ 0 \ 0.5 \ \frac{0.3}{R} \ \frac{1}{R} \right] \cdot \left[\left\| \dot{Y}_{DC_i} \right\| \ \left\| \dot{Y}_{DW_i} \right\| \ \left\| \dot{Y}_{LLmax_i} \right\| \ \left\| \dot{Y}_{LLmin_i} \right\| \ \left\| \dot{Y}_{SY_i} \right\| \ \left\| \dot{Y}_{SX_i} \right\| \right]^T$$

Capacidad a Flexión

$$\phi_b := 0.9$$

$$L_b := 2.58 \cdot m$$

$$C_b := 1$$

Clasificación de la sección por pandeo Local

(A

Alas

$$\lambda_f := \frac{b_f}{2 \cdot t_f} = 7.813$$

$$\lambda_{pf} := 0.38 \cdot \sqrt{\frac{E}{F_y}} = 9.152$$

$$\lambda_{rf} := 1.0 \cdot \sqrt{\frac{E}{F_y}} = 24.083$$

Alas → “Sección No Compacta”

Alma

$$h := D - 2 \cdot t_f = 0.646 \cdot m$$

$$\lambda_w := \frac{h}{t_w} = 55.261$$

$$\lambda_{pw} := 3.76 \cdot \sqrt{\frac{E}{F_y}} = 90.553$$

$$\lambda_{rw} := 5.70 \cdot \sqrt{\frac{E}{F_y}} = 137.274$$

Alma → “Sección Compacta”

Capacidad de una sección doblemente simétrica compacta alrededor del eje fuerte

- Cedencia

$$M_p := F_y \cdot Z_x = 154.94 \cdot tonf \cdot m$$

- Pandeo Lateral Torsional

$$r_{ts} := \sqrt{\frac{\sqrt{I_y \cdot C_w}}{S_x}} = 0.065 \cdot m$$

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$$c := \left(\frac{h_o}{2} \right) \cdot \sqrt{\frac{I_y}{C_w}} = 1.004$$

$$L_p := 1.76 \cdot r_y \cdot \sqrt{\frac{E}{F_y}} = 2.229 \text{ m}$$

$$L_r := 1.95 \cdot r_{ts} \cdot \left(\frac{E}{(0.7 \cdot F_y)} \right) \cdot \sqrt{\left(\frac{(J \cdot c)}{(S_x \cdot h_o)} \right) + \sqrt{\left(\frac{(J \cdot c)}{(S_x \cdot h_o)} \right)^2 + 6.76 \cdot \left(\frac{(0.7 \cdot F_y)}{E} \right)^2}} = 6.336 \text{ m}$$

$$F_{cr}(l_b) := \left(\frac{(C_b \cdot \pi^2 \cdot E)}{\left(\frac{l_b}{r_{ts}} \right)^2} \right) \cdot \sqrt{1 + 0.078 \cdot \left(\frac{(J \cdot c)}{(S_x \cdot h_o)} \right) \cdot \left(\frac{l_b}{r_{ts}} \right)^2}$$

$$M_{nl}(l_b) := \text{if} \left(l_b \leq L_p, M_p, \left(\text{if} \left(l_b \leq L_r, C_b \cdot \left(M_p - (M_p - 0.7 \cdot F_y \cdot S_x) \cdot \left(\frac{(l_b - L_p)}{(L_r - L_p)} \right) \right), F_{cr}(l_b) \cdot S_x \right) \right) \right)$$

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Capacidad de una sección doblemente simétrica con alma compacta y patines no compactos o esbeltos alrededor del eje fuerte

- Pandeo Local por compresión del patín

$$k_c := \frac{4}{\sqrt{\frac{h}{t_w}}} = 0.538$$

$$M_{n2}(\lambda) := \left\| \begin{array}{l} \text{if } \lambda < \lambda_{pf} \\ \quad \left\| M_p \right. \\ \text{also if } \lambda_{pf} < \lambda < \lambda_{rf} \\ \quad \left\| \left(M_p - (M_p - 0.7 \cdot F_y \cdot S_x) \cdot \left(\frac{\lambda - \lambda_{pf}}{\lambda_{rf} - \lambda_{pf}} \right) \right) \right. \\ \text{else} \\ \quad \left\| \frac{0.9 \cdot E \cdot k_c \cdot S_x}{\lambda^2} \right. \end{array} \right\|$$

Capacidad de una sección doblemente simétrica con alma no compacta alrededor del eje fuerte

- Pandeo Local por compresión del patín

$$M_{n3}(\lambda) := \left\| \begin{array}{l} \text{if } \lambda < \lambda_{pf} \\ \quad \left\| M_p \right. \\ \text{also if } \lambda_{pf} < \lambda < \lambda_{rf} \\ \quad \left\| \left(M_p - (M_p - 0.7 \cdot F_y \cdot S_x) \cdot \left(\frac{\lambda - \lambda_{pf}}{\lambda_{rf} - \lambda_{pf}} \right) \right) \right. \\ \text{else} \\ \quad \left\| \frac{0.9 \cdot E \cdot k_c \cdot S_x}{\lambda^2} \right. \end{array} \right\|$$

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$$M_{nx} := \left\| \begin{array}{l} \text{if } Alas = \text{"Sección Compacta"} \\ \left\| \begin{array}{l} \text{if } Alma = \text{"Sección Compacta"} \\ \left\| M_{n1}(L_b) \right. \\ \text{else} \\ \left\| M_{n3}(\lambda_f) \right. \end{array} \right\| \\ \text{else} \\ \left\| \begin{array}{l} \text{if } Alma = \text{"Sección Compacta"} \\ \left\| M_{n2}(\lambda_f) \right. \\ \text{else} \\ \left\| M_{n3}(\lambda_f) \right. \end{array} \right\| \end{array} \right\| = 154.94 \text{ tonf} \cdot m$$

Capacidad de la sección alrededor del eje debil **(AISC 360-10.F6)**

- Cedencia

$$M_{py} := \min(F_y \cdot Z_y, 1.6 \cdot F_y \cdot S_y)$$

- Pandeo Local del ala

$$F_{crf}(\lambda_f) := \frac{(0.69 \cdot E)}{(\lambda_f)^2}$$

$$M_{ny}(\lambda_f) := \text{if} \left(\lambda_f \leq \lambda_{pf}, M_{py}, \text{if} \left(\lambda_f \leq \lambda_{rf}, \left(M_{py} - (M_{py} - 0.7 \cdot F_y \cdot S_y) \cdot \left(\frac{(\lambda_f - \lambda_{pf})}{(\lambda_{rf} - \lambda_{pf})} \right) \right), F_{crf}(\lambda_f) \cdot S_y \right) \right)$$

$$M_{ny} := M_{ny}(\lambda_f)$$

Capacidad a Compresión

Clasificación de la sección por pandeo Local

Alas

$$\lambda_f := \frac{b_f}{2 \cdot t_f} = 7.813$$

$$\lambda_{rf} := 0.56 \cdot \sqrt{\frac{E}{F_y}} = 13.487$$

Alas → “Sección Compacta”

Alma

$$h := D - 2 \cdot t_f = 0.646 \text{ m}$$

$$\lambda_w := \frac{h}{t_w} = 55.261$$

$$\lambda_{rw} := 1.49 \cdot \sqrt{\frac{E}{F_y}} = 35.884$$

Alma → “Sección Esbelta”

$$K := 1$$

$$r := \max(r_x, r_y) = 0.272 \text{ m}$$

$$F_e := \frac{\pi^2 \cdot E}{\left(\frac{K \cdot L}{r}\right)^2} = (2.433 \cdot 10^9) \text{ Pa}$$

$$F_{cr} := \left\| \begin{array}{l} \text{if } \frac{F_y}{F_e} \leq 2.25 \\ \left\| \left(0.658 \frac{F_y}{F_e}\right) \cdot F_y \right\| \\ \text{else} \\ \left\| 0.877 \cdot F_e \right\| \end{array} \right\| = (3.249 \cdot 10^8) \text{ Pa}$$

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$$b_e := \left\| \begin{array}{l} \text{if } \lambda_w \geq 1.49 \cdot \sqrt{\frac{E}{F_{cr}}} \\ \left\| \left(1.92 \cdot t_w \cdot \sqrt{\frac{E}{F_{cr}}} \cdot \left(1 - \frac{0.34}{\left(\frac{h}{t_w} \right)} \cdot \sqrt{\frac{E}{F_{cr}}} \right) \right) \right\| \\ \text{else} \\ h \end{array} \right\| = 0.472 \text{ } m$$

$$A_e := b_e \cdot t_w = 0.006 \text{ } m^2$$

$$A_{gl} := h \cdot t_w = 0.008 \text{ } m^2$$

$$Q_a := \frac{A_e}{A_{gl}} = 0.73$$

$$Q_s := \left\| \begin{array}{l} \text{if } \frac{b_f}{2 \cdot t_f} \leq 0.56 \cdot \sqrt{\frac{E}{F_y}} \\ \left\| 1 \right\| \\ \text{also if } 0.56 \cdot \sqrt{\frac{E}{F_y}} < \frac{b_f}{2 \cdot t_f} \leq 1.03 \cdot \sqrt{\frac{E}{F_y}} \\ \left\| 1.415 - 0.74 \cdot \left(\frac{b_f}{2 \cdot t_f} \right) \cdot \sqrt{\frac{F_y}{E}} \right\| \\ \text{else} \\ \left\| \frac{0.69 \cdot E}{F_y \cdot \left(\frac{b_f}{2 \cdot t_f} \right)^2} \right\| \end{array} \right\| = 1$$

$$Q := Q_a \cdot Q_s$$

$$F_{cr} := \left\| \begin{array}{l} \text{if } \frac{Q \cdot F_y}{F_e} \leq 2.25 \\ \left\| \left(0.658 \sqrt{\frac{Q \cdot F_y}{F_e}} \right) \cdot Q \cdot F_y \right\| \\ \text{else} \\ \left\| 0.877 \cdot F_e \right\| \end{array} \right\| = (2.411 \cdot 10^8) \text{ } Pa$$

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$$P_n := F_{cr} \cdot A_g = 431.889 \text{ tonf}$$

$$\phi_c := 0.9$$

Flexo compresión

$$RazonCapacidad1_i := \begin{cases} \text{if } \frac{PU_{Strenght1a_i}}{\phi_c \cdot P_n} \geq 0.2 \\ \left\| \frac{PU_{Strenght1a_i}}{\phi_c \cdot P_n} + \frac{8}{9} \cdot \left(\frac{MUx_{Strenght1a_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{Strenght1a_i}}{\phi_b \cdot M_{ny}} \right) \right\| \\ \text{else} \\ \left\| \frac{PU_{Strenght1a_i}}{2 \cdot \phi_c \cdot P_n} + \left(\frac{MUx_{Strenght1a_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{Strenght1a_i}}{\phi_b \cdot M_{ny}} \right) \right\| \end{cases}$$

$$RazonCapacidad2_i := \begin{cases} \text{if } \frac{PU_{Strenght1b_i}}{\phi_c \cdot P_n} \geq 0.2 \\ \left\| \frac{PU_{Strenght1b_i}}{\phi_c \cdot P_n} + \frac{8}{9} \cdot \left(\frac{MUx_{Strenght1b_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{Strenght1b_i}}{\phi_b \cdot M_{ny}} \right) \right\| \\ \text{else} \\ \left\| \frac{PU_{Strenght1b_i}}{2 \cdot \phi_c \cdot P_n} + \left(\frac{MUx_{Strenght1b_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{Strenght1b_i}}{\phi_b \cdot M_{ny}} \right) \right\| \end{cases}$$

$$RazonCapacidad3_i := \begin{cases} \text{if } \frac{PU_{Service1a_i}}{\phi_c \cdot P_n} \geq 0.2 \\ \left\| \frac{PU_{Service1a_i}}{\phi_c \cdot P_n} + \frac{8}{9} \cdot \left(\frac{MUx_{Service1a_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{Service1a_i}}{\phi_b \cdot M_{ny}} \right) \right\| \\ \text{else} \\ \left\| \frac{PU_{Service1a_i}}{2 \cdot \phi_c \cdot P_n} + \left(\frac{MUx_{Service1a_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{Service1a_i}}{\phi_b \cdot M_{ny}} \right) \right\| \end{cases}$$

$$RazonCapacidad4_i := \begin{cases} \text{if } \frac{PU_{Service1b_i}}{\phi_c \cdot P_n} \geq 0.2 \\ \left\| \frac{PU_{Service1b_i}}{\phi_c \cdot P_n} + \frac{8}{9} \cdot \left(\frac{MUx_{Service1b_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{Service1b_i}}{\phi_b \cdot M_{ny}} \right) \right\| \\ \text{else} \\ \left\| \frac{PU_{Service1b_i}}{2 \cdot \phi_c \cdot P_n} + \left(\frac{MUx_{Service1b_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{Service1b_i}}{\phi_b \cdot M_{ny}} \right) \right\| \end{cases}$$

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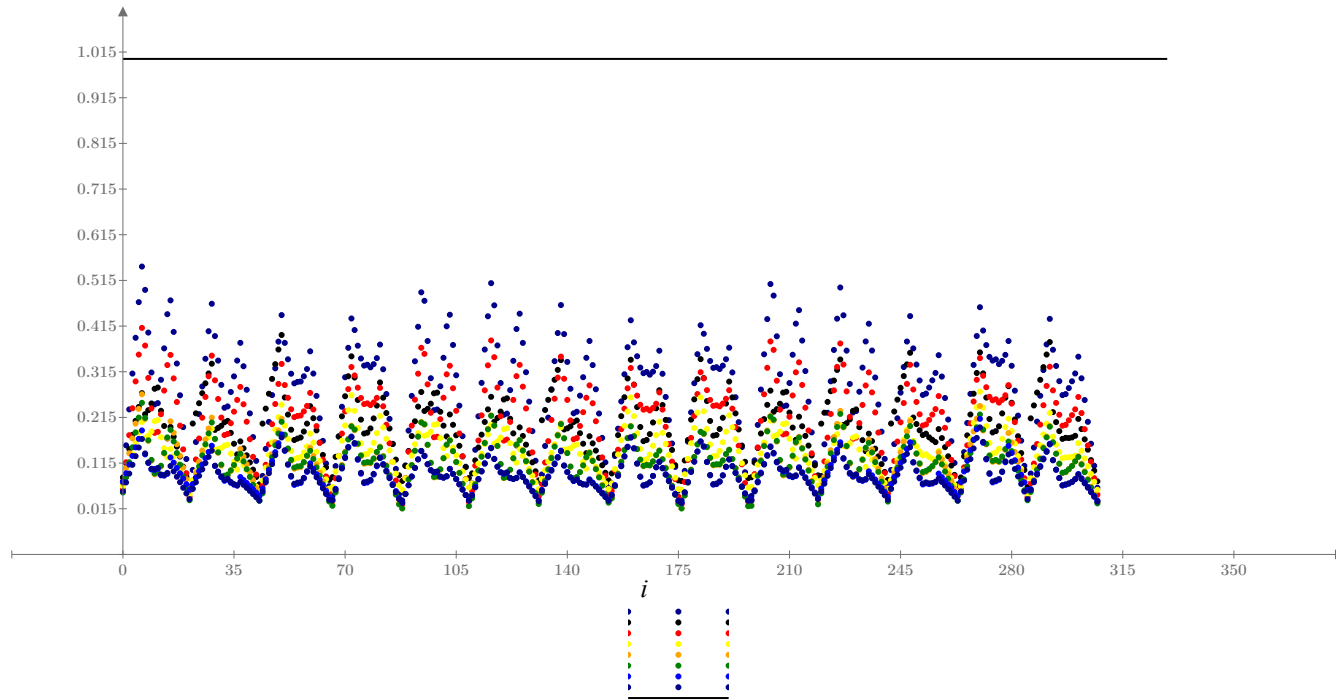
$$\begin{aligned}
 \text{RazonCapacidad5}_i &:= \left\| \begin{array}{l} \text{if } \frac{PU_{ExtremEventIa_i}}{\phi_c \cdot P_n} \geq 0.2 \\ \left\| \frac{PU_{ExtremEventIa_i}}{\phi_c \cdot P_n} + \frac{8}{9} \cdot \left(\frac{MUx_{ExtremEventIa_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{ExtremEventIa_i}}{\phi_b \cdot M_{ny}} \right) \right\| \\ \text{else} \\ \left\| \frac{PU_{ExtremEventIa_i}}{2 \cdot \phi_c \cdot P_n} + \left(\frac{MUx_{ExtremEventIa_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{ExtremEventIa_i}}{\phi_b \cdot M_{ny}} \right) \right\| \end{array} \right\| \\
 \text{RazonCapacidad6}_i &:= \left\| \begin{array}{l} \text{if } \frac{PU_{ExtremEventIb_i}}{\phi_c \cdot P_n} \geq 0.2 \\ \left\| \frac{PU_{ExtremEventIb_i}}{\phi_c \cdot P_n} + \frac{8}{9} \cdot \left(\frac{MUx_{ExtremEventIb_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{ExtremEventIb_i}}{\phi_b \cdot M_{ny}} \right) \right\| \\ \text{else} \\ \left\| \frac{PU_{ExtremEventIb_i}}{2 \cdot \phi_c \cdot P_n} + \left(\frac{MUx_{ExtremEventIb_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{ExtremEventIb_i}}{\phi_b \cdot M_{ny}} \right) \right\| \end{array} \right\|
 \end{aligned}$$

$$\begin{aligned}
 \text{RazonCapacidad7}_i &:= \left\| \begin{array}{l} \text{if } \frac{PU_{ExtremEventIc_i}}{\phi_c \cdot P_n} \geq 0.2 \\ \left\| \frac{PU_{ExtremEventIc_i}}{\phi_c \cdot P_n} + \frac{8}{9} \cdot \left(\frac{MUx_{ExtremEventIc_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{ExtremEventIc_i}}{\phi_b \cdot M_{ny}} \right) \right\| \\ \text{else} \\ \left\| \frac{PU_{ExtremEventIc_i}}{2 \cdot \phi_c \cdot P_n} + \left(\frac{MUx_{ExtremEventIc_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{ExtremEventIc_i}}{\phi_b \cdot M_{ny}} \right) \right\| \end{array} \right\|
 \end{aligned}$$

$$\begin{aligned}
 \text{RazonCapacidad8}_i &:= \left\| \begin{array}{l} \text{if } \frac{PU_{ExtremEventId_i}}{\phi_c \cdot P_n} \geq 0.2 \\ \left\| \frac{PU_{ExtremEventId_i}}{\phi_c \cdot P_n} + \frac{8}{9} \cdot \left(\frac{MUx_{ExtremEventId_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{ExtremEventId_i}}{\phi_b \cdot M_{ny}} \right) \right\| \\ \text{else} \\ \left\| \frac{PU_{ExtremEventId_i}}{2 \cdot \phi_c \cdot P_n} + \left(\frac{MUx_{ExtremEventId_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{ExtremEventId_i}}{\phi_b \cdot M_{ny}} \right) \right\| \end{array} \right\|
 \end{aligned}$$

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$RazonCapacidad1_i$

$RazonCapacidad2_i$

$RazonCapacidad3_i$

$RazonCapacidad4_i$

$RazonCapacidad5_i$

$RazonCapacidad6_i$

$RazonCapacidad7_i$

$RazonCapacidad8_i$

1

Cortante

$$\phi_v := 0.9$$

$$A_w := h \cdot t_w = 0.008 \text{ m}^2$$

$$C_v := 1.0$$

$$V_n := 0.6 \cdot F_y \cdot A_w \cdot C_v = 175.398 \text{ tonf}$$

$$RazonCapacidad1_i := \frac{VUx_{Strenght1a_i}}{V_n}$$

$$RazonCapacidad2_i := \frac{VUx_{Strenght1b_i}}{V_n}$$

$$RazonCapacidad3_i := \frac{VUx_{Service1a_i}}{V_n}$$

$$RazonCapacidad4_i := \frac{VUx_{Service1b_i}}{V_n}$$

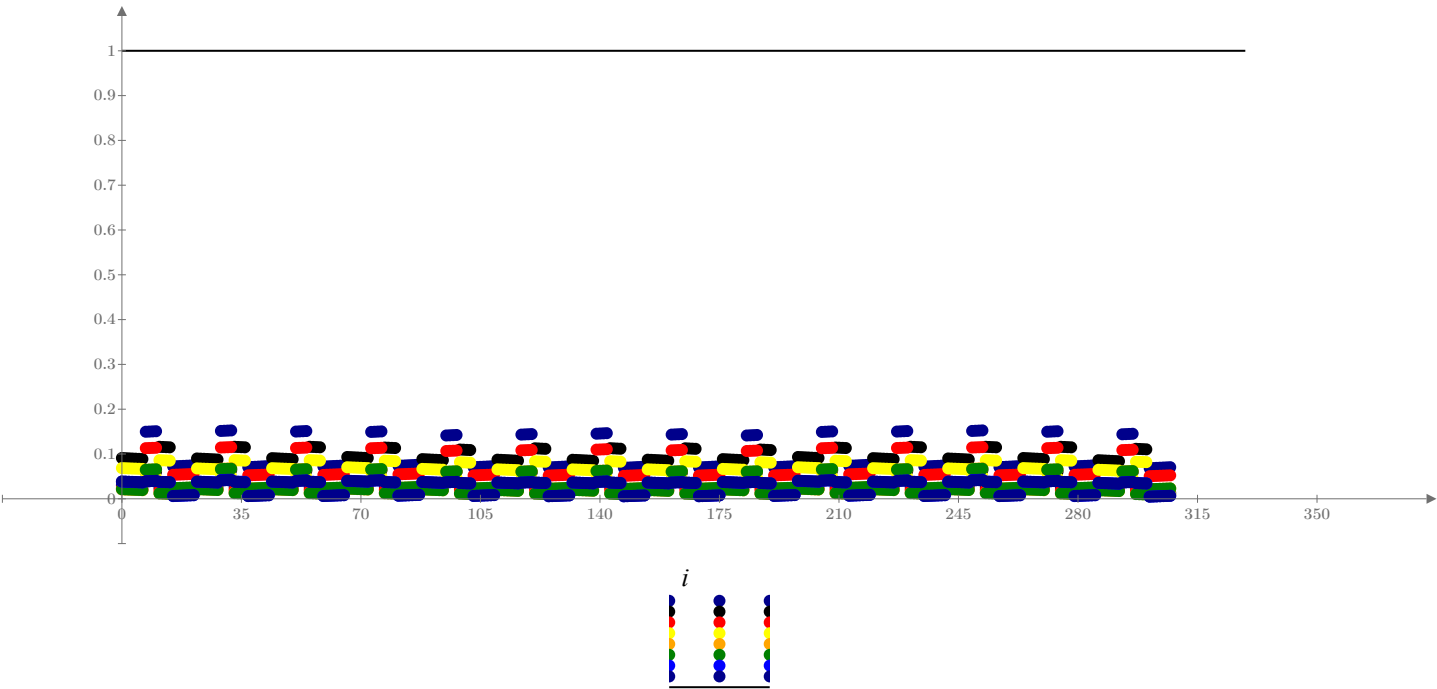
$$RazonCapacidad5_i := \frac{VUx_{ExtremEvent1a_i}}{V_n}$$

$$RazonCapacidad6_i := \frac{VUx_{ExtremEvent1b_i}}{V_n}$$

$$RazonCapacidad7_i := \frac{VUx_{ExtremEvent1c_i}}{V_n}$$

$$RazonCapacidad8_i := \frac{VUx_{ExtremEvent1d_i}}{V_n}$$

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$RazonCapacidad1_i$

$RazonCapacidad2_i$

$RazonCapacidad3_i$

$RazonCapacidad4_i$

$RazonCapacidad5_i$

$RazonCapacidad6_i$

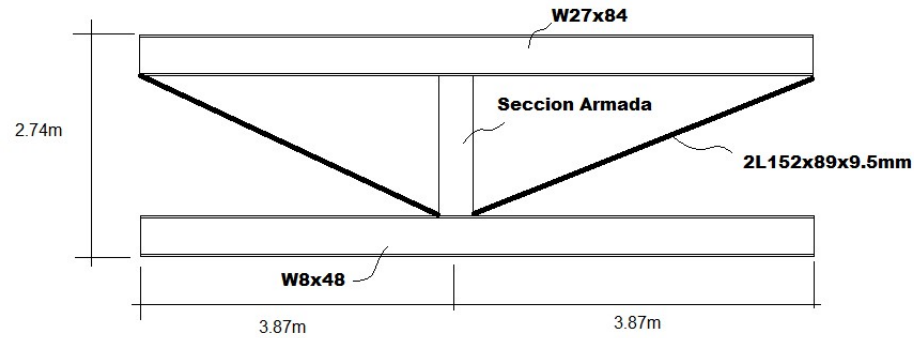
$RazonCapacidad7_i$

$RazonCapacidad8_i$

1

Revisión Diafragma Central (Cuerda Inferior)

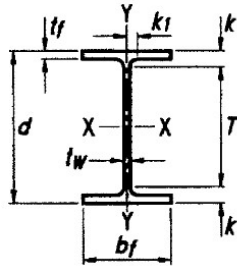
- Geometría



Sec = "W8X48"

$L := 7.74 \cdot m$

$W_s = 48 \frac{lbf}{ft}$



$D = 21.59 \text{ cm}$

$t_w = 1.016 \text{ cm}$

$t_f = 1.74 \text{ cm}$

$b_f = 20.599 \text{ cm}$

$F_y := 50 \cdot ksi$

$E := 29000000 \cdot \frac{lbf}{in^2}$

Propiedades de la Sección

$I_x = (7.659 \cdot 10^3) \text{ cm}^4$

$S_x = 707.921 \text{ cm}^3$

$r_x = 9.169 \text{ cm}$

$Z_x = 802.966 \text{ cm}^3$

$I_y = (2.535 \cdot 10^3) \text{ cm}^4$

$S_y = 245.806 \text{ cm}^3$

$r_y = 5.283 \text{ cm}$

$Z_y = 375.264 \text{ cm}^3$

$h_o = 19.863 \text{ cm}$

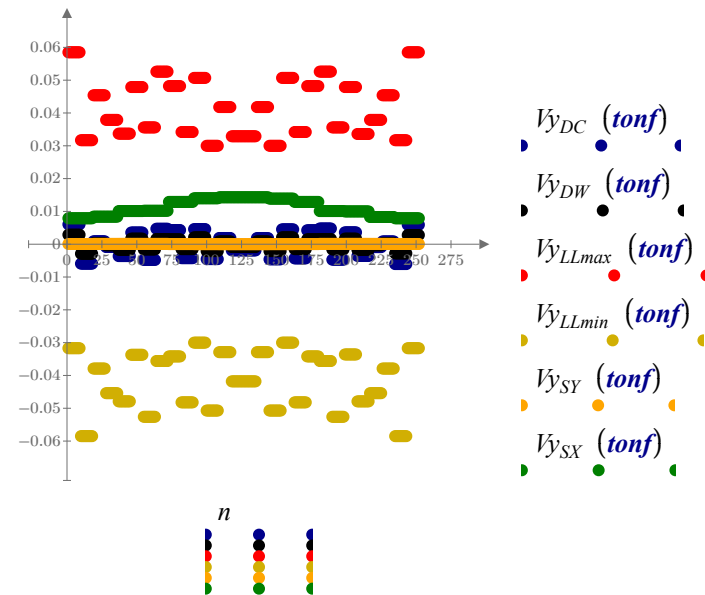
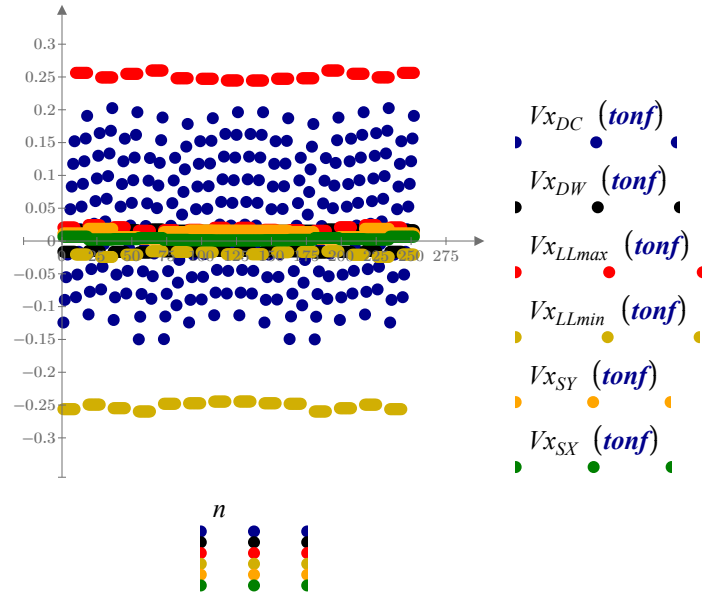
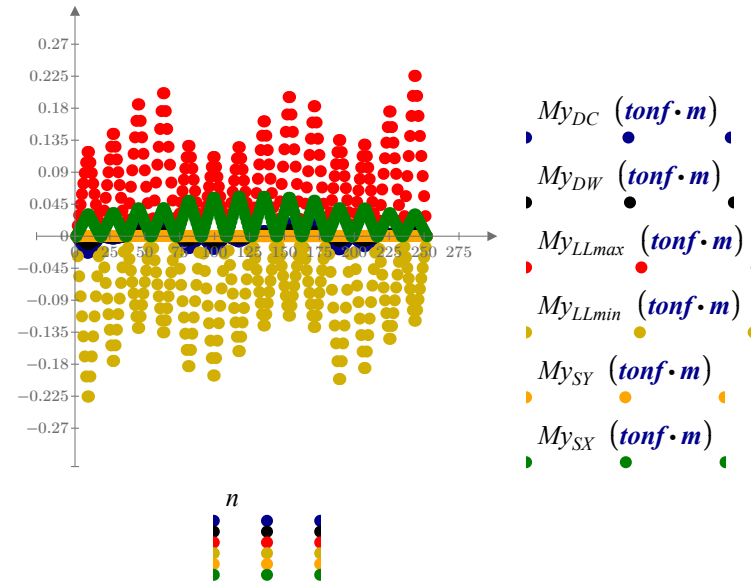
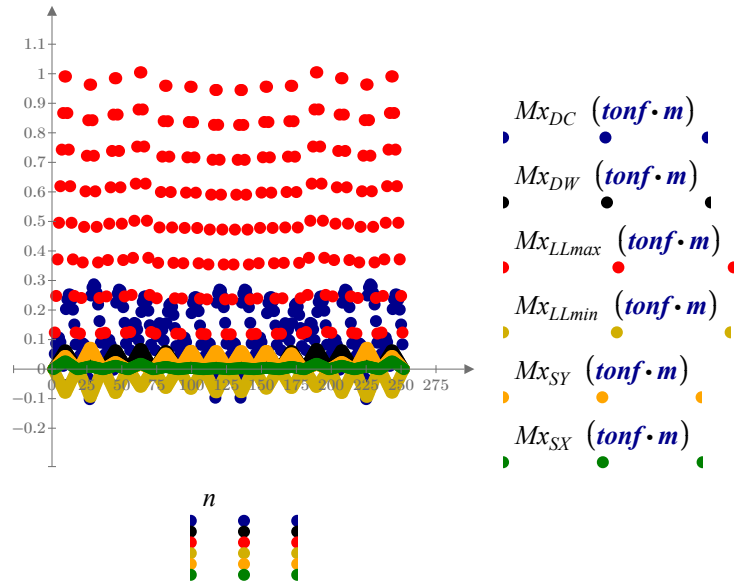
$C_w = (2.5 \cdot 10^5) \text{ cm}^6$

$J = 81.581 \text{ cm}^4$

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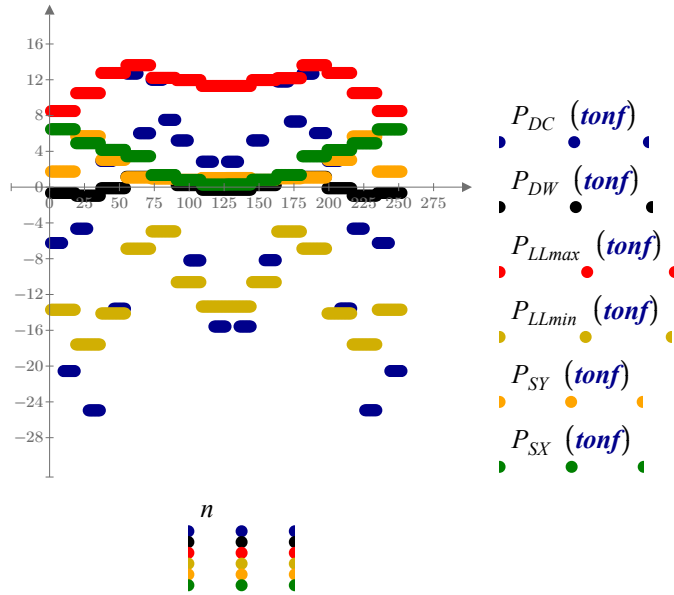
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Demandas



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Demanada última

$$PU_{Strenght1a_i} := \begin{bmatrix} 1.25 & 1.5 & 1.75 & 0 & 0 & 0 \end{bmatrix} \cdot \begin{bmatrix} \|P_{DC_i}\| & \|P_{DW_i}\| & \|P_{LLmax_i}\| & \|P_{LLmin_i}\| & \|P_{SY_i}\| & \|P_{SX_i}\| \end{bmatrix}^T$$

$$PU_{Strenght1b_i} := \begin{bmatrix} 1.25 & 1.5 & 0 & 1.75 & 0 & 0 \end{bmatrix} \cdot \begin{bmatrix} \|P_{DC_i}\| & \|P_{DW_i}\| & \|P_{LLmax_i}\| & \|P_{LLmin_i}\| & \|P_{SY_i}\| & \|P_{SX_i}\| \end{bmatrix}^T$$

$$PU_{Service1a_i} := \begin{bmatrix} 1 & 1 & 1.3 & 0 & 0 & 0 \end{bmatrix} \cdot \begin{bmatrix} \|P_{DC_i}\| & \|P_{DW_i}\| & \|P_{LLmax_i}\| & \|P_{LLmin_i}\| & \|P_{SY_i}\| & \|P_{SX_i}\| \end{bmatrix}^T$$

$$PU_{Service1b_i} := \begin{bmatrix} 1 & 1 & 0 & 1.3 & 0 & 0 \end{bmatrix} \cdot \begin{bmatrix} \|P_{DC_i}\| & \|P_{DW_i}\| & \|P_{LLmax_i}\| & \|P_{LLmin_i}\| & \|P_{SY_i}\| & \|P_{SX_i}\| \end{bmatrix}^T$$

$$PU_{ExtremEvent1a_i} := \begin{bmatrix} 1 & 1 & 0.5 & 0 & \frac{1}{R} & \frac{0.3}{R} \end{bmatrix} \cdot \begin{bmatrix} \|P_{DC_i}\| & \|P_{DW_i}\| & \|P_{LLmax_i}\| & \|P_{LLmin_i}\| & \|P_{SY_i}\| & \|P_{SX_i}\| \end{bmatrix}^T$$

$$PU_{ExtremEvent1b_i} := \begin{bmatrix} 1 & 1 & 0.5 & 0 & \frac{0.3}{R} & \frac{1}{R} \end{bmatrix} \cdot \begin{bmatrix} \|P_{DC_i}\| & \|P_{DW_i}\| & \|P_{LLmax_i}\| & \|P_{LLmin_i}\| & \|P_{SY_i}\| & \|P_{SX_i}\| \end{bmatrix}^T$$

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$$PU_{ExtremEventIc_i} := \begin{bmatrix} 1 & 1 & 0 & 0.5 & \frac{1}{R} & \frac{0.3}{R} \end{bmatrix} \cdot \left[\begin{bmatrix} \|P_{DC_i}\| & \|P_{DW_i}\| & \|P_{LLmax_i}\| & \|P_{LLmin_i}\| & \|P_{SY_i}\| & \|P_{SX_i}\| \end{bmatrix} \right]^T$$

$$PU_{ExtremEventId_i} := \begin{bmatrix} 1 & 1 & 0 & 0.5 & \frac{0.3}{R} & \frac{1}{R} \end{bmatrix} \cdot \left[\begin{bmatrix} \|P_{DC_i}\| & \|P_{DW_i}\| & \|P_{LLmax_i}\| & \|P_{LLmin_i}\| & \|P_{SY_i}\| & \|P_{SX_i}\| \end{bmatrix} \right]^T$$

$$MUx_{StrenghtIa_i} := \begin{bmatrix} 1.25 & 1.5 & 1.75 & 0 & 0 & 0 \end{bmatrix} \cdot \left[\begin{bmatrix} \|Mx_{DC_i}\| & \|Mx_{DW_i}\| & \|Mx_{LLmax_i}\| & \|Mx_{LLmin_i}\| & \|Mx_{SY_i}\| & \|Mx_{SX_i}\| \end{bmatrix} \right]^T$$

$$MUx_{StrenghtIb_i} := \begin{bmatrix} 1.25 & 1.5 & 0 & 1.75 & 0 & 0 \end{bmatrix} \cdot \left[\begin{bmatrix} \|Mx_{DC_i}\| & \|Mx_{DW_i}\| & \|Mx_{LLmax_i}\| & \|Mx_{LLmin_i}\| & \|Mx_{SY_i}\| & \|Mx_{SX_i}\| \end{bmatrix} \right]^T$$

$$MUx_{ServiceIIa_i} := \begin{bmatrix} 1 & 1 & 1.3 & 0 & 0 & 0 \end{bmatrix} \cdot \left[\begin{bmatrix} \|Mx_{DC_i}\| & \|Mx_{DW_i}\| & \|Mx_{LLmax_i}\| & \|Mx_{LLmin_i}\| & \|Mx_{SY_i}\| & \|Mx_{SX_i}\| \end{bmatrix} \right]^T$$

$$MUx_{ServiceIIb_i} := \begin{bmatrix} 1 & 1 & 0 & 1.3 & 0 & 0 \end{bmatrix} \cdot \left[\begin{bmatrix} \|Mx_{DC_i}\| & \|Mx_{DW_i}\| & \|Mx_{LLmax_i}\| & \|Mx_{LLmin_i}\| & \|Mx_{SY_i}\| & \|Mx_{SX_i}\| \end{bmatrix} \right]^T$$

$$MUx_{ExtremEventIa_i} := \begin{bmatrix} 1 & 1 & 0.5 & 0 & \frac{1}{R} & \frac{0.3}{R} \end{bmatrix} \cdot \left[\begin{bmatrix} \|Mx_{DC_i}\| & \|Mx_{DW_i}\| & \|Mx_{LLmax_i}\| & \|Mx_{LLmin_i}\| & \|Mx_{SY_i}\| & \|Mx_{SX_i}\| \end{bmatrix} \right]^T$$

$$MUx_{ExtremEventIb_i} := \begin{bmatrix} 1 & 1 & 0.5 & 0 & \frac{0.3}{R} & \frac{1}{R} \end{bmatrix} \cdot \left[\begin{bmatrix} \|Mx_{DC_i}\| & \|Mx_{DW_i}\| & \|Mx_{LLmax_i}\| & \|Mx_{LLmin_i}\| & \|Mx_{SY_i}\| & \|Mx_{SX_i}\| \end{bmatrix} \right]^T$$

$$MUx_{ExtremEventIc_i} := \begin{bmatrix} 1 & 1 & 0 & 0.5 & \frac{1}{R} & \frac{0.3}{R} \end{bmatrix} \cdot \left[\begin{bmatrix} \|Mx_{DC_i}\| & \|Mx_{DW_i}\| & \|Mx_{LLmax_i}\| & \|Mx_{LLmin_i}\| & \|Mx_{SY_i}\| & \|Mx_{SX_i}\| \end{bmatrix} \right]^T$$

$$MUx_{ExtremEventId_i} := \begin{bmatrix} 1 & 1 & 0 & 0.5 & \frac{0.3}{R} & \frac{1}{R} \end{bmatrix} \cdot \left[\begin{bmatrix} \|Mx_{DC_i}\| & \|Mx_{DW_i}\| & \|Mx_{LLmax_i}\| & \|Mx_{LLmin_i}\| & \|Mx_{SY_i}\| & \|Mx_{SX_i}\| \end{bmatrix} \right]^T$$

$$MUy_{StrenghtIa_i} := \begin{bmatrix} 1.25 & 1.5 & 1.75 & 0 & 0 & 0 \end{bmatrix} \cdot \left[\begin{bmatrix} \|My_{DC_i}\| & \|My_{DW_i}\| & \|My_{LLmax_i}\| & \|My_{LLmin_i}\| & \|My_{SY_i}\| & \|My_{SX_i}\| \end{bmatrix} \right]^T$$

$$MUy_{StrenghtIb_i} := \begin{bmatrix} 1.25 & 1.5 & 0 & 1.75 & 0 & 0 \end{bmatrix} \cdot \left[\begin{bmatrix} \|My_{DC_i}\| & \|My_{DW_i}\| & \|My_{LLmax_i}\| & \|My_{LLmin_i}\| & \|My_{SY_i}\| & \|My_{SX_i}\| \end{bmatrix} \right]^T$$

$$MUy_{ServiceIIa_i} := \begin{bmatrix} 1 & 1 & 1.3 & 0 & 0 & 0 \end{bmatrix} \cdot \left[\begin{bmatrix} \|My_{DC_i}\| & \|My_{DW_i}\| & \|My_{LLmax_i}\| & \|My_{LLmin_i}\| & \|My_{SY_i}\| & \|My_{SX_i}\| \end{bmatrix} \right]^T$$

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$$MUy_{Service11b_i} := \begin{bmatrix} 1 & 1 & 0 & 1.3 & 0 & 0 \end{bmatrix} \cdot \left[\begin{bmatrix} \|My_{DC_i}\| & \|My_{DW_i}\| & \|My_{LLmax_i}\| & \|My_{LLmin_i}\| & \|My_{SY_i}\| & \|My_{SX_i}\| \end{bmatrix} \right]^T$$

$$MUy_{ExtremEvent1a_i} := \begin{bmatrix} 1 & 1 & 0.5 & 0 & \frac{1}{R} & \frac{0.3}{R} \end{bmatrix} \cdot \left[\begin{bmatrix} \|My_{DC_i}\| & \|My_{DW_i}\| & \|My_{LLmax_i}\| & \|My_{LLmin_i}\| & \|My_{SY_i}\| & \|My_{SX_i}\| \end{bmatrix} \right]^T$$

$$MUy_{ExtremEvent1b_i} := \begin{bmatrix} 1 & 1 & 0.5 & 0 & \frac{0.3}{R} & \frac{1}{R} \end{bmatrix} \cdot \left[\begin{bmatrix} \|My_{DC_i}\| & \|My_{DW_i}\| & \|My_{LLmax_i}\| & \|My_{LLmin_i}\| & \|My_{SY_i}\| & \|My_{SX_i}\| \end{bmatrix} \right]^T$$

$$MUy_{ExtremEvent1c_i} := \begin{bmatrix} 1 & 1 & 0 & 0.5 & \frac{1}{R} & \frac{0.3}{R} \end{bmatrix} \cdot \left[\begin{bmatrix} \|My_{DC_i}\| & \|My_{DW_i}\| & \|My_{LLmax_i}\| & \|My_{LLmin_i}\| & \|My_{SY_i}\| & \|My_{SX_i}\| \end{bmatrix} \right]^T$$

$$MUy_{ExtremEvent1d_i} := \begin{bmatrix} 1 & 1 & 0 & 0.5 & \frac{0.3}{R} & \frac{1}{R} \end{bmatrix} \cdot \left[\begin{bmatrix} \|My_{DC_i}\| & \|My_{DW_i}\| & \|My_{LLmax_i}\| & \|My_{LLmin_i}\| & \|My_{SY_i}\| & \|My_{SX_i}\| \end{bmatrix} \right]^T$$

$$VUx_{Strenght1a_i} := \begin{bmatrix} 1.25 & 1.5 & 1.75 & 0 & 0 & 0 \end{bmatrix} \cdot \left[\begin{bmatrix} \|Vx_{DC_i}\| & \|Vx_{DW_i}\| & \|Vx_{LLmax_i}\| & \|Vx_{LLmin_i}\| & \|Vx_{SY_i}\| & \|Vx_{SX_i}\| \end{bmatrix} \right]^T$$

$$VUx_{Strenght1b_i} := \begin{bmatrix} 1.25 & 1.5 & 0 & 1.75 & 0 & 0 \end{bmatrix} \cdot \left[\begin{bmatrix} \|Vx_{DC_i}\| & \|Vx_{DW_i}\| & \|Vx_{LLmax_i}\| & \|Vx_{LLmin_i}\| & \|Vx_{SY_i}\| & \|Vx_{SX_i}\| \end{bmatrix} \right]^T$$

$$VUx_{Service11a_i} := \begin{bmatrix} 1 & 1 & 1.3 & 0 & 0 & 0 \end{bmatrix} \cdot \left[\begin{bmatrix} \|Vx_{DC_i}\| & \|Vx_{DW_i}\| & \|Vx_{LLmax_i}\| & \|Vx_{LLmin_i}\| & \|Vx_{SY_i}\| & \|Vx_{SX_i}\| \end{bmatrix} \right]^T$$

$$VUx_{Service11b_i} := \begin{bmatrix} 1 & 1 & 0 & 1.3 & 0 & 0 \end{bmatrix} \cdot \left[\begin{bmatrix} \|Vx_{DC_i}\| & \|Vx_{DW_i}\| & \|Vx_{LLmax_i}\| & \|Vx_{LLmin_i}\| & \|Vx_{SY_i}\| & \|Vx_{SX_i}\| \end{bmatrix} \right]^T$$

$$VUx_{ExtremEvent1a_i} := \begin{bmatrix} 1 & 1 & 0.5 & 0 & \frac{1}{R} & \frac{0.3}{R} \end{bmatrix} \cdot \left[\begin{bmatrix} \|Vx_{DC_i}\| & \|Vx_{DW_i}\| & \|Vx_{LLmax_i}\| & \|Vx_{LLmin_i}\| & \|Vx_{SY_i}\| & \|Vx_{SX_i}\| \end{bmatrix} \right]^T$$

$$VUx_{ExtremEvent1b_i} := \begin{bmatrix} 1 & 1 & 0.5 & 0 & \frac{0.3}{R} & \frac{1}{R} \end{bmatrix} \cdot \left[\begin{bmatrix} \|Vx_{DC_i}\| & \|Vx_{DW_i}\| & \|Vx_{LLmax_i}\| & \|Vx_{LLmin_i}\| & \|Vx_{SY_i}\| & \|Vx_{SX_i}\| \end{bmatrix} \right]^T$$

$$VUx_{ExtremEvent1c_i} := \begin{bmatrix} 1 & 1 & 0 & 0.5 & \frac{1}{R} & \frac{0.3}{R} \end{bmatrix} \cdot \left[\begin{bmatrix} \|Vx_{DC_i}\| & \|Vx_{DW_i}\| & \|Vx_{LLmax_i}\| & \|Vx_{LLmin_i}\| & \|Vx_{SY_i}\| & \|Vx_{SX_i}\| \end{bmatrix} \right]^T$$

$$VUx_{ExtremEvent1d_i} := \begin{bmatrix} 1 & 1 & 0 & 0.5 & \frac{0.3}{R} & \frac{1}{R} \end{bmatrix} \cdot \left[\begin{bmatrix} \|Vx_{DC_i}\| & \|Vx_{DW_i}\| & \|Vx_{LLmax_i}\| & \|Vx_{LLmin_i}\| & \|Vx_{SY_i}\| & \|Vx_{SX_i}\| \end{bmatrix} \right]^T$$

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$$VUy_{Strenght1a_i} := [1.25 \ 1.5 \ 1.75 \ 0 \ 0 \ 0] \cdot \left[\left\| \dot{Y}_{DC_i} \right\| \ \left\| \dot{Y}_{DW_i} \right\| \ \left\| \dot{Y}_{LLmax_i} \right\| \ \left\| \dot{Y}_{LLmin_i} \right\| \ \left\| \dot{Y}_{SY_i} \right\| \ \left\| \dot{Y}_{SX_i} \right\| \right]^T$$

$$VUy_{Strenght1b_i} := [1.25 \ 1.5 \ 0 \ 1.75 \ 0 \ 0] \cdot \left[\left\| \dot{Y}_{DC_i} \right\| \ \left\| \dot{Y}_{DW_i} \right\| \ \left\| \dot{Y}_{LLmax_i} \right\| \ \left\| \dot{Y}_{LLmin_i} \right\| \ \left\| \dot{Y}_{SY_i} \right\| \ \left\| \dot{Y}_{SX_i} \right\| \right]^T$$

$$VUy_{Service1a_i} := [1 \ 1 \ 1.3 \ 0 \ 0 \ 0] \cdot \left[\left\| \dot{Y}_{DC_i} \right\| \ \left\| \dot{Y}_{DW_i} \right\| \ \left\| \dot{Y}_{LLmax_i} \right\| \ \left\| \dot{Y}_{LLmin_i} \right\| \ \left\| \dot{Y}_{SY_i} \right\| \ \left\| \dot{Y}_{SX_i} \right\| \right]^T$$

$$VUy_{Service1b_i} := [1 \ 1 \ 0 \ 1.3 \ 0 \ 0] \cdot \left[\left\| \dot{Y}_{DC_i} \right\| \ \left\| \dot{Y}_{DW_i} \right\| \ \left\| \dot{Y}_{LLmax_i} \right\| \ \left\| \dot{Y}_{LLmin_i} \right\| \ \left\| \dot{Y}_{SY_i} \right\| \ \left\| \dot{Y}_{SX_i} \right\| \right]^T$$

$$VUy_{ExtremEvent1a_i} := \left[1 \ 1 \ 0.5 \ 0 \ \frac{1}{R} \ \frac{0.3}{R} \right] \cdot \left[\left\| \dot{Y}_{DC_i} \right\| \ \left\| \dot{Y}_{DW_i} \right\| \ \left\| \dot{Y}_{LLmax_i} \right\| \ \left\| \dot{Y}_{LLmin_i} \right\| \ \left\| \dot{Y}_{SY_i} \right\| \ \left\| \dot{Y}_{SX_i} \right\| \right]^T$$

$$VUy_{ExtremEvent1b_i} := \left[1 \ 1 \ 0.5 \ 0 \ \frac{0.3}{R} \ \frac{1}{R} \right] \cdot \left[\left\| \dot{Y}_{DC_i} \right\| \ \left\| \dot{Y}_{DW_i} \right\| \ \left\| \dot{Y}_{LLmax_i} \right\| \ \left\| \dot{Y}_{LLmin_i} \right\| \ \left\| \dot{Y}_{SY_i} \right\| \ \left\| \dot{Y}_{SX_i} \right\| \right]^T$$

$$VUy_{ExtremEvent1c_i} := \left[1 \ 1 \ 0 \ 0.5 \ \frac{1}{R} \ \frac{0.3}{R} \right] \cdot \left[\left\| \dot{Y}_{DC_i} \right\| \ \left\| \dot{Y}_{DW_i} \right\| \ \left\| \dot{Y}_{LLmax_i} \right\| \ \left\| \dot{Y}_{LLmin_i} \right\| \ \left\| \dot{Y}_{SY_i} \right\| \ \left\| \dot{Y}_{SX_i} \right\| \right]^T$$

$G := 11200 \text{ } \mathbf{ksi}$

$$VUy_{ExtremEvent1d_i} := \left[1 \ 1 \ 0 \ 0.5 \ \frac{0.3}{R} \ \frac{1}{R} \right] \cdot \left[\left\| \dot{Y}_{DC_i} \right\| \ \left\| \dot{Y}_{DW_i} \right\| \ \left\| \dot{Y}_{LLmax_i} \right\| \ \left\| \dot{Y}_{LLmin_i} \right\| \ \left\| \dot{Y}_{SY_i} \right\| \ \left\| \dot{Y}_{SX_i} \right\| \right]^T$$

Capacidad a Flexión

$$\phi_b := 0.9$$

$$L_b := 3.87 \cdot m$$

$$C_b := 1$$

Clasificación de la sección por pandeo Local

(A

Alas

$$\lambda_f := \frac{b_f}{2 \cdot t_f} = 5.92$$

$$\lambda_{pf} := 0.38 \cdot \sqrt{\frac{E}{F_y}} = 9.152$$

$$\lambda_{rf} := 1.0 \cdot \sqrt{\frac{E}{F_y}} = 24.083$$

Alas → “Sección No Compacta”

Alma

$$h := D - 2 \cdot t_f = 0.181 \cdot m$$

$$\lambda_w := \frac{h}{t_w} = 17.825$$

$$\lambda_{pw} := 3.76 \cdot \sqrt{\frac{E}{F_y}} = 90.553$$

$$\lambda_{rw} := 5.70 \cdot \sqrt{\frac{E}{F_y}} = 137.274$$

Alma → “Sección Compacta”

Capacidad de una sección doblemente simétrica compacta alrededor del eje fuerte

- Cedencia

$$M_p := F_y \cdot Z_x = 31.115 \cdot tonf \cdot m$$

- Pandeo Lateral Torsional

$$r_{ts} := \sqrt{\frac{\sqrt{I_y \cdot C_w}}{S_x}} = 0.06 \cdot m$$

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$$c := \left(\frac{h_o}{2} \right) \cdot \sqrt{\frac{I_y}{C_w}} = 1$$

$$L_p := 1.76 \cdot r_y \cdot \sqrt{\frac{E}{F_y}} = 2.239 \text{ m}$$

$$L_r := 1.95 \cdot r_{ts} \cdot \left(\frac{E}{(0.7 \cdot F_y)} \right) \cdot \sqrt{\left(\frac{(J \cdot c)}{(S_x \cdot h_o)} \right) + \sqrt{\left(\frac{(J \cdot c)}{(S_x \cdot h_o)} \right)^2 + 6.76 \cdot \left(\frac{(0.7 \cdot F_y)}{E} \right)^2}} = 10.728 \text{ m}$$

$$F_{cr}(l_b) := \left(\frac{(C_b \cdot \pi^2 \cdot E)}{\left(\frac{l_b}{r_{ts}} \right)^2} \right) \cdot \sqrt{1 + 0.078 \cdot \left(\frac{(J \cdot c)}{(S_x \cdot h_o)} \right) \cdot \left(\frac{l_b}{r_{ts}} \right)^2}$$

$$M_{nl}(l_b) := \text{if} \left(l_b \leq L_p, M_p, \left(\text{if} \left(l_b \leq L_r, C_b \cdot \left(M_p - (M_p - 0.7 \cdot F_y \cdot S_x) \cdot \left(\frac{(l_b - L_p)}{(L_r - L_p)} \right) \right), F_{cr}(l_b) \cdot S_x \right) \right) \right)$$

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Capacidad de una sección doblemente simétrica con alma compacta y patines no compactos o esbeltos alrededor del eje fuerte

- Pandeo Local por compresión del patín

$$k_c := \frac{4}{\sqrt{\frac{h}{t_w}}} = 0.947$$

$$M_{n2}(\lambda) := \left\| \begin{array}{l} \text{if } \lambda < \lambda_{pf} \\ \quad \left\| M_p \right. \\ \text{also if } \lambda_{pf} < \lambda < \lambda_{rf} \\ \quad \left\| \left(M_p - (M_p - 0.7 \cdot F_y \cdot S_x) \cdot \left(\frac{\lambda - \lambda_{pf}}{\lambda_{rf} - \lambda_{pf}} \right) \right) \right. \\ \text{else} \\ \quad \left\| \frac{0.9 \cdot E \cdot k_c \cdot S_x}{\lambda^2} \right. \end{array} \right\|$$

Capacidad de una sección doblemente simétrica con alma no compacta alrededor del eje fuerte

- Pandeo Local por compresión del patín

$$M_{n3}(\lambda) := \left\| \begin{array}{l} \text{if } \lambda < \lambda_{pf} \\ \quad \left\| M_p \right. \\ \text{also if } \lambda_{pf} < \lambda < \lambda_{rf} \\ \quad \left\| \left(M_p - (M_p - 0.7 \cdot F_y \cdot S_x) \cdot \left(\frac{\lambda - \lambda_{pf}}{\lambda_{rf} - \lambda_{pf}} \right) \right) \right. \\ \text{else} \\ \quad \left\| \frac{0.9 \cdot E \cdot k_c \cdot S_x}{\lambda^2} \right. \end{array} \right\|$$

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$$M_{nx} := \left\| \begin{array}{l} \text{if } Alas = \text{"Sección Compacta"} \\ \left\| \begin{array}{l} \text{if } Alma = \text{"Sección Compacta"} \\ \left\| M_{n1} (L_b) \right. \\ \text{else} \\ \left\| M_{n3} (\lambda f) \right. \end{array} \right\| \\ \text{else} \\ \left\| \begin{array}{l} \text{if } Alma = \text{"Sección Compacta"} \\ \left\| M_{n2} (\lambda f) \right. \\ \text{else} \\ \left\| M_{n3} (\lambda f) \right. \end{array} \right\| \end{array} \right\| = 31.115 \text{ tonf} \cdot m$$

Capacidad de la sección alrededor del eje debil (**AISC 360-10.F6**)

- Cedencia

$$M_{py} := \min (F_y \cdot Z_y, 1.6 \cdot F_y \cdot S_y)$$

- Pandeo Local del ala

$$F_{crf}(\lambda_f) := \frac{(0.69 \cdot E)}{(\lambda_f)^2}$$

$$M_{ny}(\lambda_f) := \text{if} \left(\lambda_f \leq \lambda_{pf}, M_{py}, \text{if} \left(\lambda_f \leq \lambda_{rf}, \left(M_{py} - (M_{py} - 0.7 \cdot F_y \cdot S_y) \cdot \left(\frac{(\lambda_f - \lambda_{pf})}{(\lambda_{rf} - \lambda_{pf})} \right) \right), F_{crf}(\lambda_f) \cdot S_y \right) \right)$$

$$M_{ny} := M_{ny}(\lambda_f)$$

Capacidad a Compresión

Clasificación de la sección por pandeo Local

Alas

$$\lambda_f := \frac{b_f}{2 \cdot t_f} = 5.92$$

$$\lambda_{rf} := 0.56 \cdot \sqrt{\frac{E}{F_y}} = 13.487$$

Alas → “Sección Compacta”

Alma

$$h := D - 2 \cdot t_f = 0.181 \text{ m}$$

$$\lambda_w := \frac{h}{t_w} = 17.825$$

$$\lambda_{rw} := 1.49 \cdot \sqrt{\frac{E}{F_y}} = 35.884$$

Alma → “Sección Compacta”

$$K := 1$$

$$r := \max(r_x, r_y) = 0.092 \text{ m}$$

$$F_e := \frac{\pi^2 \cdot E}{\left(\frac{K \cdot L}{r}\right)^2} = (2.77 \cdot 10^8) \text{ Pa}$$

$$F_{cr} := \left\| \begin{array}{l} \text{if } \frac{F_y}{F_e} \leq 2.25 \\ \left\| \left(0.658 \frac{F_y}{F_e}\right) \cdot F_y \right\| \\ \text{else} \\ \left\| 0.877 \cdot F_e \right\| \end{array} \right\| = (2.048 \cdot 10^8) \text{ Pa}$$

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$$b_e := \left\| \begin{array}{l} \text{if } \lambda w \geq 1.49 \cdot \sqrt{\frac{E}{F_{cr}}} \\ \left\| \left(1.92 \cdot t_w \cdot \sqrt{\frac{E}{F_{cr}}} \cdot \left(1 - \frac{0.34}{\left(\frac{h}{t_w} \right)} \cdot \sqrt{\frac{E}{F_{cr}}} \right) \right) \right\| \\ \text{else} \\ h \end{array} \right\| = 0.181 \text{ } m$$

$$A_e := b_e \cdot t_w = 0.002 \text{ } m^2$$

$$A_{gl} := h \cdot t_w = 0.002 \text{ } m^2$$

$$Q_a := \frac{A_e}{A_{gl}} = 1$$

$$Q_s := \left\| \begin{array}{l} \text{if } \frac{b_f}{2 \cdot t_f} \leq 0.56 \cdot \sqrt{\frac{E}{F_y}} \\ \left\| 1 \right\| \\ \text{also if } 0.56 \cdot \sqrt{\frac{E}{F_y}} < \frac{b_f}{2 \cdot t_f} \leq 1.03 \cdot \sqrt{\frac{E}{F_y}} \\ \left\| 1.415 - 0.74 \cdot \left(\frac{b_f}{2 \cdot t_f} \right) \cdot \sqrt{\frac{F_y}{E}} \right\| \\ \text{else} \\ \left\| \frac{0.69 \cdot E}{F_y \cdot \left(\frac{b_f}{2 \cdot t_f} \right)^2} \right\| \end{array} \right\| = 1$$

$$Q := Q_a \cdot Q_s$$

$$F_{cr} := \left\| \begin{array}{l} \text{if } \frac{Q \cdot F_y}{F_e} \leq 2.25 \\ \left\| \left(0.658 \sqrt{\frac{Q \cdot F_y}{F_e}} \right) \cdot Q \cdot F_y \right\| \\ \text{else} \\ \left\| 0.877 \cdot F_e \right\| \end{array} \right\| = (2.048 \cdot 10^8) \text{ } Pa$$

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$$P_n := F_{cr} \cdot A_g = 209.363 \text{ tonf}$$

$$\phi_c := 0.9$$

Flexo compresión

$$RazonCapacidad1_i := \left\| \begin{array}{l} \text{if } \frac{PU_{Strenght1a_i}}{\phi_c \cdot P_n} \geq 0.2 \\ \left\| \frac{PU_{Strenght1a_i}}{\phi_c \cdot P_n} + \frac{8}{9} \cdot \left(\frac{MUx_{Strenght1a_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{Strenght1a_i}}{\phi_b \cdot M_{ny}} \right) \right\| \\ \text{else} \\ \left\| \frac{PU_{Strenght1a_i}}{2 \cdot \phi_c \cdot P_n} + \left(\frac{MUx_{Strenght1a_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{Strenght1a_i}}{\phi_b \cdot M_{ny}} \right) \right\| \end{array} \right\|$$

$$RazonCapacidad2_i := \left\| \begin{array}{l} \text{if } \frac{PU_{Strenght1b_i}}{\phi_c \cdot P_n} \geq 0.2 \\ \left\| \frac{PU_{Strenght1b_i}}{\phi_c \cdot P_n} + \frac{8}{9} \cdot \left(\frac{MUx_{Strenght1b_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{Strenght1b_i}}{\phi_b \cdot M_{ny}} \right) \right\| \\ \text{else} \\ \left\| \frac{PU_{Strenght1b_i}}{2 \cdot \phi_c \cdot P_n} + \left(\frac{MUx_{Strenght1b_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{Strenght1b_i}}{\phi_b \cdot M_{ny}} \right) \right\| \end{array} \right\|$$

$$RazonCapacidad3_i := \left\| \begin{array}{l} \text{if } \frac{PU_{Service1a_i}}{\phi_c \cdot P_n} \geq 0.2 \\ \left\| \frac{PU_{Service1a_i}}{\phi_c \cdot P_n} + \frac{8}{9} \cdot \left(\frac{MUx_{Service1a_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{Service1a_i}}{\phi_b \cdot M_{ny}} \right) \right\| \\ \text{else} \\ \left\| \frac{PU_{Service1a_i}}{2 \cdot \phi_c \cdot P_n} + \left(\frac{MUx_{Service1a_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{Service1a_i}}{\phi_b \cdot M_{ny}} \right) \right\| \end{array} \right\|$$

$$RazonCapacidad4_i := \left\| \begin{array}{l} \text{if } \frac{PU_{Service1b_i}}{\phi_c \cdot P_n} \geq 0.2 \\ \left\| \frac{PU_{Service1b_i}}{\phi_c \cdot P_n} + \frac{8}{9} \cdot \left(\frac{MUx_{Service1b_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{Service1b_i}}{\phi_b \cdot M_{ny}} \right) \right\| \\ \text{else} \\ \left\| \frac{PU_{Service1b_i}}{2 \cdot \phi_c \cdot P_n} + \left(\frac{MUx_{Service1b_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{Service1b_i}}{\phi_b \cdot M_{ny}} \right) \right\| \end{array} \right\|$$

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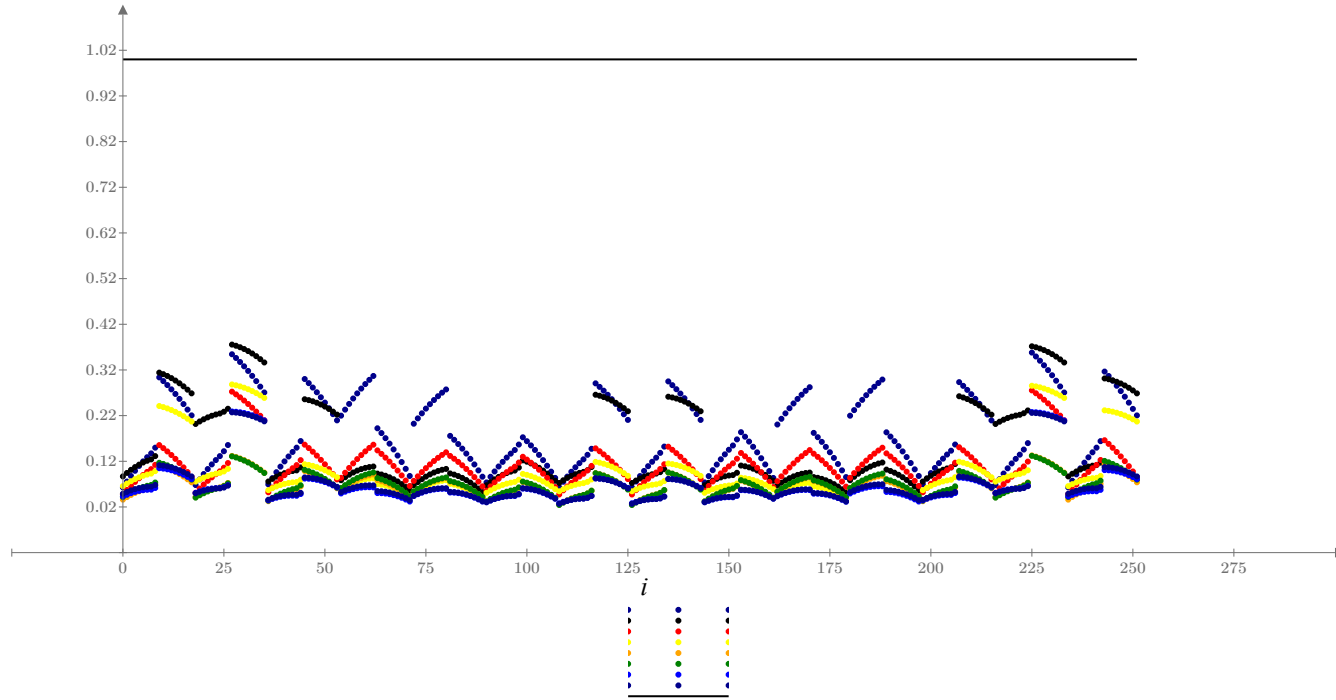
$$\begin{aligned}
 \text{RazonCapacidad5}_i &:= \left\| \begin{array}{l} \text{if } \frac{PU_{ExtremEventIa_i}}{\phi_c \cdot P_n} \geq 0.2 \\ \left\| \frac{PU_{ExtremEventIa_i}}{\phi_c \cdot P_n} + \frac{8}{9} \cdot \left(\frac{MUx_{ExtremEventIa_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{ExtremEventIa_i}}{\phi_b \cdot M_{ny}} \right) \right\| \\ \text{else} \\ \left\| \frac{PU_{ExtremEventIa_i}}{2 \cdot \phi_c \cdot P_n} + \left(\frac{MUx_{ExtremEventIa_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{ExtremEventIa_i}}{\phi_b \cdot M_{ny}} \right) \right\| \end{array} \right\| \\
 \text{RazonCapacidad6}_i &:= \left\| \begin{array}{l} \text{if } \frac{PU_{ExtremEventIb_i}}{\phi_c \cdot P_n} \geq 0.2 \\ \left\| \frac{PU_{ExtremEventIb_i}}{\phi_c \cdot P_n} + \frac{8}{9} \cdot \left(\frac{MUx_{ExtremEventIb_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{ExtremEventIb_i}}{\phi_b \cdot M_{ny}} \right) \right\| \\ \text{else} \\ \left\| \frac{PU_{ExtremEventIb_i}}{2 \cdot \phi_c \cdot P_n} + \left(\frac{MUx_{ExtremEventIb_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{ExtremEventIb_i}}{\phi_b \cdot M_{ny}} \right) \right\| \end{array} \right\|
 \end{aligned}$$

$$\begin{aligned}
 \text{RazonCapacidad7}_i &:= \left\| \begin{array}{l} \text{if } \frac{PU_{ExtremEventIc_i}}{\phi_c \cdot P_n} \geq 0.2 \\ \left\| \frac{PU_{ExtremEventIc_i}}{\phi_c \cdot P_n} + \frac{8}{9} \cdot \left(\frac{MUx_{ExtremEventIc_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{ExtremEventIc_i}}{\phi_b \cdot M_{ny}} \right) \right\| \\ \text{else} \\ \left\| \frac{PU_{ExtremEventIc_i}}{2 \cdot \phi_c \cdot P_n} + \left(\frac{MUx_{ExtremEventIc_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{ExtremEventIc_i}}{\phi_b \cdot M_{ny}} \right) \right\| \end{array} \right\|
 \end{aligned}$$

$$\begin{aligned}
 \text{RazonCapacidad8}_i &:= \left\| \begin{array}{l} \text{if } \frac{PU_{ExtremEventId_i}}{\phi_c \cdot P_n} \geq 0.2 \\ \left\| \frac{PU_{ExtremEventId_i}}{\phi_c \cdot P_n} + \frac{8}{9} \cdot \left(\frac{MUx_{ExtremEventId_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{ExtremEventId_i}}{\phi_b \cdot M_{ny}} \right) \right\| \\ \text{else} \\ \left\| \frac{PU_{ExtremEventId_i}}{2 \cdot \phi_c \cdot P_n} + \left(\frac{MUx_{ExtremEventId_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{ExtremEventId_i}}{\phi_b \cdot M_{ny}} \right) \right\| \end{array} \right\|
 \end{aligned}$$

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Cortante

$$\phi_v := 0.9$$

$$A_w := h \cdot t_w = 0.002 \text{ m}^2$$

$$C_v := 1.0$$

$$V_n := 0.6 \cdot F_y \cdot A_w \cdot C_v = 42.78 \text{ tonf}$$

$$RazonCapacidad1_i := \frac{VUx_{Strenght1a_i}}{V_n}$$

$$RazonCapacidad2_i := \frac{VUx_{Strenght1b_i}}{V_n}$$

$$RazonCapacidad3_i := \frac{VUx_{Service1a_i}}{V_n}$$

$$RazonCapacidad4_i := \frac{VUx_{Service1b_i}}{V_n}$$

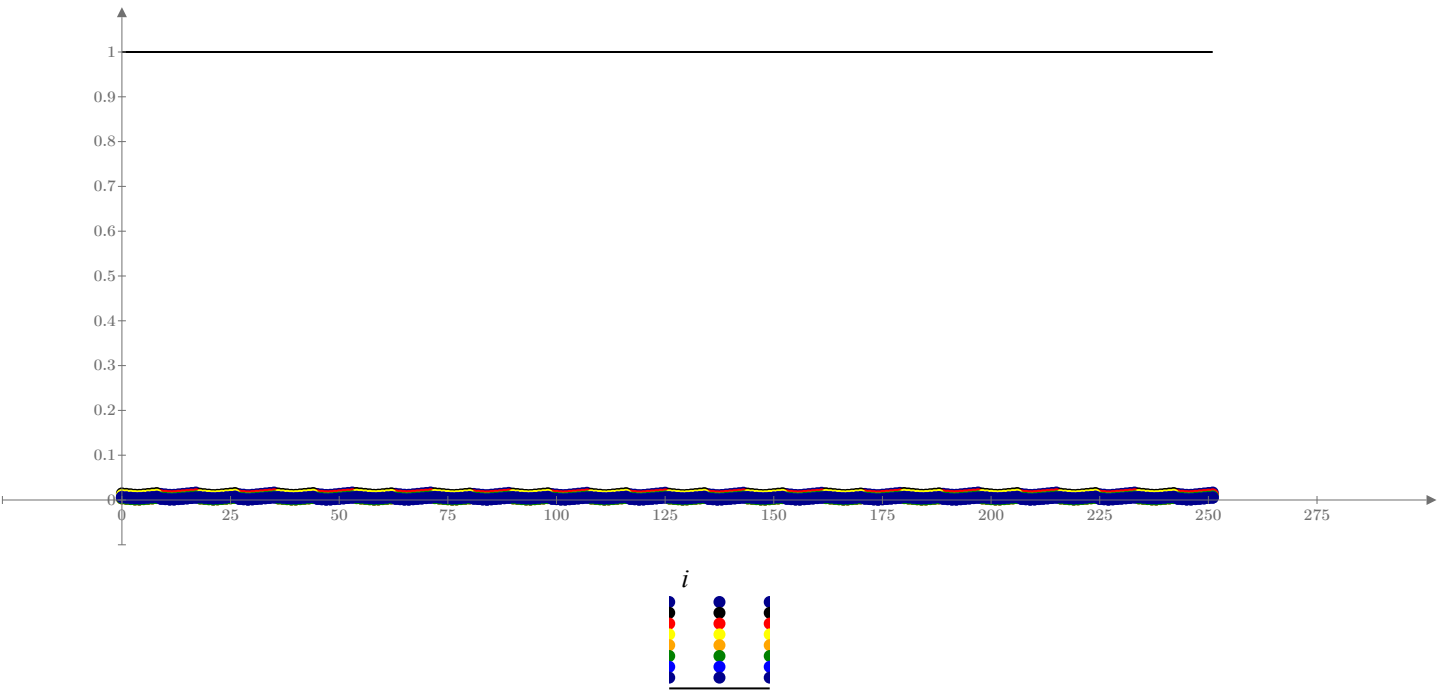
$$RazonCapacidad5_i := \frac{VUx_{ExtremEvent1a_i}}{V_n}$$

$$RazonCapacidad6_i := \frac{VUx_{ExtremEvent1b_i}}{V_n}$$

$$RazonCapacidad7_i := \frac{VUx_{ExtremEvent1c_i}}{V_n}$$

$$RazonCapacidad8_i := \frac{VUx_{ExtremEvent1d_i}}{V_n}$$

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$RazonCapacidad1_i$

$RazonCapacidad2_i$

$RazonCapacidad3_i$

$RazonCapacidad4_i$

$RazonCapacidad5_i$

$RazonCapacidad6_i$

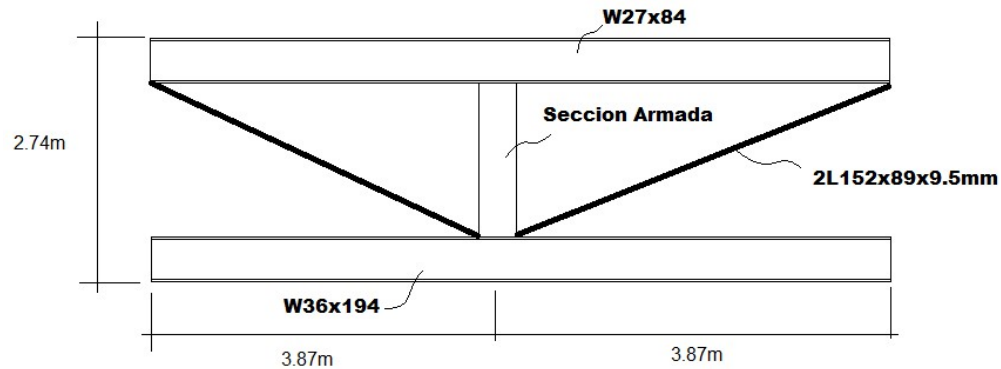
$RazonCapacidad7_i$

$RazonCapacidad8_i$

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Revisión Diafragma en Apoyos (Cuerda Superior)

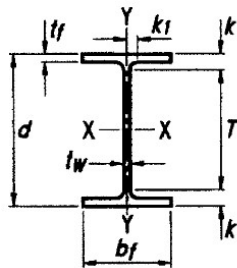
- Geometría



Sec = "W27X84"

$L := 7.74 \cdot m$

$W_s = 84 \frac{lb}{ft}$



$D = 67.818 \text{ cm}$

$t_w = 1.168 \text{ cm}$

$t_f = 1.626 \text{ cm}$

$b_f = 25.4 \text{ cm}$

$F_y := 50 \cdot ksi$

$E := 29000000 \cdot \frac{lb}{in^2}$

Propiedades de la Sección

$I_x = (1.186 \cdot 10^5) \text{ cm}^4$

$S_x = (3.49 \cdot 10^3) \text{ cm}^3$

$r_x = 27.178 \text{ cm}$

$Z_x = (3.998 \cdot 10^3) \text{ cm}^3$

$I_y = (4.412 \cdot 10^3) \text{ cm}^4$

$S_y = 347.406 \text{ cm}^3$

$r_y = 5.258 \text{ cm}$

$Z_y = 544.051 \text{ cm}^3$

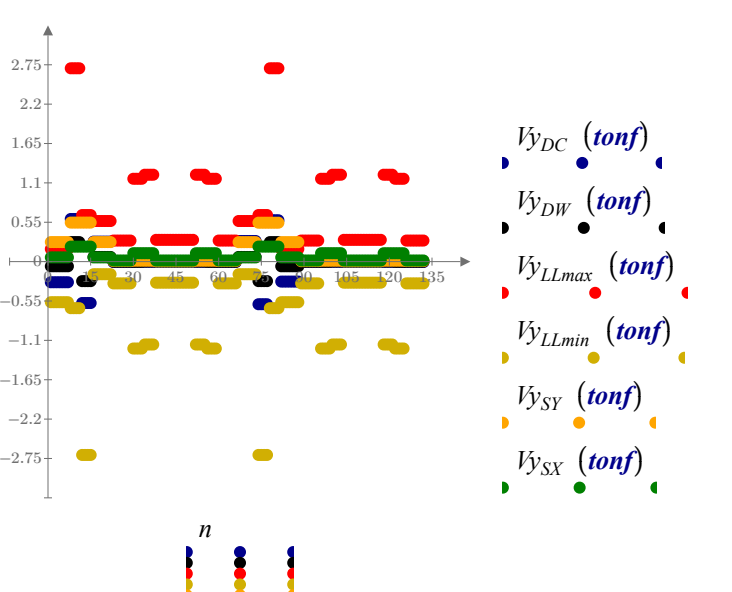
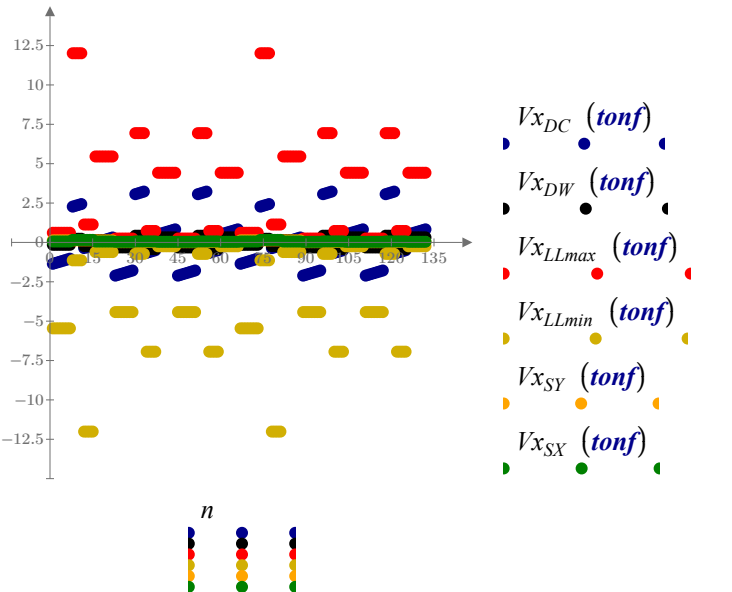
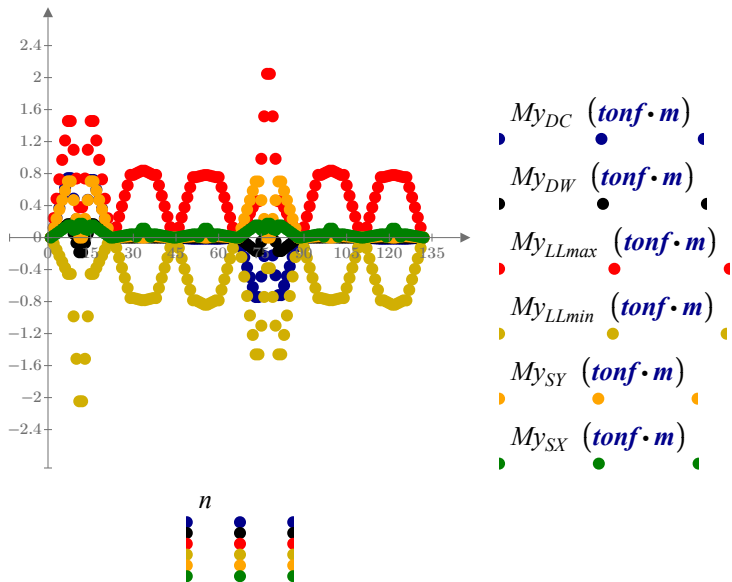
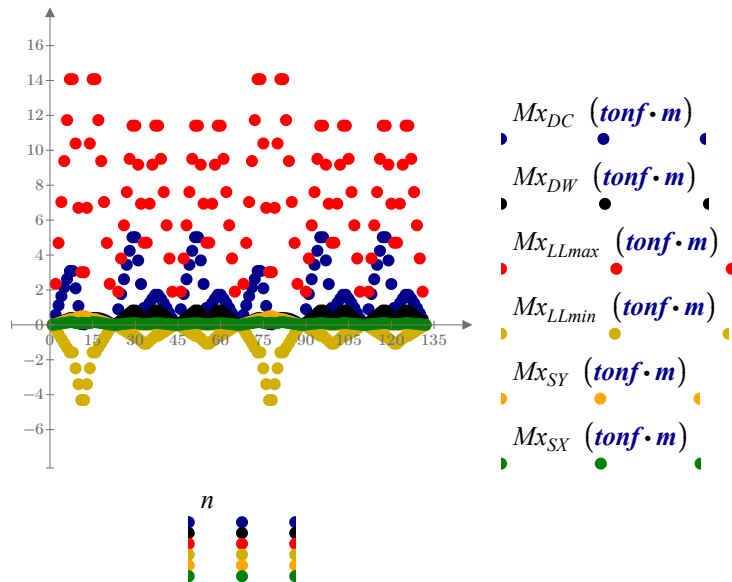
$h_o = 66.294 \text{ cm}$

$C_w = (4.807 \cdot 10^6) \text{ cm}^6$

$J = 116.961 \text{ cm}^4$

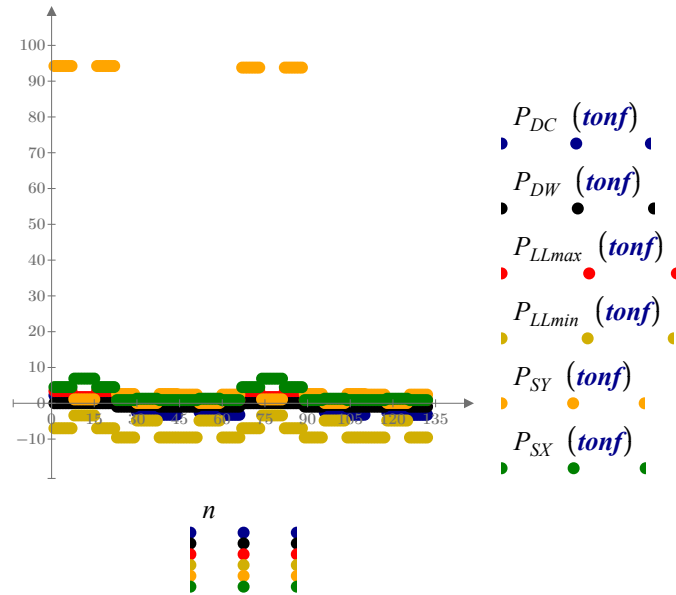
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Demandas



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Demanda última

$$PU_{Strengh1a_i} := \begin{bmatrix} 1.25 & 1.5 & 1.75 & 0 & 0 & 0 \end{bmatrix} \cdot \left[\begin{matrix} \|P_{DC_i}\| & \|P_{DW_i}\| & \|P_{LLmax_i}\| & \|P_{LLmin_i}\| & \|P_{SY_i}\| & \|P_{SX_i}\| \end{matrix} \right]^T$$

$$PU_{Strengh1b_i} := \begin{bmatrix} 1.25 & 1.5 & 0 & 1.75 & 0 & 0 \end{bmatrix} \cdot \left[\begin{matrix} \|P_{DC_i}\| & \|P_{DW_i}\| & \|P_{LLmax_i}\| & \|P_{LLmin_i}\| & \|P_{SY_i}\| & \|P_{SX_i}\| \end{matrix} \right]^T$$

$$PU_{Service1a_i} := \begin{bmatrix} 1 & 1 & 1.3 & 0 & 0 & 0 \end{bmatrix} \cdot \left[\begin{matrix} \|P_{DC_i}\| & \|P_{DW_i}\| & \|P_{LLmax_i}\| & \|P_{LLmin_i}\| & \|P_{SY_i}\| & \|P_{SX_i}\| \end{matrix} \right]^T$$

$$PU_{Service1b_i} := \begin{bmatrix} 1 & 1 & 0 & 1.3 & 0 & 0 \end{bmatrix} \cdot \left[\begin{matrix} \|P_{DC_i}\| & \|P_{DW_i}\| & \|P_{LLmax_i}\| & \|P_{LLmin_i}\| & \|P_{SY_i}\| & \|P_{SX_i}\| \end{matrix} \right]^T$$

$$PU_{ExtremEvent1a_i} := \begin{bmatrix} 1 & 1 & 0.5 & 0 & \frac{1}{R} & \frac{0.3}{R} \end{bmatrix} \cdot \left[\begin{matrix} \|P_{DC_i}\| & \|P_{DW_i}\| & \|P_{LLmax_i}\| & \|P_{LLmin_i}\| & \|P_{SY_i}\| & \|P_{SX_i}\| \end{matrix} \right]^T$$

$$PU_{ExtremEvent1b_i} := \begin{bmatrix} 1 & 1 & 0.5 & 0 & \frac{0.3}{R} & \frac{1}{R} \end{bmatrix} \cdot \left[\begin{matrix} \|P_{DC_i}\| & \|P_{DW_i}\| & \|P_{LLmax_i}\| & \|P_{LLmin_i}\| & \|P_{SY_i}\| & \|P_{SX_i}\| \end{matrix} \right]^T$$

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$$PU_{ExtremEventIc_i} := \begin{bmatrix} 1 & 1 & 0 & 0.5 & \frac{1}{R} & \frac{0.3}{R} \end{bmatrix} \cdot \begin{bmatrix} \|P_{DC_i}\| & \|P_{DW_i}\| & \|P_{LLmax_i}\| & \|P_{LLmin_i}\| & \|P_{SY_i}\| & \|P_{SX_i}\| \end{bmatrix}^T$$

$$PU_{ExtremEventId_i} := \begin{bmatrix} 1 & 1 & 0 & 0.5 & \frac{0.3}{R} & \frac{1}{R} \end{bmatrix} \cdot \begin{bmatrix} \|P_{DC_i}\| & \|P_{DW_i}\| & \|P_{LLmax_i}\| & \|P_{LLmin_i}\| & \|P_{SY_i}\| & \|P_{SX_i}\| \end{bmatrix}^T$$

$$MUX_{StrenghtIa_i} := \begin{bmatrix} 1.25 & 1.5 & 1.75 & 0 & 0 & 0 \end{bmatrix} \cdot \begin{bmatrix} \|Mx_{DC_i}\| & \|Mx_{DW_i}\| & \|Mx_{LLmax_i}\| & \|Mx_{LLmin_i}\| & \|Mx_{SY_i}\| & \|Mx_{SX_i}\| \end{bmatrix}^T$$

$$MUX_{StrenghtIb_i} := \begin{bmatrix} 1.25 & 1.5 & 0 & 1.75 & 0 & 0 \end{bmatrix} \cdot \begin{bmatrix} \|Mx_{DC_i}\| & \|Mx_{DW_i}\| & \|Mx_{LLmax_i}\| & \|Mx_{LLmin_i}\| & \|Mx_{SY_i}\| & \|Mx_{SX_i}\| \end{bmatrix}^T$$

$$MUX_{ServiceIIa_i} := \begin{bmatrix} 1 & 1 & 1.3 & 0 & 0 & 0 \end{bmatrix} \cdot \begin{bmatrix} \|Mx_{DC_i}\| & \|Mx_{DW_i}\| & \|Mx_{LLmax_i}\| & \|Mx_{LLmin_i}\| & \|Mx_{SY_i}\| & \|Mx_{SX_i}\| \end{bmatrix}^T$$

$$MUX_{ServiceIIb_i} := \begin{bmatrix} 1 & 1 & 0 & 1.3 & 0 & 0 \end{bmatrix} \cdot \begin{bmatrix} \|Mx_{DC_i}\| & \|Mx_{DW_i}\| & \|Mx_{LLmax_i}\| & \|Mx_{LLmin_i}\| & \|Mx_{SY_i}\| & \|Mx_{SX_i}\| \end{bmatrix}^T$$

$$MUX_{ExtremEventIa_i} := \begin{bmatrix} 1 & 1 & 0.5 & 0 & \frac{1}{R} & \frac{0.3}{R} \end{bmatrix} \cdot \begin{bmatrix} \|Mx_{DC_i}\| & \|Mx_{DW_i}\| & \|Mx_{LLmax_i}\| & \|Mx_{LLmin_i}\| & \|Mx_{SY_i}\| & \|Mx_{SX_i}\| \end{bmatrix}^T$$

$$MUX_{ExtremEventIb_i} := \begin{bmatrix} 1 & 1 & 0.5 & 0 & \frac{0.3}{R} & \frac{1}{R} \end{bmatrix} \cdot \begin{bmatrix} \|Mx_{DC_i}\| & \|Mx_{DW_i}\| & \|Mx_{LLmax_i}\| & \|Mx_{LLmin_i}\| & \|Mx_{SY_i}\| & \|Mx_{SX_i}\| \end{bmatrix}^T$$

$$MUX_{ExtremEventIc_i} := \begin{bmatrix} 1 & 1 & 0 & 0.5 & \frac{1}{R} & \frac{0.3}{R} \end{bmatrix} \cdot \begin{bmatrix} \|Mx_{DC_i}\| & \|Mx_{DW_i}\| & \|Mx_{LLmax_i}\| & \|Mx_{LLmin_i}\| & \|Mx_{SY_i}\| & \|Mx_{SX_i}\| \end{bmatrix}^T$$

$$MUX_{ExtremEventId_i} := \begin{bmatrix} 1 & 1 & 0 & 0.5 & \frac{0.3}{R} & \frac{1}{R} \end{bmatrix} \cdot \begin{bmatrix} \|Mx_{DC_i}\| & \|Mx_{DW_i}\| & \|Mx_{LLmax_i}\| & \|Mx_{LLmin_i}\| & \|Mx_{SY_i}\| & \|Mx_{SX_i}\| \end{bmatrix}^T$$

$$MUY_{StrenghtIa_i} := \begin{bmatrix} 1.25 & 1.5 & 1.75 & 0 & 0 & 0 \end{bmatrix} \cdot \begin{bmatrix} \|My_{DC_i}\| & \|My_{DW_i}\| & \|My_{LLmax_i}\| & \|My_{LLmin_i}\| & \|My_{SY_i}\| & \|My_{SX_i}\| \end{bmatrix}^T$$

$$MUY_{StrenghtIb_i} := \begin{bmatrix} 1.25 & 1.5 & 0 & 1.75 & 0 & 0 \end{bmatrix} \cdot \begin{bmatrix} \|My_{DC_i}\| & \|My_{DW_i}\| & \|My_{LLmax_i}\| & \|My_{LLmin_i}\| & \|My_{SY_i}\| & \|My_{SX_i}\| \end{bmatrix}^T$$

$$MUY_{ServiceIIa_i} := \begin{bmatrix} 1 & 1 & 1.3 & 0 & 0 & 0 \end{bmatrix} \cdot \begin{bmatrix} \|My_{DC_i}\| & \|My_{DW_i}\| & \|My_{LLmax_i}\| & \|My_{LLmin_i}\| & \|My_{SY_i}\| & \|My_{SX_i}\| \end{bmatrix}^T$$

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$$MU_{Service11b_i} := [1 \ 1 \ 0 \ 1.3 \ 0 \ 0] \cdot \left[\begin{array}{c} \|My_{DC_i}\| \\ \|My_{DW_i}\| \\ \|My_{LLmax_i}\| \\ \|My_{LLmin_i}\| \\ \|My_{SY_i}\| \\ \|My_{SX_i}\| \end{array} \right]^T$$

$$MU_{ExtremEvent1a_i} := \left[1 \ 1 \ 0.5 \ 0 \ \frac{1}{R} \ \frac{0.3}{R} \right] \cdot \left[\begin{array}{c} \|My_{DC_i}\| \\ \|My_{DW_i}\| \\ \|My_{LLmax_i}\| \\ \|My_{LLmin_i}\| \\ \|My_{SY_i}\| \\ \|My_{SX_i}\| \end{array} \right]^T$$

$$MU_{ExtremEvent1b_i} := \left[1 \ 1 \ 0.5 \ 0 \ \frac{0.3}{R} \ \frac{1}{R} \right] \cdot \left[\begin{array}{c} \|My_{DC_i}\| \\ \|My_{DW_i}\| \\ \|My_{LLmax_i}\| \\ \|My_{LLmin_i}\| \\ \|My_{SY_i}\| \\ \|My_{SX_i}\| \end{array} \right]^T$$

$$MU_{ExtremEvent1c_i} := \left[1 \ 1 \ 0 \ 0.5 \ \frac{1}{R} \ \frac{0.3}{R} \right] \cdot \left[\begin{array}{c} \|My_{DC_i}\| \\ \|My_{DW_i}\| \\ \|My_{LLmax_i}\| \\ \|My_{LLmin_i}\| \\ \|My_{SY_i}\| \\ \|My_{SX_i}\| \end{array} \right]^T$$

$$MU_{ExtremEvent1d_i} := \left[1 \ 1 \ 0 \ 0.5 \ \frac{0.3}{R} \ \frac{1}{R} \right] \cdot \left[\begin{array}{c} \|My_{DC_i}\| \\ \|My_{DW_i}\| \\ \|My_{LLmax_i}\| \\ \|My_{LLmin_i}\| \\ \|My_{SY_i}\| \\ \|My_{SX_i}\| \end{array} \right]^T$$

$$VUX_{Strenght1a_i} := [1.25 \ 1.5 \ 1.75 \ 0 \ 0 \ 0] \cdot \left[\begin{array}{c} \|Vx_{DC_i}\| \\ \|Vx_{DW_i}\| \\ \|Vx_{LLmax_i}\| \\ \|Vx_{LLmin_i}\| \\ \|Vx_{SY_i}\| \\ \|Vx_{SX_i}\| \end{array} \right]^T$$

$$VUX_{Strenght1b_i} := [1.25 \ 1.5 \ 0 \ 1.75 \ 0 \ 0] \cdot \left[\begin{array}{c} \|Vx_{DC_i}\| \\ \|Vx_{DW_i}\| \\ \|Vx_{LLmax_i}\| \\ \|Vx_{LLmin_i}\| \\ \|Vx_{SY_i}\| \\ \|Vx_{SX_i}\| \end{array} \right]^T$$

$$VUX_{Service11a_i} := [1 \ 1 \ 1.3 \ 0 \ 0 \ 0] \cdot \left[\begin{array}{c} \|Vx_{DC_i}\| \\ \|Vx_{DW_i}\| \\ \|Vx_{LLmax_i}\| \\ \|Vx_{LLmin_i}\| \\ \|Vx_{SY_i}\| \\ \|Vx_{SX_i}\| \end{array} \right]^T$$

$$VUX_{Service11b_i} := [1 \ 1 \ 0 \ 1.3 \ 0 \ 0] \cdot \left[\begin{array}{c} \|Vx_{DC_i}\| \\ \|Vx_{DW_i}\| \\ \|Vx_{LLmax_i}\| \\ \|Vx_{LLmin_i}\| \\ \|Vx_{SY_i}\| \\ \|Vx_{SX_i}\| \end{array} \right]^T$$

$$VUX_{ExtremEvent1a_i} := \left[1 \ 1 \ 0.5 \ 0 \ \frac{1}{R} \ \frac{0.3}{R} \right] \cdot \left[\begin{array}{c} \|Vx_{DC_i}\| \\ \|Vx_{DW_i}\| \\ \|Vx_{LLmax_i}\| \\ \|Vx_{LLmin_i}\| \\ \|Vx_{SY_i}\| \\ \|Vx_{SX_i}\| \end{array} \right]^T$$

$$VUX_{ExtremEvent1b_i} := \left[1 \ 1 \ 0.5 \ 0 \ \frac{0.3}{R} \ \frac{1}{R} \right] \cdot \left[\begin{array}{c} \|Vx_{DC_i}\| \\ \|Vx_{DW_i}\| \\ \|Vx_{LLmax_i}\| \\ \|Vx_{LLmin_i}\| \\ \|Vx_{SY_i}\| \\ \|Vx_{SX_i}\| \end{array} \right]^T$$

$$VUX_{ExtremEvent1c_i} := \left[1 \ 1 \ 0 \ 0.5 \ \frac{1}{R} \ \frac{0.3}{R} \right] \cdot \left[\begin{array}{c} \|Vx_{DC_i}\| \\ \|Vx_{DW_i}\| \\ \|Vx_{LLmax_i}\| \\ \|Vx_{LLmin_i}\| \\ \|Vx_{SY_i}\| \\ \|Vx_{SX_i}\| \end{array} \right]^T$$

$$VUX_{ExtremEvent1d_i} := \left[1 \ 1 \ 0 \ 0.5 \ \frac{0.3}{R} \ \frac{1}{R} \right] \cdot \left[\begin{array}{c} \|Vx_{DC_i}\| \\ \|Vx_{DW_i}\| \\ \|Vx_{LLmax_i}\| \\ \|Vx_{LLmin_i}\| \\ \|Vx_{SY_i}\| \\ \|Vx_{SX_i}\| \end{array} \right]^T$$

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$$VUyStrenght1a_i := [1.25 \ 1.5 \ 1.75 \ 0 \ 0 \ 0] \cdot \left[\left\| \dot{Y}_{DC_i} \right\| \ \left\| \dot{Y}_{DW_i} \right\| \ \left\| \dot{Y}_{LLmax_i} \right\| \ \left\| \dot{Y}_{LLmin_i} \right\| \ \left\| \dot{Y}_{SY_i} \right\| \ \left\| \dot{Y}_{SX_i} \right\| \right]^T$$

$$VUyStrenght1b_i := [1.25 \ 1.5 \ 0 \ 1.75 \ 0 \ 0] \cdot \left[\left\| \dot{Y}_{DC_i} \right\| \ \left\| \dot{Y}_{DW_i} \right\| \ \left\| \dot{Y}_{LLmax_i} \right\| \ \left\| \dot{Y}_{LLmin_i} \right\| \ \left\| \dot{Y}_{SY_i} \right\| \ \left\| \dot{Y}_{SX_i} \right\| \right]^T$$

$$VUyService1a_i := [1 \ 1 \ 1.3 \ 0 \ 0 \ 0] \cdot \left[\left\| \dot{Y}_{DC_i} \right\| \ \left\| \dot{Y}_{DW_i} \right\| \ \left\| \dot{Y}_{LLmax_i} \right\| \ \left\| \dot{Y}_{LLmin_i} \right\| \ \left\| \dot{Y}_{SY_i} \right\| \ \left\| \dot{Y}_{SX_i} \right\| \right]^T$$

$$VUyService1b_i := [1 \ 1 \ 0 \ 1.3 \ 0 \ 0] \cdot \left[\left\| \dot{Y}_{DC_i} \right\| \ \left\| \dot{Y}_{DW_i} \right\| \ \left\| \dot{Y}_{LLmax_i} \right\| \ \left\| \dot{Y}_{LLmin_i} \right\| \ \left\| \dot{Y}_{SY_i} \right\| \ \left\| \dot{Y}_{SX_i} \right\| \right]^T$$

$$VUyExtremEvent1a_i := \left[1 \ 1 \ 0.5 \ 0 \ \frac{1}{R} \ \frac{0.3}{R} \right] \cdot \left[\left\| \dot{Y}_{DC_i} \right\| \ \left\| \dot{Y}_{DW_i} \right\| \ \left\| \dot{Y}_{LLmax_i} \right\| \ \left\| \dot{Y}_{LLmin_i} \right\| \ \left\| \dot{Y}_{SY_i} \right\| \ \left\| \dot{Y}_{SX_i} \right\| \right]^T$$

$$VUyExtremEvent1b_i := \left[1 \ 1 \ 0.5 \ 0 \ \frac{0.3}{R} \ \frac{1}{R} \right] \cdot \left[\left\| \dot{Y}_{DC_i} \right\| \ \left\| \dot{Y}_{DW_i} \right\| \ \left\| \dot{Y}_{LLmax_i} \right\| \ \left\| \dot{Y}_{LLmin_i} \right\| \ \left\| \dot{Y}_{SY_i} \right\| \ \left\| \dot{Y}_{SX_i} \right\| \right]^T$$

$$VUyExtremEvent1c_i := \left[1 \ 1 \ 0 \ 0.5 \ \frac{1}{R} \ \frac{0.3}{R} \right] \cdot \left[\left\| \dot{Y}_{DC_i} \right\| \ \left\| \dot{Y}_{DW_i} \right\| \ \left\| \dot{Y}_{LLmax_i} \right\| \ \left\| \dot{Y}_{LLmin_i} \right\| \ \left\| \dot{Y}_{SY_i} \right\| \ \left\| \dot{Y}_{SX_i} \right\| \right]^T$$

$$VUyExtremEvent1d_i := \left[1 \ 1 \ 0 \ 0.5 \ \frac{0.3}{R} \ \frac{1}{R} \right] \cdot \left[\left\| \dot{Y}_{DC_i} \right\| \ \left\| \dot{Y}_{DW_i} \right\| \ \left\| \dot{Y}_{LLmax_i} \right\| \ \left\| \dot{Y}_{LLmin_i} \right\| \ \left\| \dot{Y}_{SY_i} \right\| \ \left\| \dot{Y}_{SX_i} \right\| \right]^T$$

$G := 11200 \cdot \text{ksi}$

Capacidad a Flexión

$$\phi_b := 0.9$$

$$L_b := 2.58 \cdot m$$

$$C_b := 1$$

Clasificación de la sección por pandeo Local

Alas

$$\lambda_f := \frac{b_f}{2 \cdot t_f} = 7.813$$

$$\lambda_{pf} := 0.38 \cdot \sqrt{\frac{E}{F_y}} = 9.152$$

$$\lambda_{rf} := 1.0 \cdot \sqrt{\frac{E}{F_y}} = 24.083$$

Alas → “Sección No Compacta”

Alma

$$h := D - 2 \cdot t_f = 0.646 \cdot m$$

$$\lambda_w := \frac{h}{t_w} = 55.261$$

$$\lambda_{pw} := 3.76 \cdot \sqrt{\frac{E}{F_y}} = 90.553$$

$$\lambda_{rw} := 5.70 \cdot \sqrt{\frac{E}{F_y}} = 137.274$$

Alma → “Sección Compacta”

Capacidad de una sección doblemente simétrica compacta alrededor del eje fuerte

- Cedencia

$$M_p := F_y \cdot Z_x = 154.94 \cdot tonf \cdot m$$

- Pandeo Lateral Torsional

$$r_{ts} := \sqrt{\frac{\sqrt{I_y \cdot C_w}}{S_x}} = 0.065 \cdot m$$

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$$c := \left(\frac{h_o}{2} \right) \cdot \sqrt{\frac{I_y}{C_w}} = 1.004$$

$$L_p := 1.76 \cdot r_y \cdot \sqrt{\frac{E}{F_y}} = 2.229 \text{ m}$$

$$L_r := 1.95 \cdot r_{ts} \cdot \left(\frac{E}{(0.7 \cdot F_y)} \right) \cdot \sqrt{\left(\frac{(J \cdot c)}{(S_x \cdot h_o)} \right)^2 + 6.76 \cdot \left(\frac{(0.7 \cdot F_y)}{E} \right)^2} = 6.336 \text{ m}$$

$$F_{cr}(l_b) := \left(\frac{(C_b \cdot \pi^2 \cdot E)}{\left(\frac{l_b}{r_{ts}} \right)^2} \right) \cdot \sqrt{1 + 0.078 \cdot \left(\frac{(J \cdot c)}{(S_x \cdot h_o)} \right) \cdot \left(\frac{l_b}{r_{ts}} \right)^2}$$

$$M_{nI}(l_b) := \text{if} \left(l_b \leq L_p, M_p, \left(\text{if} \left(l_b \leq L_r, C_b \cdot \left(M_p - (M_p - 0.7 \cdot F_y \cdot S_x) \cdot \left(\frac{(l_b - L_p)}{(L_r - L_p)} \right) \right), F_{cr}(l_b) \cdot S_x \right) \right) \right)$$

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Capacidad de una sección doblemente simétrica con alma compacta y patines no compactos o esbeltos alrededor del eje fuerte

- Pandeo Local por compresión del patín

$$k_c := \frac{4}{\sqrt{\frac{h}{t_w}}} = 0.538$$

$$M_{n2}(\lambda) := \left\| \begin{array}{l} \text{if } \lambda < \lambda_{pf} \\ \quad \left\| M_p \right. \\ \text{also if } \lambda_{pf} < \lambda < \lambda_{rf} \\ \quad \left\| \left(M_p - (M_p - 0.7 \cdot F_y \cdot S_x) \cdot \left(\frac{\lambda - \lambda_{pf}}{\lambda_{rf} - \lambda_{pf}} \right) \right) \right. \\ \text{else} \\ \quad \left\| \frac{0.9 \cdot E \cdot k_c \cdot S_x}{\lambda^2} \right. \end{array} \right\|$$

Capacidad de una sección doblemente simétrica con alma no compacta alrededor del eje fuerte

- Pandeo Local por compresión del patín

$$M_{n3}(\lambda) := \left\| \begin{array}{l} \text{if } \lambda < \lambda_{pf} \\ \quad \left\| M_p \right. \\ \text{also if } \lambda_{pf} < \lambda < \lambda_{rf} \\ \quad \left\| \left(M_p - (M_p - 0.7 \cdot F_y \cdot S_x) \cdot \left(\frac{\lambda - \lambda_{pf}}{\lambda_{rf} - \lambda_{pf}} \right) \right) \right. \\ \text{else} \\ \quad \left\| \frac{0.9 \cdot E \cdot k_c \cdot S_x}{\lambda^2} \right. \end{array} \right\|$$

$$M_{nx} := \left\| \begin{array}{l} \text{if } Alas = \text{"Sección Compacta"} \\ \left\| \begin{array}{l} \text{if } Alma = \text{"Sección Compacta"} \\ \left\| M_{n1} (L_b) \right. \\ \text{else} \\ \left\| M_{n3} (\lambda_f) \right. \end{array} \right\| \\ \text{else} \\ \left\| \begin{array}{l} \text{if } Alma = \text{"Sección Compacta"} \\ \left\| M_{n2} (\lambda_f) \right. \\ \text{else} \\ \left\| M_{n3} (\lambda_f) \right. \end{array} \right\| \end{array} \right\| = 154.94 \text{ tonf} \cdot m$$

Capacidad de la sección alrededor del eje debil **(AISC 360-10.F6)**

- Cedencia

$$M_{py} := \min (F_y \cdot Z_y, 1.6 \cdot F_y \cdot S_y)$$

- Pandeo Local del ala

$$F_{crf}(\lambda_f) := \frac{(0.69 \cdot E)}{(\lambda_f)^2}$$

$$M_{ny}(\lambda_f) := \text{if} \left(\lambda_f \leq \lambda_{pf}, M_{py}, \text{if} \left(\lambda_f \leq \lambda_{rf}, \left(M_{py} - (M_{py} - 0.7 \cdot F_y \cdot S_y) \cdot \left(\frac{(\lambda_f - \lambda_{pf})}{(\lambda_{rf} - \lambda_{pf})} \right) \right), F_{crf}(\lambda_f) \cdot S_y \right) \right)$$

$$M_{ny} := M_{ny}(\lambda_f)$$

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Capacidad a Compresión

Clasificación de la sección por pandeo Local

Alas

$$\lambda_f := \frac{b_f}{2 \cdot t_f} = 7.813$$

$$\lambda_{rf} := 0.56 \cdot \sqrt{\frac{E}{F_y}} = 13.487$$

Alas → “Sección Compacta”

Alma

$$h := D - 2 \cdot t_f = 0.646 \text{ m}$$

$$\lambda_w := \frac{h}{t_w} = 55.261$$

$$\lambda_{rw} := 1.49 \cdot \sqrt{\frac{E}{F_y}} = 35.884$$

Alma → “Sección Esbelta”

$$K := 1$$

$$r := \max(r_x, r_y) = 0.272 \text{ m}$$

$$F_e := \frac{\pi^2 \cdot E}{\left(\frac{K \cdot L}{r}\right)^2} = (2.433 \cdot 10^9) \text{ Pa}$$

$$F_{cr} := \left\| \begin{array}{l} \text{if } \frac{F_y}{F_e} \leq 2.25 \\ \left\| \left(0.658 \frac{F_y}{F_e}\right) \cdot F_y \right\| \\ \text{else} \\ \left\| 0.877 \cdot F_e \right\| \end{array} \right\| = (3.249 \cdot 10^8) \text{ Pa}$$

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$$b_e := \left\| \begin{array}{l} \text{if } \lambda_w \geq 1.49 \cdot \sqrt{\frac{E}{F_{cr}}} \\ \left\| \left(1.92 \cdot t_w \cdot \sqrt{\frac{E}{F_{cr}}} \cdot \left(1 - \frac{0.34}{\left(\frac{h}{t_w} \right)} \cdot \sqrt{\frac{E}{F_{cr}}} \right) \right) \right\| \\ \text{else} \\ h \end{array} \right\| = 0.472 \text{ } m$$

$$A_e := b_e \cdot t_w = 0.006 \text{ } m^2$$

$$A_{gl} := h \cdot t_w = 0.008 \text{ } m^2$$

$$Q_a := \frac{A_e}{A_{gl}} = 0.73$$

$$Q_s := \left\| \begin{array}{l} \text{if } \frac{b_f}{2 \cdot t_f} \leq 0.56 \cdot \sqrt{\frac{E}{F_y}} \\ \left\| 1 \right\| \\ \text{also if } 0.56 \cdot \sqrt{\frac{E}{F_y}} < \frac{b_f}{2 \cdot t_f} \leq 1.03 \cdot \sqrt{\frac{E}{F_y}} \\ \left\| 1.415 - 0.74 \cdot \left(\frac{b_f}{2 \cdot t_f} \right) \cdot \sqrt{\frac{F_y}{E}} \right\| \\ \text{else} \\ \left\| \frac{0.69 \cdot E}{F_y \cdot \left(\frac{b_f}{2 \cdot t_f} \right)^2} \right\| \end{array} \right\| = 1$$

$$Q := Q_a \cdot Q_s$$

$$F_{cr} := \left\| \begin{array}{l} \text{if } \frac{Q \cdot F_y}{F_e} \leq 2.25 \\ \left\| \left(0.658 \sqrt{\frac{Q \cdot F_y}{F_e}} \right) \cdot Q \cdot F_y \right\| \\ \text{else} \\ \left\| 0.877 \cdot F_e \right\| \end{array} \right\| = (2.411 \cdot 10^8) \text{ } Pa$$

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$$P_n := F_{cr} \cdot A_g = 431.889 \text{ tonf}$$

$$\phi_c := 0.9$$

Flexo compresión

$$RazonCapacidad1_i := \begin{cases} \text{if } \frac{PU_{Strenght1a_i}}{\phi_c \cdot P_n} \geq 0.2 \\ \left\| \frac{PU_{Strenght1a_i}}{\phi_c \cdot P_n} + \frac{8}{9} \cdot \left(\frac{MUx_{Strenght1a_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{Strenght1a_i}}{\phi_b \cdot M_{ny}} \right) \right\| \\ \text{else} \\ \left\| \frac{PU_{Strenght1a_i}}{2 \cdot \phi_c \cdot P_n} + \left(\frac{MUx_{Strenght1a_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{Strenght1a_i}}{\phi_b \cdot M_{ny}} \right) \right\| \end{cases}$$

$$RazonCapacidad2_i := \begin{cases} \text{if } \frac{PU_{Strenght1b_i}}{\phi_c \cdot P_n} \geq 0.2 \\ \left\| \frac{PU_{Strenght1b_i}}{\phi_c \cdot P_n} + \frac{8}{9} \cdot \left(\frac{MUx_{Strenght1b_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{Strenght1b_i}}{\phi_b \cdot M_{ny}} \right) \right\| \\ \text{else} \\ \left\| \frac{PU_{Strenght1b_i}}{2 \cdot \phi_c \cdot P_n} + \left(\frac{MUx_{Strenght1b_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{Strenght1b_i}}{\phi_b \cdot M_{ny}} \right) \right\| \end{cases}$$

$$RazonCapacidad3_i := \begin{cases} \text{if } \frac{PU_{Service1a_i}}{\phi_c \cdot P_n} \geq 0.2 \\ \left\| \frac{PU_{Service1a_i}}{\phi_c \cdot P_n} + \frac{8}{9} \cdot \left(\frac{MUx_{Service1a_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{Service1a_i}}{\phi_b \cdot M_{ny}} \right) \right\| \\ \text{else} \\ \left\| \frac{PU_{Service1a_i}}{2 \cdot \phi_c \cdot P_n} + \left(\frac{MUx_{Service1a_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{Service1a_i}}{\phi_b \cdot M_{ny}} \right) \right\| \end{cases}$$

$$RazonCapacidad4_i := \begin{cases} \text{if } \frac{PU_{Service1b_i}}{\phi_c \cdot P_n} \geq 0.2 \\ \left\| \frac{PU_{Service1b_i}}{\phi_c \cdot P_n} + \frac{8}{9} \cdot \left(\frac{MUx_{Service1b_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{Service1b_i}}{\phi_b \cdot M_{ny}} \right) \right\| \\ \text{else} \\ \left\| \frac{PU_{Service1b_i}}{2 \cdot \phi_c \cdot P_n} + \left(\frac{MUx_{Service1b_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{Service1b_i}}{\phi_b \cdot M_{ny}} \right) \right\| \end{cases}$$

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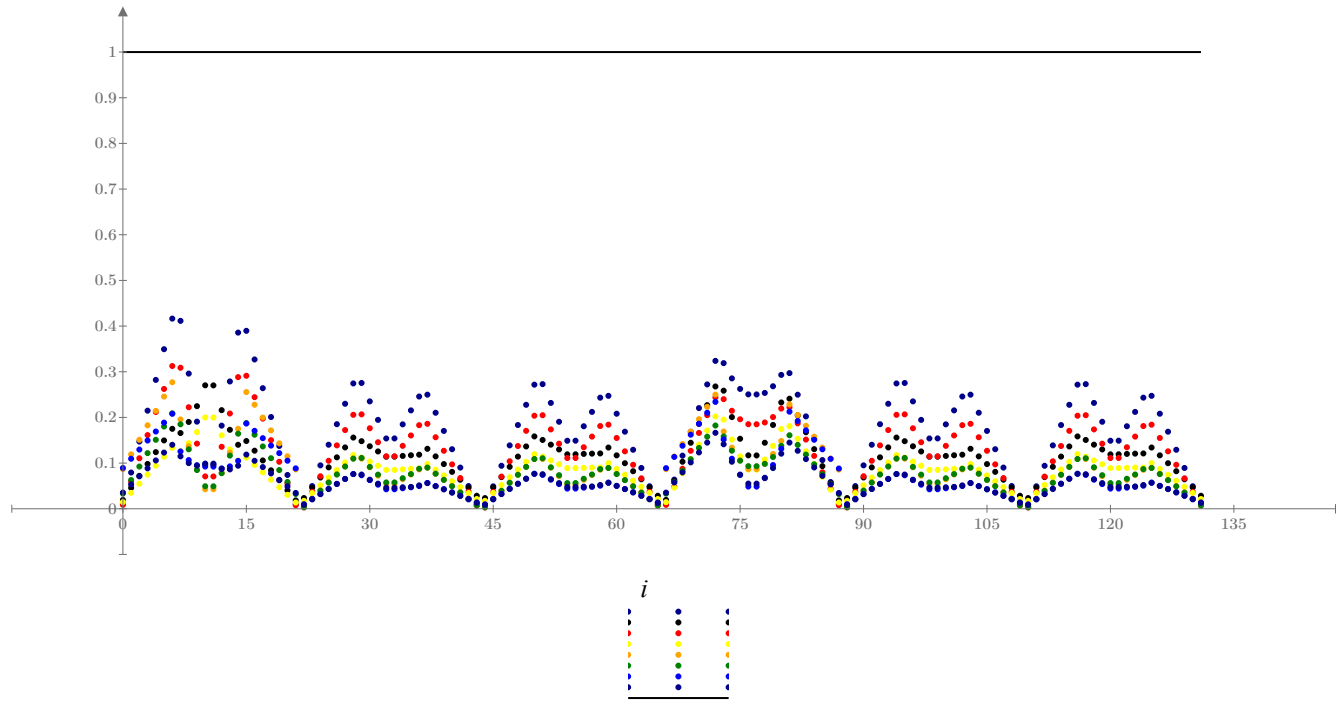
$$\begin{aligned}
 \text{RazonCapacidad5}_i &:= \left\| \begin{array}{l} \text{if } \frac{PU_{ExtremEventIa_i}}{\phi_c \cdot P_n} \geq 0.2 \\ \left\| \frac{PU_{ExtremEventIa_i}}{\phi_c \cdot P_n} + \frac{8}{9} \cdot \left(\frac{MUx_{ExtremEventIa_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{ExtremEventIa_i}}{\phi_b \cdot M_{ny}} \right) \right\| \\ \text{else} \\ \left\| \frac{PU_{ExtremEventIa_i}}{2 \cdot \phi_c \cdot P_n} + \left(\frac{MUx_{ExtremEventIa_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{ExtremEventIa_i}}{\phi_b \cdot M_{ny}} \right) \right\| \end{array} \right\| \\
 \text{RazonCapacidad6}_i &:= \left\| \begin{array}{l} \text{if } \frac{PU_{ExtremEventIb_i}}{\phi_c \cdot P_n} \geq 0.2 \\ \left\| \frac{PU_{ExtremEventIb_i}}{\phi_c \cdot P_n} + \frac{8}{9} \cdot \left(\frac{MUx_{ExtremEventIb_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{ExtremEventIb_i}}{\phi_b \cdot M_{ny}} \right) \right\| \\ \text{else} \\ \left\| \frac{PU_{ExtremEventIb_i}}{2 \cdot \phi_c \cdot P_n} + \left(\frac{MUx_{ExtremEventIb_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{ExtremEventIb_i}}{\phi_b \cdot M_{ny}} \right) \right\| \end{array} \right\|
 \end{aligned}$$

$$\begin{aligned}
 \text{RazonCapacidad7}_i &:= \left\| \begin{array}{l} \text{if } \frac{PU_{ExtremEventIc_i}}{\phi_c \cdot P_n} \geq 0.2 \\ \left\| \frac{PU_{ExtremEventIc_i}}{\phi_c \cdot P_n} + \frac{8}{9} \cdot \left(\frac{MUx_{ExtremEventIc_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{ExtremEventIc_i}}{\phi_b \cdot M_{ny}} \right) \right\| \\ \text{else} \\ \left\| \frac{PU_{ExtremEventIc_i}}{2 \cdot \phi_c \cdot P_n} + \left(\frac{MUx_{ExtremEventIc_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{ExtremEventIc_i}}{\phi_b \cdot M_{ny}} \right) \right\| \end{array} \right\|
 \end{aligned}$$

$$\begin{aligned}
 \text{RazonCapacidad8}_i &:= \left\| \begin{array}{l} \text{if } \frac{PU_{ExtremEventId_i}}{\phi_c \cdot P_n} \geq 0.2 \\ \left\| \frac{PU_{ExtremEventId_i}}{\phi_c \cdot P_n} + \frac{8}{9} \cdot \left(\frac{MUx_{ExtremEventId_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{ExtremEventId_i}}{\phi_b \cdot M_{ny}} \right) \right\| \\ \text{else} \\ \left\| \frac{PU_{ExtremEventId_i}}{2 \cdot \phi_c \cdot P_n} + \left(\frac{MUx_{ExtremEventId_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{ExtremEventId_i}}{\phi_b \cdot M_{ny}} \right) \right\| \end{array} \right\|
 \end{aligned}$$

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$RazonCapacidad1_i$

$RazonCapacidad2_i$

$RazonCapacidad3_i$

$RazonCapacidad4_i$

$RazonCapacidad5_i$

$RazonCapacidad6_i$

$RazonCapacidad7_i$

$RazonCapacidad8_i$

1

Cortante

$$\phi_v := 0.9$$

$$A_w := h \cdot t_w = 0.008 \text{ m}^2$$

$$C_v := 1.0$$

$$V_n := 0.6 \cdot F_y \cdot A_w \cdot C_v = 175.398 \text{ tonf}$$

$$RazonCapacidad1_i := \frac{VUx_{Strenght1a_i}}{V_n}$$

$$RazonCapacidad2_i := \frac{VUx_{Strenght1b_i}}{V_n}$$

$$RazonCapacidad3_i := \frac{VUx_{Service1a_i}}{V_n}$$

$$RazonCapacidad4_i := \frac{VUx_{Service1b_i}}{V_n}$$

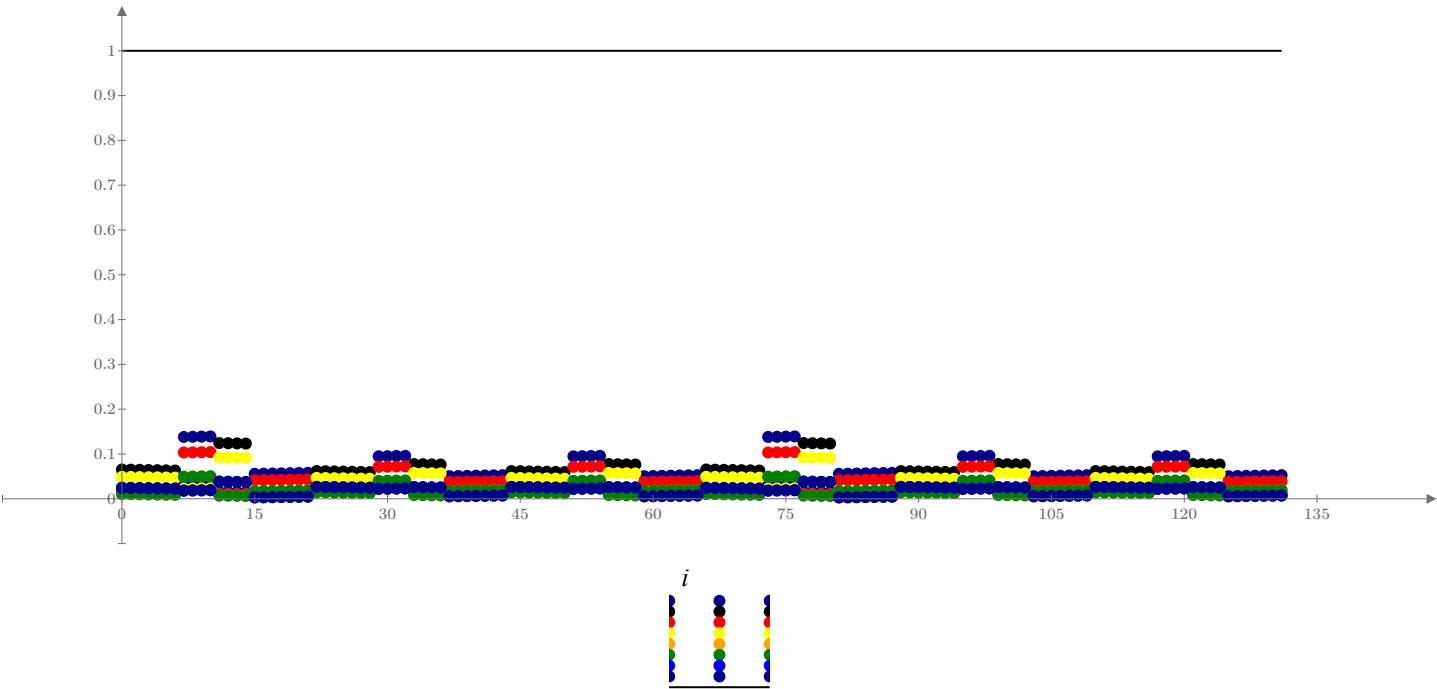
$$RazonCapacidad5_i := \frac{VUx_{ExtremEvent1a_i}}{V_n}$$

$$RazonCapacidad6_i := \frac{VUx_{ExtremEvent1b_i}}{V_n}$$

$$RazonCapacidad7_i := \frac{VUx_{ExtremEvent1c_i}}{V_n}$$

$$RazonCapacidad8_i := \frac{VUx_{ExtremEvent1d_i}}{V_n}$$

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$RazonCapacidad1_i$

$RazonCapacidad2_i$

$RazonCapacidad3_i$

$RazonCapacidad4_i$

$RazonCapacidad5_i$

$RazonCapacidad6_i$

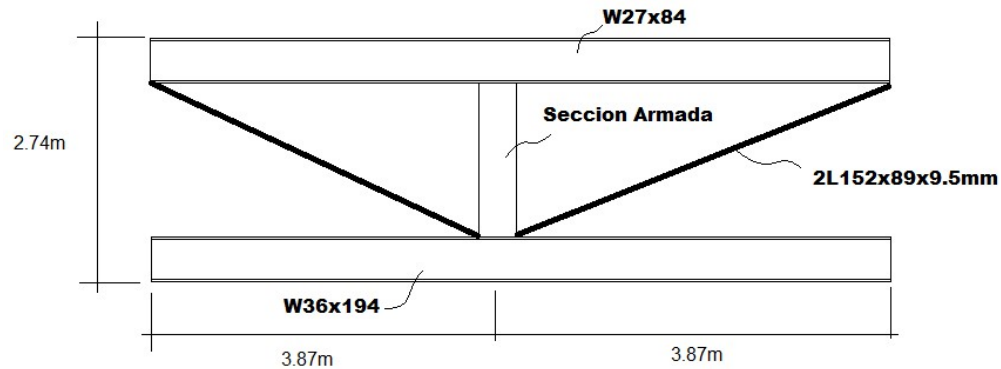
$RazonCapacidad7_i$

$RazonCapacidad8_i$

1

Revisión Diafragma en Apoyos (Cuerda Inferior)

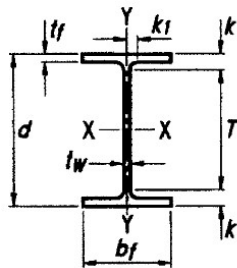
- Geometría



Sec = "W36X194"

$L := 7.74 \cdot m$

$W_s = 194 \frac{lb_f}{ft}$



$D = 92.71 \text{ cm}$

$t_w = 1.943 \text{ cm}$

$t_f = 3.2 \text{ cm}$

$b_f = 30.734 \text{ cm}$

$F_y := 50 \cdot ksi$

$E := 29000000 \cdot \frac{lb_f}{in^2}$

Propiedades de la Sección

$I_x = (5.036 \cdot 10^5) \text{ cm}^4$

$S_x = (1.088 \cdot 10^4) \text{ cm}^3$

$r_x = 37.084 \text{ cm}$

$Z_x = (1.257 \cdot 10^4) \text{ cm}^3$

$I_y = (1.561 \cdot 10^4) \text{ cm}^4$

$S_y = (1.014 \cdot 10^3) \text{ cm}^3$

$r_y = 6.502 \text{ cm}$

$Z_y = (1.601 \cdot 10^3) \text{ cm}^3$

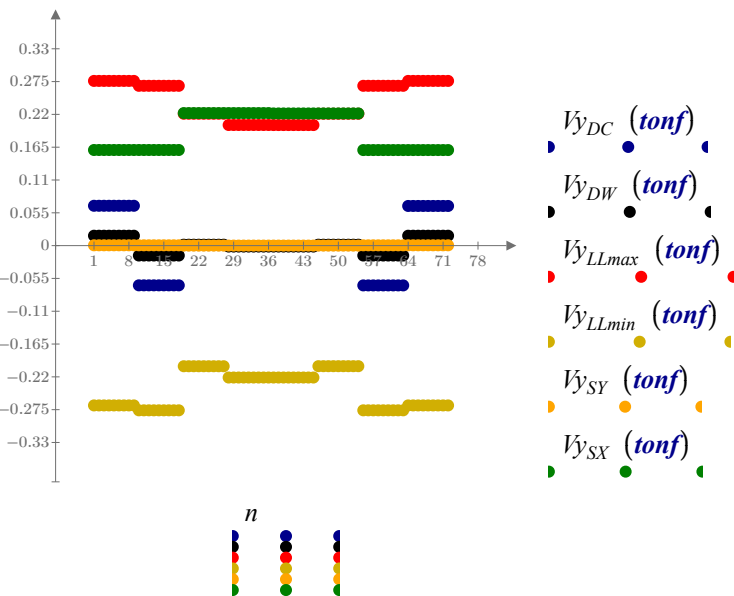
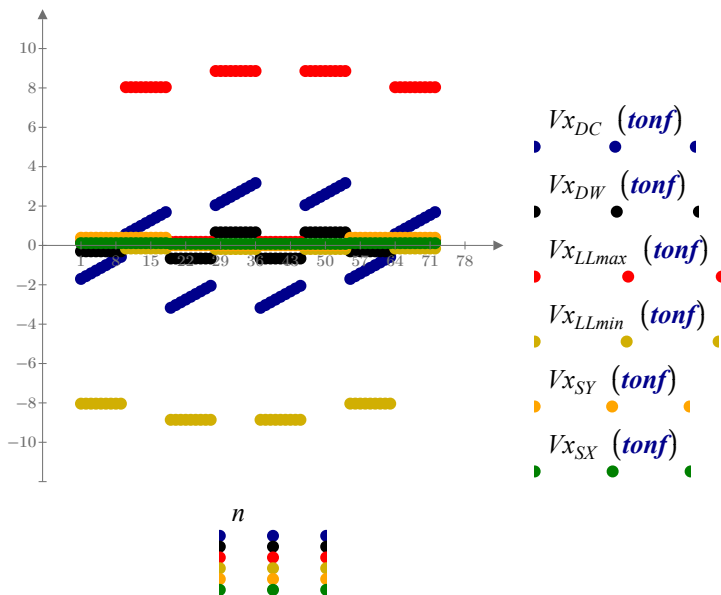
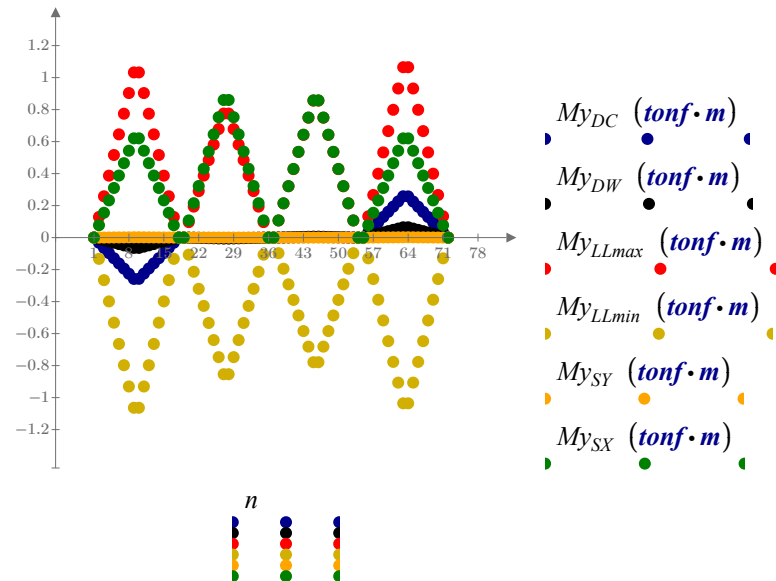
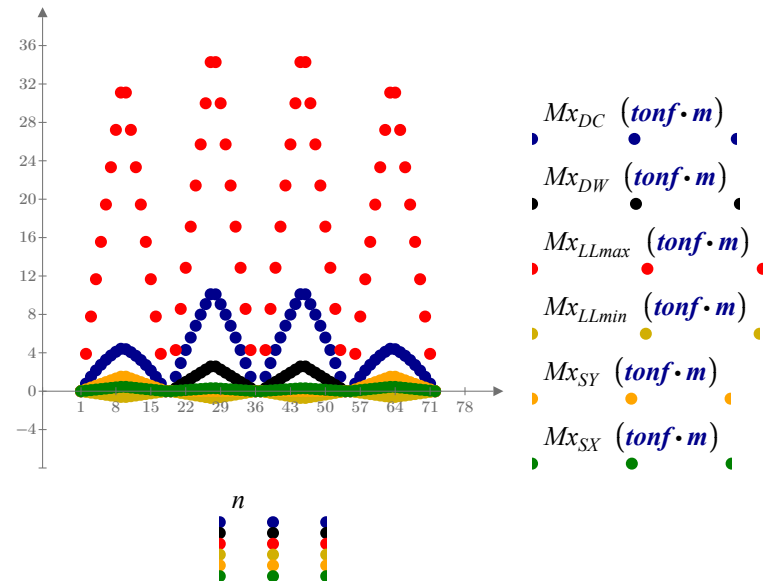
$h_o = 89.408 \text{ cm}$

$C_w = (3.115 \cdot 10^7) \text{ cm}^6$

$J = 924.034 \text{ cm}^4$

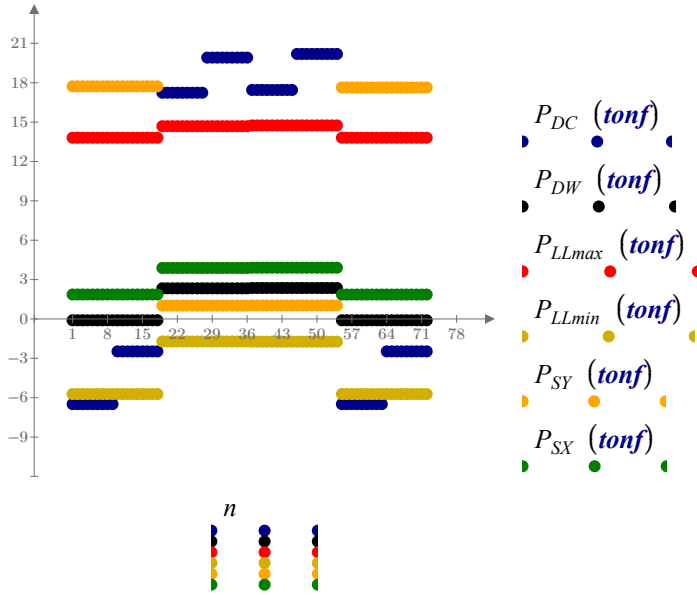
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Demandas



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Demanada última

$$PU_{Strengh1a_i} := [1.25 \ 1.5 \ 1.75 \ 0 \ 0 \ 0] \cdot \left[\left\| P_{DC_i} \right\| \ \left\| P_{DW_i} \right\| \ \left\| P_{LLmax_i} \right\| \ \left\| P_{LLmin_i} \right\| \ \left\| P_{SY_i} \right\| \ \left\| P_{SX_i} \right\| \right]^T$$

$$PU_{Strengh1b_i} := [1.25 \ 1.5 \ 0 \ 1.75 \ 0 \ 0] \cdot \left[\left\| P_{DC_i} \right\| \ \left\| P_{DW_i} \right\| \ \left\| P_{LLmax_i} \right\| \ \left\| P_{LLmin_i} \right\| \ \left\| P_{SY_i} \right\| \ \left\| P_{SX_i} \right\| \right]^T$$

$$PU_{Service1a_i} := [1 \ 1 \ 1.3 \ 0 \ 0 \ 0] \cdot \left[\left\| P_{DC_i} \right\| \ \left\| P_{DW_i} \right\| \ \left\| P_{LLmax_i} \right\| \ \left\| P_{LLmin_i} \right\| \ \left\| P_{SY_i} \right\| \ \left\| P_{SX_i} \right\| \right]^T$$

$$PU_{Service1b_i} := [1 \ 1 \ 0 \ 1.3 \ 0 \ 0] \cdot \left[\left\| P_{DC_i} \right\| \ \left\| P_{DW_i} \right\| \ \left\| P_{LLmax_i} \right\| \ \left\| P_{LLmin_i} \right\| \ \left\| P_{SY_i} \right\| \ \left\| P_{SX_i} \right\| \right]^T$$

$$PU_{ExtremEvent1a_i} := \left[1 \ 1 \ 0.5 \ 0 \ \frac{1}{R} \ \frac{0.3}{R} \right] \cdot \left[\left\| P_{DC_i} \right\| \ \left\| P_{DW_i} \right\| \ \left\| P_{LLmax_i} \right\| \ \left\| P_{LLmin_i} \right\| \ \left\| P_{SY_i} \right\| \ \left\| P_{SX_i} \right\| \right]^T$$

$$PU_{ExtremEvent1b_i} := \left[1 \ 1 \ 0.5 \ 0 \ \frac{0.3}{R} \ \frac{1}{R} \right] \cdot \left[\left\| P_{DC_i} \right\| \ \left\| P_{DW_i} \right\| \ \left\| P_{LLmax_i} \right\| \ \left\| P_{LLmin_i} \right\| \ \left\| P_{SY_i} \right\| \ \left\| P_{SX_i} \right\| \right]^T$$

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$$PU_{ExtremEventIc_i} := \begin{bmatrix} 1 & 1 & 0 & 0.5 & \frac{1}{R} & \frac{0.3}{R} \end{bmatrix} \cdot \begin{bmatrix} \|P_{DC_i}\| & \|P_{DW_i}\| & \|P_{LLmax_i}\| & \|P_{LLmin_i}\| & \|P_{SY_i}\| & \|P_{SX_i}\| \end{bmatrix}^T$$

$$PU_{ExtremEventId_i} := \begin{bmatrix} 1 & 1 & 0 & 0.5 & \frac{0.3}{R} & \frac{1}{R} \end{bmatrix} \cdot \begin{bmatrix} \|P_{DC_i}\| & \|P_{DW_i}\| & \|P_{LLmax_i}\| & \|P_{LLmin_i}\| & \|P_{SY_i}\| & \|P_{SX_i}\| \end{bmatrix}^T$$

$$MUX_{StrenghtIa_i} := \begin{bmatrix} 1.25 & 1.5 & 1.75 & 0 & 0 & 0 \end{bmatrix} \cdot \begin{bmatrix} \|Mx_{DC_i}\| & \|Mx_{DW_i}\| & \|Mx_{LLmax_i}\| & \|Mx_{LLmin_i}\| & \|Mx_{SY_i}\| & \|Mx_{SX_i}\| \end{bmatrix}^T$$

$$MUX_{StrenghtIb_i} := \begin{bmatrix} 1.25 & 1.5 & 0 & 1.75 & 0 & 0 \end{bmatrix} \cdot \begin{bmatrix} \|Mx_{DC_i}\| & \|Mx_{DW_i}\| & \|Mx_{LLmax_i}\| & \|Mx_{LLmin_i}\| & \|Mx_{SY_i}\| & \|Mx_{SX_i}\| \end{bmatrix}^T$$

$$MUX_{ServiceIa_i} := \begin{bmatrix} 1 & 1 & 1.3 & 0 & 0 & 0 \end{bmatrix} \cdot \begin{bmatrix} \|Mx_{DC_i}\| & \|Mx_{DW_i}\| & \|Mx_{LLmax_i}\| & \|Mx_{LLmin_i}\| & \|Mx_{SY_i}\| & \|Mx_{SX_i}\| \end{bmatrix}^T$$

$$MUX_{ServiceIb_i} := \begin{bmatrix} 1 & 1 & 0 & 1.3 & 0 & 0 \end{bmatrix} \cdot \begin{bmatrix} \|Mx_{DC_i}\| & \|Mx_{DW_i}\| & \|Mx_{LLmax_i}\| & \|Mx_{LLmin_i}\| & \|Mx_{SY_i}\| & \|Mx_{SX_i}\| \end{bmatrix}^T$$

$$MUX_{ExtremEventIa_i} := \begin{bmatrix} 1 & 1 & 0.5 & 0 & \frac{1}{R} & \frac{0.3}{R} \end{bmatrix} \cdot \begin{bmatrix} \|Mx_{DC_i}\| & \|Mx_{DW_i}\| & \|Mx_{LLmax_i}\| & \|Mx_{LLmin_i}\| & \|Mx_{SY_i}\| & \|Mx_{SX_i}\| \end{bmatrix}^T$$

$$MUX_{ExtremEventIb_i} := \begin{bmatrix} 1 & 1 & 0.5 & 0 & \frac{0.3}{R} & \frac{1}{R} \end{bmatrix} \cdot \begin{bmatrix} \|Mx_{DC_i}\| & \|Mx_{DW_i}\| & \|Mx_{LLmax_i}\| & \|Mx_{LLmin_i}\| & \|Mx_{SY_i}\| & \|Mx_{SX_i}\| \end{bmatrix}^T$$

$$MUX_{ExtremEventIc_i} := \begin{bmatrix} 1 & 1 & 0 & 0.5 & \frac{1}{R} & \frac{0.3}{R} \end{bmatrix} \cdot \begin{bmatrix} \|Mx_{DC_i}\| & \|Mx_{DW_i}\| & \|Mx_{LLmax_i}\| & \|Mx_{LLmin_i}\| & \|Mx_{SY_i}\| & \|Mx_{SX_i}\| \end{bmatrix}^T$$

$$MUX_{ExtremEventId_i} := \begin{bmatrix} 1 & 1 & 0 & 0.5 & \frac{0.3}{R} & \frac{1}{R} \end{bmatrix} \cdot \begin{bmatrix} \|Mx_{DC_i}\| & \|Mx_{DW_i}\| & \|Mx_{LLmax_i}\| & \|Mx_{LLmin_i}\| & \|Mx_{SY_i}\| & \|Mx_{SX_i}\| \end{bmatrix}^T$$

$$MY_{StrenghtIa_i} := \begin{bmatrix} 1.25 & 1.5 & 1.75 & 0 & 0 & 0 \end{bmatrix} \cdot \begin{bmatrix} \|My_{DC_i}\| & \|My_{DW_i}\| & \|My_{LLmax_i}\| & \|My_{LLmin_i}\| & \|My_{SY_i}\| & \|My_{SX_i}\| \end{bmatrix}^T$$

$$MY_{StrenghtIb_i} := \begin{bmatrix} 1.25 & 1.5 & 0 & 1.75 & 0 & 0 \end{bmatrix} \cdot \begin{bmatrix} \|My_{DC_i}\| & \|My_{DW_i}\| & \|My_{LLmax_i}\| & \|My_{LLmin_i}\| & \|My_{SY_i}\| & \|My_{SX_i}\| \end{bmatrix}^T$$

$$MY_{ServiceIa_i} := \begin{bmatrix} 1 & 1 & 1.3 & 0 & 0 & 0 \end{bmatrix} \cdot \begin{bmatrix} \|My_{DC_i}\| & \|My_{DW_i}\| & \|My_{LLmax_i}\| & \|My_{LLmin_i}\| & \|My_{SY_i}\| & \|My_{SX_i}\| \end{bmatrix}^T$$

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$$MUy_{ServiceI1b_i} := [1 \ 1 \ 0 \ 1.3 \ 0 \ 0] \cdot \left[\begin{array}{c} \|My_{DC_i}\| \\ \|My_{DW_i}\| \\ \|My_{LLmax_i}\| \\ \|My_{LLmin_i}\| \\ \|My_{SY_i}\| \\ \|My_{SX_i}\| \end{array} \right]^T$$

$$MUy_{ExtremEventIa_i} := \left[1 \ 1 \ 0.5 \ 0 \ \frac{1}{R} \ \frac{0.3}{R} \right] \cdot \left[\begin{array}{c} \|My_{DC_i}\| \\ \|My_{DW_i}\| \\ \|My_{LLmax_i}\| \\ \|My_{LLmin_i}\| \\ \|My_{SY_i}\| \\ \|My_{SX_i}\| \end{array} \right]^T$$

$$MUy_{ExtremEventIb_i} := \left[1 \ 1 \ 0.5 \ 0 \ \frac{0.3}{R} \ \frac{1}{R} \right] \cdot \left[\begin{array}{c} \|My_{DC_i}\| \\ \|My_{DW_i}\| \\ \|My_{LLmax_i}\| \\ \|My_{LLmin_i}\| \\ \|My_{SY_i}\| \\ \|My_{SX_i}\| \end{array} \right]^T$$

$$MUy_{ExtremEventIc_i} := \left[1 \ 1 \ 0 \ 0.5 \ \frac{1}{R} \ \frac{0.3}{R} \right] \cdot \left[\begin{array}{c} \|My_{DC_i}\| \\ \|My_{DW_i}\| \\ \|My_{LLmax_i}\| \\ \|My_{LLmin_i}\| \\ \|My_{SY_i}\| \\ \|My_{SX_i}\| \end{array} \right]^T$$

$$MUy_{ExtremEventId_i} := \left[1 \ 1 \ 0 \ 0.5 \ \frac{0.3}{R} \ \frac{1}{R} \right] \cdot \left[\begin{array}{c} \|My_{DC_i}\| \\ \|My_{DW_i}\| \\ \|My_{LLmax_i}\| \\ \|My_{LLmin_i}\| \\ \|My_{SY_i}\| \\ \|My_{SX_i}\| \end{array} \right]^T$$

$$VUx_{StrenghtIa_i} := [1.25 \ 1.5 \ 1.75 \ 0 \ 0 \ 0] \cdot \left[\begin{array}{c} \|Vx_{DC_i}\| \\ \|Vx_{DW_i}\| \\ \|Vx_{LLmax_i}\| \\ \|Vx_{LLmin_i}\| \\ \|Vx_{SY_i}\| \\ \|Vx_{SX_i}\| \end{array} \right]^T$$

$$VUx_{StrenghtIb_i} := [1.25 \ 1.5 \ 0 \ 1.75 \ 0 \ 0] \cdot \left[\begin{array}{c} \|Vx_{DC_i}\| \\ \|Vx_{DW_i}\| \\ \|Vx_{LLmax_i}\| \\ \|Vx_{LLmin_i}\| \\ \|Vx_{SY_i}\| \\ \|Vx_{SX_i}\| \end{array} \right]^T$$

$$VUx_{ServiceI1a_i} := [1 \ 1 \ 1.3 \ 0 \ 0 \ 0] \cdot \left[\begin{array}{c} \|Vx_{DC_i}\| \\ \|Vx_{DW_i}\| \\ \|Vx_{LLmax_i}\| \\ \|Vx_{LLmin_i}\| \\ \|Vx_{SY_i}\| \\ \|Vx_{SX_i}\| \end{array} \right]^T$$

$$VUx_{ServiceI1b_i} := [1 \ 1 \ 0 \ 1.3 \ 0 \ 0] \cdot \left[\begin{array}{c} \|Vx_{DC_i}\| \\ \|Vx_{DW_i}\| \\ \|Vx_{LLmax_i}\| \\ \|Vx_{LLmin_i}\| \\ \|Vx_{SY_i}\| \\ \|Vx_{SX_i}\| \end{array} \right]^T$$

$$VUx_{ExtremEventIa_i} := \left[1 \ 1 \ 0.5 \ 0 \ \frac{1}{R} \ \frac{0.3}{R} \right] \cdot \left[\begin{array}{c} \|Vx_{DC_i}\| \\ \|Vx_{DW_i}\| \\ \|Vx_{LLmax_i}\| \\ \|Vx_{LLmin_i}\| \\ \|Vx_{SY_i}\| \\ \|Vx_{SX_i}\| \end{array} \right]^T$$

$$VUx_{ExtremEventIb_i} := \left[1 \ 1 \ 0.5 \ 0 \ \frac{0.3}{R} \ \frac{1}{R} \right] \cdot \left[\begin{array}{c} \|Vx_{DC_i}\| \\ \|Vx_{DW_i}\| \\ \|Vx_{LLmax_i}\| \\ \|Vx_{LLmin_i}\| \\ \|Vx_{SY_i}\| \\ \|Vx_{SX_i}\| \end{array} \right]^T$$

$$VUx_{ExtremEventIc_i} := \left[1 \ 1 \ 0 \ 0.5 \ \frac{1}{R} \ \frac{0.3}{R} \right] \cdot \left[\begin{array}{c} \|Vx_{DC_i}\| \\ \|Vx_{DW_i}\| \\ \|Vx_{LLmax_i}\| \\ \|Vx_{LLmin_i}\| \\ \|Vx_{SY_i}\| \\ \|Vx_{SX_i}\| \end{array} \right]^T$$

$$VUx_{ExtremEventId_i} := \left[1 \ 1 \ 0 \ 0.5 \ \frac{0.3}{R} \ \frac{1}{R} \right] \cdot \left[\begin{array}{c} \|Vx_{DC_i}\| \\ \|Vx_{DW_i}\| \\ \|Vx_{LLmax_i}\| \\ \|Vx_{LLmin_i}\| \\ \|Vx_{SY_i}\| \\ \|Vx_{SX_i}\| \end{array} \right]^T$$

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$$VUy_{Strength1a_i} := [1.25 \ 1.5 \ 1.75 \ 0 \ 0 \ 0] \cdot \left[\left\| \dot{Y}_{DC_i} \right\| \ \left\| \dot{Y}_{DW_i} \right\| \ \left\| \dot{Y}_{LLmax_i} \right\| \ \left\| \dot{Y}_{LLmin_i} \right\| \ \left\| \dot{Y}_{SY_i} \right\| \ \left\| \dot{Y}_{SX_i} \right\| \right]^T$$

$$VUy_{Strength1b_i} := [1.25 \ 1.5 \ 0 \ 1.75 \ 0 \ 0] \cdot \left[\left\| \dot{Y}_{DC_i} \right\| \ \left\| \dot{Y}_{DW_i} \right\| \ \left\| \dot{Y}_{LLmax_i} \right\| \ \left\| \dot{Y}_{LLmin_i} \right\| \ \left\| \dot{Y}_{SY_i} \right\| \ \left\| \dot{Y}_{SX_i} \right\| \right]^T$$

$$VUy_{Service1a_i} := [1 \ 1 \ 1.3 \ 0 \ 0 \ 0] \cdot \left[\left\| \dot{Y}_{DC_i} \right\| \ \left\| \dot{Y}_{DW_i} \right\| \ \left\| \dot{Y}_{LLmax_i} \right\| \ \left\| \dot{Y}_{LLmin_i} \right\| \ \left\| \dot{Y}_{SY_i} \right\| \ \left\| \dot{Y}_{SX_i} \right\| \right]^T$$

$$VUy_{Service1b_i} := [1 \ 1 \ 0 \ 1.3 \ 0 \ 0] \cdot \left[\left\| \dot{Y}_{DC_i} \right\| \ \left\| \dot{Y}_{DW_i} \right\| \ \left\| \dot{Y}_{LLmax_i} \right\| \ \left\| \dot{Y}_{LLmin_i} \right\| \ \left\| \dot{Y}_{SY_i} \right\| \ \left\| \dot{Y}_{SX_i} \right\| \right]^T$$

$$VUy_{ExtremEvent1a_i} := \left[1 \ 1 \ 0.5 \ 0 \ \frac{1}{R} \ \frac{0.3}{R} \right] \cdot \left[\left\| \dot{Y}_{DC_i} \right\| \ \left\| \dot{Y}_{DW_i} \right\| \ \left\| \dot{Y}_{LLmax_i} \right\| \ \left\| \dot{Y}_{LLmin_i} \right\| \ \left\| \dot{Y}_{SY_i} \right\| \ \left\| \dot{Y}_{SX_i} \right\| \right]^T$$

$$VUy_{ExtremEvent1b_i} := \left[1 \ 1 \ 0.5 \ 0 \ \frac{0.3}{R} \ \frac{1}{R} \right] \cdot \left[\left\| \dot{Y}_{DC_i} \right\| \ \left\| \dot{Y}_{DW_i} \right\| \ \left\| \dot{Y}_{LLmax_i} \right\| \ \left\| \dot{Y}_{LLmin_i} \right\| \ \left\| \dot{Y}_{SY_i} \right\| \ \left\| \dot{Y}_{SX_i} \right\| \right]^T$$

$$VUy_{ExtremEvent1c_i} := \left[1 \ 1 \ 0 \ 0.5 \ \frac{1}{R} \ \frac{0.3}{R} \right] \cdot \left[\left\| \dot{Y}_{DC_i} \right\| \ \left\| \dot{Y}_{DW_i} \right\| \ \left\| \dot{Y}_{LLmax_i} \right\| \ \left\| \dot{Y}_{LLmin_i} \right\| \ \left\| \dot{Y}_{SY_i} \right\| \ \left\| \dot{Y}_{SX_i} \right\| \right]^T$$

$$VUy_{ExtremEvent1d_i} := \left[1 \ 1 \ 0 \ 0.5 \ \frac{0.3}{R} \ \frac{1}{R} \right] \cdot \left[\left\| \dot{Y}_{DC_i} \right\| \ \left\| \dot{Y}_{DW_i} \right\| \ \left\| \dot{Y}_{LLmax_i} \right\| \ \left\| \dot{Y}_{LLmin_i} \right\| \ \left\| \dot{Y}_{SY_i} \right\| \ \left\| \dot{Y}_{SX_i} \right\| \right]^T$$

$G := 11200$ **ksi**

Capacidad a Flexión

$$\phi_b := 0.9$$

$$L_b := 3.87 \cdot m$$

$$C_b := 1$$

Clasificación de la sección por pandeo Local

Alas

$$\lambda_f := \frac{b_f}{2 \cdot t_f} = 4.802$$

$$\lambda_{pf} := 0.38 \cdot \sqrt{\frac{E}{F_y}} = 9.152$$

$$\lambda_{rf} := 1.0 \cdot \sqrt{\frac{E}{F_y}} = 24.083$$

Alas → “Sección No Compacta”

Alma

$$h := D - 2 \cdot t_f = 0.863 \cdot m$$

$$\lambda_w := \frac{h}{t_w} = 44.418$$

$$\lambda_{pw} := 3.76 \cdot \sqrt{\frac{E}{F_y}} = 90.553$$

$$\lambda_{rw} := 5.70 \cdot \sqrt{\frac{E}{F_y}} = 137.274$$

Alma → “Sección Compacta”

Capacidad de una sección doblemente simétrica compacta alrededor del eje fuerte

- Cedencia

$$M_p := F_y \cdot Z_x = 487.045 \cdot tonf \cdot m$$

- Pandeo Lateral Torsional

$$r_{ts} := \sqrt{\frac{\sqrt{I_y \cdot C_w}}{S_x}} = 0.08 \cdot m$$

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$$c := \left(\frac{h_o}{2} \right) \cdot \sqrt{\frac{I_y}{C_w}} = 1.001$$

$$L_p := 1.76 \cdot r_y \cdot \sqrt{\frac{E}{F_y}} = 2.756 \text{ m}$$

$$L_r := 1.95 \cdot r_{ts} \cdot \left(\frac{E}{(0.7 \cdot F_y)} \right) \cdot \sqrt{\left(\frac{(J \cdot c)}{(S_x \cdot h_o)} \right) + \sqrt{\left(\frac{(J \cdot c)}{(S_x \cdot h_o)} \right)^2 + 6.76 \cdot \left(\frac{(0.7 \cdot F_y)}{E} \right)^2}} = 8.411 \text{ m}$$

$$F_{cr}(l_b) := \left(\frac{(C_b \cdot \pi^2 \cdot E)}{\left(\frac{l_b}{r_{ts}} \right)^2} \right) \cdot \sqrt{1 + 0.078 \cdot \left(\frac{(J \cdot c)}{(S_x \cdot h_o)} \right) \cdot \left(\frac{l_b}{r_{ts}} \right)^2}$$

$$M_{nl}(l_b) := \text{if} \left(l_b \leq L_p, M_p, \left(\text{if} \left(l_b \leq L_r, C_b \cdot \left(M_p - (M_p - 0.7 \cdot F_y \cdot S_x) \cdot \left(\frac{(l_b - L_p)}{(L_r - L_p)} \right) \right), F_{cr}(l_b) \cdot S_x \right) \right) \right)$$

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Capacidad de una sección doblemente simétrica con alma compacta y patines no compactos o esbeltos alrededor del eje fuerte

- Pandeo Local por compresión del patín

$$k_c := \frac{4}{\sqrt{\frac{h}{t_w}}} = 0.6$$

$$M_{n2}(\lambda) := \left\| \begin{array}{l} \text{if } \lambda < \lambda_{pf} \\ \quad \left\| M_p \right. \\ \text{also if } \lambda_{pf} < \lambda < \lambda_{rf} \\ \quad \left\| \left(M_p - (M_p - 0.7 \cdot F_y \cdot S_x) \cdot \left(\frac{\lambda - \lambda_{pf}}{\lambda_{rf} - \lambda_{pf}} \right) \right) \right. \\ \text{else} \\ \quad \left\| \frac{0.9 \cdot E \cdot k_c \cdot S_x}{\lambda^2} \right. \end{array} \right\|$$

Capacidad de una sección doblemente simétrica con alma no compacta alrededor del eje fuerte

- Pandeo Local por compresión del patín

$$M_{n3}(\lambda) := \left\| \begin{array}{l} \text{if } \lambda < \lambda_{pf} \\ \quad \left\| M_p \right. \\ \text{also if } \lambda_{pf} < \lambda < \lambda_{rf} \\ \quad \left\| \left(M_p - (M_p - 0.7 \cdot F_y \cdot S_x) \cdot \left(\frac{\lambda - \lambda_{pf}}{\lambda_{rf} - \lambda_{pf}} \right) \right) \right. \\ \text{else} \\ \quad \left\| \frac{0.9 \cdot E \cdot k_c \cdot S_x}{\lambda^2} \right. \end{array} \right\|$$

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$$M_{nx} := \left\| \begin{array}{l} \text{if } Alas = \text{"Sección Compacta"} \\ \left\| \begin{array}{l} \text{if } Alma = \text{"Sección Compacta"} \\ \left\| M_{n1}(\lambda_b) \right. \\ \text{else} \\ \left\| M_{n3}(\lambda_f) \right. \end{array} \right\| \\ \text{else} \\ \left\| \begin{array}{l} \text{if } Alma = \text{"Sección Compacta"} \\ \left\| M_{n2}(\lambda_f) \right. \\ \text{else} \\ \left\| M_{n3}(\lambda_f) \right. \end{array} \right\| \end{array} \right\| = 487.045 \text{ tonf} \cdot m$$

Capacidad de la sección alrededor del eje debil **(AISC 360-10.F6)**

- Cedencia

$$M_{py} := \min(F_y \cdot Z_y, 1.6 \cdot F_y \cdot S_y)$$

- Pandeo Local del ala

$$F_{crf}(\lambda_f) := \frac{(0.69 \cdot E)}{(\lambda_f)^2}$$

$$M_{ny}(\lambda_f) := \text{if} \left(\lambda_f \leq \lambda_{pf}, M_{py}, \text{if} \left(\lambda_f \leq \lambda_{rf}, \left(M_{py} - (M_{py} - 0.7 \cdot F_y \cdot S_y) \cdot \left(\frac{(\lambda_f - \lambda_{pf})}{(\lambda_{rf} - \lambda_{pf})} \right) \right), F_{crf}(\lambda_f) \cdot S_y \right) \right)$$

$$M_{ny} := M_{ny}(\lambda_f)$$

Capacidad a Compresión

Clasificación de la sección por pandeo Local

Alas

$$\lambda_f := \frac{b_f}{2 \cdot t_f} = 4.802$$

$$\lambda_{rf} := 0.56 \cdot \sqrt{\frac{E}{F_y}} = 13.487$$

Alas → “Sección Compacta”

Alma

$$h := D - 2 \cdot t_f = 0.863 \text{ m}$$

$$\lambda_w := \frac{h}{t_w} = 44.418$$

$$\lambda_{rw} := 1.49 \cdot \sqrt{\frac{E}{F_y}} = 35.884$$

Alma → “Sección Esbelta”

$$K := 1$$

$$r := \max(r_x, r_y) = 0.371 \text{ m}$$

$$F_e := \frac{\pi^2 \cdot E}{\left(\frac{K \cdot L}{r}\right)^2} = (4.53 \cdot 10^9) \text{ Pa}$$

$$F_{cr} := \left\| \begin{array}{l} \text{if } \frac{F_y}{F_e} \leq 2.25 \\ \left\| \left(0.658 \frac{F_y}{F_e}\right) \cdot F_y \right\| \\ \text{else} \\ \left\| 0.877 \cdot F_e \right\| \end{array} \right\| = (3.339 \cdot 10^8) \text{ Pa}$$

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$$b_e := \left\| \begin{array}{l} \text{if } \lambda w \geq 1.49 \cdot \sqrt{\frac{E}{F_{cr}}} \\ \left\| \left(1.92 \cdot t_w \cdot \sqrt{\frac{E}{F_{cr}}} \cdot \left(1 - \frac{0.34}{\left(\frac{h}{t_w} \right)} \cdot \sqrt{\frac{E}{F_{cr}}} \right) \right) \right\| \\ \text{else} \\ h \end{array} \right\| = 0.742 \text{ } m$$

$$A_e := b_e \cdot t_w = 0.014 \text{ } m^2$$

$$A_{gl} := h \cdot t_w = 0.017 \text{ } m^2$$

$$Q_a := \frac{A_e}{A_{gl}} = 0.86$$

$$Q_s := \left\| \begin{array}{l} \text{if } \frac{b_f}{2 \cdot t_f} \leq 0.56 \cdot \sqrt{\frac{E}{F_y}} \\ \left\| 1 \right\| \\ \text{also if } 0.56 \cdot \sqrt{\frac{E}{F_y}} < \frac{b_f}{2 \cdot t_f} \leq 1.03 \cdot \sqrt{\frac{E}{F_y}} \\ \left\| 1.415 - 0.74 \cdot \left(\frac{b_f}{2 \cdot t_f} \right) \cdot \sqrt{\frac{F_y}{E}} \right\| \\ \text{else} \\ \left\| \frac{0.69 \cdot E}{F_y \cdot \left(\frac{b_f}{2 \cdot t_f} \right)^2} \right\| \end{array} \right\| = 1$$

$$Q := Q_a \cdot Q_s$$

$$F_{cr} := \left\| \begin{array}{l} \text{if } \frac{Q \cdot F_y}{F_e} \leq 2.25 \\ \left\| \left(0.658 \sqrt{\frac{Q \cdot F_y}{F_e}} \right) \cdot Q \cdot F_y \right\| \\ \text{else} \\ \left\| 0.877 \cdot F_e \right\| \end{array} \right\| = (2.883 \cdot 10^8) \text{ } Pa$$

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$$P_n := F_{cr} \cdot A_g = (1.192 \cdot 10^3) \text{ tonf}$$

$$\phi_c := 0.9$$

Flexo compresión

$$RazonCapacidad1_i := \left\| \begin{array}{l} \text{if } \frac{PU_{Strenght1a_i}}{\phi_c \cdot P_n} \geq 0.2 \\ \left\| \frac{PU_{Strenght1a_i}}{\phi_c \cdot P_n} + \frac{8}{9} \cdot \left(\frac{MUx_{Strenght1a_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{Strenght1a_i}}{\phi_b \cdot M_{ny}} \right) \right\| \\ \text{else} \\ \left\| \frac{PU_{Strenght1a_i}}{2 \cdot \phi_c \cdot P_n} + \left(\frac{MUx_{Strenght1a_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{Strenght1a_i}}{\phi_b \cdot M_{ny}} \right) \right\| \end{array} \right\|$$

$$RazonCapacidad2_i := \left\| \begin{array}{l} \text{if } \frac{PU_{Strenght1b_i}}{\phi_c \cdot P_n} \geq 0.2 \\ \left\| \frac{PU_{Strenght1b_i}}{\phi_c \cdot P_n} + \frac{8}{9} \cdot \left(\frac{MUx_{Strenght1b_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{Strenght1b_i}}{\phi_b \cdot M_{ny}} \right) \right\| \\ \text{else} \\ \left\| \frac{PU_{Strenght1b_i}}{2 \cdot \phi_c \cdot P_n} + \left(\frac{MUx_{Strenght1b_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{Strenght1b_i}}{\phi_b \cdot M_{ny}} \right) \right\| \end{array} \right\|$$

$$RazonCapacidad3_i := \left\| \begin{array}{l} \text{if } \frac{PU_{Service1a_i}}{\phi_c \cdot P_n} \geq 0.2 \\ \left\| \frac{PU_{Service1a_i}}{\phi_c \cdot P_n} + \frac{8}{9} \cdot \left(\frac{MUx_{Service1a_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{Service1a_i}}{\phi_b \cdot M_{ny}} \right) \right\| \\ \text{else} \\ \left\| \frac{PU_{Service1a_i}}{2 \cdot \phi_c \cdot P_n} + \left(\frac{MUx_{Service1a_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{Service1a_i}}{\phi_b \cdot M_{ny}} \right) \right\| \end{array} \right\|$$

$$RazonCapacidad4_i := \left\| \begin{array}{l} \text{if } \frac{PU_{Service1b_i}}{\phi_c \cdot P_n} \geq 0.2 \\ \left\| \frac{PU_{Service1b_i}}{\phi_c \cdot P_n} + \frac{8}{9} \cdot \left(\frac{MUx_{Service1b_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{Service1b_i}}{\phi_b \cdot M_{ny}} \right) \right\| \\ \text{else} \\ \left\| \frac{PU_{Service1b_i}}{2 \cdot \phi_c \cdot P_n} + \left(\frac{MUx_{Service1b_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{Service1b_i}}{\phi_b \cdot M_{ny}} \right) \right\| \end{array} \right\|$$

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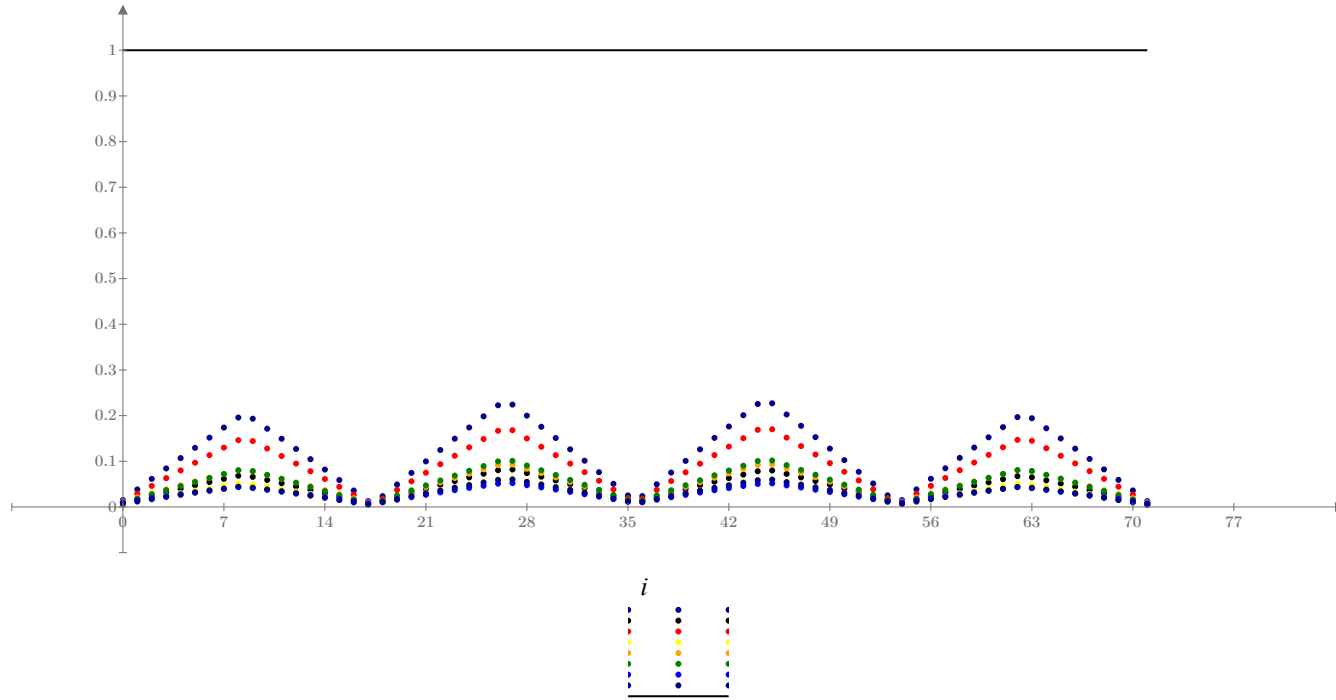
$$\begin{aligned}
 \text{RazonCapacidad5}_i &:= \left\| \begin{array}{l} \text{if } \frac{PU_{ExtremEventIa_i}}{\phi_c \cdot P_n} \geq 0.2 \\ \left\| \frac{PU_{ExtremEventIa_i}}{\phi_c \cdot P_n} + \frac{8}{9} \cdot \left(\frac{MUx_{ExtremEventIa_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{ExtremEventIa_i}}{\phi_b \cdot M_{ny}} \right) \right\| \\ \text{else} \\ \left\| \frac{PU_{ExtremEventIa_i}}{2 \cdot \phi_c \cdot P_n} + \left(\frac{MUx_{ExtremEventIa_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{ExtremEventIa_i}}{\phi_b \cdot M_{ny}} \right) \right\| \end{array} \right\| \\
 \text{RazonCapacidad6}_i &:= \left\| \begin{array}{l} \text{if } \frac{PU_{ExtremEventIb_i}}{\phi_c \cdot P_n} \geq 0.2 \\ \left\| \frac{PU_{ExtremEventIb_i}}{\phi_c \cdot P_n} + \frac{8}{9} \cdot \left(\frac{MUx_{ExtremEventIb_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{ExtremEventIb_i}}{\phi_b \cdot M_{ny}} \right) \right\| \\ \text{else} \\ \left\| \frac{PU_{ExtremEventIb_i}}{2 \cdot \phi_c \cdot P_n} + \left(\frac{MUx_{ExtremEventIb_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{ExtremEventIb_i}}{\phi_b \cdot M_{ny}} \right) \right\| \end{array} \right\|
 \end{aligned}$$

$$\begin{aligned}
 \text{RazonCapacidad7}_i &:= \left\| \begin{array}{l} \text{if } \frac{PU_{ExtremEventIc_i}}{\phi_c \cdot P_n} \geq 0.2 \\ \left\| \frac{PU_{ExtremEventIc_i}}{\phi_c \cdot P_n} + \frac{8}{9} \cdot \left(\frac{MUx_{ExtremEventIc_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{ExtremEventIc_i}}{\phi_b \cdot M_{ny}} \right) \right\| \\ \text{else} \\ \left\| \frac{PU_{ExtremEventIc_i}}{2 \cdot \phi_c \cdot P_n} + \left(\frac{MUx_{ExtremEventIc_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{ExtremEventIc_i}}{\phi_b \cdot M_{ny}} \right) \right\| \end{array} \right\|
 \end{aligned}$$

$$\begin{aligned}
 \text{RazonCapacidad8}_i &:= \left\| \begin{array}{l} \text{if } \frac{PU_{ExtremEventId_i}}{\phi_c \cdot P_n} \geq 0.2 \\ \left\| \frac{PU_{ExtremEventId_i}}{\phi_c \cdot P_n} + \frac{8}{9} \cdot \left(\frac{MUx_{ExtremEventId_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{ExtremEventId_i}}{\phi_b \cdot M_{ny}} \right) \right\| \\ \text{else} \\ \left\| \frac{PU_{ExtremEventId_i}}{2 \cdot \phi_c \cdot P_n} + \left(\frac{MUx_{ExtremEventId_i}}{\phi_b \cdot M_{nx}} + \frac{MUy_{ExtremEventId_i}}{\phi_b \cdot M_{ny}} \right) \right\| \end{array} \right\|
 \end{aligned}$$

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$RazonCapacidad1_i$

$RazonCapacidad2_i$

$RazonCapacidad3_i$

$RazonCapacidad4_i$

$RazonCapacidad5_i$

$RazonCapacidad6_i$

$RazonCapacidad7_i$

$RazonCapacidad8_i$

1

Cortante

$$\phi_v := 0.9$$

$$A_w := h \cdot t_w = 0.017 \text{ m}^2$$

$$C_v := 1.0$$

$$V_n := 0.6 \cdot F_y \cdot A_w \cdot C_v = 389.921 \text{ tonf}$$

$$RazonCapacidad1_i := \frac{VUx_{Strenght1a_i}}{V_n}$$

$$RazonCapacidad2_i := \frac{VUx_{Strenght1b_i}}{V_n}$$

$$RazonCapacidad3_i := \frac{VUx_{Service1a_i}}{V_n}$$

$$RazonCapacidad4_i := \frac{VUx_{Service1b_i}}{V_n}$$

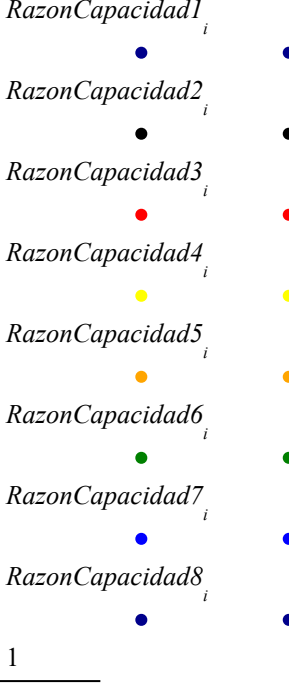
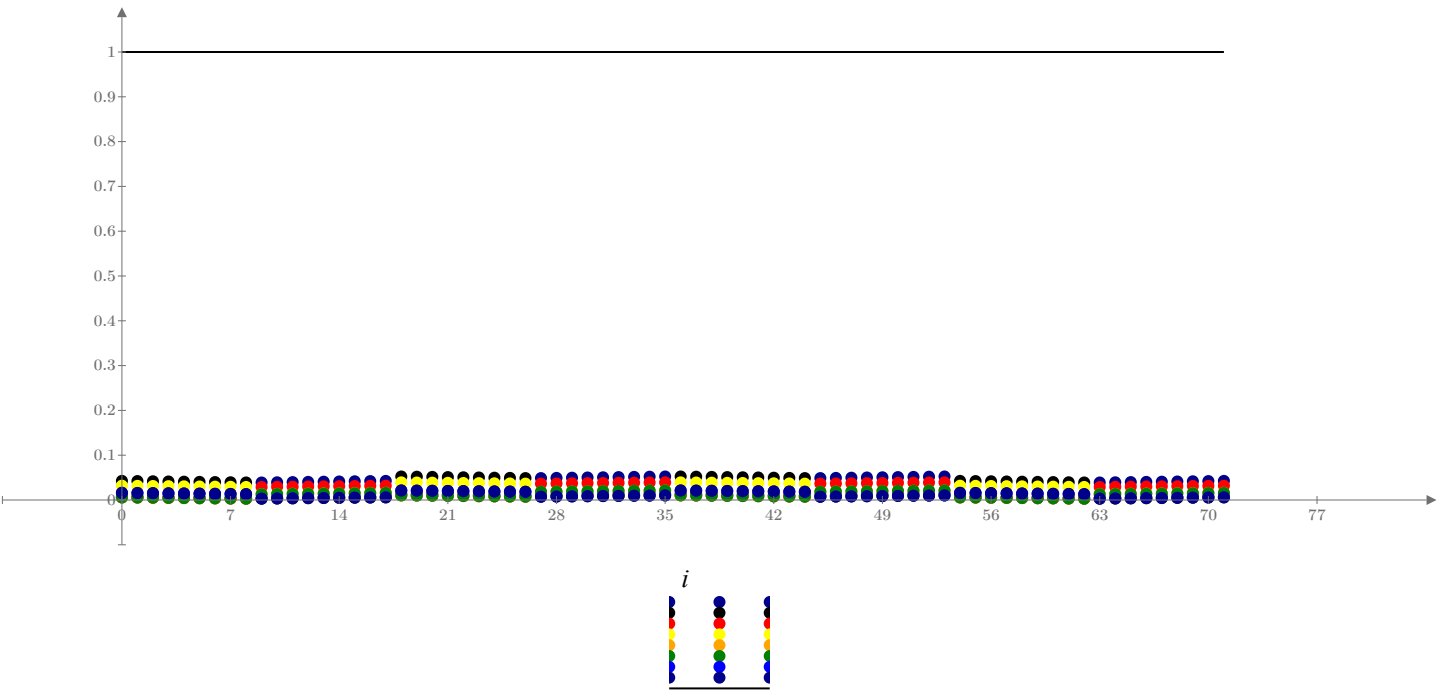
$$RazonCapacidad5_i := \frac{VUx_{ExtremEvent1a_i}}{V_n}$$

$$RazonCapacidad6_i := \frac{VUx_{ExtremEvent1b_i}}{V_n}$$

$$RazonCapacidad7_i := \frac{VUx_{ExtremEvent1c_i}}{V_n}$$

$$RazonCapacidad8_i := \frac{VUx_{ExtremEvent1d_i}}{V_n}$$

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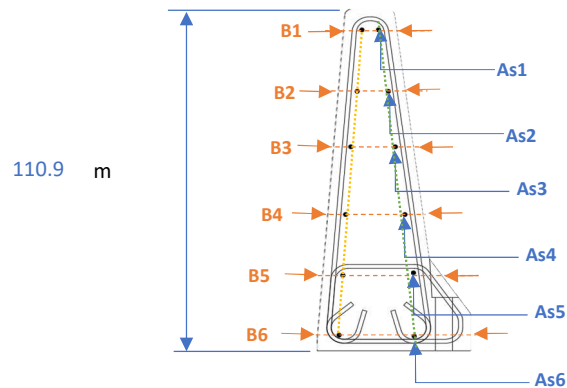


III. Diseño de las barandas vehiculares

1. Materiales

Concreto Baranda	f'_c	280	kg/cm ²
Concreto Losa	f'_c	350	kg/cm ²
Acero de refuerzo	f_y	4200	kg/cm ²

2. Capacidad de la baranda en su eje vertical (Mw)



Sección	B (cm)	As interno	As externo
1	15.6	# 4	# 4
2	19.7	# 4	# 4
3	23.4	# 4	# 4
4	27.9	# 4	# 4
5	34.9	# 4	# 4
6	45	# 4	# 4

Calculo de Mw región interior

Sección	rec. (cm)	d (cm)	As int (cm2)	a (cm)	ϕMn interna (tonf.m)	As ext (cm2)	a (cm)	ϕMn externa (tonf.m)
1	5	10.6	1.27	1.21	0.53	1.27	1.21	0.53
2	5	14.7	1.27		0.75	1.27		0.75
3	5	18.4	1.27		0.95	1.27		0.95
4	5	22.9	1.27		1.19	1.27		1.19
5	5	29.9	1.27		1.56	1.27		1.56
6	5	40	1.27		2.10	1.27		2.10
					7.07			7.07

Mwinternc 6.37 tonf.m/m
Mwexternc 6.37 tonf.m/m
Mw promedio 6.37 tonf.m/m

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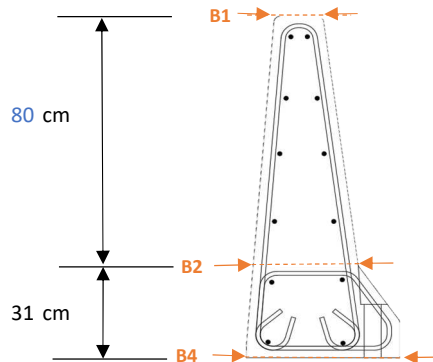
Mw región de extremos

Lc supuesto 196 cm
Longitud de desarrollo 30 cm

Sección	Ubicación en Altura (cm)	Longitud embebida (cm)	rec. (cm)	Fracción desarrollada	As int (cm2)	d (cm)	a (cm)	ϕMn interna (tonf.m)
1	104.3	184.3	5	1.00	1.27	10.60	1.07	0.54
2	84.3	149.0	5	1.00	1.27	14.70		0.75
3	66.3	117.2	5	1.00	1.27	18.40		0.95
4	44.3	78.3	5	1.00	1.27	22.90		1.19
5	24.6	43.5	5	1.00	1.27	29.90		1.56
6	5.1	9.0	5	0.30	0.38	40.00		0.63
								5.62

Mwi prom 5.07 tonf.m/m

3. Capacidad de la baranda en su eje horizontal



	Sección	B (cm)	Bprom
TOP	1	15	23.3
	2	31.5	
BOT	3	31.5	38.25
	4	45	

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Mc región interior

	Acero col		Fracción de desarroll	As (cm)	a	rec (cm)	d (cm)	φMn tonf.m/m
TOP	# 4	@20cm	1	6.33	1.12	5.00	18.25	4.71
BOT	# 7	@20cm	0.94	18.21	2.76	5.00	33.25	20.97

Mci prom 9.237 tonf.m/m

Mc región externa

	Acero col		Fracción de desa	As (cm)	a	rec (cm)	d (cm)	φMn tonf.m/m
TOP	# 4	@20cm	1	6.33	1.12	5.00	18.25	4.71
BOT	# 7	@20cm	0.939	18.21	2.76	5.00	33.25	20.97

Mce prom 9.237 tonf.m/m

4. Capacidad de la branda

	Interior	Exterior	
Lt	1.2	1.2	m
Ft	27	27	ton
H	1.109	1.109	m
Mb	0	0	tonf.m/m
Mw	6.37	5.07	tonf.m/m
Mc	9.24	9.24	tonf.m/m
	18.47	18.47	kip.ft/ft
Lc	3.27	1.62	m
Rw	54.5	26.9	Ton

OK

* A criterio de diseñador se considera adecuado

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5. Revisión de Cortante

Ft	27	ton
Fl	9	ton
Vres	28.46	ton/Lc

Acero Colocado # 7 @20cm

As	31.37	cm ² /Lc
μ	1	
Vn	113.32	tonf/Lc

OK

6. Revisión de anclaje del acero de refuerzo

Se asume anclaje químico (HIT RE-500SD) para varilla #7 G60

Profundidad embebido para desarrollar esfuerzo de ruptura	=	18.50	cm
Factor de ajuste por separación @ 20cm	=	0.86	
Esfuerzo capaz de desarrollar	=	3612	kg/cm ²
Fracción de desarrollo considerando interacción Tensión/cortante	=	0.939	

*Especificación HIT-RE500

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2. Revisión de la losa

En la zona cercana a las pilas

MDC	=	-2.00 ton-m
MDW	=	-0.08 ton-m
MLL max	=	0.44
MLLmin	=	-1.30
MCT	=	-9.24

MU _{Ext.EventII}	=	-11.10 ton-m
		-11.97 ton-m
T	=	9.93 ton/m

Considerando que se desarrolla la resistencia tras el impacto

LRFD A13.4.2-1

ds	=	20.21 cm
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Arreglo supuesto de varillas

Díámetro de varilla	Dvar	#	5
Área de las varilla	Avar	1.98	cm ²
Distancia d	de	20.21	cm
Separación	S	20	cm
	As	16.23	cm ²
	Ta	68167.99	kg
	C	58237.78	kg
	a	1.96	cm

Bastones	Díámetro de varilla	Dvar	4
	Área de las varilla	Avar	1.27 cm ²
	Distancia d	de	20.21 cm
	Separación	S	20 cm

Momento resistente	Mr	12.61	ton-m	SI CUMPLE
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Revisión acero máximo

c	2.30	cm
c/d	0.11	SI CUMPLE

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En la zona cercana a los centros de claros

MDC	=	-1.30 ton-m
MDW	=	-0.06 ton-m
MLL min	=	0.60
MLLmax	=	-1.15
MCT	=	-9.24

MU _{Ext.EventII}	=	-10.30 ton-m
		-11.17 ton-m
T	=	9.93 ton/m

Considerando que se desarrolla la resistencia tras el impacto

LRFD A13.4.2-1

ds	=	20.21 cm
----	---	----------

Arreglo supuesto de varillas

Díámetro de varilla	Dvar	#	5	Bastones	Díámetro de varilla	Dvar	4
Área de las varilla	Avar	1.98	cm ²		Área de las varilla	Avar	1.27 cm ²
Distancia d	de	20.21	cm		Distancia d	de	20.21 cm
Separación	S	20	cm		Separación	S	20 cm
	As	16.23	cm ²				
	Ta	68167.99	kg				
	C	58237.78	kg				
	a	1.96	cm				

Momento resistente	Mr	12.61	ton-m	SI CUMPLE
--------------------	----	-------	-------	------------------

Revisión acero máximo

c	2.30	cm	
c/d	0.11		SI CUMPLE