CAPÍTULO 6

MEMORIA DE CÁLCULO

6.1. DATOS GENERALES

Destino: Edificio de educación Universitaria, Ampliación de la Facultad Regional San Rafael, Universidad Tecnológica Nacional.

Ubicación: Av. Urquiza 314, San Rafael, Mendoza.

Materiales de Construcción: Hormigón armado, acero y mampostería.

6.2. ESTRUCTURACIÓN

Sistema de cargas verticales y laterales: Pórticos de hormigón armado, tabiques de hormigón y tabiques de mampostería encadenada.

Sistemas de piso: Losa de hormigón armado tipo alivianada, con viguetas pretensadas.

Sistema de cubierta superior: Cubierta liviana de chapa galvanizada trapezoidal Nº22, estructura de perfiles de chapa tipo "hoesch" apoyados sobre cerchas metálicas de perfiles normales tipo "L" con diagonales y montantes de ADN420s soldados.

6.3. PROPIEDADES DE LOS MATERIALES

6.3.1. HORMIGÓN ARMADO

- Hormigón Estructural H20 según especificaciones de CIRSOC 201
- Resistencia a la Compresión: f'c = 200 kg/cm²
- Módulo de Elasticidad Longitudinal: E = 215000 kg/cm²
- Tamaño máximo del agregado grueso: 25.4mm
- Cemento Pórtland Común que cumpla con IRAM 50000-2000 y CIRSOC 201.
- Contenido de cemento: 300kg/m³
- Relación agua/cemento: a/c = 0.60
- Dosificación: 1:5 (cemento : agregado)

6.3.2. ACERO DE REFUERZO

- Acero de Dureza Natural ADN420s soldados
- Tensión de Fluencia: fy = 4200 kg/cm²
- Módulo de Elasticidad Longitudinal: E = 2100000 kg/cm²
- Responde a las Normas: CIRSOC 201 e IRAM-IAS U500-207
- Nervuradas
- Anclajes y empalmes ≥ 30cm
- Recubrimiento mínimo 2cm

- Recubrimiento mínimo en bases 5cm

6.3.3. ACERO ESTRUCTURAL

- Acero tipo F-22
- Tensión de fluencia 2200 kg/cm²
- Módulo de Elasticidad Longitudinal: E = 2100000 kg/cm²
- γ = 1.60
- Tensión admisible: 1250 kg/cm²

6.3.4. MAMPOSTERÍA

- Mampostería de Ladrillos Cerámicos Macizos (LCM) según CIRSOC 103 parte III
- Resistencia a la compresión f'u = 5 kg/cm²
- Mortero tipo E, resistencia mínima a compresión a 28 días, 150 kg/cm²
- Docificación 1 : 0,25 : 3 (cemento:cal:arena)
- Resistencia al corte 2 kg/cm²
- Módulo de Elasticidad Longitudinal: E = 24000 kg/cm²
- Módulo de Corte: G = 4800 kg/cm²

6.3.5. TERRENO NATURAL

- Suelo tipo 1 (CIRSOC 103) sitio SC
- Resistencia a la compresión 2 kg/cm², las especificaciones técnicas de la edificación existente señala esta resistencia, ver ANEXO Nº1.
- Todo elemento estructural en contacto con el suelo, llevará 5cm de hormigón de limpieza

6.3.6. ANCLAJE QUÍMICO

- Adhesivo Epoxi de dos componentes para anclajes
- Alta capacidad de carga
- Rápido Curado
- Se recomienda usar Sika®AnchorFix®-3001, especificaciones en el ANEXO 4.

6.3.7. MANGUITOS DE EMPALME

- Manguitos que respete las disposiciones del CIRSOC 201 respecto a empalmes mecánicos.
- Utilizar Sistema QUICK WEDGE® de NVENT LENTON®, especificaciones en el ANEXO 4.

6.3.8. UNIÓN HORMIGÓN ENDURECIDO – HORMIGÓN FRESCO

- Agente de unión epoxídrico, tixotrópico, sin solventes.
- Utilizar Sikadur®-32 Gel, especificaciones en el ANEXO 4.

6.4. ANÁLISIS ESTRUCTURAL

El análisis estructural se encuentra en el *punto 5.3.2.6 "Análisis de Carga"* en el *capítulo 5*.

6.5. PLANILLAS DE CÁLCULO

6.5.1. **ANÁLISIS SÍSMICO EN PLANTA BAJA**

SISMO P.B. - BLOQUE 1			
FZA. SISMICA EN X		**FZA. SISMICA EN Y**	
Qx=Qy	248.20	Qx=Qy	248.20
Co	0.15	Co	0.15
γd	1.40	γd	1.40
γvi	1.00	γvi	1.00
γdux=γduy	1.3	γdux=γduy	1.3
S	0.80	S	0.80
Cx=Cy	0.2184	Cx=Cy	0.2184
Fsx	**54.21**	**Fsy**	**54.21**

SISMO VINCULADO EN PLANTA BAJA - BLOQUE 1							
Fx[t]:	**54.21**	**CORTE EN NIVEL "X"**		**Fy[t]:**	**54.21**	**CORTE EN NIVEL "Y"**	
Ex[m]:	0.07	Lx[m]:	18.20	Mtxmax.:	253.15	Mtymax.:	151.96
Ey[m]:	3.10	Ly[m]:	10.50	Mtxmin.:	82.40	Mtymin.:	-144.01

DIR.	PLANO "i"	Di [t]	Qp [t]	di [m]	Qmt [t]				Qt [t]	Corte en Muros				
					X		Y			L [cm]	b [cm]	Qm [kg]	τm [kg/cm2]	τm [adm] [kg/cm2]
					max.	min.	max.	min.						
X	1	9.77	1.89	8.86	1.78	0.58	1.07	-1.01	3.67	-	-	3667	-	-
	2	42.19	8.15	5.76	5.00	1.63	3.00	-2.84	13.15	-	-	13152	-	-
	3	228.60	44.17	-1.44	-6.78	-2.21	-4.07	3.86	37.39	3600	20	37388	0.58	2.00
Y	4	57.85	16.69	9.00	10.71	3.49	6.43	-6.10	23.13	760	20	23125	1.69	2.00
	5	7.15	2.06	4.50	0.66	0.22	0.40	-0.38	2.46	-	-	2461	-	-
	6	57.85	16.69	0.00	0.00	0.00	0.00	0.00	16.69	760	20	16694	1.22	2.00
	7	7.15	2.06	4.50	0.66	0.22	0.40	-0.38	2.46	-	-	2461	-	-
	8	57.85	16.69	9.00	10.71	3.49	6.43	-6.10	23.13	760	20	23125	1.69	2.00

SISMO P.B. - BLOQUE 2			
FZA. SISMICA EN X		**FZA. SISMICA EN Y**	
Qx=Qy (t)	281.09	Qx=Qy (t)	281.09
Co	0.15	Co	0.15
γd	1.40	γd	1.40
γvi	1.00	γvi	1.00
γdux=γduy	1.3	γdux=γduy	1.3
S	0.80	S	0.80
Cx=Cy	0.2184	Cx=Cy	0.2184
Fsx=Fsy	**61.39**	**Fsx=Fsy**	**61.39**

SISMO VINCULADO EN PLANTA BAJA - BLOQUE 2							
Fx[t]:	**61.39**	**CORTE EN NIVEL "X"**		**Fy[t]:**	**61.39**	**CORTE EN NIVEL "Y"**	
Ex[m]:	0.00	Lx[m]:	17.60	Mtxmax.:	320.12	Mtymax.:	162.07
Ey[m]:	3.64	Ly[m]:	10.50	Mtxmin.:	126.74	Mtymin.:	-162.07

DIR.	PLANO "i"	Di [t]	Qp [t]	di [m]	Qmt [t]				Qt [t]	Corte en Muros				
					X		Y			L [cm]	b [cm]	Qm [kg]	τm [kg/cm2]	τm [adm] [kg/cm2]
					max.	min.	max.	min.						
X	1	9.77	2.20	8.82	2.36	0.94	1.20	-1.20	4.56	-	-	4559	-	-
	2	42.19	9.50	5.72	6.62	2.62	3.35	-3.35	16.11	-	-	16113	-	-
	3	220.80	49.69	-1.48	-8.98	-3.55	-4.55	4.55	40.72	1760	20	40716	1.29	2.00
Y	9	57.85	18.91	8.70	13.81	5.47	6.99	-6.99	25.89	760	20	25895	1.89	2.00
	10	7.15	2.34	4.50	0.88	0.35	0.45	-0.45	2.78	-	-	2783	-	-
	11	57.85	18.91	0.00	0.00	0.00	0.00	0.00	18.91		-	18905		-
	12	7.15	2.34	4.50	0.88	0.35	0.45	-0.45	2.78	-	-	2783	-	-
	13	57.85	18.91	8.70	13.81	5.47	6.99	-6.99	25.89	760	20	25895	1.89	2.00

SISMO P.B. - BLOQUE 3			
FZA. SISMICA EN X		FZA. SISMICA EN Y	
Qx=Qy	336.30	Qx=Qy	336.30
Co	0.15	Co	0.15
γd	1.40	γd	1.40
γvi	1.00	γvi	1.00
γdux=γduy	1.3	γdux=γduy	1.3
S	0.80	S	0.80
Cx=Cy	0.2184	Cx=Cy	0.2184
Fsx=Fsy	**73.45**	**Fsx=Fsy**	**73.45**

SISMO VINCULADO EN PLANTA BAJA - BLOQUE 3							
Fx[t]:	**73.45**	**CORTE EN NIVEL "X"**		**Fy[t]:**	**73.45**	**CORTE EN NIVEL "Y"**	
Ex[m]:	-0.08	Lx[m]:	27.20	Mtxmax.:	394.93	Mtymax.:	293.77
Ey[m]:	3.80	Ly[m]:	10.50	Mtxmin.:	163.57	Mtymin.:	-305.57

DIR.	PLANO "i"	Di [t]	Qp [t]	di [m]	Qmt [t]				Qt [t]	Corte en Muros				
					X		Y			L [cm]	b [cm]	Qm [kg]	τm [kg/cm2]	τm [adm] [kg/cm2]
					max.	min.	max.	min.						
X	1	14.85	2.26	9.33	1.95	0.81	1.45	-1.51	4.21	-	-	4212	-	-
	2	44.05	6.70	6.23	3.87	1.60	2.88	-2.99	10.57	-	-	10567	-	-
	3	424.19	64.49	-0.97	-5.82	-2.41	-4.33	4.51	58.67	3600	20	58669	0.91	2.00
Y	14	57.85	16.80	13.50	11.02	4.56	8.20	-8.53	25.00	760	20	25002	1.83	2.00
	15	7.15	2.08	9.00	0.91	0.38	0.68	-0.70	2.75	-	-	2752	-	-
	16	57.85	16.80	4.50	3.67	1.52	2.73	-2.84	19.54	760	20	19537	1.43	2.00
	17	7.15	2.08	0.00	0.00	0.00	0.00	0.00	2.08	-	-	2077	-	-
	18	57.85	16.80	4.50	3.67	1.52	2.73	-2.84	19.54	760	20	19537	1.43	2.00
	19	7.15	2.08	9.00	0.91	0.38	0.68	-0.70	2.75	-	-	2752	-	-
	20	57.85	16.80	13.50	11.02	4.56	8.20	-8.53	25.00	760	20	25002	1.83	2.00

SISMO P.B. - BLOQUE 4			
FZA. SISMICA EN X		**FZA. SISMICA EN Y**	
Qx=Qy	197.33	Qx=Qy	197.33
Co	0.15	Co	0.15
γd	1.40	γd	1.40
γvi	1.00	γvi	1.00
γdux=γduy	1.3	γdux=γduy	1.3
S	0.80	S	0.80
Cx=Cy	0.2184	Cx=Cy	0.2184
Fsx=Fsy	**43.10**	**Fsx=Fsy**	**43.10**

SISMO VINCULADO EN PLANTA BAJA - BLOQUE 4							
Fx[t]:	**43.10**	**CORTE EN NIVEL "X"**		**Fy[t]:**	**43.10**	**CORTE EN NIVEL "Y"**	
Ex[m]:	-1.06	Lx[m]:	13.60	Mtxmax.:	189.00	Mtymax.:	42.22
Ey[m]:	2.36	Ly[m]:	13.50	Mtxmin.:	14.46	Mtymin.:	-133.62

DIR.	PLANO "i"	Di [t]	Qp [t]	di [m]	Qmt [t]				Qt [t]	Corte en Muros				
					X		Y			L [cm]	b [cm]	Qm [kg]	τm [kg/cm2]	τm [adm] [kg/cm2]
					max.	min.	max.	min.						
X	3	81.27	20.45	-4.17	-9.70	-0.74	-2.17	6.86	10.75	945	20	10747	0.63	2.00
	2	0.44	0.11	3.05	0.04	0.00	0.01	-0.03	0.15	-	-	-	-	-
	25	0.28	0.07	4.00	0.03	0.00	0.01	-0.02	0.10	-	-	-	-	-
	22	51.08	12.85	6.33	9.27	0.71	2.07	-6.56	14.92	689	20	14925	1.20	2.00
	23	38.07	9.58	0.30	0.33	0.03	0.07	-0.24	9.65	425	20	9653	1.26	2.00
	24	0.14	0.03	6.43	0.03	0.00	0.01	-0.02	0.04	-	-	40	-	-
Y	25	0.18	0.05	3.15	0.02	0.00	0.00	-0.01	0.05	-	-	51	-	-
	22	23.85	6.34	-2.85	-1.95	-0.15	-0.44	1.38	5.90	321	20	5900	1.02	2.00
	23	81.54	21.66	-4.15	-9.70	-0.74	-2.17	6.86	19.49	911	20	19493	1.19	2.00
	24	0.29	0.08	0.97	0.01	0.00	0.00	-0.01	0.08	-	-	-	-	-
	21	56.38	14.98	7.20	11.63	0.89	2.60	-8.22	17.57	760	20	17575	1.28	2.00

6.5.2. ANÁLISIS SÍSMICO EN PLANTA BAJA

SOLICITACIONES SISMICAS EN PLANOS DESVINCULADOS S/1° PISO - BLOQUE 1 (C.C.S. Pcia. De Mza. 1987)							
Co	γd	γvi	γdu(col)	γdu(mur)	S	C(col)	C(mur)
0.15	1.4	1.3	1.15	1.3	0.8	0.251	0.284
LOS PLANOS SISMORRESISTENTES QUE CORRESPONDEN AL PRESENTE ANÁLISIS SE ENCUENTRAN ENCUADRADOS EN LA SALVEDAD AL ART. 5.5.5. "ARRIOSTRAMIENTOS DE LAS FUNDACIONES" POR LA EVALUACIÓN EFECTUADA DEL COEFICIENTE gvi							

DIR.	PLANO	Q [t]	Ts [t]	CORTE EN MUROS			
				Qm [t]	b [cm]	L [cm]	τm [kg/cm2]
X	1	5.07	1.27	---	---	---	---
	2	28.98	7.28	---	---	---	---
	3	31.25	8.87	8.87	20	1825	0.243
Y	4	11.48	3.26	3.26	20	745	0.219
	5	12.57	3.16	---	---	---	---
	6	16.37	4.65	4.65	20	760	0.306
	7	12.82	3.22	---	---	---	---
	8	12.07	3.43	3.43	20	745	0.230

SOLICITACIONES SISMICAS EN PLANOS DESVINCULADOS S/1° PISO - BLOQUE 2 (C.C.S. Pcia. De Mza. 1987)							
Co	γd	γvi	γdu(col)	γdu(mur)	S	C(col)	C(mur)
0.15	1.4	1.3	1.15	1.3	0.8	0.251	0.284
LOS PLANOS SISMORRESISTENTES QUE CORRESPONDEN AL PRESENTE ANÁLISIS SE ENCUENTRAN ENCUADRADOS EN LA SALVEDAD AL ART. 5.5.5. "ARRIOSTRAMIENTOS DE LAS FUNDACIONES" POR LA EVALUACIÓN EFECTUADA DEL COEFICIENTE gvi							

DIR.	PLANO	Q [t]	Ts [t]	CORTE EN MUROS			
				Qm [t]	b [cm]	L [cm]	τm [kg/cm2]
X	1	37.23	9.35	---	---	---	---
	3	33.09	9.40	9.40	20	1780	0.264
Y	9	14.70	4.17	4.17	20	745	0.280
	10	13.64	3.43	---	---	---	---
	11	13.64	3.43	---	---	---	---
	12	13.64	3.43	---	---	---	---
	13	14.70	4.17	4.17	20	745	0.280

SOLICITACIONES SISMICAS EN PLANOS DESVINCULADOS S/1° PISO - BLOQUE 3 (C.C.S. Pcia. De Mza. 1987)							
Co	γd	γvi	γdu(col)	γdu(mur)	S	C(col)	C(mur)
0.15	1.4	1.3	1.15	1.3	0.8	0.251	0.284
LOS PLANOS SISMORRESISTENTES QUE CORRESPONDEN AL PRESENTE ANÁLISIS SE ENCUENTRAN ENCUADRADOS EN LA SALVEDAD AL ART. 5.5.5. "ARRIOSTRAMIENTOS DE LAS FUNDACIONES" POR LA EVALUACIÓN EFECTUADA DEL COEFICIENTE gvi							

DIR.	PLANO	Q [t]	Ts [t]	CORTE EN MUROS			
				Qm [t]	b [cm]	L [cm]	τm [kg/cm2]
X	1	7.12	1.79	---	---	---	---
	2	36.27	9.11	---	---	---	---
	3	40.59	11.52	11.52	20	2725	0.21
Y	14	11.70	3.32	3.32	20	745	0.22
	15	12.42	3.12	---	---	---	---
	16	12.18	3.06	---	---	---	---
	17	12.18	3.06	---	---	---	---
	18	12.18	3.06	---	---	---	---
	19	12.18	3.06	---	---	---	---
	20	11.13	3.16	3.16	20	745	0.21

SOLICITACIONES SISMICAS EN PLANOS DESVINCULADOS S/1° PISO - BLOQUE 4 (C.C.S. Pcia. De Mza. 1987)							
Co	γd	γvi	γdu(col)	γdu(mur)	S	C(col)	C(mur)
0.15	1.4	1.3	1.15	1.3	0.8	0.251	0.284
LOS PLANOS SISMORRESISTENTES QUE CORRESPONDEN AL PRESENTE ANÁLISIS SE ENCUENTRAN ENCUADRADOS EN LA SALVEDAD AL ART. 5.5.5. "ARRIOSTRAMIENTOS DE LAS FUNDACIONES" POR LA EVALUACIÓN EFECTUADA DEL COEFICIENTE gvi							

DIR.	PLANO	Q [t]	Ts [t]	CORTE EN MUROS			
				Qm [t]	b [cm]	L [cm]	τm [kg/cm2]
X	1	0.77	0.19	---	---	---	---
	3	13.98	3.97	3.97	20	945	0.21
	2	6.20	1.56	---	---	---	---
	25	4.38	1.10	---	---	---	---
	22	15.51	4.40	4.40	20	688.56	0.32
	23	6.13	1.74	1.74	20	425.115	0.20
	24	2.87	0.72	---	---	---	---
	26	0.35	0.09	---	---	---	---
Y	25	2.94	0.74	---	---	---	---
	22	8.82	2.50	2.50	20	321.48	0.39
	23	14.11	4.00	4.00	20	910.53	0.22
	24	6.60	1.66	---	---	---	---
	21	16.91	4.80	4.80	20	760	0.32
	26	0.81	0.20	---	---	---	---

6.5.3. PLANILLA DE BASES

BASES DE H°A° - BLOQUE 1											
DESIGNAC.	ax [cm]	ay [cm]	h [cm]	M [tcm]	N [t]	Q [t]	σ_1 [kg/cm2]	σ_2 [kg/cm2]	σ_3 [kg/cm2]	σ_4 [kg/cm2]	Aº INF.
CIMIENTO CORRIDO	ANCHO: 50		60	---	---	---	---	---	---	---	HORMIG. / CICLÓPEO
B1	110	110	100	287	-3.2	0.69	1.00	0.81	1.59	0.53 FICT.	#∅12 C/15
B2	240	170	120	2120	-20.5	8.19	1.67	0.79	2.37	1.19 FICT.	#∅12 C/15
B3	140	140	110	263	-23.65	1.21	1.00	1.67	2.31	0.63 FICT.	#∅12 C/15

BASES DE H°A° - BLOQUE 2											
DESIGNAC.	ax [cm]	ay [cm]	h [cm]	M [tcm]	N [t]	Q [t]	σ_1 [kg/cm2]	σ_2 [kg/cm2]	σ_3 [kg/cm2]	σ_4 [kg/cm2]	Aº INF.
CIMIENTO CORRIDO	ANCHO: 50		60	---	---	---	---	---	---	---	HORMIG. / CICLÓPEO
B0	80	80	70	---	---	---	---	---	---	---	#∅8 C/15
B2	240	170	120	2120	-20.5	8.19	1.67	0.79	2.37	1.19 FICT.	#∅12 C/15
B3	140	140	110	263	-23.65	1.21	1.00	1.67	2.31	0.63 FICT.	#∅12 C/15

BASES DE H°A° - BLOQUE 3											
DESIGNAC.	ax [cm]	ay [cm]	h [cm]	M [tcm]	N [t]	Q [t]	σ_1 [kg/cm2]	σ_2 [kg/cm2]	σ_3 [kg/cm2]	σ_4 [kg/cm2]	Aº INF.
CIMIENTO CORRIDO	ANCHO: 50		60	---	---	---	---	---	---	---	HORMIG. / CICLÓPEO
B0	80	80	70	---	---	---	---	---	---	---	#∅8 C/15
B1	110	110	100	287	-3.2	0.69	1.00	0.81	1.59	0.53 FICT.	#∅12 C/15
B2	240	170	120	2120	-20.5	8.19	1.67	0.79	2.37	1.19 FICT.	#∅12 C/15
B3	140	140	110	263	-23.65	1.21	1.00	1.67	2.31	0.63 FICT.	#∅12 C/15

BASES DE H°A° - BLOQUE 4											
DESIGNAC.	ax [cm]	ay [cm]	h [cm]	M [tcm]	N [t]	Q [t]	σ_1 [kg/cm2]	σ_2 [kg/cm2]	σ_3 [kg/cm2]	σ_4 [kg/cm2]	Aº INF.
CIMIENTO CORRIDO	ANCHO: 50		60	---	---	---	---	---	---	---	HORMIG. / CICLÓPEO
B0	80	80	70	---	---	---	---	---	---	---	#∅8 C/15

BASES DE H°A° - ESCALERA EXTERIOR											
DESIGNAC.	ax [cm]	ay [cm]	h [cm]	M [tcm]	N [t]	Q [t]	σ_1 [kg/cm2]	σ_2 [kg/cm2]	σ_3 [kg/cm2]	σ_4 [kg/cm2]	Aº INF.
B4	550	200	100	957	13.6	2.9	1.33	1.04	0.43	0.24	#∅12 C/15

6.5.4. PLANILLA DE COLUMNAS Y TABIQUES

COLUMNAS DE Hº Aº - BLOQUE 1													
DESIG.	DIMENSIONES		SOLICITACIONES			Aº LONGITUDINAL			ESTRIBOS				
	ax [cm]	ay [cm]	Mmax [tcm]	Nmax [t]	Q [t]	A=A' [cm2]	INT. Aº A	INT. Aº A´	Vcb [t]	Vs [t]	Ø [mm]	Ast [cm²]	SEP. [cm]
Cv	18	18	---	---	---	---	2 ∅ 8	2 ∅ 8	---	---	6	0.28	20
C1	30		Y=81 X=287	-3.2	0.49 0.69	16.08	8 ∅ 16		5.27	Ast mín	6	0.28	20
C2	80	20	2120	-20.5	8.19	9.42 2.2	3 ∅ 20 2 ∅ 12	3 ∅ 20	11.88	Ast mín	6	0.28	20
C3	25	46	1325	-14.37	4.00	15.45	3Ø12e + 6Ø16	3Ø12e + 6Ø16	8.47	Ast mín	6	0.28	20
C4	25	46	671.5	-17.29	2.03	11.43	3Ø12 + 4Ø16	3Ø12 + 4Ø16	8.47	Ast mín	6	0.28	20
C5	30		Y=158 X=263	-23.65	1.21 0.96	43.96	14 ∅ 20		5.27	Ast mín	8	0.5	20
C101	30		Y=76,7 X=182	-1.63	0.89 0.25	16.08	8 ∅ 16		5.27	Ast mín	6	0.28	20
C102	80	20	203	-7.18	0.46	9.42 2.2	3 ∅ 20 2 ∅ 12	3 ∅ 20	11.88	Ast mín	6	0.28	20
C103	25	46	1075	-3.54	2.11	15.45	3Ø12e + 6Ø16	3Ø12e + 6Ø16	8.47	Ast mín	6	0.28	20
C104	25	46	835	-4.75	3.25	11.43	3Ø12 + 4Ø16	3Ø12 + 4Ø16	8.47	Ast mín	6	0.28	20
C105	30		Y=561 X=638	-5.32	1.75 1.87	43.96	14 ∅ 20		5.27	Ast mín	8	0.5	20

COLUMNAS DE Hº Aº - BLOQUE 2													
DESIG.	DIMENSIONES		SOLICITACIONES			Aº LONGITUDINAL			ESTRIBOS				
	ax [cm]	ay [cm]	Mmax [tcm]	Nmax [t]	Q [t]	A=A' [cm2]	INT. Aº A	INT. Aº A´	Vcb [t]	Vs [t]	Ø [mm]	Ast [cm²]	SEP. [cm]
Cv	18	18	---	---	---	---	2 ∅ 8	2 ∅ 8	---	---	6	0.28	20
C1	30		Y=81 X=287	-3.2	0.49 0.69	16.08	8 ∅ 16		5.27	Ast mín	6	0.28	20
C2	80	18	2120	-20.5	8.19	9.42 2.2	3 ∅ 20 2 ∅ 12	3 ∅ 20	10.69	0.23	6	0.28	20
C3	25	46	1325	-14.37	4.00	15.45	3Ø12e + 6Ø16	3Ø12e + 6Ø16	8.47	Ast mín	6	0.28	20
C5	30		Y=158 X=263	-23.65	1.21 0.96	43.96	14 ∅ 20		5.27	Ast mín	8	0.5	20
C101	30		Y=76,7 X=182	-1.63	0.89 0.25	16.08	8 ∅ 16		5.27	Ast mín	6	0.28	20
C102	80	18	203	-7.18	0.46	9.42 2.2	3 ∅ 20 2 ∅ 12	3 ∅ 20	10.69	Ast mín	6	0.28	20
C103	25	46	1075	-3.54	2.11	15.45	3Ø12e + 6Ø16	3Ø12e + 6Ø16	8.47	Ast mín	6	0.28	20
C105	30		Y=561 X=638	-5.32	1.75 1.87	43.96	14 ∅ 20		5.27	Ast mín	8	0.5	20

COLUMNAS DE Hº Aº - BLOQUE 3													
DESIG.	DIMENSIONES		SOLICITACIONES			Aº LONGITUDINAL			ESTRIBOS				
	ax [cm]	ay [cm]	Mmax [tcm]	Nmax [t]	Q [t]	A=A' [cm2]	INT. Aº A	INT. Aº A´	Vcb [t]	Vs [t]	Ø [mm]	Ast [cm²]	SEP. [cm]
Cv	18	18	---	---	---	---	2 ∅ 8	2 ∅ 8	---	---	6	0.28	20
C1	30		Y=81 X=287	-3.2	0.49 0.69	16.08	8 ∅ 16		5.27	Ast mín	6	0.28	20
C2	80	20	2120	-20.5	8.19	9.42 2.2	3 ∅ 20 2 ∅ 12	3 ∅ 20	11.88	Ast mín	6	0.28	20
C3	25	46	1325	-14.37	4.00	15.45	3Ø12e + 6Ø16	3Ø12e + 6Ø16	8.47	Ast mín	6	0.28	20
C4	25	46	671.5	-17.29	2.03	11.43	3Ø12 + 4Ø16	3Ø12 + 4Ø16	8.47	Ast mín	6	0.28	20
C5	30		Y=158 X=263	-23.65	1.21 0.96	43.96	14 ∅ 20		5.27	Ast mín	8	0.5	20
C101	30		Y=76,7 X=182	-1.63	0.89 0.25	16.08	8 ∅ 16		5.27	Ast mín	6	0.28	20
C102	80	20	203	-7.18	0.46	9.42 2.2	3 ∅ 20 2 ∅ 12	3 ∅ 20	11.88	Ast mín	6	0.28	20
C103	25	46	1075	-3.54	2.11	15.45	3Ø12e + 6Ø16	3Ø12e + 6Ø16	8.47	Ast mín	6	0.28	20
C104	25	46	835	-4.75	3.25	11.43	3Ø12 + 4Ø16	3Ø12 + 4Ø16	8.47	Ast mín	6	0.28	20
C105	30		Y=561 X=638	-5.32	1.75 1.87	43.96	14 ∅ 20		5.27	Ast mín	8	0.5	20

COLUMNAS DE Hº Aº - BLOQUE 4													
DESIG.	DIMENSIONES		SOLICITACIONES			Aº LONGITUDINAL			ESTRIBOS				
	ax [cm]	ay [cm]	Mmax [tcm]	Nmax [t]	Q [t]	A=A' [cm2]	INT. Aº A	INT. Aº A´	Vcb [t]	Vs [t]	Ø [mm]	Ast [cm²]	SEP. [cm]
Cv	18	18	---	---	---	---	2 ∅ 8	2 ∅ 8	---	---	6	0.28	20
C6	18	40	Y=94	-25.59	0.24	19.07	2∅12e + 1∅10e + 8∅16	2∅12e + 1∅10e + 8∅16	1.90	Ast mín	8	0.5	20
						2.20	INTERMEDIA 2∅12e						
C7	30		169	-5.25	0.51	3.16	4∅10e + 6∅10		5.27	Ast mín	6	0.28	20
C106	18	40	Y=632	-2.62	2.22	19.07	2∅12e + 1∅10e + 8∅16	2∅12e + 1∅10e + 8∅16	1.90	1.06	8	0.5	20
						2.20	INTERMEDIA 2∅12e						
C107	30		149	-0.98	0.54	3.16	4∅10e + 6∅10		5.27	Ast mín	6	0.28	20
C108	18	40	---	-30	---	---	3 ∅ 12	3 ∅ 12	---	---	6	0.28	20
						---	INTERMEDIA 2 ∅ 10						

TABIQUES DE Hº Aº - ESCALERA EXTERIOR													
DESIG.	DIMENSIONES		SOLICITACIONES			Aº LONGITUDINAL			ESTRIBOS				
	ax [cm]	ay [cm]	Mmax [tcm]	Nmax [t]	Q [t]	A=A' [cm2]	INT. Aº A	INT. Aº A´	Vcb [t]	Vs [t]	Ø [mm]	Ast [cm²]	SEP. [cm]
T1	100	18	211	2.55	0.64	11.31	1 ∅ 12 c/10cm	1 ∅ 12 c/10cm	58.51	Ast mín	6	0.28	20

6.5.5. PLANILLA DE LOSAS CERÁMICAS

LOSAS CERÁMICAS (TIPO PREAR 90) - BLOQUE 1							
DESIG.	q [kg/m2]	L [m]	M [kgm]	SERIE VIGUETA	ESP. DE C. DE C. [cm]	ALT. BLOKE [cm]	Madm. [kgm]
L1	760	4.50	1924	S5º de 4.60 m	5	16.5	2046

LOSAS CERÁMICAS (TIPO PREAR 90) - BLOQUE 2							
DESIG.	q [kg/m2]	L [m]	M [kgm]	SERIE VIGUETA	ESP. DE C. DE C. [cm]	ALT. BLOKE [cm]	Madm. [kgm]
L1	760	4.50	1924	S5º de 4.60 m	5	16.5	2046

LOSAS CERÁMICAS (TIPO PREAR 90) - BLOQUE 3							
DESIG.	q [kg/m2]	L [m]	M [kgm]	SERIE VIGUETA	ESP. DE C. DE C. [cm]	ALT. BLOKE [cm]	Madm. [kgm]
L1	760	4.50	1924	S5º de 4.60 m	5	16.5	2046

LOSAS CERÁMICAS (TIPO PREAR 90) - BLOQUE 4							
DESIG.	q [kg/m2]	L [m]	M [kgm]	SERIE VIGUETA	ESP. DE C. DE C. [cm]	ALT. BLOKE [cm]	Madm. [kgm]
L1	760	4.50	1924	S5º de 4.60 m	5	16.5	2046
L2	760	5.75	3141	DOBLE S6º de 5.90 m (máx)	5	16.5	3743
L3	760	5.95	3363	DOBLE S6º de 6.10 m (máx)	5	16.5	3743
L4	760	6.25	3711	DOBLE S6º de 6.40 m (máx)	5	16.5	3743

6.5.6. PLANILLA DE VIGAS Y LOSAS DE HORMIGÓN ARMADO

VIGAS Y LOSAS DE H°A° - BLOQUE 1

DESIGN.	LUZ [m]	SOLICITACIONES		M [tcm]				DIMENSIONES [m]			SECCION DE A° [cm2]				INTEGRACIÓN DE ARMADURA				Vua [t]		Vca [t]	Vsa [t]	ESTRIBO			BARRAS A 45°				
		Diagrama	q [kg/m]	A	Tramo		B	b cm	dmin cm	hmin cm	A	Tr.		B	A	Tramo		B			Vca [t]	Vsb [t]	Ø [mm]	Ast [cm²]	Sep. [cm]	A			B	
				Neg. Pos.	Neg.	Pos.	Neg. Pos.				Sup. Inf.	Sup. Inf.		Sup. Inf.	Sup. Inf.	Sup. Inf.		Sup. Inf.		Vub [t]	Vcb [t]	Vsb [t]				INT.	XA [cm]	INT.	XB [cm]
Vf1	---	---	---	---	---	---	---	18	27	30	---	---	---	---	2 Ø 8	2 Ø 8		2 Ø 8	---	---	---	---	---	6	20	---	---	---	---	---
				---	---	---	---				---	---	---	---	2 Ø 8	2 Ø 8		2 Ø 8	---	---										
Vf2	---	---	---	---	---	---	---	18	27	30	---	---	---	---	2 Ø 12	2 Ø 12		2 Ø 12	---	---	---	---	---	6	20	---	---	---	---	---
				---	---	---	---				---	---	---	---	2 Ø 12	2 Ø 12		2 Ø 12	---	---										
Vd-VE	---	---	---	---	---	---	---	18	17	20	---	---	---	---	2 Ø 8	2 Ø 8		2 Ø 8	---	---	---	---	---	6	20	---	---	---	---	---
				---	---	---	---				---	---	---	---	2 Ø 8	2 Ø 8		2 Ø 8	---	---										
VE2	---		---	---	---	---	---	18	27	30	---	---	---	---	2 Ø 8	2 Ø 8		2 Ø 8	---	---	---	---	---	6	20	---	---	---	---	---
				---	---	---	---				---	---	---	---	2 Ø 8	2 Ø 8		2 Ø 8	---	---										
V1a	4.5		550	121	---	123	---	18	37	40	2.2	---	2.2	---	2 Ø 12	2 Ø 12		2 Ø 12	1.62	1.62	4.96	Ast mín	6	0.28	20	---	---	---	---	---
				---	60	---	---				---	2.2	---	---	2 Ø 12	2 Ø 12		2 Ø 12												
V1b	4.5		550	123	---	123	---	18	37	40	2.2	---	2.2	---	2 Ø 12	2 Ø 12		2 Ø 12	1.62	1.62	4.96	Ast mín	6	0.28	20	---	---	---	---	---
				---	59	---	---				---	2.2	---	---	2 Ø 12	2 Ø 12		2 Ø 12												
V1c	4.5		550	123	---	123	---	18	37	40	2.2	---	2.2	---	2 Ø 12	2 Ø 12		2 Ø 12	1.62	1.62	4.96	Ast mín	6	0.28	20	---	---	---	---	---
				---	59	---	---				---	2.2	---	---	2 Ø 12	2 Ø 12		2 Ø 12												
V1d	4.5		550	123	---	121	---	18	37	40	2.2	---	2.2	---	2 Ø 12	2 Ø 12		2 Ø 12	1.62	1.62	4.96	Ast mín	6	0.28	20	---	---	---	---	---
				---	60	---	---				---	2.2	---	---	2 Ø 12	2 Ø 12		2 Ø 12												
V2a	4.5		1695	253	---	253	---	18	57	60	3.39	---	3.39	---	3 Ø 12	3 Ø 12		3 Ø 12	3.25	4.38	7.65	Ast mín	6	0.28	20	---	---	---	---	---
				---	312	---	---				---	3.39	---	---	3 Ø 12	3 Ø 12		3 Ø 12												
V2b	4.5		300	253	---	---	6	18	57	60	3.39	---	---	---	3 Ø 12	2 Ø 12		2 Ø 12	1.25	0.1	7.65	Ast mín	6	0.28	20	---	---	---	---	---
				---	7	---					---	2.2	---	2.2	2 Ø 12	2 Ø 12		2 Ø 12												
V2c	4.5		300	---	---	77	---	18	57	60	---	---	2.2	---	2 Ø 12	2 Ø 12		2 Ø 12	0.49	0.86	7.65	Ast mín	6	0.28	20	---	---	---	---	---
				6	46	---					2.2	2.2	---	2.2	2 Ø 12	2 Ø 12		2 Ø 12												
V2d	4.5		300	77	---	77	---	18	57	60	2.2	---	2.2	---	2 Ø 12	2 Ø 12		2 Ø 12	0.85	0.5	7.65	Ast mín	6	0.28	20	---	---	---	---	---
				---	42	---	---				---	2.2	---	---	2 Ø 12	2 Ø 12		2 Ø 12												
V3	3		1970	---	---	---	---	25	47	50	---	---	---	---	2 Ø 12	2 Ø 12		2 Ø 12	2.95	2.95	8.76	Ast mín	6	0.28	20	---	---	---	---	---
				---	222	---	---				---	2.2	---	---	2 Ø 12	2 Ø 12		2 Ø 12												
V4a	4.5		4000	1432	---	1868	---	25	47	50	10.3	---	19.72	---	2Ø16+2Ø20	2 Ø 16		2Ø16+5Ø20	14.72	15.93	8.76	10.87	8	0.5	18.16	2 Ø 20	120	1 Ø 20 2 Ø 20 2 Ø 20	120 150 100	
				---	1110	---					---	13.44	---		2Ø16+1Ø20	2Ø16+3Ø20		2Ø16+1Ø20												
V4b	3		4000	805	---	86		25	47	50	19.72	---	7.16		2Ø16+5Ø20	2Ø16+1Ø20		2Ø16+1Ø20	8.85		8.76	3.04	6	0.28	20	2 Ø 20 2 Ø 20	100 100	---	---	
				---	113	---					---	4.02	---		2Ø16+1Ø20	2 Ø 16		2 Ø 16	4.13											
V5a	3		1990	---	---	398	---	25	47	50	---	---	3.39	---	2 Ø 12	2 Ø 12		4 Ø 12	1.66		8.76	Ast mín	6	0.28	20	---	---	2 Ø 20	50	
				---	70	---					---	2.2	---		2 Ø 12	2 Ø 12		2 Ø 12	4.31											
V5b	2	0.2t/	1990	398	---	---	---	25	47	50	3.39	---	---	---	4 Ø 12	2 Ø 12		2 Ø 12	3.98		8.76	Ast mín	6	0.28	20	2 Ø 20	50	---	---	
				---	---	---					---	---	---		2 Ø 12	2 Ø 12		2 Ø 12	0											

V101a	4.5		200	66	---	66	18	37	40	1.57	---	1.57	2 ∅ 10	2 ∅ 10	2 ∅ 10	0.89	4.96	Ast mín	6	0.28	20	---	---	---	---
				---	34	---				---	1.57	---	2 ∅ 10	2 ∅ 10	2 ∅ 10	0.89									
V101b	4.5		200	66	---	68	18	37	40	1.57	---	1.57	2 ∅ 10	2 ∅ 10	2 ∅ 10	0.89	4.96	Ast mín	6	0.28	20	---	---	---	---
				---	33	---				---	1.57	---	2 ∅ 10	2 ∅ 10	2 ∅ 10	0.89									
V101c	4.5		200	68	---	66	18	37	40	1.57	---	1.57	2 ∅ 10	2 ∅ 10	2 ∅ 10	0.89	4.96	Ast mín	6	0.28	20	---	---	---	---
				---	33	---				---	1.57	---	2 ∅ 10	2 ∅ 10	2 ∅ 10	0.89									
V101d	4.5		200	66	---	66	18	37	40	1.57	---	1.57	2 ∅ 10	2 ∅ 10	2 ∅ 10	0.89	4.96	Ast mín	6	0.28	20	---	---	---	---
				---	34	---				---	1.57	---	2 ∅ 10	2 ∅ 10	2 ∅ 10	0.89									
VP	4.5		300	---	---	---	18	57	60	---	---	---	2 ∅ 10	2 ∅ 10	2 ∅ 10	0.68	7.65	Ast mín	6	0.28	20	---	---	---	---
				---	76	---				---	1.57	---	3 ∅ 10	3 ∅ 10	3 ∅ 10	0.68									
LM1	1.95	0.3 t	3205	---	---	---	100	15	18	---	---	---	---	---	---	6.55	---	---	2.7	1 ∅ 6 c/10cm		---	---	---	---
				---	668	---				---	11.31	---	1∅16c/8.5cm	1∅16c/8.5cm	1∅16c/8.5cm	0			REPARTICION						

VIGAS Y LOSAS DE H°A° - BLOQUE 2

DESIGN.	LUZ [m]	SOLICITACIONES		M [tcm]			DIMENSIONES [m]			SECCION DE A° [cm2]			INTEGRACIÓN DE ARMADURA			Vua [t]	Vca [t]	Vsa [t]	ESTRIBO			BARRAS A 45°			
				A	Tramo	B				A	Tr.	B	A	Tramo	B				Ø [mm]	Ast [cm²]	Sep. [cm]	A		B	
		Diagrama	q [kg/m]	Neg. Pos.	Neg. Pos.	Neg. Pos.	b cm	dmín cm	hmín cm	Sup. Inf.	Sup. Inf.	Sup. Inf.	Sup. Inf.	Sup. Inf.	Sup. Inf.	Vub [t]	Vcb [t]	Vsb [t]				INT.	XA [cm]	INT.	XB [cm]
Vf1	---		---	---	---	---	18	27	30	---	---	---	2 ∅ 8	2 ∅ 8	2 ∅ 8	---	---	---	---	6	20	---	---	---	---
				---	---	---				---	---	---	2 ∅ 8	2 ∅ 8	2 ∅ 8	---									
Vf2	---		---	---	---	---	18	27	30	---	---	---	2 ∅ 12	2 ∅ 12	2 ∅ 12	---	---	---	---	6	20	---	---	---	---
				---	---	---				---	---	---	2 ∅ 12	2 ∅ 12	2 ∅ 12	---									
Vd-VE	---		---	---	---	---	18	17	20	---	---	---	2 ∅ 8	2 ∅ 8	2 ∅ 8	---	---	---	---	6	20	---	---	---	---
				---	---	---				---	---	---	2 ∅ 8	2 ∅ 8	2 ∅ 8	---									
VE2	---		---	---	---	---	18	27	30	---	---	---	2 ∅ 8	2 ∅ 8	2 ∅ 8	---	---	---	---	6	20	---	---	---	---
				---	---	---				---	---	---	2 ∅ 8	2 ∅ 8	2 ∅ 8	---									
V5a	3		1990	---	---	398	25	47	50	---	---	3.39	2 ∅ 12	2 ∅ 12	4 ∅ 12	1.66	8.76	Ast mín	6	0.28	20	---	---	2 ∅ 20	50
				---	70	---				---	2.2	---	2 ∅ 12	2 ∅ 12	2 ∅ 12	4.31									
V5b	2	0.21t	1990	398	---	---	25	47	50	3.39	---	---	4 ∅ 12	2 ∅ 12	2 ∅ 12	3.98	8.76	Ast mín	6	0.28	20	2 ∅ 20	50	---	---
				---	---	---				---	---	---	2 ∅ 12	2 ∅ 12	2 ∅ 12	0									
V6a	4.5		525	125	---	125	18	37	40	2.2	---	2.2	2 ∅ 12	2 ∅ 12	2 ∅ 12	1.58	4.96	Ast mín	6	0.28	20	---	---	---	---
				---	63	---				---	2.2	---	2 ∅ 12	2 ∅ 12	2 ∅ 12	1.65									
V6b	4.5		525	125	---	123	18	37	40	2.2	---	2.2	2 ∅ 12	2 ∅ 12	2 ∅ 12	1.62	4.96	Ast mín	6	0.28	20	---	---	---	---
				---	58	---				---	2.2	---	2 ∅ 12	2 ∅ 12	2 ∅ 12	1.6									
V6c	4.5		525	123	---	125	18	37	40	2.2	---	2.2	2 ∅ 12	2 ∅ 12	2 ∅ 12	1.6	4.96	Ast mín	6	0.28	20	---	---	---	---
				---	58	---				---	2.2	---	2 ∅ 12	2 ∅ 12	2 ∅ 12	1.62									
V6d	4.5		525	125	---	125	18	37	40	2.2	---	2.2	2 ∅ 12	2 ∅ 12	2 ∅ 12	1.65	4.96	Ast mín	6	0.28	20	---	---	---	---
				---	63	---				---	2.2	---	2 ∅ 12	2 ∅ 12	2 ∅ 12	1.6									

V1a	4.5		550	121	---	123	18	37	40	2.2	---	2.2	2 ∅ 12	2 ∅ 12	2 ∅ 12	1.62	4.96	Ast mín	6	0.28	20	---	---	---	---
				---	60	---				---	2.2	---	2 ∅ 12	2 ∅ 12	2 ∅ 12	1.62									
V1b-V1c-V1d-V1e	4.5		550	123	---	123	18	37	40	2.2	---	2.2	2 ∅ 12	2 ∅ 12	2 ∅ 12	1.62	4.96	Ast mín	6	0.28	20	---	---	---	---
				---	59	---				---	2.2	---	2 ∅ 12	2 ∅ 12	2 ∅ 12	1.62									
V1f	4.5		550	123	---	121	18	37	40	2.2	---	2.2	2 ∅ 12	2 ∅ 12	2 ∅ 12	1.62	4.96	Ast mín	6	0.28	20	---	---	---	---
				---	60	---				---	2.2	---	2 ∅ 12	2 ∅ 12	2 ∅ 12	1.62									
V9a	4.5		300	65	---	65	18	57	60	2.2	---	2.2	2 ∅ 12	2 ∅ 12	2 ∅ 12	1.62	7.65	Ast mín	6	0.28	20	---	---	---	---
				---	47	---				---	2.2	---	2 ∅ 12	2 ∅ 12	2 ∅ 12	1.62									
V9b	4.5		300	65	---	44	18	57	60	2.2	---	2.2	2 ∅ 12	2 ∅ 12	2 ∅ 12	1.62	7.65	Ast mín	6	0.28	20	---	---	---	---
				---	22	---				---	2.2	---	2 ∅ 12	2 ∅ 12	2 ∅ 12	1.62									
V9c	4.5		300	44	---	66	18	57	60	2.2	---	2.2	2 ∅ 12	2 ∅ 12	2 ∅ 12	1.62	7.65	Ast mín	6	0.28	20	---	---	---	---
				---	22	---				---	2.2	---	2 ∅ 12	2 ∅ 12	2 ∅ 12	1.62									
V9d	4.5		300	66	---	---	18	57	60	2.2	---	2.2	2 ∅ 12	2 ∅ 12	2 ∅ 12	1.62	7.65	Ast mín	6	0.28	20	---	---	---	---
				---	48	3				---	2.2	---	2 ∅ 12	2 ∅ 12	2 ∅ 12	1.62									
V9e	4.5		300	---	---	252	18	57	60	2.2	---	2.2	2 ∅ 12	2 ∅ 12	2 ∅ 12	1.62	7.65	Ast mín	6	0.28	20	---	---	---	---
				3	5	---				---	2.2	---	2 ∅ 12	2 ∅ 12	2 ∅ 12	1.62									
V9f	4.5		1695	252	---	252	18	57	60	3.39	---	3.39	3 ∅ 12	3 ∅ 12	3 ∅ 12	3.25	7.65	Ast mín	6	0.28	20	---	---	---	---
				---	312	---				---	3.39	---	3 ∅ 12	3 ∅ 12	3 ∅ 12	4.38									
V3	3		1970	---	---	---	25	47	50	---	---	---	2 ∅ 12	2 ∅ 12	2 ∅ 12	2.95	8.76	Ast mín	6	0.28	20	---	---	---	---
				---	222	---				---	2.2	---	2 ∅ 12	2 ∅ 12	2 ∅ 12	2.95									
V4a	4.5		4000	1432	---	1868	25	47	50	10.3	---	19.72	2∅16+2∅20	2 ∅ 16	2∅16+5∅20	14.72	8.76	10.87	8	0.5	18.16	2 ∅ 20	120	1 ∅ 20 2 ∅ 20 2 ∅ 20	120 150 100
				---	1110	---				---	13.44	---	2∅16+1∅20	2∅16+3∅20	2∅16+1∅20	15.93									
V4b	3		4000	805	---	86	25	47	50	19.72	---	7.16	2∅16+5∅20	2∅16+1∅20	2∅16+1∅20	8.85	8.76	3.04	6	0.28	20	2 ∅ 20 2 ∅ 20	100 100	---	---
				---	113	---				---	4.02	---	2∅16+1∅20	2 ∅ 16	2 ∅ 16	4.13									
V5a	3		1990	---	---	398	25	47	50	---	---	3.39	2 ∅ 12	2 ∅ 12	4 ∅ 12	1.66	8.76	Ast mín	6	0.28	20	---	---	2 ∅ 20	50
				---	70	---				---	2.2	---	2 ∅ 12	2 ∅ 12	2 ∅ 12	4.31									
V5b	2	0.21t	1990	398	---	---	25	47	50	3.39	---	---	4 ∅ 12	2 ∅ 12	2 ∅ 12	3.98	8.76	Ast mín	6	0.28	20	2 ∅ 20	50	---	---
				---	---	---				---	---	---	2 ∅ 12	2 ∅ 12	2 ∅ 12	0									
V101a	4.5		200	66	---	66	18	37	40	1.57	---	1.57	2 ∅ 10	2 ∅ 10	2 ∅ 10	0.89	4.96	Ast mín	6	0.28	20	---	---	---	---
				---	34	---				---	1.57	---	2 ∅ 10	2 ∅ 10	2 ∅ 10	0.89									
V101b-V101c V101d-V101e	4.5		200	66	---	66	18	37	40	1.57	---	1.57	2 ∅ 10	2 ∅ 10	2 ∅ 10	0.89	4.96	Ast mín	6	0.28	20	---	---	---	---
				---	33	---				---	1.57	---	2 ∅ 10	2 ∅ 10	2 ∅ 10	0.89									
V101f	4.5		200	66	---	66	18	37	40	1.57	---	1.57	2 ∅ 10	2 ∅ 10	2 ∅ 10	0.89	4.96	Ast mín	6	0.28	20	---	---	---	---
				---	34	---				---	1.57	---	2 ∅ 10	2 ∅ 10	2 ∅ 10	0.89									
VP	4.5		300	---	---	---	18	57	60	---	---	---	2 ∅ 10	2 ∅ 10	2 ∅ 10	0.68	7.65	Ast mín	6	0.28	20	---	---	---	---
				---	76	---				---	1.57	---	3 ∅ 10	3 ∅ 10	3 ∅ 10	0.68									
LM1	1.95	0.3 t	3205	---	---	---	100	15	18	---	---	---	---	---	---	6.55	---	---	2.7	1 ∅ 6 c/10cm		---	---	---	---
				---	668	---				---	11.31	---	1∅16c/8.5cm	1∅16c/8.5cm	1∅16c/8.5cm	0			REPARTICION						

VIGAS Y LOSAS DE H°A° - BLOQUE 4

DESIGN.	LUZ [m]	SOLICITACIONES		M [tcm]			DIMENSIONES [m]			SECCION DE A° [cm2]			INTEGRACIÓN DE ARMADURA			Vua [t]	Vca [t]	Vsa [t]	ESTRIBO			BARRAS A 45°			
		Diagrama	q [kg/m]	A	Tramo	B				A	Tr.	B	A	Tramo	B	Vub [t]	Vcb [t]	Vsb [t]	Ø [mm]	Ast [cm²]	Sep. [cm]	A		B	
				Neg. Pos.	Neg. Pos.	Neg. Pos.	b cm	dmín cm	hmín cm	Sup. Inf.	Sup. Inf.	Sup. Inf.	Sup. Inf.	Sup. Inf.	Sup. Inf.							INT.	XA [cm]	INT.	XB [cm]
Vf1	---	----	---	---	---	---	18	27	30	---	---	---	2 ∅ 8	2 ∅ 8	2 ∅ 8	---	---	---	---	6	20	---	---	---	---
				---	---	---				---	---	---	2 ∅ 8	2 ∅ 8	2 ∅ 8	---									
Vf2	---	----	---	---	---	---	18	27	30	---	---	---	2 ∅ 12	2 ∅ 12	2 ∅ 12	---	---	---	---	6	20	---	---	---	---
				---	---	---				---	---	---	2 ∅ 12	2 ∅ 12	2 ∅ 12	---									
Vd-VE	---	----	---	---	---	---	18	17	20	---	---	---	2 ∅ 8	2 ∅ 8	2 ∅ 8	---	---	---	---	6	20	---	---	---	---
				---	---	---				---	---	---	2 ∅ 8	2 ∅ 8	2 ∅ 8	---									
VE2	---		---	---	---	---	18	27	30	---	---	---	2 ∅ 8	2 ∅ 8	2 ∅ 8	0.64	---	---	---	6	20	---	---	---	---
				---	---	---				---	---	---	2 ∅ 8	2 ∅ 8	2 ∅ 8	0.64									
V10	3		200	---	---	---	18	37	40	---	---	---	2 ∅ 10	2 ∅ 10	2 ∅ 10	0.3	4.96	Ast mín	6	0.28	20	---	---	---	---
				---	23	---				---	1.57	---	2 ∅ 10	2 ∅ 10	2 ∅ 10	0.3									
V11	3		1700	---	---	---	18	57	60	---	---	---	3 ∅ 10	2 ∅ 10	3 ∅ 10	2.55	7.65	Ast mín	6	0.28	20	1 ∅ 10	50	1 ∅ 10	50
				---	191	---				---	2.36	---	2 ∅ 10	3 ∅ 10	2 ∅ 10	2.55									
V12	3.75		730	---	---	---	18	28	30	---	---	---	3 ∅ 10	2 ∅ 10	3 ∅ 10	1.37	3.76	Ast mín	6	0.28	20	1 ∅ 10	65	1 ∅ 10	65
				---	129	---				---	2.36	---	2 ∅ 10	3 ∅ 10	2 ∅ 10	1.37									
V13	7.7		4225	---	---	---	25	67	70	---	---	---	4 ∅ 20	2 ∅ 20	4 ∅ 20	16.26	12.48	9.20	8	0.5	20	2 ∅ 20	130	2 ∅ 20	130
				---	3131	---				---	21.99	---	5 ∅ 20	7 ∅ 20	5 ∅ 20	16.26									
LM3	3		3030	---	---	---	100	12	15	---	---	---	---	---	---	4.5	---	---	2.16	1 ∅ 6 c/10cm		---	---	---	---
				---	341	---				---	14.14	---	1∅12c/ 8cm	1∅12c/ 8cm	1∅12c/ 8cm	4.5			REPARTICION						
LM4	2.55		1720	---	---	---	100	12	15	---	---	---	---	---	---	2.2	---	---	2.16	1 ∅ 6 c/10cm		---	---	---	---
				---	103	---				---	14.14	---	1∅8 c/ 10cm	1∅8 c/ 10cm	1∅8 c/ 10cm	2.2			REPARTICION						

VIGAS Y LOSAS DE H°A° - ESCALERA DE EXTERIOR

DESIGN.	LUZ [m]	SOLICITACIONES		M [tcm]			DIMENSIONES [m]			SECCION DE A° [cm2]			INTEGRACIÓN DE ARMADURA			Vua [t]	Vca [t]	Vsa [t]	ESTRIBO			BARRAS A 45°			
		Diagrama	q [kg/m]	A	Tramo	B				A	Tr.	B	A	Tramo	B	Vub [t]	Vcb [t]	Vsb [t]	Ø [mm]	Ast [cm²]	Sep. [cm]	A		B	
				Neg. Pos.	Neg. Pos.	Neg. Pos.	b cm	dmín cm	hmín cm	Sup. Inf.	Sup. Inf.	Sup. Inf.	Sup. Inf.	Sup. Inf.	Sup. Inf.							INT.	XA [cm]	INT.	XB [cm]
Vf2	---	----	---	---	---	---	18	27	30	---	---	---	2 ∅ 12	2 ∅ 12	2 ∅ 12	---	---	---	---	6	20	---	---	---	---
				---	---	---				---	---	---	2 ∅ 12	2 ∅ 12	2 ∅ 12	---									
Ve	---		415	47	---	---	48	13.5	16.5	2.36	---	---	4 ∅ 8	4 ∅ 8	4 ∅ 8	0.62	4.83	Ast mín	6	0.28	20	---	---	---	---
				---	---	---				---	---	---	4 ∅ 8	4 ∅ 8	4 ∅ 8	---									
Le	---		1270	163	---	---	100	15	18	5.00	---	---	1∅8c/ 10cm	1∅8c/ 10cm	1∅8c/ 10cm	2.03	---	---	2.83	1 ∅ 6 c/10cm		---	---	---	---
				---	---	---				---	---	---	---	---	---	---			REPARTICION						
Vv	---		---	---	---	---	18	15	18	---	---	---	2 ∅ 8	2 ∅ 8	2 ∅ 8	---	---	---	---	6	20	---	---	---	---
				---	---	---				---	---	---	2 ∅ 8	2 ∅ 8	2 ∅ 8	---									

6.5.7. PLANILLAS DE CORREAS DE TECHO

CORREAS DE TECHO - BLOQUE 1														
DESIG.	SEP. [m]	qc [kg/cm]	TIPO DE ESTR.	α [°]	Mx [kgcm]	My [kgcm]	SECCIÓN ADOPTADA	Wx [cm³]	Wy [cm³]	σMÁX. [kg/cm²]	Jx [cm⁴]	Jy [cm⁴]	f [cm]	L/250 [cm]
C1	0.80	1.12	CONTINUA L1=L2=L3=L4=4.50	7	24054	3034	**C 140 – 60 – 2.00**	25.2	7.51	1359	176.4	29.35	0.78	1.80

CORREAS DE TECHO - BLOQUE 2														
DESIG.	SEP. [m]	qc [kg/cm]	TIPO DE ESTR.	α [°]	Mx [kgcm]	My [kgcm]	SECCIÓN ADOPTADA	Wx [cm³]	Wy [cm³]	σMÁX. [kg/cm²]	Jx [cm⁴]	Jy [cm⁴]	f [cm]	L/250 [cm]
C1	0.80	1.12	CONTINUA L1=L2=L3=L4=4.50	7	24054	3034	**C 140 – 60 – 2.00**	25.2	7.51	1359	176.4	29.35	0.78	1.80

CORREAS DE TECHO - BLOQUE 3														
DESIG.	SEP. [m]	qc [kg/cm]	TIPO DE ESTR.	α [°]	Mx [kgcm]	My [kgcm]	SECCIÓN ADOPTADA	Wx [cm³]	Wy [cm³]	σMÁX. [kg/cm²]	Jx [cm⁴]	Jy [cm⁴]	f [cm]	L/250 [cm]
C2	0.80	1.12	CONTINUA L1=L2=L3=L4=L5=L6=4.50	7	23749	2995	**C 140 – 60 – 2.00**	25.2	7.51	1341	176.4	29.35	0.81	1.80

CORREAS DE TECHO - BLOQUE 4														
DESIG.	SEP. [m]	qc [kg/cm]	TIPO DE ESTR.	α [°]	Mx [kgcm]	My [kgcm]	SECCIÓN ADOPTADA	Wx [cm³]	Wy [cm³]	σMÁX. [kg/cm²]	Jx [cm⁴]	Jy [cm⁴]	f [cm]	L/250 [cm]
C2	0.80	1.12	CONTINUA L=VARIABLE	7	23749	2995	**C 140 – 60 – 2.00**	25.2	7.51	1341	176.4	29.35	0.81	1.80

CERCHAS Y PERFILES DE ACERO - BLOQUE 1																	
DESIGN.	BARRA	L [cm]	N [kg]	M [tcm]	SECCION ADOPTADA	Ag [cm2]	Jx [cm4]	Y [cm]	σmáx. [kg/cm2]	r [cm]		Lkx [cm]		λx		ωmáx	σmin. [kg/cm2]
										IND.	CONJ.	IND.	CONJ.	IND.	CONJ.		
VR1	C. SUP.	48	-9330	---	2 ÁNG. 2"x1/4" (51mmx6.4mm)	12.34	---	---	---	---	1.25	---	48	---	38	1.3	-983
	C.INF.	48	9330	---	2 ÁNG. 2"x1/4" (51mmx6.4mm)	12.34	---	---	756	---	---	---	---	---	---	---	---
	ZIG-ZAG LATERAL	51	-1348	---	Ø 20	3.14	---	---	---	---	0.5	---	48	---	96	1.82	-781
	ZIG-ZAG SUP. E INF.	23	-618	---	Ø 12	1.13	---	---	---	---	0.3	---	21.3	---	71	1.42	-777
VR2	C. SUP.	32	-2570	---	2 ÁNG. 1"x1/8" (25mmx3.2mm)	3.02	---	---	---	---	0.75	---	31.9	---	43	1.16	-987
	C.INF.	32	2570	---	2 ÁNG. 1"x1/8" (25mmx3.2mm)	3.02	---	---	851	---	---	---	---	---	---	---	---
	ZIG-ZAG LATERAL	34	-578	---	Ø 12	1.13	---	---	---	---	0.3	---	31.9	---	106	2.02	-1033.2
	ZIG-ZAG SUP. E INF.	23	-277	---	Ø 8	0.5	---	---	---	---	0.2	---	21.3	---	107	2.05	-1135.7
VM1	MÉNSULA	200	170	137	C 220-80-2.5 DOBLE	20.6	1531	11	993	---	---	---	---	---	---	---	---

CERCHAS Y PERFILES DE ACERO - BLOQUE 2																	
DESIGN.	BARRA	L [cm]	N [kg]	M [tcm]	SECCION ADOPTADA	Ag [cm2]	Jx [cm4]	Y [cm]	σmáx. [kg/cm2]	r [cm]		Lkx [cm]		λx		ωmáx	σmin. [kg/cm2]
										IND.	CONJ.	IND.	CONJ.	IND.	CONJ.		
VR3	C. SUP.	106	-12605	---	2 ÁNG. 2 1/2"x3/16" (64mmx4.8mm)	12	---	---	---	1.2	1.95	53*	106	44	54	1.24	-1303
	C.INF.	212	12138	---	2 ÁNG. 2 1/2"x3/16" (64mmx4.8mm)	12	---	---	1012	---	---	---	---	---	---	---	---
	MONTS.	66	-666	---	□ 50-50-2.00	3.03	---	---	---	---	1.95	---	66	---	34	1.1	-242
	DIAGS.	124	4752	---	□ 50-50-2.00	3.03	---	---	1568	---	---	---	---	---	---	---	---
VM1	MÉNSULA	200	170	137	C 220-80-2.5 DOBLE	20.6	1531	11	993	---	---	---	---	---	---	---	---
VM2	MÉNSULA	300	252	308	C 220-80-4.8 DOBLE	38.2	2732	11	1247	---	---	---	---	---	---	---	---

*Arriostrar a la mitad de la longitud

CERCHAS Y PERFILES DE ACERO - BLOQUE 3																		
DESIGN.	BARRA	L [cm]	N [kg]	M [tcm]	SECCION ADOPTADA	Ag [cm2]	Jx [cm4]	Y [cm]	σmáx. [kg/cm2]	r [cm]		Lkx [cm]		λx		ω máx	σmin. [kg/cm2]
										IND.	CONJ.	IND.	CONJ.	IND.	CONJ.		
VR1	C. SUP.	48	-9330	---	2 ÁNG. 2"x1/4" (51mmx6.4mm)	12.34	---	---	---	---	1.25	---	48	---	38	1.3	-983
	C.INF.	48	9330	---	2 ÁNG. 2"x1/4" (51mmx6.4mm)	12.34	---	---	756	---	---	---	---	---	---	---	---
	ZIG-ZAG LATERAL	51	-1348	---	∅ 20	3.14	---	---	---	---	0.5	---	48	---	96	1.82	-781
	ZIG-ZAG SUP. E INF.	23	-618	---	∅ 12	1.13	---	---	---	---	0.3	---	21.3	---	71	1.42	-777
VR2	C. SUP.	32	-2570	---	2 ÁNG. 1"x1/8" (25mmx3.2mm)	3.02	---	---	---	---	0.75	---	31.9	---	43	1.16	-987
	C.INF.	32	2570	---	2 ÁNG. 1"x1/8" (25mmx3.2mm)	3.02	---	---	851	---	---	---	---	---	---	---	---
	ZIG-ZAG LATERAL	34	-578	---	∅ 12	1.13	---	---	---	---	0.3	---	31.9	---	106	2.02	-1033.2
	ZIG-ZAG SUP. E INF.	23	-277	---	∅ 8	0.5	---	---	---	---	0.2	---	21.3	---	107	2.05	-1135.7
VM1	MÉNSULA	200	170	137	C 220-80-2.5 DOBLE	20.6	1531	11	993	---	---	---	---	---	---	---	---

CERCHAS Y PERFILES DE ACERO - BLOQUE 4																		
DESIGN.	BARRA	L [cm]	N [kg]	M [tcm]	SECCION ADOPTADA	Ag [cm2]	Jx [cm4]	Y [cm]	σmáx. [kg/cm2]	r [cm]		Lkx [cm]		λx		ωmáx	σmin. [kg/cm2]
										IND.	CONJ.	IND.	CONJ.	IND.	CONJ.		
VR1	C. SUP.	48	-9330	---	2 ÁNG. 2"x1/4" (51mmx6.4mm)	12.34	---	---	---	---	1.25	---	48	---	38	1.3	-983
	C.INF.	48	9330	---	2 ÁNG. 2"x1/4" (51mmx6.4mm)	12.34	---	---	756	---	---	---	---	---	---	---	---
	ZIG-ZAG LATERAL	51	-1348	---	∅ 20	3.14	---	---	---	---	0.5	---	48	---	96	1.82	-781
	ZIG-ZAG SUP. E INF.	23	-618	---	∅ 12	1.13	---	---	---	---	0.3	---	21.3	---	71	1.42	-777
VR2	C. SUP.	32	-2570	---	2 ÁNG. 1"x1/8" (25mmx3.2mm)	3.02	---	---	---	---	0.75	---	31.9	---	43	1.16	-987
	C.INF.	32	2570	---	2 ÁNG. 1"x1/8" (25mmx3.2mm)	3.02	---	---	851	---	---	---	---	---	---	---	---
	ZIG-ZAG LATERAL	34	-578	---	∅ 12	1.13	---	---	---	---	0.3	---	31.9	---	106	2.02	-1033.2
	ZIG-ZAG SUP. E INF.	23	-277	---	∅ 8	0.5	---	---	---	---	0.2	---	21.3	---	107	2.05	-1135.7
VR4	C. SUP.	48	-17200	---	2 ÁNG. 2 1/2"x1/4" (64mmx6.4mm)	15.74	---	---	---	---	1.21	---	48	---	40	1.14	-1246
	C.INF.	48	17200	---	2 ÁNG. 2 1/2"x1/4" (64mmx6.4mm)	15.74	---	---	1093	---	---	---	---	---	---	---	---
	ZIG-ZAG LATERAL	51	-1863	---	∅ 20	3.14	---	---	---	---	0.5	---	48	---	96	1.82	-1080
	ZIG-ZAG SUP. E INF.	23	-857	---	∅ 12	1.13	---	---	---	---	0.3	---	21.3	---	71	1.42	-1077